

**INPUT TO THE REPORT OF THE HIGH-
LEVEL PANEL ON GLOBAL ASSESSMENT
OF RESOURCES FOR IMPLEMENTING
THE STRATEGIC PLAN FOR
BIODIVERSITY 2011-2020**

(UNEP/CBD/COP/11/INF/20)

**CLUSTER REPORT ON RESOURCE REQUIREMENTS FOR
THE AICHI BIODIVERSITY TARGETS**

TARGET 5, 7, 11, 15: FOREST CLUSTER

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Assessing the Financial Resources Needed to Implement the Strategic Plan for Biodiversity 2012- 2020 and Achieve the Aichi Biodiversity Targets

Forest Cluster Report

Final Report

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Acronyms

ABS	Access and Benefit Sharing
AP	Asia Pacific (ITTO statistics)
CAR	Central African Republic
CI	Conservation International
DRC	Democratic Republic of Congo
FCPF	Forest Carbon Partnership Facility
FLEGT	Forest Law Enforcement Governance and Trade
FORRU	Forest Restoration Research Unit
GFRA	Global Forest Resources Assessment
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
ITTO	International Tropical Timber Organization
MRV	Monitoring Reporting and Verification
NFP	National forest programme
PES	Payment for Environmental Services
PNG	Papua New Guinea
REDD+	Reduced Emissions from Deforestation and forest Degradation plus the role of conservation, sustainable management of forests (SMF) and enhancement of forest carbon stocks
R-PP	Readiness Preparation Proposal
RWE	Roundwood Equivalent
SFM	Sustainable Forest Management
TA	Tropical America (in ITTO statistics)
TEEB	The Economics of Ecosystems and Biodiversity
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
UN-REDD	United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
VPA	Voluntary Partnership Agreement
WRI	World Resources Institute

1 Introduction to the Target Cluster on Forests

1.1 Overview

The primary target in the cluster is Target 5 - *Loss of forest habitats* - for which there have been various earlier studies aiming variously for 100%, 50% and 25% reduction in deforestation. There is much less information on reducing degradation. Really accurate information on forest area changes is limited due to the sheer scale of the task, the problem of defining what constitutes permanent loss of forest cover, especially in forests being harvested and ecosystems subjected to long-cycle periodic changes, such as the drier forest types. National and therefore global figures can also mask losses of biodiversity rich natural forests through replacement by planted forests consisting of one or relatively few species as both contribute to 'forest cover'.

Currently, the loss of forest habitat is most severe in tropical and sub-tropical forests - permanent land-use changes resulting in forest loss having occurred much earlier in Europe, the Mediterranean basin, temperate North America and parts of East Asia. Exploitation of the very extensive Siberian forests is generally more recent. Although reversing habitat loss is highly complex, studies for Central Europe and Japan (e.g. GTZ 1984 and Totman 1989) conclude that critical factors include alternative products such as coal in place of fuelwood, intensification of agriculture and reduction of forest for livestock food combined with political and social changes that gave individuals and communities legally enforceable rights and gave them a direct interest in the forest.

Temperate forests are in general much easier to restore than tropical ones although the currently restored forests in both these localities is not the same ecologically as the original "wild wood". The "Black Forest" in south Germany which is now predominantly spruce with fir and pine originally was mainly beech.

Securing impact under Target 5 is a pre-requisite for progress on Target 7 - *Sustainable Forest Management*. Certified forests are still largely confined to temperate regions and to plantations in the tropics and sub-tropics although this does not mean that progress is not being achieved elsewhere and in natural forest management.

The forest element of Target 11 - *Protected Areas* - is directly affected by progress under Targets 5 and 7, as forest areas that are secure and sustainably managed contribute substantially to biodiversity conservation as well as delivery of other environmental services. By the same rationale, the creation of an effective operational base for protection and sustainable management of forest resources provides enhancement of carbon stocks and reduction of emissions. The policy and governance framework for this also provides a solid basis from which Target 15 - *Forest Landscape Restoration* - can be started.

Because the drivers of forest loss often lie beyond the immediate forest sector, support for and progress towards the other Aichi targets, especially Strategic Goals A and E, is a pre-requisite for success with the directly forest-related targets. In developing the actions promulgated here, there is an assumption that all Aichi targets will be delivered leading to transformational change in the way in which biodiversity is treated in national economic and land-use planning and in the governance systems that frame this planning. Without these changes being made and sustained the present trend of loss of biodiversity as forests are degraded and converted will continue, albeit at varying rates in response to the level of interest, resources and political commitment devoted to its prevention.

Law enforcement and the efficient capture of revenue that can be reinvested into forest management are crucial to the success of this strategic plan. The failure to pay salaries and wages that enable forest personnel to live with dignity and deliver their family obligations as well as those to their employer lies at the root of many of the current problems. Forest agency personnel responsible for supervision are often beholden to

concessionaires for access, food and accommodation on inspection visits and the *per diem* culture created by erosion of the real value of salaries has reached the point where it undermines work almost to the point of absurdity in some countries (see *Hunting for Per Diem* - Norad Evaluation Report 2/2012).

Because much of the work carried out in forests is done by communities as part of collaborative forest management or by the commercial sector, transparent equitable systems that encourage partnerships based on long-term commitment and shared interests rather than conflict and short-term gain are crucial. The proposed actions are predicated on this approach.

In addition to linkages between the Aichi targets, the forest targets cluster (Targets 5, 7, 11, 15) are closely linked with many other global targets. The Global Objectives on Forests agreed upon under the UNFF seek to:

- Reverse the loss of forest cover worldwide through sustainable forest management (SFM), including protection, restoration, afforestation and reforestation, and increase efforts to prevent forest degradation;
- Enhance forest-based economic, social and environmental benefits, including by improving the livelihoods of forest-dependent people;
- Increase significantly the area of sustainably managed forests, including protected forests, and increase the proportion of forest products derived from sustainably managed forests; and
- Reverse the decline in official development assistance for sustainable forest management and mobilize significantly increased new and additional financial resources from all sources for the implementation of sustainable forest management.

Under the UNFCCC there is an on-going process seeking to reduce emission from deforestation and forest degradation in developing countries (REDD and REDD+). Under the UNCCD the forest cluster targets are aligned with the 10 year strategic plan, especially with Strategic Objective 2 - to improve the condition of affected ecosystems and Strategic Objective 3 - to generate global benefits through effective implementation of UNCCD.

The forest cluster targets are also linked to the objectives of the EU timber procurement regulations, the US Lacey Act, the UK's timber procurement act and initiatives such as the Global Forest Trade Network.

1.2 Method of Assessment - All Forest Targets

There is considerable overlap in the actions required to achieve each target and the allocation of each action to one of the Targets 5 and 7 is somewhat arbitrary. Actions for Targets 11 and 15, while coherent and linked are more closely linked to those targets. Each action was subjected to analysis of existing information available on the costs for achieving progress towards the 2020 targets using the indicators developed by SBSTA. The range of figures thus generated varied and at times was very large indeed (Table 3). Where appropriate, figures were moderated by reference to other sources of information, such as projects and programmes as well as specific studies undertaken by the authors. The sources of information utilised are listed in the EXCEL file [Forest Target Cluster Studies.xls Compilation Worksheet]. The resource needs estimates have also been discussed with international experts and stakeholders when opportunity has arisen.

There have been a number of global assessments of the financial investment needed to halve the loss of forest habitats, and deliver sustainable forest management and forest conservation and restoration. These assessments have not differentiated to a great extent on the financial implications for specific actions to be taken nor on the upfront investment

versus on-going expenditure. These global assessments have nevertheless been used to provide an indication that the estimates made here are of the right order of magnitude. It must be noted that these global figures are focused on individual targets rather than on transformational change, which is the basis of the cost assessment delivered in this report.

The methodology for estimating the resource needs under each action was based on a holistic economy and sector approach which did not differentiate between targets when determining the needed actions and the resources needed for them. The allocation of actions to targets is therefore artificial and the actions for the forest cluster are to be read as a holistic package for successful achievement of the Aichi targets.

The broad activities required under each Action are described in the text below but it has to be noted that these have to be generic when presented on a global scale. In developing the cost framework for the 8 years from 2013 to 2020, the basis for the main Scenario 2 is 100 countries. For the work on restoration, the basic figure of 150 million ha is derived from 15% of the estimated 1 billion ha of degraded land that could be restored. Given the asymmetric distribution of forests in different countries, summarised in Table 5, the need to focus on countries with large resources as well as highly threatened forest biodiversity have been strongly considered.

For all Actions, preparatory or scene-setting activities are encompassed under the heading "Upfront" in Annex Table 1. Recurrent annual costs are in the next column right in this table headed "Ongoing/year".

Compared with the GEF Needs Assessment, the main difference in respect of the figures presented here is that the finance is predominantly aimed at wider drivers of change, which while they may require substantial support will generate benefits, as for example with the focus on capturing revenues (Action 5.5) and that on increasing processing efficiency (7.2), which would have direct impact on the resource base and also generate financial surpluses through reduced costs.

In Table 1, costs are differentiated between public and private sector; the latter could include community level actions as well as those of commercial enterprises. Where costs are split between both, the split has been estimated as 50:50. It is appreciated that this would vary according to country circumstances. The main private sector funded action is increasing processing efficiency, the logic being that processing is done predominantly outside the public sector. Part of the costs shown as private sector could be supported from public funding through grant schemes and allowances that encourage good practices and support transition to this.

1.3 Presentation of Results for All Forest Targets

The detailed results generated are all presented as tables in the Annex. Table 1 shows the main scenario developed with initial and annual costs by individual actions. The basis for nearly all of the costs in this report is either area or 100 countries. Consequently, the costs are effectively linearly variable. Lower and higher cost scenarios would effectively be proportional in these circumstances.

Table 1 summarises the costs for each year showing start up costs and annual costs. This is necessarily indicative only because much will depend on the rate at which activities are started and in some cases the size of the countries that engage in these activities, especially where these are area based, as with protected areas. Start up and Annual Costs by action are also presented in Figure 1 and Figure 2.

Table 2 lists the proposed actions while Table 3 gives the total costs of a pessimistic scenario based on 50% of the costs and of an optimistic scenario based on 125% of the costs. It also lists the range of estimates located in the literature review.

Table 4 presents a summary of forest change statistics by region showing gains and losses. Gains tend to be from plantation forests while losses are mainly from natural forests, including primary forests, and so even if arithmetically balanced, there is undoubtedly loss of biodiversity. Because the main global forest area is concentrated in relatively few countries, Table 5 lists countries with more than 40 million ha of forest. Table 6 summarises information from Conservation International on forest relevant biodiversity "Hotspots".

Information on tropical timber trade statistics is given in Table 7, drawn from ITTO reports; it includes a listing of the main exporters of tropical timber products. Table 8 summarises information gaps, as has also been done in the reports for other clusters.

The detailed calculations that underpin the figures in tables presented in this report are in the EXCEL file Forest Target Cluster Studies Final.xls.

1.4 Uptake

The figures presented here are based on there being interventions in a substantial proportion of global forests. Table 5 lists the forest area of the world's most heavily forested countries and gives a cumulative tally. Much of the world's forest area, but not its forest biodiversity, is held in the temperate and boreal forests of Russia, Canada and USA, all of which have relatively stable forest cover figures although boreal forests in particular are highly vulnerable to global warming, especially from increased pest and disease problems - note the recent severe bark-beetle attacks in Canada and NW USA - and changes in ecological succession linked with soil and seeding changes.

Given a strong interest in forest biodiversity, reducing forest loss in high forest biodiversity countries has to be a priority and the forest biodiversity hotspots information repeated in Table 6 provides information that can assist with this. To proceed with the Actions proposed here, detailed country-level planning would be needed and the average costs used here would need to be revised to account for national differences. Costs would also be affected by scale and small countries and islands with limited forest area but high biodiversity will have very different unit costs from those countries where the forest is in more extensive, even if fragmented, blocks.

The overlap between actions to secure biodiversity and to address issues such as REDD+ and illegal trade is substantial and the costs of some of the actions proposed here could well be met through one or other of these schemes.

At the same time, there is urgent need to ensure that investment in conservation, as in REDD+ and control of illegal trade, the rights and needs of forest dependent people are prioritised and aligned, especially in terms of national development, poverty and equity.

Translation of the broad proposals made here into a workable action plan will be challenging.

