Assessing the relevance of countries and their capacities for reporting forests under UNFCCC

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Thünen Working Paper 36

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Content

Abstract

German

Die Staatengemeinschaft hat sich vorgenommen 2015 in Paris ein globales Klimaabkommen zu verabschieden, welches ab 2020 in Kraft treten und alle Mitgliedstaaten zu verbindlichen Emissionsreduktionen verpflichten soll. Dabei ist die Ausgangslage für gemeinsame Pflichten und Regeln durch die historische Unterscheidung zwischen Industrie- und Entwicklungsländern geprägt; auf der einen Seite die Industrieländer (Annex I) mit umfassenden Berichts- und je nach Ambitionen- Anrechnungsverpflichtungen, auf der anderen Seite Entwicklungs- und Schwellenländer (Non-Annex I) mit unterschiedlichsten ökonomischen und technischen Kapazitäten hinsichtlich der Erfassung und Beeinflussung von Emissionen. Dabei tragen gerade diese Länder durch Rodung und nicht nachhaltige Bewirtschaftung von Wäldern in nicht unerheblichem Maße zur Erhöhung der CO_2-Konzentration in der Atmosphäre bei.

Im Lichte des neuen Abkommens lösen wir die historische Unterscheidung zwischen Annex I und Non-Annex I Ländern auf und schauen, welche Länder aufgrund ihrer Waldausstattung tatsächlich relevant wären für ein effektives Klimaabkommen. Dabei werden öffentlich zugängliche Daten verschiedenen