1.5 Limitations

There is an important paradox surrounding the underlying measurement and monitoring that are required to plan and achieve success in meeting the Aichi Forest Targets. With the exception of most developed economies, the statistical and information base relating to forests is generally poor. Some of the well known limitations identified in discussion on forest cover changes at global level, include the widely applied rule of thumb that 10% canopy cover and trees more than 4 metres tall constitute forest regardless of the ecological conditions of the sites.

At the same time there is continuous pressure for more diversity of indicators and for more accurate systems of monitoring, reporting and verification, especially at the moment for carbon, certification and SFM. By breaking down this work into often poorly coherent and badly connected datasets, the overall picture may not be apparent.

There would appear to be merit in the system proposed in the FAO-Finland Mid-term Evaluation of focusing on comparison between the state the forest should be in if it were not badly degraded, its current state and hence the gap (in essence observed *versus* expected). Different parameters would have varying weights depending on the type of forest, its vulnerabilities and the demands placed on it. Reward systems could then be based around progress on filling the gap rather than on individual components or services. The proposals in this report concentrate on the holistic treatment of forests.

Note must also be made of the institutional barriers. Analysis of the contact points and lead agencies for activities relating to the Rio Conventions, UNFF, NFPs and other commitments are often widely spread with limited coherence and widespread competition to maintain influence and engagement. Whilst this may benefit individuals and at times even institutions, it is not helpful for the state of the forest and its potential to support national development and deliver sustainable benefits to enhance of the quality of life for all citizens. (See, for example, Evaluation Report 2010:5/1, MFA, Helsinki).

2 Aichi Target 5

2.1 Introduction

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.

The 'headline' deforestation rate by country is provided by FAO through the Global Forest Resources Assessment (GFRA) report published each decade with interim reports half way through each decade and biennial reports on State of the World's Forests. Forest is defined as areas with tree crown coverage of 10% or greater of the surface area. This is easily understood but does not reflect the true situation. Naturally dense forest in good condition would have a canopy cover exceeding this but so far the 10% figure has been used for all countries and forest types although more appropriate data exists. GFRA includes figures for areas with 40% cover but these have not been used and the dataset is less comprehensive than for 10% canopy cover. There are issues relating to both changes in the way data is collected and presented and limitations of the data supplied by some countries, although there is increasing use of remote sensing to validate reported figures.

The 'headline' forest cover figure does not report either degradation or fragmentation although both are important for forestry and especially for biodiversity. Within most countries, there is a range of forest types, for example dry and evergreen forests and also sub-types within these. Deforestation and degradation may be concentrated within specific forest types as when these forests occupy good quality land for farming or contain valuable timber species. The 'headline' figures do not reflect this aspect.

In general forest biodiversity is highest in wet tropical forests on broken topography that is subjected to natural disturbance as in the Tropical Andes centred on Bolivia, Colombia, Ecuador and Peru. In terms of countries, 17 contain over 75% of the world's 4 billion ha of forests (Annex Table 4), while 5 countries alone contain over half. Of these, only Brazil is tropical; the others (Canada, China, Russia and USA) are mainly boreal or temperate with some sub-tropical types in a few localities. Annex Table 5 provides summary information on those CI Biodiversity Hotspots that relate to forests together with information on their remaining extent, protection status and the countries in which they occur.

The interest in secure forest cover and composition, and the policy and governance framework that can provide it, is shared by policy areas relating to biodiversity conservation, water supplies, livelihood and food security, REDD+ and climate change, and international trade in forest products. The actions proposed here will deliver benefits for all these policy interests and all these interests themselves depend on political change to bring forests into a much wider green economic development system, as defined under the Strategic Plan for Biodiversity 2011-2020 and the Aichi Targets.

2.2 Links to other targets

Targets 5, 7 and 11 in particular are closely linked and interdependent. Reducing forest loss and degradation is an essential first step towards the sustainable management of Target 7 which in turn feeds back into eliminating habitat loss by both deforestation and degradation. It also links forward to Target 11, protected areas, since sustainably managed forests by definition also provide ecosystem conservation together with other environmental services.

While restoration (Target 15) may seem more distant it is also relevant to Target 5 as it should replenish forest cover and composition and in due course the restored forest should move towards sustainable management (for a diversity of purposes and functions) as in Target 7 and provide protection as per Target 11.

The proposed Actions are presented notionally under the four targets to facilitate linking with other work under these but the decision as to precisely where to place them is somewhat arbitrary and in reality they would form an interlocking set of actions with many cross-linkages and synergies across the targets and for the related policies noted above.

There is at least some finance available for REDD+ and for forest law-enforcement, governance and trade (FLEGT) and many of the actions being undertaken through these mechanisms are identical in scope, if not always in location, to what is required for biodiversity; there is thus considerable opportunity for synergy and cross-benefit. Care will be needed to ensure there is good coordination and collaboration while avoiding duplication and excess pressure on often limited national capacity for uptake.

2.3 Actions

2.3.1 Action 5.1 Biodiversity inventories

The purpose of biodiversity inventories is to prioritise specific areas that require special efforts to safeguard their biodiversity values. The biodiversity inventories will also identify the threats driving habitat loss and make recommendations for reducing habitat loss and degradation. Information on the most threatened forest ecosystems globally can be found in Table 6 in the Annex.

The implementation of forest biodiversity inventories could be part of national assessment of biodiversity and ecosystem services. These assessments could follow a national TEEB study modality which also provides an indication of the cost of delivering and inventory on forest biodiversity. It is likely that parts of the inventories can be conducted by remote sensing and using biomass as a proxy for biodiversity which provides an opportunity to find synergies with carbon MRV systems. Furthermore, biodiversity values can and have been included in national forest inventories and in many cases biodiversity has already been mapped at various levels, which would facilitate conducting forest biodiversity inventories and mapping.

Biodiversity inventories will help countries focus their efforts and investments and will support national efforts to reduce emissions from deforestation and forest degradation (REDD+ strategies). Similar inventories and mapping exercises which capture the multiple benefits of forests have been conducted in some countries under the UN-REDD Programme¹ for the purpose of guiding REDD+ actions and investments with the aim of safeguarding multiple benefits.

2.3.2 Action 5.2 Monitoring system

Efficient and effective management requires measurement and monitoring information. Monitoring systems will be needed for all forest cluster targets to assist management and provide information on impact to support decision-making. Elements for monitoring information on the progress with halving habitat loss, including monitoring of key taxa, can be built into national forest monitoring systems, especially REDD+ related monitoring systems and national natural resource accounting systems.

Monitoring of the progress is also important for provision of transparent records of the conservation of national, regional and global biodiversity values. Interesting progress has been made recently on monitoring forest resources *e.g.*, Global Forest Resource Assessment, REDD+ monitoring and the Global Forest Watch, which can provide additional information on the delivery of Target 5.

¹

http://www.un-redd.org/AboutUNREDDProgramme/GlobalActivities/New_Multiple_Benefits/tabid/1016/Default.aspx

A wealth of information has been gathered by and resides with FAO on forest monitoring; REDD+ related monitoring, reporting and verification (MRV), has also been the target of many studies (*e.g.*, Hoare *et al.* 2008 for the Eliasch Review). The World Bank and its Forest Carbon Partnership Facility (FCPF) has also gathered cost estimates for REDD+ MRV through the national Readiness Preparation Proposal (R-PP) submissions for REDD+ activities, which provide fair estimates of the cost of establishing monitoring systems.

Capturing information for the adaptive management envisaged for the forest cluster targets can be partly based on national forest inventory frameworks but these will require some adjustment to capture adequately the more specific Aichi target indicators.

2.3.3 Action 5.3 Training and education of professional officers

Capacity building will be required for all targets under the forest cluster. In respect of remote sensing and the use of new technologies, the training need is likely to be both substantial and iterative due to technical advances and changes in the cost-effectiveness of different techniques. The proposed capacity building will generate benefit for other Aichi targets and across ecosystems and needs to cover the range of expertise from policy to field levels.

The assessment has looked at current cost implication for advanced training (MSc and BSc) at both international and national level which has formed the basis for the resource needs estimates. As noted by Hardcastle and Baird (2008) for the Eliasch Review, the technical capability for measuring and monitoring forests generally has been severely eroded in many countries. Specialists have moved on for a variety of reasons and it is essential to rebuild this capability; such rebuilding would of course assist with forest measurement and monitoring for attributes other than forest biodiversity.

2.3.4 Action 5.4 Enhanced Law enforcement

In the past two decades, many countries have revised and updated their forest policies and legislation, often through National Forest Programmes. The approach is a broadly based "manifesto" one, which seeks wide engagement of stakeholders as well as coherence and commitment across government. While the theoretical frameworks that have been developed is sound and appropriate, effective law enforcement is often poor due to limited resources, corruption and weak judiciary systems. Without this critical institutional support, transition towards less destructive land management practices and creation of enabling conditions for SFM, forest restoration and conservation is not possible. FLEGT and similar approaches seek to link improved law enforcement with market access.

Effective law enforcement is a prerequisite for the sustainable management of forests and underpins fair trade; it is also essential to encourage interest from and long-term commitment from ethical investors and to seek and secure engagement of local communities and to work with their interests in mind to meet their needs and aspirations. Many countries, however, lack the human, institutional and financial resources to enforce their forest-related legislation.

The lack of resources includes transportation, security and communications-related equipment, capacity and support from the judicial system and at times from politicians. There is at least anecdotal evidence that electioneering periods may be associated with increased illegal activities and allocation of forest land to other uses.

Successful and accurate law enforcement may be combined with an incentive system based on the monitoring system. Success requires that the issues be approached systematically and with long-term supportive measures, including awareness raising, certification,

privatisation and, especially, a transparent system of accountable payments of appropriate salaries and allowances (Contreras 2001, CIFOR).

2.3.5 Action 5.5 Creation of enabling conditions to counter illegality

While donor efforts to create enabling conditions for forestry have been significant, one important caveat has been the need for reinvestment of revenue to sustain these. Where law enforcement is weak or ineffective, failure to capture fees and taxes means that revenues are much reduced, thus precluding adequate reinvestment. Investment in revenue capture would bring immediate returns and create a level playing field for investors and actors. Forestry activities are predominantly undertaken by commercial investors and local communities. A transparent and effective system of regulation and law enforcement encourages entry by investors with good ethical and social responsibility standards and is crucial to protect community-managed resources from illegal operators.

Government agencies responsible for delivery need well-trained personnel who are adequately rewarded for their efforts through appropriate salaries and conditions of service. In many countries, appropriation of revenue from national natural resources for non-resource management expenditures has been the historical norm and highlights the need for a well-functioning fiscal system across the board in developing countries to free the forest from being seen as a 'cash cow'.

2.4 Assessment of Resource Needs

5.1 Biodiversity inventories

The biodiversity inventories are assumed to be largely desk based, building mainly on existing information such as remote sensing (biomass as proxy data) and drawing upon existing reports and studies. They can also be aligned with other ecosystem inventories, such as TEEB studies, to benefit from synergies and cost savings.

The standard FCPF readiness preparedness proposal (R-PP) grant was US\$ 200,000 per country while the GEF 6 needs assessment study proposed a figure of between US\$ 100,000 and US\$ 1,000,000 per country. The cost of the multiple benefit REDD+ maps created by the UN-REDD Programme ranged from US\$ 60,000 to 70,000.

On the basis of the above, the average upfront resource need for a comprehensive desk-based biodiversity inventory is estimated as US\$ 250,000 per country. Annual expenses are incorporated under the monitoring system (Action 5.2). Provision for 100 countries is therefore US\$ 25,000,000. The actual funding per country can be varied depending on cost levels, the size and diversity of the country and availability of data.

5.2 Monitoring system

Based on experiences and estimates from national forest inventories, REDD+ and initiatives such as the Global Forest Watch, the cost for including appropriate data collection for the forest cluster targets has been estimated as an upfront cost of US\$150 million (US\$ 1.5 million *per country*) with annual costs of US\$ 400,000 *per country* for collecting, verifying and reporting on the additional indicators. The system covers all four forest cluster targets (5, 7, 11 and 15) and will in reality vary widely in different countries.

5.3 Training and education of professional officers

The cost for training three people to Master of Science level at an advanced facility outside the country has been estimated to be between US\$ 100,000 and 140,000 per year (Hardcastle and Baird, 2008 for Eliasch Review). Due to recent increases in tuition and living costs, this has been increased to US\$ 200,000 as an upfront cost for each of the 100

countries. Training in national institutions is estimated as US\$ 25,000/year/student and as basis for the calculation 20 students per country has been used. The on-going resource need is therefore US\$ 50 million. This training again covers all four forest cluster targets and is expected to bring benefits for delivering the other targets as well.

5.4 Law enforcement

The cost for improving law enforcement is very difficult to estimate due to the wide variation in circumstances at country level; in some cases, even basic policies and legislation are lacking. As Aichi Targets 1 to 4 provide for changes in national processes and Targets 17 to 20 seek to improve planning and capacity, the estimate for the forest target cluster is based on the resource needs for additional transport, equipment and indicator-based performance incentives.

The upfront resource need is estimated at US\$ 300 million (US\$ 3 million/country) with the same amount being on an annual basis.

5.5 Creation of enabling conditions

The World Bank (FLEGT) estimate of lost revenue from illegal logging and trade and failure to collect forest taxes and fees is US\$ 10 to 15 billion annually; the resource estimate for creating enabling conditions is based upon the assumption that countries should be willing to spend up to this amount. Success with this action would generate substantial funds for national re-investment of revenue into the forestry sector and in due course success would eliminate the need for external funding to make up this amount. In the estimates of resource needs, the figure of US\$ 10 billion has been used for both upfront and annual investment.

Investment on this scale is needed to deliver the transformational change, without which the situation will continue to deteriorate. As such change would bring benefits far wider than simply biodiversity conservation, funds available for REDD+, FLEGT and for NFPs could all be sources although additional finance would still be needed initially.

2.5 Results

Actions	Upfront Costs (US\$)	On-going costs /year (US\$)
5.1 Biodiversity inventories	25,000,000	
5.2 Monitoring system	150,000,000	40,000,000
5.3 Training and education of professional officers	20,000,000	50,000,000
5.4 Law enforcement	300,000,000	300,000,000
5.5 Creation of enabling conditions (financial incentives which counter illegality)	10,000,000,000	10,000,000,000

Basis of calculations

5.1 Inventories and advocacy for inclusion of biodiversity in national policies; the cost per country is based on estimates from Targets 2 to 4 "Macroeconomics" cluster and its reference to GEF 6 assessment plus analogy with similar actions in other fora. For 100 countries at US\$ 250,000, total cost is US\$ 25 million.

- 5.2 The upfront cost of US\$ 1.5 million *per* country is estimated from the set-up costs for similar monitoring systems as reported by the World Bank and Eliasch Review. For 100 countries the total is US\$ 150 million. The annual costs for the monitoring system, US\$ 400,000 *per* country are based on figures in the Eliasch Review study on capacity and capability, For 100 countries, this US\$ 40 million.
- 5.3 Using figures from the Eliasch Review for capacity building, the upfront cost is estimated as US\$ 200,000 *per* country for overseas post-graduate education in developed countries while for annual costs, 20 people *per* year trained nationally or regionally at US\$ 25,000 gives a total of US\$ 500,000 *per* country. For 100 countries, these total US\$ 20 million for upfront costs and US\$ 50 million for annual costs.
- 5.4 The figure here is for the incremental cost for forest-relevant law enforcement beyond that proposed under Targets 2 to 4 and 17 to 20. The unit cost *per* country of US\$ 3 million is based on analogy of costs from similar donor interventions.
- 5.5 Globally, lost revenues from illegal logging and trade were estimated by the World Bank as US\$ 10 to 15 billion annually. On the assumption that it would be rational to spend up to this amount to remedy, US\$ 10 billion has been used as both the upfront and annual cost. The investment should result in recovery of a greater amount. This figure is a global one, neither area or nor country based.

3 Aichi Target 7

3.1 Introduction

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

Sustainable Forest Management ² is the stated aim in nearly all forest-relevant multilateral agreements and in most forest policies. It is also widely misunderstood. It includes protective as well as productive functions. Certification is independent verification of the sustainable management of sources of traded forest products but is currently not widespread in tropical and subtropical regions. Assuming 30% of the global forest area is “productive” and that three times the currently certified area is well-managed and effectively sustainable, this means that some 20% of tropical and subtropical production forest might be considered to be sustainably managed. There is obviously a long way to go to achieve full certification and substantial support will be needed to initiate changed practices, which can then be continued through reinvestment of revenue.

3.2 Links to other targets

[see section under Target 5]

3.3 Actions

3.3.1 Action 7.1 Market correction, public procurement policies

Incremental systems such as the Global Forest Trade Network were developed to assist producers with access to markets on the basis of product differentiation, moving towards certification through an agreed action plan. Although originally certification was seen as bringing a price premium, in practice it is becoming a pre-requisite for market access especially in the dominant markets for tropical and subtropical timber products of North America and Europe. The first step has been to focus on legality as in the EU timber regulations and the US Lacey Act. The EU has also initiated voluntary partnership agreements (VPA) with tropical timber producing countries to facilitate their access to the EU market. Legality is, of course, merely the first step towards sustainable management. Although VPAs include obligatory compliance to secure access, there is no direct leverage on timber products exported elsewhere or consumed domestically, only an agreement to work towards ensuring legality for these.

In terms of global trade patterns, China is a major importer of primary tropical timber products but much of the material is subsequently exported as secondary products to Europe and North America, giving leverage for import regulations requiring legality. India is also a major importer of primary products but nearly all is consumed domestically. Given domestic markets that do not require legality assurance, the existence of less discriminating export markets and the transaction costs of legality assurance, short-term interests may conclude that simply avoiding more demanding markets is the best strategy. The proposed action aims to try and increase consumer demand in all markets, export and domestic, for at least legality assurance.

Average public expenditure as a proportion of GDP in the 20 largest economies is 44% and in many developing countries the public expenditure ranges well above 15% on average.

² Sustainable Forest Management aims to ensure that the goods and services derived from the forest meet present-day needs while at the same time securing their continued availability and contribution to long-term development (FAO). It encompasses: the extent of forest resources; biodiversity; forest health and vitality; productive, protective and socio-economic functions; and the legal policy and institutional framework.

Public expenditure constitutes a strong market force which can direct production towards sustainable forest management. Public procurement policies incorporating SFM-related criteria are now the norm in many northern countries but similar domestic public procurement policies are still far from being implemented in many developing countries, as presaged in VPAs, or in transitioning economies.

As noted in Table 6, in terms of tropical primary timber products (logs, sawnwood, veneer, plywood) there are significant regional differences. The Asia Pacific region dominates the export trade. Looking at Roundwood Equivalent (RWE) figures (the volume of logs converted to generate the products), this region supplies 85% of global tropical plywood and two-thirds of sawnwood. Tropical log exports are mainly coming from Gabon, Republic of Congo, East Malaysia, Myanmar, PNG and, much less, from Ecuador and Guyana. Veneer production consumes only 3% of converted logs.

In respect of international trade in primary tropical forest products, there are 15 major exporting countries that are members of ITTO: six in Africa (Cameroon, CAR, DRC, Gabon, Ghana and Republic of Congo); five in Asia-Pacific (Indonesia, Malaysia, Myanmar, PNG and Thailand, which also imports substantial volumes of sawnwood); and four in Tropical America (Brazil, Ecuador, Guyana and Peru).

Current trade patterns are very different from those two or three decades ago, with south-south trade increasing together with further processing. The value of exports of secondary processed products (mouldings, furniture, building supplies, etc.) in 2010 was US\$ 10.3 billion compared with US\$ 9.4 billion of primary products. At the same time, the tropical/temperate division in processed products is increasingly blurred, *e.g.* tropical veneer face on a plywood core from temperate logs. Plywood is increasingly produced from plantations that supply uniform material and surround the processing facility; both factors that promote cost efficient production.

Demand for roundwood (logs cut from a felled tree) is projected to increase dramatically between now and 2030 largely as a result of increased living standards and demand for construction and especially packaging. Demand may increase further as moves towards a low carbon society and construction material demand, for example, shifts towards renewable resources.³ At the same time, many regions of the world are already experiencing wood supply deficit and this is likely to grow due to increasing demands from alternative land management such as agriculture and biomass energy production. To counter these trends, efficiency gain can be achieved, especially in the developing countries, where investments in new, more efficient technology have been lagging behind and provide opportunities for major gains through technology transfer.

3.3.2 Action 7.2 Efficiency in processing

Increasing processing efficiency in tropical forests is a way of directly and quickly reducing pressure on the forest. In Europe and North America, processing is normally highly efficient due to cost-competition so residues are minimised through use in other products and technology changes adapt to use residues. This is not so in most tropical countries. Studies such as by ITTO⁴ suggest volume recovery from felled trees to sawnwood and other products is often less than 20%. Much processing industry in the tropics/sub-tropics is outdated and inappropriate for efficient conversion of the current resource (smaller tree sizes, different species, *etc.*) The inefficiency of the tropical wood supply chain contrasts strongly with temperate regions where close to 100% of harvested volume is utilised.

³ Jan Wintzell, Pöyry, Sept. 2011, Sten Nilsson 2011

⁴ ITTO studies for example, there are others

Globally, around half of all wood harvested is used for fuel (including charcoal) and the proportion is much higher in many tropical countries although hard data is very limited. Efficiency of production varies but intense competition in charcoal markets such as in Rwanda has led to more efficient conversion. There is no doubt that large efficiency gains in round timber harvesting, sawn timber and energy processing techniques are fairly easily achievable; this would reduce significantly the volume of material harvested.

In the late 1970s there was substantial effort to improve the effectiveness of wood use amongst big users such as the tobacco industry. More recently, GIZ for example has supported work on charcoal conversion efficiency while the tea sector is also going back to wood fuel, although its consumption is quite limited other than locally. Wood for power generation through gasification is an emerging issue that could increase demand for wood in countries with limited rural electrification and poor power generation infrastructure.

Regeneration by planting and assisted natural regeneration is very common. Plantations driven only by economics tend to be short-rotation monocultures with low biodiversity values. Good plantation design, mainly small blocks leaving natural forest especially along watercourses can be beneficial as can the use of mixtures of indigenous species. Grants and similar instruments that are not tied to specific beneficial practices can be very counter-productive in terms of negative social and environmental impacts. However, by, for example, paying a planting grant but requiring that 15% of the area be left untouched, or paying 30% of the establishment costs to encourage specific species, can be effective provided such schemes are linked to appropriate and enforced standards.

Many developing countries, *e.g.* currently in East Africa, are extending timber plantations through leases with external private investors but have neither plantation standards nor the capacity to enforce them if they existed. The Sawlog Promotion Grant Scheme in Uganda, which supports plantation development only on degraded land, maintains standards through training and linking grant payments to achievement of defined standards confirmed by field inspection.

3.3.3 Action 7.3 Fire management in vulnerable ecosystems

Fire, both natural and anthropogenic, is a common cause of forest degradation and leads to forest loss. Forest ecosystems in areas where natural fires occur can benefit from fuel reduction measures (*e.g.* through controlled, early-burning or physical removal). Fire sensitive ecosystems such as moist and wet forests become vulnerable following harvesting, *e.g.* by weed growth on abandoned trails which in burning allow fires to penetrate deeply into the residual forest. Passive control measures are not costly and can be readily undertaken by local communities following basic training. In seasonal climates, nearly all of such work is counter-seasonal with agriculture, which is an added bonus. Appropriate controlled burning regimes are already known for most dry forest ecosystems although expertise has become eroded in many countries. Community based fire management in Caprivi, Namibia, yielded impressive livelihood and livestock gains within a few years, making it an attractive and viable option for communities.

Plantations and highly vulnerable forests, such as islands of rainforest in fire-climax grasslands require more intensive protection. Extensive plantations need to include appropriate fire-protection measures as part of their operating costs but communal plantings and individual woodlots also need simple protection measures such as weed cutting and firebreaks although this is not an element for biodiversity conservation! Natural forest areas within larger plantation units may benefit from fire-exclusion due to good fire preventative measures applied for the plantations. Fire in forests on peatlands is of major significance and hugely difficult and expensive to control. Extensive fires such as those in Kalimantan in the 1980s and late 1990s created severe health impact in neighbouring countries as well as nationally.

3.3.4 Action 7.4 Product creation and distribution (tourism, PES, carbon, ABS)

“Economic development and poverty eradication are the first and overriding priorities of developing countries and that a low-carbon development strategy is indispensable to sustainable development”.⁵ Developing countries cannot afford not to manage and utilise their forest ecosystems to the benefit of their citizens. An essential step for the successful implementation of the forest cluster target actions is the creation of marketable goods and services from forest conservation, SFM, forest restoration and the avoidance of habitat loss.

In order to ensure equity, transparency and good governance are pre-requisites, as noted under Target 5. In many instances unclear and at times inequitable rights and tenure need to be resolved although the full cost of this at national level cannot be borne only by biodiversity - nor carbon - gains. Access and benefit sharing arrangements will be expensive to secure and need to be linked with wider work on governance noted in Actions 5.4 and 5.5.⁶ While the potential for capturing revenue for environmental services, including carbon, is known, successful examples of equitable systems are sparse, especially in poorer tropical and sub-tropical countries where the incremental benefit would be most valuable although there are good pilots that demonstrate potential.⁷ Success with such schemes would greatly strengthen enhanced governance at forest level, by for example raising community willingness to act against illegal logging.

Transformation to a Green Economy also provides opportunities and new demands to which the forest sector can respond with existing solutions and technologies but which require dissemination and scaling up.

3.4 Assessment of Resource Needs

The cost of strengthened public procurement policies in developed consumer countries, which are covered under Action 7.1 and have been implemented as part of the efforts to strengthen forest governance through trade links have proven impossible to find in the time available. In addition to the burden on customs departments, the EU Timber Regulations for example have generated a considerable cost burden on the forest products trade within Europe. To date, no timber has been available with VPA assurance.

To estimate the cost in producer countries in respect of tropical timber product trade, ITTO trade figures from their 2011 Annual Review and assessment of the world timber situation were used to provide information on volumes and values. The trade is complicated as noted and continues to be increasingly so, with secondary processed products, south - south trade and products of multiple origin. Figures for the development of a VPA were estimated from DFID product records as some US\$ 8 million per producer country. Given 15 major producing countries and allowing for what has already been invested, this totals US\$ 80 million initial costs. A *pro rata* assumption was that 5 processing countries would require initial support of US\$ 2 million and that a similar figure should be allocated for similar work in 100 countries over the next eight years. Annual costs were estimated as 10% of these costs for legality assurance.

⁵ UNFCCC/CP/2010/7/Add.1

⁶ See, e.g. Hoare *et al* for Eliasch Review and Norad Evaluation report 5/2012

⁷ See, e.g. www.katoombagroup.org

In respect of processing, Action 7.2, noting the very poor conversion figures that are often found in tropical and sub-tropical forest sectors, a major effort to increase processing efficiency in these countries was identified as having good potential to support improved biodiversity conservation. The following figures based on ITTO reports are the basis of the estimates:

Value of trade in primary tropical timber products (logs, sawn, veneer, plywood)	US\$ 10 billion per year
Value of trade in secondary processed tropical timber products	US\$ 10 billion per year
Total value	US\$ 20 billion per year

It could be argued that the secondary processing industry is more modern and presumably more efficient but given that half the wood cut globally is for fuel and that there is considerable destruction from industries such as charcoal that also need improvement using secondary processed timber figures as a proxy to cover this seems valid. There is no hard data on informal wood use in key countries for which the information is required! Using a value of US\$20 billion as a proxy seems a reasonable assumption.

Taking 15% of this value for upfront costs gives US\$ 3 billion; taking 5% of this value as an annual cost need gives US\$ 1 billion. Analysis of ITTO trade statistics from 1989 to 2007 shows a consistent figure of 25% of the volume of tropical timber production is exported. In order to cover domestic as well as export production, the above figures need to be multiplied by 4. This gives an upfront cost of US\$ 12 billion and an annual cost of US\$ 4 billion.

Note that two analyses of ITTO project funding in 2001 and 2007 as part of the ITTO Action Plan revisions showed that Forest Industry had been grossly under-represented in both project and policy work, yet this is the forum where one would expect to see such projects and is a crucial element when considering impact along the supply chain.

Fire is a major cause of loss in many forest ecosystems, and also links to further losses from pests and diseases due to fire damage. Although it cannot be totally excluded, and would not be good to do so from the biodiversity point of view, it is relatively inexpensive to reduce its negative impact. Many savanna ecosystems cope readily with "cool fires" and controlled burning can be cheaply done. The cost estimates for Action 7.3 on fire is based on an assumption that 2 billion ha of forest need this action and an average cost of US\$ 0.10 per hectare was applied for both initial and annual costs. As well as dry forests and savannas, there is increasing need for fire protection measures in wetter forests that have been exploited.

Action 7.4 relates to the development of market opportunities for forest services and goods. A figure of US\$ 20 million was chosen for each of 100 countries, noting that there would be synergetic work undertaken by the overarching targets and by the governance and policy related actions under target 5. The annual cost was estimated as 5% of an annual trade value of US\$ 100 billion.

3.5 Results

Actions	Upfront Costs (US\$)	On-going costs /year (US\$)
7.1 Market correction, public procurement policies	290,000,000	36,000,000
7.2 Efficiency in processing	12,000,000,000	4,000,000,000
7.3 Fire management in vulnerable ecosystems	200,000,000	200,000,000
7.4 Product creation (tourism, PES, carbon, ABS)	2,000,000,000	5,000,000,000

Basis of calculations

7.1 It proved hard to find full cost details for the Voluntary Partnership Agreements being delivered by DFID/EU, especially the costs for importing countries. A figure of US\$ 8 million per country was used and there is of course a requirement for the wider governance changes presaged under target 5 and strategic targets A. There are 15 major tropical timber exporters so the total would be US\$ 120 million but some US\$40 million has already been spent leaving a total of US\$ 80 million. There are 5 processing countries which need about 25% of the start-up cost, US\$ 2 million per country, total US\$ 10 million. There is need for complementary work on public procurement in 100 countries being used as the overall target group and start-up costs for this were estimated at US\$ 2 million per country, US\$ 200 million total.

The annual costs were estimated as 10% of the start-up costs: US\$ 12 million for the 15 major producers, and a similar unit amount for the 5 processing countries, totalling US\$ 4 million, US\$ 16 million in all. There would also be annual costs in the 100 countries improving public procurement policies, estimated at 10% of the start up cost, so US\$ 20 million. In total, US\$ 20 + 16 = 36 million.

7.2 Focus is on tropical processing for which there is very little detail especially of small-scale processors. Key figures are the US\$ 20 billion value of international trade in primary and secondary tropical timber products, with 15% of this as a proxy for upfront investment and 5% for annual investment. The resulting figures are multiplied by 4 to account for the fact that on average 25% of tropical timber production is exported, the balance being consumed domestically. The US\$ 4 billion annual cost can be compared with the total annual tropical wood production recorded by ITTO as 250 million m³ giving an equivalent of US\$16 per m³.

7.3 The upfront and annual costs are both based on a cost of US\$0.10 per ha applied over 2 billion ha, half of the global forest area. While controlled burning to reduce fuel is applicable in dry forests, wet forests increasingly need fire prevention work to prevent ingress of fire along access roads, etc.

7.4 Creating market opportunities for environmental services as means of enhancing the revenue stream for forestry was identified as crucial and is linked to wider governance changes to ensure revenue accrues equitably. Start-up costs were set at US\$ 20 million per country (100 countries) and annual cost at 5% of an estimated global trade value of US\$ 100 billion.

4 Aichi Target 11

4.1 Introduction

Target 11 - By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.

In countries where protected areas are classified separately from forest reserves, there is a danger of overlooking the latter. Protected forests and reserved forests can provide substantial gains for the conservation of forest ecosystems with differential uses being allowed through zoning and regulation from strict nature reserves through extractive use to timber harvesting as part of SFM. Uganda provided a now quite old but excellent example of a valuable approach.⁸ A range of faunal and floral biodiversity was assessed for each forest reserve and the reserves were then rated for conservation value prior to development of zoning plans for each.

At a wider scale, the work on biodiversity hotspots⁹ by Conservation International notes the vast importance of forest ecosystems for global biodiversity (see Annex Table 6). As noted under Target 5, lifting ultimate responsibility for forest management and conservation out of institutions with often low influence at national level is vital and can also overcome the negative impact of institutional competition within countries.

There is at least anecdotal evidence, supported by field observations, that in some cases, natural forest management practices have been deliberately mis-applied to leave the forest in a state from which there might appear to be no alternative but to convert the remnants to plantations. Such a situation should not arise if adequate standards are developed and applied, including enforcement of penalties.

4.2 Links to other targets

In addition to Target 5 and the importance of wider sectoral level approaches, there is a close link with Target 7 - SFM, which by definition takes account of conservation. Aspects such as access and benefit sharing as well as capturing payments for services as noted under Target 7 are also highly relevant to this Target.

In respect of the assessment of forest area changes as noted under Target 5, fragmentation and connectivity are vital aspects that are seldom well covered in national and sub-national level forest assessment.

4.3 Actions

4.3.1 Action 11.1 Land tenure, legal processes, compensation for PA extension

Large scale allocation of land to conservation requires that land tenure and access rights issues be addressed effectively. In some instances, procurement of land from communities, individuals and the private sector may be necessary. In countries with high population pressure and dissected and variable landscapes, high conservation value forests may be

⁸ Forest Nature Conservation Master Plan P C Howard for Uganda Forest Department (1999)

⁹ http://www.conservation.org/where/priority_areas/hotspots/Pages/hotspots_main.aspx

already used for high value crops; compensation payments for such land will be very high.¹⁰ Such situations are also likely to make heavy demands on the time of public officials if the situation is to be resolved equitably and transparently.

Given the diversity of legal status that may be ascribed to different land units such as forest reserves, wildlife reserves, protected areas and national parks, efforts to ensure coherence, and synergy in respect of conservation value are strongly indicated. Legislation carried over from the colonial era is often quite unclear on whether such areas are public or customary land.

As noted in the CI biodiversity hotspot reporting, mining can be a major cause of loss. In most countries, the huge economic scale of commercial mining - and the influence of the multinational companies that usually undertake such investment - is usually much greater than that of the "conservation" sector. Furthermore, mining legislation tends to take legal precedence over legislation relating to forests and protected areas.

Small scale mining, as for gold in Peru and Guyana, driven by high prices can be devastating for forest conservation, especially in flat areas where ponding causes extensive areas of damage after relatively insignificant forest disturbance.¹¹ Small-scale mining also involves use of mercury, which is highly toxic to wildlife and often pollutes water supplies. Increased turbidity in water supplies is also a major problem.

The most challenging areas for consolidating and expanding protection are likely to be where land pressure is high and demand for land is the primary driver of forest loss, as in much of Sub-Saharan Africa and South Asia. The large numbers of individuals involved add to the complexity and the cost. Even where protected areas exist, connectivity is often absent and zoning followed by a focus on securing critical areas of land and protection agreements with people living in the area is required.

4.4 *Assessment of Resource Needs*

The data used here are very coarse. The aim is to increase the area protected from the current 11.5% to 17% but actual figures for each country vary widely. Rapid progress on securing SFM would have a beneficial effect on the extent of area under protection, too. The area figure used to compute the estimate is 6.5% of the global forest area of 4 billion ha; this equals 222 million ha (2.2 million Km²). There is an interesting facet to this figure in that the CI Biodiversity Hotspot data (Table 6) shows that 3 million Km² are remaining excluding the area in developed countries. Of this, 2 million Km² is classed as "protected" and of that, 1 million Km² is under Category I to IV protection. There is thus 1 million Km² (100 million ha) of remaining forest biodiversity hotspot area that is currently not protected; this needs to be identified and prioritised.

The assumption made for the cost estimate is that increasing the protected area will become increasingly difficult, especially in countries where land pressure is high and hence where it is the highest priority. There are likely to be efforts to reduce fragmentation and increase connectivity as part of the expansion and this will require compensation payments.

Given that there are likely to be high value crops, especially in areas with good moisture, compensation payments could be substantial. The budget provision proposed is for payments averaging US\$ 1,000 per ha for one quarter of the 222 million ha needed to meet the target area figure of 17% protected areas. This figure is considerably below what was

¹⁰ See for example Evaluation Report 2003:2, MFA, Helsinki

¹¹ See for example Norad Evaluation Reports 15/2010 and 2/2012

required for the Amani corridor in the Eastern Usambaras in Tanzania, which was crucial for connectivity and supported bilaterally by Finland.

The figures located for annual management costs vary quite widely but average out around US\$ 18 to 20 per ha. Given the consistency of the reports consulted, this has been accepted but it is observed that this figure is 5 to 10 times higher than the running costs estimated for national parks in Ghana. The figures here need more detailed investigation than was possible in the time available.

4.5 Results

Actions	Upfront Costs (US\$)	On-going costs /year (US\$)
11.1 Land tenure, legal processes, compensation for PA extension	55,454,575,000	4,000,000,000

Basis of Calculations

11.1 Upfront cost is based on substantial compensation payments averaging US\$ 1,000 per ha for one quarter of the additional area needed. The annual costs were estimated at US\$18 per ha for 222 million ha additional area, the unit cost is based on studies of the current costs of protected area management. This may be a high figure if the expansion takes place primarily in lower cost developing countries.

5 Aichi Target 15

5.1 Introduction

Target 15 - By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

There are estimated by IUCN and WRI to be some 1 billion ha of degraded land, much of which was previously under forest or woodland and could potentially be restored. Despite considerable interest in restoration, progress has been slow.¹² There are various possible approaches to forest landscape restoration. The most basic is to preclude the main influences (commonly fire and overgrazing) and there are numerous examples globally where this has been done - often because trees were planted but then the planted trees are overtaken by vigorous natural regrowth.

Generally speaking dry-zone ecosystems are more resilient and easier to restore than wetter ones while temperate ecosystems are usually easier to restore than tropical ones; their ecology is simpler and many moist and wet forests require a succession to take place before more valuable species become established. The Forest Restoration Research Unit in Chiang Mai Thailand¹³ has developed and promoted the "framework method" of restoration which results in more rapid establishment of key species for biodiversity. Degraded land can be utilised for plantations, most of the species used in which are ecological pioneers that favour open sites but have limited biodiversity value and produce mainly utility wood.

Restoration of forest cover would bring substantial benefit from sequestered carbon, especially on sites where soil carbon can also act as a sink, such as peat soils. While fast growing plantations could sequester carbon rapidly, their ability to deliver other values including biodiversity, water and livelihood benefits is restricted. Good plantation planning and design can be sensitive to and valuable for biodiversity when it is carried out on degraded sites (see the work of J Parrotta in the 1990s, for example) but it needs to be properly designed and executed. Plantation species have the advantage of having readily available and reliable seed sources to facilitate action and they also can be managed as 'nurse crops' to foster a local environment and create a microclimate more amenable to the re-establishment and recovery of local native species, the nurse crop thereby providing revenue to meet some of the ongoing costs. The nurse crop may be very different from the ultimate species mix and distribution desired but allows forest conditions to be re-created in which more complex regeneration can be undertaken.

Restoration solutions will need to be site specific but all such solutions should consider the wider landscape and the design should be a mosaic of different approaches. By combining economic production, framework or similar methods and encouraging natural regeneration, with such assistance as may be needed to remedy the loss of a seed bank. Well-designed mosaics can deliver multiple benefits in appropriate proportions, thus responding to the requirement to meet multiple goals. Assistance and at times grants and other instruments may be needed to fine-tune interventions and meet the needs of all stakeholders. No single approach or intervention package will be a universal panacea, interventions must be site-specific while adhering to sound general principles.

¹² <http://www.ideastransformlandscapes.org/>

¹³ <http://www.forru.org/>

5.2 *Links to other targets*

Properly delivered forest landscape restoration, including adequate mechanisms to avoid perverse incentives to deforest, can contribute to reversing forest area and quality loss. It is not “deforestation in reverse;” restoration cannot replace lost undisturbed forest in its entirety and should not be thought able to do so. The “gap” between restored and undisturbed forest is wider the more complex the original ecology. Once re-established, such forests will need to be brought under SFM principles.

If the substantial resources need for extensive restoration of degraded forest landscapes is found, it is essential that adequate provisions are put in place, as noted under Targets 5 and 7 to prevent subsequent over-exploitation and lack of protection leading to a repeat of earlier patterns. This will require attention to the drivers of deforestation and hence forests must become a core element in national economic plans. Their wide range of values must be appreciated even if they cannot be accurately measured and, while forests can act as a “bank account” from which withdrawals are made - as with farm forests in Central and Northern Europe - there has to be replenishment, just as there has to be in a bank account. Smoothing of cash flow is not synonymous with progressive liquidation.

5.3 *Actions*

5.3.1 Action 15.1 Restoration site selection

As part of the restoration efforts, land ownership, usufruct rights, ecological, economic and technical suitability have to be assessed to increase the likelihood of successful restoration. Much of this work could be subsumed under the actions proposed for Target 5 but the site selection process is crucial. One danger is of fragmented development, which would undermine the potential contribution. Careful assessment of site potential and demands for products and services through a widely based strategic approach grounded in solid attention to other land-uses is anticipated.

Degraded land may be being utilised for subsistence agriculture and this current use has to be included in the planning. More difficult to assess but vitally important is the use made by nomadic and itinerant people, which depending on the level of degradation can be quite occasional and irregular. It is vital that adequate prior assessments are made before plans are finalised and that these usually highly vulnerable groups are not overlooked or simply ignored. If current use is important for people with no alternative livelihood options, then the plans must encompass their livelihood needs and this requirement may, in some circumstances, preclude reforestation. This is why site selection is so important; it is not merely the potential to support trees.

In some cases, forest loss can lead to major hydrological changes such as seasonal inundation, it can also lead to severe loss of nutrients leaving little more than white sand. Laterisation can be a problem that is almost impossible to overcome at any reasonable costs. Where deforestation or degradation is associated with mining, there can be significant problems with heavy metal pollution and such sites require specialised attention. Given the vast area in need of restoration, it would seem sensible to start with the least problematic ones although there is a noted tendency for people to want to try with the most challenging ones first. The social issues surrounding forest restoration will prove to be much more complex to deal with than the technical ones.

5.3.2 Action 15.2 Seeds, nursery establishment, planting

A functioning seed supply system will be necessary to increase the success of nursery establishment and planting. The supply of seeds and seedlings together with timely

planting will require large-scale logistics that can deliver inputs at the right scale and time to the next part of the chain (e.g. seedlings, transportation and workers) and thereby ensure that the planting or regeneration season is not missed. To successfully reforest 150 million hectares within eight years (12.5 million/year) it is important that sufficient, funds, technical support and political will is invested early on; a solid start must be made before 2015.

5.3.3 Action 15.3 Assisted natural regeneration

Given the financial investment needed, it is important to identify the areas that can be regenerated either through assisted natural regeneration or by only securing the area from influences that are counterproductive to forest restoration (e.g. uncontrolled fire and grazing). The area suitable for assisted regeneration has been estimated to be one-third of the area that needs restoration; a further third has been estimated to be capable of regeneration naturally once the site has been secured. Again care is essential to avoid negative social impacts on vulnerable groups and mechanisms to mitigate such impacts will be needed in the plans and financing.

5.3.4 Action 15.4 Site protection (wildlife, fires, livestock)

All restoration sites will need protection against the forces that originally caused their deforestation, including uncontrolled grazing and fire, pests, etc. This will be a recurrent expense until such time, depending on the site and used species, as the restored area has achieved natural resilience against external disturbance. In this regard, support from local communities affected is vital, which emphasises the importance of securing agreement and delivering useful benefits to them that more than compensate for any losses the restoration may have imposed.

5.3.5 Action 15.5 Weeding and Post-establishment Maintenance

The areas that are to be restored are often occupied by species that are well-adapted to the degraded conditions on the site. Perennial grasses can be a major problem due to physical spread and allelopathy. Shrubs such as *Lantana* are also problematic and can quickly establish a dense understorey. Once establishment is complete, weeding and maintenance of favourable growing conditions are required if the restoration is to succeed. Restored areas are also vulnerable to fire and weed removal may be necessary as part of fire protection for an extended period.

5.4 Assessment of Resource Needs

For the initial site selection, Action 15.1 a standard amount of US\$ 100,000 for each of 100 countries has been included as an initial cost. There is no subsequent annual cost for this Action.

Action 15.2 relates to one-third of the 150 million ha target that will need to be established as an intensive plantation (not necessarily a monoculture!). The average cost is estimated to be US\$ 800 per ha, which is a fair overall average for 100 countries based on general plantation costs. This is considered as a "one-off" cost; although it may include some of the costs such as tending and replacing failed trees being incurred in years 2 and 3; these are a small proportion of the total.

Action 15.3 covers the costs for assisted natural regeneration over one-third of the target area in a similar way to Action 15.2. The unit cost used is US\$ 150 per ha, again based on figures from forestry work across a wide range of countries.

Action 15.4 covers the cost of continued protection at a rate of US\$ 10 per ha per year. Given that tree growth will be much slower than in industrial plantations as trees will be selected for values besides productivity, it has been assumed that these payments will apply throughout the period of the budget to allow for areas with higher than normal protection needs.

Finally, Action 15.5 is costed on the basis of two post establishment interventions costing US\$ 10 per ha over one-quarter of the restored area in areas where weed growth is unduly heavy. As well as releasing the trees, such operations may also be required to reduce risk from fire damage.

5.5 Results

Actions	Upfront Costs (US\$)	On-going costs /year (US\$)
15.1 Restoration site selection	100,000,000	
15.2 Seeds, nursery establishment, planting		5,000,000,000
15.3 Assisted natural regeneration		937,500,000
15.4 Site protection (wildlife, fires, livestock)		187,500,000
15.5 Weed control and climber cutting, etc		281,250,000

Basis of Calculations

- 15.1 This is a notional figure based on 100 countries at US\$ 1 million each
- 15.2 One third of the overall area of 150 million ha to be restored by artificial regeneration at an average cost of US\$ 800 per ha. The total cost for 50 million ha would be US\$ 40 billion but this would be spread over 8 years from 2013 to 2020.
- 15.3 One third of the overall area to be restored by assisted natural regeneration at US\$ 150 per ha. The total area of 50 million ha would be spread over 8 years 2013 to 2020.
- 15.4 Protection at US\$ 10 per ha for the full 150 million ha spread over 8 years.
- 15.5 Actively restored area (artificial and assisted natural regeneration) will comprise two-thirds of the area, so 100 million ha. Cost is US\$ 20 per ha for two operations spread over 8 years. This totals US\$ 250 million. There was an error in the calculation which gave the figure above and was only spotted after changes were not possible; in fact, the additional provision would be useful to provide a cushion for repeated operations that may be necessary in weedy sites. The cushion would allow an additional operation over 3 million ha.

Annex 1 Notes on the Overall Summary

Estimated costs are drawn directly from the computations in the report. To determine the investment required over the eight years from 2013 to 2020, it was assumed that action would take place evenly in each year. The total costs over the period are thus the full upfront costs plus the annual costs. The annual average cost is calculated by dividing the total costs by eight.

The scoring for cross-relevance is based on a simple assessment of High, Moderate or Low. The actions under Target 15 - *Restoration* - are treated together since they are inter-dependent within this group of actions. The underlying logic for the scores is briefly noted below. The scoring has been done deliberately to provide a range of grades, since uniform assessment of "High" would not be helpful.

Actions under Target 5 - *Deforestation and degradation*

Action 5.1 - *Biodiversity inventory* - is required to identify priority targets. There is thus strong cross-relevance to Target 11 - *Protected Areas* - by drawing attention to high value areas that are not protected and to Target 15 - *Restoration* - since this can be a valuable tool in remedying fragmentation.

Action 5.2 - *Monitoring system* - will be directly valuable for application in respect of *SFM* (Target 7) and *Protected Areas* (Target 11). While ultimately the goal for *SFM* may be to secure independent certification, monitoring systems can be useful in confirming progress towards this goal. For *Protected Areas*, monitoring information is important to distinguish between areas that are notionally protected and the reality of this protection. This action is less directly relevant to restoration although at least some of this action should be directly linked to remedy of fragmentation as noted under Action 5.1.

Action 5.3 - *Training of professional staff* - is generally cross-relevant in respect of monitoring information but particularly so in respect of Target 7 - *SFM*.

Action 5.4 - *Law enforcement* - is of fundamental importance for all the forest targets, since without it, there can be neither sustainability nor the vital transformational changes that are required. There is a strong link between this Action and the next one, which assumes effective and equitable law enforcement.

Action 5.5 - *Enabling conditions* - is the major action under this target and one which is also crucial for Targets 7 - *SFM* - and 11 - *Protected Areas*; while also important for Target 15 - *Restoration* - its importance is somewhat less. Forestry is seldom given a high profile within countries and is too often seen only as a source of revenues when many of the benefits are services that are difficult to quantify and seldom recognised adequately. In essence, forests and forestry in the broadest sense need to be included in top-level national economic planning, where transformational changes required for a green economy will take place. At present, forests seldom register at this level because revenues are low and costs high. By capturing more revenues, as well as better service values, influence will be increased leading potentially to interest in addressing the drivers of deforestation and forest degradation, which is also essential for progress on Targets 7 and 11.

Actions under Target 7 - *Sustainable Forest Management*

With the exception of Action 7.3 - *Fire protection* - the actions proposed under this target are directed to the supply-side of forest products and services and would thus be indirect in respect of their influence and impact on biodiversity.

Action 7.1 - *Market corrections* - includes activities that promulgate more widely the principles of FLEGT, using consumer pressure to lever changes, initially for legality. The

aim is to broaden the number of countries within which concern for legality is an important consideration. VPAs do not eliminate illegal timber within producer countries, they only exclude it from international trade, and the aim would be to support Actions 5.4 and 5.5 through this measure. Although FLEGT is primarily concerned with timber and timber products, in certain localities, non-timber products may be highly significant and their marketing would benefit from legality assurance.

Action 7.2 - Processing efficiency - is the dominant one under this target. The yield of sawn tropical timber is notoriously inefficient in terms of conversion from logs felled, with serious losses along the whole production chain. By improving this conversion, costs would be reduced, leading to higher profitability while the number of trees felled to yield a similar volume of products would be reduced. Much of the processing technology in tropical and subtropical countries is now outdated in terms of its appropriateness for the currently available material and is likely to become increasingly so as technological changes occur. Making full use of felled material could have major and rapid impact on the pressure for supplies of raw material, emphasising the cross-relevance to Targets 5 and 11.

Action 7.3 - Fire protection - is an aspect that has been progressively neglected. Preventative burning in fire-ecology ecosystems is known to have rapid and beneficial effects on the ecology and the livelihoods of the large number of people that depend on it for their livelihoods but is also a major cause of degradation in closed forests that have been opened up for harvesting; this latter aspect is particularly neglected. While there are good examples of renewed interest in dry temperate forest (Canada, US and Mongolia for example) the situation in tropical and subtropical countries remains one of very serious continuing degradation. Action here would have immediate benefits also for Targets 5 and 11 and, of course, needs to be considered under Target 15.

Action 7.4 - Product creation - addresses the need to identify, recognise and where possible commercialise forest products and services. Some such as carbon have been identified, others such as water have been monetised in some countries (mainly developed) while biodiversity and livelihoods tend to be ignored other than at local scales. There are numerous theoretical economic studies that conclude with massive (potentially unrealistic) benefit-cost ratios but the underlying issue, the need to recognise the importance even if it cannot be accurately monetised, is crucial for the wider recognition of the importance of forests within the fabric of national economic development decision-making. This in turn is essential for the transformational change in the way forests are seen as national assets, and given recognition at the highest levels, that is encompassed in Target 5 and also provides justification for Target 11.

Actions under Target 11 - Protected areas

The single action (11.1) proposed under this Target responds to the aim of increasing the area protected from 11.5% to 17%. There are important riders around this that need to be clearly understood. Firstly, if forests are brought under sustainable management (Target 7) for production, extractive use or for conservation, then by definition, they will make substantial contribution to this. In most cases, sustainably managed forest blocks will be zoned for a range of objectives with operational standards to ensure that a diversity of needs is met, including long-term sustainability. Effective protected areas can also reduce deforestation and forest degradation (Target 5), hence the high cross-relevance.

The crude percentage goal needs to be translated in detail to account for fragmentation, connectivity, uniqueness and ecological viability. In many cases, national level figures hide swingeing losses of particular ecological types.

In arriving at the financing need, it was assumed that only one-quarter of the additional area would require major compensation payments but that these were likely to be high

because in many cases, use will be for high value crops. It was also observed that the management costs for protected areas, estimated at around US\$ 15 per ha per annum (equivalent to US\$ 1,500 per km²/annum) seems very high compared with figures for national park protection and management globally.

One specific ecosystem worth noting here is mangroves. These have generally been neglected and in many countries have been devastated almost to extinction. Yet studies show substantial carbon, biodiversity, livelihood and coastal protection values. There is also a natural link to work on wetland conservation. Mangrove restoration is feasible technically but often inhibited by intensive use of converted areas, including for high value housing and tourism development as well as livelihood use. ITTO is interesting in that, in response to sustained pressure from Japan - its major financier - it has developed a Mangrove Action Plan and funded numerous national projects on mangroves.

Actions under Target 15 - Forest restoration

To a certain degree, actions under this target are less closely linked with the other three targets although they are by no means irrelevant. There is certainly well-founded concern that superficial "success" in reversing deforestation is little more than the replacement of area of natural forest loss by plantations, usually of monocultures for industrial wood production.

Noting this rider, there remains a huge area of degraded land that is either largely treeless or occupied by degraded secondary forest. The various potential users each claim and work towards specific interests; some see it as a resource for extensive productive plantations, others as a challenge to restore diverse tropical forests on a vast scale.

A more realistic option, and the one proposed here, is to utilise a mixed approach that includes elements of a range of alternatives depending on the existing resource, its potential and the needs in terms of different products and services. This approach is based on good landscape level forest design with emphasis on small blocks, attention to critical facets such as watersheds, remaining pockets of natural vegetation and watercourses with different systems employed to generate different types of restored forest across the area. It also proposes to make use of natural regeneration processes where this is feasible.

In terms of cross-relevance, the strongest initially would be with Target 11 - *Protected Areas* - especially if the activities are focused on tackling fragmentation in the most vulnerable forest ecosystems. There is also a useful cross-relevance with Target 5 - *Deforestation*. In due course, there should be cross-relevance with Target 7 - *SFM* - but while this may be included in the design of the application, its impact up to 2020 will be slight.

Brief Points on Prioritisation

By way of an example from Southern Sudan in 2006 - just after the peace accord - an initial forestry strategy and policy outline was required urgently, a somewhat challenging assignment undertaken in very basic conditions. The response of national colleagues to the question of priorities was that "everything is a priority here". Whilst understandable, this is not helpful.

Eventually, a system was developed that prioritised counties on the basis of population pressure and relative poverty levels. This was linked through discussion of the forest that was there, the needs and potential into a series of interventions that were most appropriate for each county. There were three core criteria for priorities that were used:

- Will impact positively on a large number of people;
- Will be applicable over a large area; and
- Will deliver visible and useful benefits fairly quickly and will be within the capability of the available human resources to deliver.

There was one additional priority that was added to these:

- Focus on securing highly vulnerable ecosystems that are in danger of irreversible damage or loss.

In delivering the actions that have been developed to meet the Aichi targets, prioritisation systems will be required to ensure that resources are used in the most effective way. Priorities will need to be decided between and within countries using transparent systems, focusing on the most vulnerable points and avoiding the temptation to tackle the most intractable first because it is a challenge.

Annex 2 Summary Tables

Table 1 Overall Summary - Forest targets

Ref	Proposed Actions	Estimated Costs		2013 to 2020		Cross-relevance to other forest targets			
		Upfront	Annual	Total	Annual Average	5	7	11	15
		US\$ million	US\$ million	US\$ million	US\$ million				
5.1	Biodiversity Inventory	25	0	25	3		L	H	H
5.2	Monitoring system	150	40	470	59		H	H	L
5.3	Training PO s	20	50	420	53		H	M	L
5.4	Law Enforcement	300	300	2,700	338		H	H	H
5.5	Enabling Conditions	10,000	10,000	90,000	11,250		H	H	M
	Total Target 5	10,495	10,390	93,615	11,702				
7.1	Market Corrections	290	36	578	72	M		M	L
7.2	Processing Efficiency	12,000	4,000	44,000	5,500	H		M	L
7.3	Fire Management	200	200	1,800	225	H		H	M
7.4	Product Creation	2,000	5,000	42,000	5,250	H		M	M
	Total Target 7	14,490	9,236	88,378	11,047				
11.1	Protected Areas	55,455	4,000	87,455	10,932	H	H		M
15.1	Site Selection	100	0	100	13				
15.2	Establishment	0	5,000	40,000	5,000				
15.3	Assisted Nat Regen	0	938	7,500	938				
15.4	Site Protection	0	188	1,500	188				
15.5	Weed Control	0	281	2,250	281				
	Total Target 15	100	6,406	51,350	6,419	M	L	H	
	Total forest targets	80,540	30,032	320,798	40,100				
	In US\$ billion	81	30	321	40				

Table 2 Summary of Recommended Actions

Actions to deliver Targets 5, 7, 11, 15	Upfront	On-going/year	Contribution to Targets	Finance source (Public)	Finance source (Private)	Comment
<i>Target 5</i>						
5.1 Biodiversity inventories	25,000,000		1, 2, 5, 11,	x		Vital initial step
5.2 Monitoring system	150,000,000	40,000,000	2, 5, 7, 11, 15	x		Includes inventory updating
5.3 Training and education of professional officers	20,000,000	50,000,000	5, 7, 11, 15	x		Support to monitoring and information gathering, analysis and use
5.4 Law enforcement	300,000,000	300,000,000	5, 7, 11, 15	x		Wider benefits for other forest sector interests, REDD+, FLEGT, etc.
5.5 Creation of enabling conditions (financial incentives which counter illegality)	10,000,000,000	10,000,000,000	5, 7, 11, 15	x	x	Will eventually become self-financing
<i>Target 7</i>						
7.1 Market correction, public procurement policies	290,000,000	36,000,000	3, 5, 7, 11, 15	x		Strong links with FLEGT
7.2 Efficiency in processing	12,000,000,000	4,000,000,000	5, 7, 11, 15		x	Should be self-financing and investment should come from industry and trade sector
7.3 Fire management in vulnerable ecosystems	200,000,000	200,000,000		x		Strong livelihood benefits also
7.4 Product creation (tourism, PES, carbon, ABS)	2,000,000,000	5,000,000,000	7, 11	x	x	Follows holistic approach

Actions to deliver Targets 5, 7, 11, 15	Upfront	On-going/year	Contribution to Targets	Finance source (Public)	Finance source (Private)	Comment
<i>Target 11</i>						
11.1 Land tenure, legal processes, compensation for PA extension	55,454,575,000	4,000,000,000	5,11	x		Compensation payments expected to be very substantial
<i>Target 15</i>						
15.1 Restoration site selection	100,000,000		15	x	x	Initial step
15.2 Seeds, nursery establishment, planting		5,000,000,000	15	x	x	Range of artificial and natural regeneration system to be employed
15.3 Assisted natural regeneration		937,500,000	15	x	x	Should be strongly guided by biodiversity considerations
15.4 Site protection (wildlife, fires, livestock)		187,500,000	15	x	x	Essential to protect progress
15.5 Weed control and climber cutting <i>etc.</i>		281,250,000	15	x	x	Additional to that during initial establishment phase
Total	80,539,575,000	30,032,250,000				
Public	62,489,575,000	15,329,125,000				
Private	18,050,000,000	14,703,125,000				
Check	80,539,575,000	30,032,250,000				

Table 3 Comparison with Global Numbers

Scenario	Yearly cost	Public	Private
Action based calculations for DEFRA study	US\$ 40 billion	US\$ 23 billion	US\$ 17 billion
Pessimistic scenario, 50% of above	US\$ 20 billion	US\$ 12 billion	US\$ 8 billion
Optimistic scenario, 125% of above	US\$ 50 billion	US\$ 30 billion	US\$ 20 billion
<i>Range of Estimates Located and Reviewed</i>			
Target	Range	Lowest	Highest
Global estimate for Target 5 (halve)	US\$ 5.0 to 37.5 billion	5.0	37.5
Global estimate for Target 7 (SFM)	US\$ 49.5 to 160.0 billion	49.5	160.0
Global estimate for Target 11 (conservation)	US\$ 4.0 to 27.5 billion + US\$ 3.1 to 4.8 billion	7.1	32.3
Global estimate for Target 15 (restoration)	US\$ 20.4 to 87.0 billion	20.4	87.0
Total		82.0	316.8

Table 4 Forest Loss by Region

Region	Forest Area 2010 000s Ha	Net Annual Change 2005-10 000s Ha	Average Annual Change	Average Annual Change 2005 - 2010		Loss rate "Traffic Light"	Average Annual Change 2005 - 2010	
				Loss 000s Ha	Gain 000s Ha		Loss %	Gain %
Eastern and Southern Africa	267,517	-1,832	-0.7%	-1,836	5		-0.7%	0.0%
Northern Africa	78,814	-41	-0.1%	-68	27		-0.1%	0.0%
Western and Central Africa	328,088	-1,536	-0.5%	-1,548	12		-0.5%	0.0%
Africa	674,419	-3,410	-0.5%	-3,452	44		-0.5%	0.0%
East Asia	254,626	2,557	1.0%	-216	2,772		-0.1%	1.1%
South and Southeast Asia	294,373	-991	-0.3%	-1,361	370		-0.5%	0.1%
Western and Central Asia	43,513	127	0.3%	-17	143		0.0%	0.3%
Asia	592,512	1,693	0.3%	-1,594	3,285		-0.3%	0.6%
Europe	1,005,001	770	0.1%	-8	777		0.0%	0.1%
Caribbean	6,933	41	0.6%	-2	44		0.0%	0.6%
Central America	19,499	-249	-1.3%	-272	23		-1.4%	0.1%
North America	678,961	228	0.0%	-155	383		0.0%	0.1%
South America	864,351	-3,581	-0.4%	-3,666	83		-0.4%	0.0%
America	1,569,744	-3,561	-0.2%	-4,095	533		-0.3%	0.0%
Oceania	191,384	-1,072	-0.6%	-1,080	8		-0.6%	0.0%
World	4,033,060	-5,580	-0.1%	-10,229	4,647		-0.3%	0.1%

Source: FAO GFRA 2010

Loss rate "Traffic light" key		+ve or 0		< - 0.5%		> 0.5%
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Table 5 Forest Cover by Country

Top Forest Cover Countries				
With more than 40 million ha each (i.e. 1% or more of the total global forest)				
Country	Forest area (million ha)	Cumulative forest area (million ha)	Relative to total forest area (%)	Cumulative relative figures (%)
Russia	809	809	20.1%	20.1%
Brazil	520	1,329	12.9%	33.0%
Canada	310	1,639	7.7%	40.6%
USA	304	1,943	7.5%	48.2%
China	207	2,150	5.1%	53.3%
DRC	154	2,304	3.8%	57.1%
Australia	149	2,453	3.7%	60.8%
Indonesia	94	2,547	2.3%	63.2%
Sudan	70	2,617	1.7%	64.9%
India	68	2,685	1.7%	66.6%
Peru	68	2,753	1.7%	68.3%
Mexico	65	2,818	1.6%	69.9%
Colombia	60	2,878	1.5%	71.4%
Angola	58	2,936	1.4%	72.8%
Bolivia	57	2,993	1.4%	74.2%
Zambia	49	3,042	1.2%	75.4%
Venezuela	46	3,088	1.1%	76.6%
Other 196 'countries'	945	4,033	23.4%	100.0%

Source: FAO Global Forest Resources Assessment (2010) including countries and independent territories of sovereign states, totalling to 213 'countries'.

Table 6 CI Biodiversity Hotspot Information

Hotspot	Original Extent Km ²	Remaining Habitat Km ²	Percentage Habitat Remaining	Forest type	Indicative threats					Area protected Km ²	Area protected Cat 1 - IV Km ²	Population density per Km ²
					Agricultural Expansion, over-grazing, charcoal	Conversion for plantations, high value crops	Logging and timber products	Mining	Danger from uncontrolled fire			
Atlantic Forest	1,233,875	99,944	8	Lowland and montane tropical moist forest	M	L	L		M in places	50,370	22,782	87
California Floristic Province	293,804	73,451	25	Range of diverse types					H	108,715	30,002	121
Caribbean Islands	229,549	22,955	10	Range of moist forest types and elfin woodlands	H	L	L		Localised	29,605	16,306	155
Caucasus	532,658	143,818	27	Arid woodlands, some BL forest and montane BL/conifer patches	H	L	H		H in dry areas	42,721	35,538	68
Cerrado	2,031,990	438,910	22	Savanna	H	M	L		Needs control	111,051	28,736	13
Chilean Winter Rainfall - Valdivian Forests	397,142	119,143	30	Deciduous, temperate rainforest and cloud forest	H	L	L		Limited	50,745	44,388	37
Coastal Forests of Eastern Africa	291,250	29,125	10	Savanna, gallery forest	H	L	L	Occasional	H	50,889	11,343	52
East Melanesian Islands	99,384	29,815	30	Diverse, moist forest, swamp forest, mangrove, seasonal	H	M	H	Important		5,677	0	13
Eastern Afromontane	1,017,806	106,870	10	Montane, dry to moist	M	H	L		M	154,132	59,191	95
Guinean Forests of West Africa	620,314	93,047	15	Lowland wet/moist forest, some montane	H	M	H	Localised but significant	L, higher post logging	108,104	18,880	137
Himalaya	741,706	185,427	25	Subtropical and temperate BL, coniferous	H	L	H	Limited, localised	H in parts	112,578	77,739	123
Horn of Africa	1,659,363	82,968	5	Arid, open savanna	H	No	No		H	145,322	51,229	23

Hotspot	Original Extent Km ²	Remaining Habitat Km ²	Percentage Habitat Remaining	Forest type	Indicative threats					Area protected Km ²	Area protected Cat 1 - IV Km ²	Population density per Km ²
					Agricultural Expansion, over-grazing, charcoal	Conversion for plantations, high value crops	Logging and timber products	Mining	Danger from uncontrolled fire			
Indo - Burma	2,373,057	118,653	5	Evergreen to deciduous	H	H	H	Some	H in parts	235,758	132,283	134
Irano - Anatolian	899,773	134,966	15	Oak and juniper dominate forests	H	L	M		H	56,193	25,783	58
Japan	373,490	74,698	20	Diverse						62,025	21,918	336
Madagascar and the Indian Ocean Islands	600,461	60,046	10	Notable endemic rainforest and dry forests	H	H	H		varies	18,482	14,664	32
Madrean Pine - Oak Woodlands	461,265	92,253	20	Pine-oak	M	L	H		H in places	27,361	8,900	32
Maputaland - Pondoland - Albany	274,136	67,163	24	Diverse warm temperate forest and grasslands	H	H	M		H	23,051	20,322	70
Mediterranean Basin	2,085,292	98,009	5	Human induced sclerophyllus maquis	H	L	L		H	90,242	28,751	111
Mesoamerica	1,130,019	226,004	20	Complex, extensive wet, moist and swamp forest	H	L	M		H in places	142,103	63,902	72
Mountains of Central Asia	863,362	172,672	20	Limited high elevation temperate types, including important fruit and nut species	H	L	M		H	59,563	58,605	42
Mountains of Southwest China	262,446	20,996	8	Diverse temperate to subtropical	H	L	L		varies	14,034	4,273	32
New Caledonia	18,972	5,122	27	Limited wet evergreen forest remains	H	M	L	Extensive	H	4,192	497	11
New Zealand	270,197	59,443	22	Temperate rainforest						74,260	59,794	14

Hotspot	Original Extent Km ²	Remaining Habitat Km ²	Percentage Habitat Remaining	Forest type	Indicative threats					Area protected Km ²	Area protected Cat 1 - IV Km ²	Population density per Km ²
					Agricultural Expansion, over-grazing, charcoal	Conversion for plantations, high value crops	Logging and timber products	Mining	Danger from uncontrolled fire			
Philippines	297,179	20,803	7	Lowland tropical rainforest, mixed forest and pine forest at higher elevations	H	M	L		varies	32,404	18,060	273
Polynesia - Micronesia	47,239	10,015	21	Mangrove, rainforest, cloud forest, savanna - all relatively limited	L	Too limited	Too limited	Some, localised intensive	varies	2,436	2,088	59
Southwest Australia	356,717	107,015	30	Sub-tropical dry Mediterranean forest				Some but controlled	H	38,379	38,258	5
Sundaland	1,501,063	100,571	7	Mainly lowland tropical rainforest including peat forests, with hill forests and seasonal forests in places	M	H	H	Some, extensive in places	M to H in places	179,723	77,408	153
Tropical Andes	1,542,644	385,661	25	Moist/wet lowland tropical forest, cloud forests, highly diverse	H	M	H	Large and small scale, both serious	Limited	246,871	121,650	37
Tumbes - Choc	274,597	65,903	24	Tropical wet/moist forest, mangrove and important coastal dry forest	H	L	M	Localised	Limited	34,338	18,814	51
Wallacea	338,494	50,774	15	Mainly tropical rainforest but some dry formations	H	H	H	Intensive in places	H in parts	24,387	19,702	81
Western Ghats and Sri Lanka	189,611	43,611	23	Rainforest, dry-evergreen, deciduous and cloud forests	H	M	H	Low, localised	H in parts	26,130	21,259	261
Total	23,308,855	3,339,851	14%									
Excl developed	22,014,647	3,025,244	14%									

Hotspot	Original Extent Km ²	Remaining Habitat Km ²	Percentage Habitat Remaining	Forest type	Indicative threats					Area protected Km ²	Area protected Cat 1 - IV Km ²	Population density per Km ²
					Agricultural Expansion, over-grazing, charcoal	Conversion for plantations, high value crops	Logging and timber products	Mining	Danger from uncontrolled fire			

Excluded from above

Cape Floristic Region	78,555	15,711	20	Shrubland, not forest
Succulent Karoo	102,691	29,780	29	Not forest, succulents

Item	Unit cost	Total Area Protected Km ²	Total Area Protected Cat I – IV Km ²
All Forest Biodiversity Hotspots		2,361,841	1,153,065
<i>Excluding developed countries</i>		2,078,462	1,003,093
Annual Cost Scenarios	US\$/Km ²		
	100	236,184,100	115,306,500
	150	354,276,150	172,959,750
	200	472,368,200	230,613,000

Hotspot	Current risk of deforestation and degradation	Main Countries	Includes top forest-cover countries?
Atlantic Forest	Reduced pressures recently but urbanisation poses threat	Argentina, Brazil	Y
California Floristic Province	Generally low, good protection of what remains but threats from commercial agriculture, urbanisation and pollution	USA	Y
Caribbean Islands	Varies widely, some locations still have high risk of both, plus urban and infrastructure development	Cuba, Dominican Rep, Haiti, Jamaica plus smaller islands	
Caucasus	High on remaining forests	Armenia, and Azerbaijan, Georgia, Iran, Russia, Turkey	Y
Cerrado	Conversion risk remains high	Brazil	Y
Chilean Winter Rainfall - Valdivian Forests	Grazing, urbanisation, invasives and infrastructure	Chile, Argentina	
Coastal Forests of Eastern Africa	High	Kenya, Mozambique, SW Somalia, Tanzania	
East Melanesian Islands	High	Solomon Islands, Vanuatu, part PNG	
Eastern Afromontane	High	Burundi, DRC, Eritrea, Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Saudi Arabia, Tanzania, Yemen, Zimbabwe	Y
Guinean Forests of West Africa	High but not uniformly	Benin, SW Cameroon, Côte d'Ivoire, Ghana, Guinea, Liberia, Nigeria, Equatorial Guinea, Sierra Leone, Togo, São Tomé and Príncipe	
Himalaya	High	Bhutan, Nepal, NE India, N Pakistan	Y
Horn of Africa	High	NE Eritrea, E Ethiopia, NE Kenya, Oman, W Saudi Arabia, Somalia, Yemen	
Indo - Burma	High	Cambodia, Laos, Myanmar, Thailand, NE India, S China	Y
Irano - Anatolian		Armenia, Iran Turkey parts of Azerbaijan, Georgia, Iraq, Turkmenistan	
Japan	Low generally, invasives	Japan	
Madagascar and the Indian Ocean Islands	High	Comoros, Madagascar, Mauritius, Seychelles	
Madrean Pine - Oak Woodlands	High	Mexico	Y
Maputaland - Pondoland	Degradation perhaps more important than outright	S Mozambique, South Africa, E Swaziland	

Hotspot	Current risk of deforestation and degradation	Main Countries	Includes top forest-cover countries?
- Albany	forest loss		
Mediterranean Basin	Generally low but vulnerable to fire damage and infrastructure development	Algeria, Balkan states, Egypt, France, Greece, Israel, Lebanon, Libya, Morocco, Spain, Syria, Turkey, Tunisia, Macronesia and Mediterranean islands	
Mesoamerica	High risk of both in most but not all countries in this system	Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama	Y
Mountains of Central Asia	Replanting may hide significant losses of natural forests	North-eastern Afghanistan, western China, southern Kazakhstan, Kyrgyzstan, Tajikistan, small part of Turkmenistan, eastern Uzbekistan	Y
Mountains of Southwest China	Degradation, infrastructure development	SW China	Y
New Caledonia	Invasives, degradation	New Caledonia	
New Zealand	Low generally, invasives	New Zealand	
Philippines	Extensive reforestation but natural forests remain under threat	Philippines	
Polynesia - Micronesia	Low in most of the islands	Fiji, Hawaii, Micronesia, Polynesia,	
Southwest Australia	Low but problems remain related to invasives and farming systems	Australia	Y
Sundaland	Major risk of forest loss in lowland tropical forest, substantial population pressure, resettlement	Indonesia, Malaysia	Y
Tropical Andes	High rates of both	Bolivia, Colombia, Ecuador, Peru, parts of Argentina, Chile and Venezuela	Y
Tumbes - Choc	Urbanisation an issue	Colombia, Ecuador, Panama, Peru	Y
Wallacea	Major risk of both	Indonesia	Y
Western Ghats and Sri Lanka	Continued risk of both, high population pressure	India, Sri Lanka	Y

Excluded from above

Cape Floristic Region		South Africa	
Succulent Karoo		SW Namibia, South Africa	

Table 7 ITTO Trade Statistics(000's m³)

<i>Region</i>	Production						Export						Export %						
<i>Product</i>	2007	2008	2009	2010	2011	Mean	2007	2008	2009	2010	2011	Mean	2007	2008	2009	2010	2011	Mean	
<i>Africa</i>																			
Logs	18,266	18,999	17,674	17,939	17,809	18,137	3,948	3,979	3,356	3,009	2,883	3,435	22%	21%	19%	17%	16%	19%	
Sawn	4,676	4,879	4,770	4,771	4,613	4,742	1,949	2,022	1,825	2,056	1,900	1,950	42%	41%	38%	43%	41%	41%	
Veneer	866	940	931	939	941	923	304	301	206	211	224	249	35%	32%	22%	22%	24%	27%	
Ply	495	455	444	423	419	447	267	222	231	234	217	234	54%	49%	52%	55%	52%	52%	
RWE	29,559	30,711	29,147	29,378	28,955	29,550	8,686	8,743	7,599	7,689	7,265	7,996	29%	28%	26%	26%	25%	27%	
<i>AP</i>																			
Logs	87,521	89,359	86,777	86,975	83,366	86,800	9,139	8,469	7,668	8,274	8,863	8,483	10%	9%	9%	10%	11%	10%	
Sawn	19,290	18,477	17,794	18,245	17,872	18,336	6,427	5,378	5,105	6,596	6,453	5,992	33%	29%	29%	36%	36%	33%	
Veneer	1,635	1,905	1,722	1,705	1,690	1,731	520	489	404	367	366	429	32%	26%	23%	21%	22%	25%	
Ply	11,860	10,169	9,718	10,043	9,587	10,275	7,166	5,854	5,847	6,333	6,336	6,307	60%	58%	60%	63%	66%	61%	
RWE	153,013	149,995	144,785	146,518	141,154	147,093	38,306	32,651	31,173	35,543	35,876	34,710	25%	22%	22%	24%	25%	24%	
<i>TA</i>																			
Logs	31,811	32,285	31,993	32,329	32,333	32,150	420	352	239	348	370	346	1%	1%	1%	1%	1%	1%	
Sawn	17,520	18,004	17,912	18,019	18,020	17,895	2,400	1,527	1,332	1,081	992	1,466	14%	8%	7%	6%	6%	8%	
Veneer	359	362	368	370	370	366	169	52	26	28	28	61	47%	14%	7%	7%	8%	17%	
Ply	1,226	1,162	958	939	915	1,040	596	400	232	239	239	341	49%	34%	24%	25%	26%	32%	
RWE	67,200	68,412	67,495	67,987	67,937	67,806	6,480	4,151	3,247	2,918	2,778	3,915	10%	6%	5%	4%	4%	6%	
<i>Total</i>																			
Logs	137,597	140,643	136,445	137,242	133,508	137,087	13,507	12,801	11,262	11,631	12,117	12,263	10%	9%	8%	8%	9%	9%	
Sawn	41,486	41,360	40,476	41,035	40,505	40,972	10,776	8,926	8,262	9,733	9,345	9,408	26%	22%	20%	24%	23%	23%	
Veneer	2,861	3,206	3,021	3,014	3,001	3,020	993	843	636	605	618	739	35%	26%	21%	20%	21%	25%	
Ply	13,581	11,786	11,120	11,405	10,921	11,763	8,028	6,477	6,310	6,807	6,792	6,883	59%	55%	57%	60%	62%	59%	
RWE	249,773	249,118	241,427	243,884	238,046	244,450	53,472	45,545	42,020	46,149	45,920	46,621	21%	18%	17%	19%	19%	19%	

Average	% of Global Figure - Production		
	Africa	AP	TA
Logs	13%	63%	23%
Sawn	12%	45%	44%
Veneer	31%	57%	12%
Ply	4%	87%	9%
RWE	12%	60%	28%

% of Global Figure - Export		
Africa	AP	TA
28%	69%	3%
21%	64%	16%
34%	58%	8%
3%	92%	5%
17%	74%	8%

Global Exports RWE							
Africa		AP		TA		Global	
3,435	43%	8,483	24%	346	9%	12,263	26%
3,550	44%	10,905	31%	2,669	68%	17,123	37%
473	6%	816	2%	115	3%	1,404	3%
539	7%	14,507	42%	785	20%	15,830	34%
7,996		34,710		3,915		46,621	

Table 8 Gap Analysis

To be finalised

Forest Targets	
Evidence on basic data and statistics	<p>The availability and quality of information is generally inversely related to need for intervention support on the actions proposed in this report.</p> <p>This is a major issue that needs to be addressed more widely. Despite computerisation, record keeping in most developing countries is far worse than it was in the past and the difference between them and developed countries continues to increase. Compare for example British Forestry Commission with any country in East or southern Africa. 40 years ago, they were broadly similar, now they are poles apart.</p>
Evidence on costs	<p>Strength of evidence - low</p> <p>The cost information varies widely and most of the figures needed fall outside the topics on which good cost data is available. The range of costs suggested in some of the studies reviewed seems to be grossly over-optimistic. REDD+ has been seeking US\$ 30 billion for several years but has so far managed only about US\$ 5 billion.</p> <p>Extent to which further research is required - considerable</p> <p>There is information in grey sources including donor and multilateral agency reports and archives that could be usefully abstracted.</p> <p>In the next phase, rather than working from a blank sheet of paper and often generating "wish lists" it should be possible to hone in and start to find answers to the question, "What could be achieved with US\$ X?"</p> <p>Transparency (and thence competition) over comparative costs between and within countries is a powerful tool for reducing costs to more realistic levels</p>
Evidence on current levels of expenditure	<p>Strength of evidence - low</p> <p>Extent to which further research is required - considerable</p> <p>The approach adopted in this programme is valuable in that it is forcing people to think about unit costs and hopefully reality. Many of the most disadvantaged countries have little of inadequate data and information on how much is spent or what is reasonable in terms of costs and on the relative costs of different budget items. Enforcing more discipline (gently) on budget development through probing questions such as, "What happens if you only get 50%?" <i>etc.</i> could assist in developing more realistic cost frames.</p> <p>On the basis of REDD+, however, (as an example) after more than a years work by a skilled and dedicated team, there is still no clear and accurate statement that relates donor pledges to money arriving in countries, let alone it being spent. It will be useful if the lessons learnt from this are applied to Aichi funding.</p>

Other Targets

Links to other Targets

The main links within the forest relevant target are within target 7 on sustainable management, 11 on protected areas and the potential conservation value of well-managed forest.

Target 15 on restoration is also significant as in many cases close links with other land uses such as agriculture and livestock need to be close and synergetic.

Note that REDD+ is now moving strongly towards closer links with agriculture (REALU) at policy and research levels.

There is also an issue in respect of Target 5. There appears to be an assumption that all forests are closed forests and should have stable interfaces; this simply does not apply in drier forests, which have ill-understood long-term natural and human induced variation cycles

Evidence on potential co-benefits

Very limited indeed. Many recent evaluations (DFID, Finland, Norway) have sought evidence that links forest interventions to poverty. These links are far more complex than generally realised and the question of co-benefits is likely to be a stumbling block with donors seeking short-term impacts. The first priority has to be to stop losing the forest capital and the second to increase the level of products and services its provides while taking care to relate these and their distribution in an equitable way.

Strength of evidence - low

Extent to which further research is required - considerable

Other policy areas

Related policy areas outside of biodiversity

Climate change (especially REDD+ but also adaptation), FLEGT and NFPs are the main areas in the technical sense.

Perhaps more vital in the long term is the closer integration of forest related plans and actions with economic planning and finance. Until there is transformational change that really puts forests in their right place given their role in underpinning many aspects of the environment and the national economy, the technical areas will not succeed.

The greatest difficulty perhaps is that most times, neglect of the forest does not result in immediately visible negative impact, it is much more insidious, which is why the measuring and monitoring is so important, but the transaction costs related to these need to be proportional to the values being secured.

Evidence on potential benefits to other policy areas

Extent of potential benefits - high

Extent to which further research is required - some

Figure 1 Upfront Costs by Action

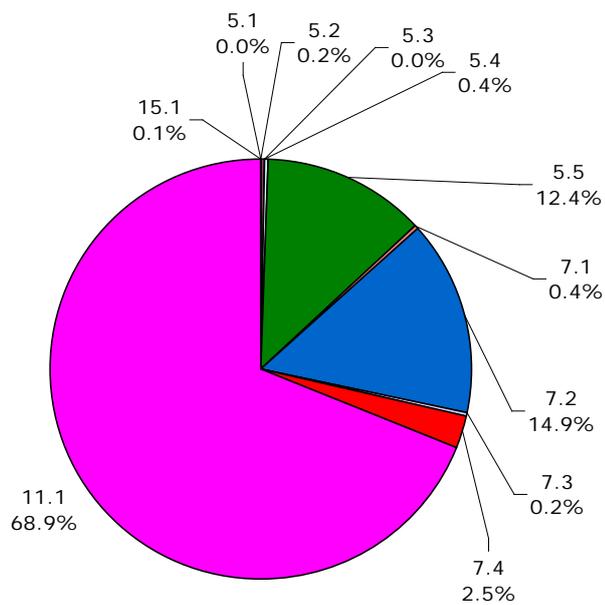
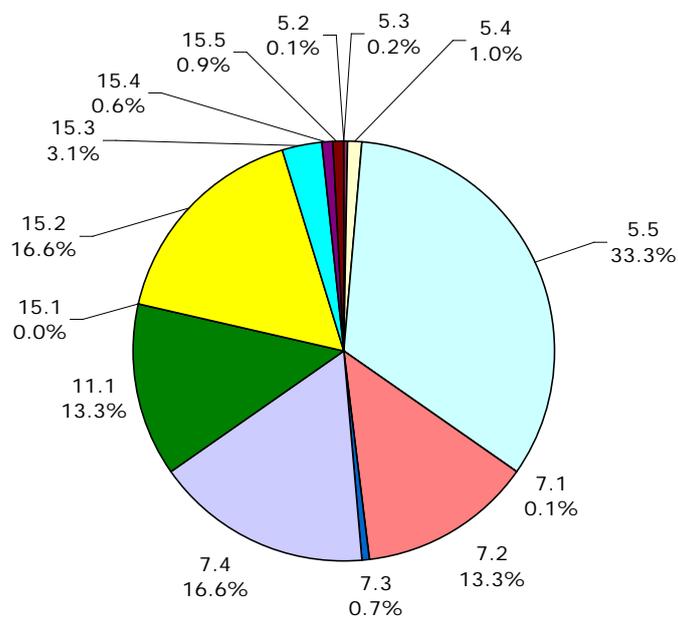


Figure 2 Annual Costs by Action



Annex 3 Reference Material

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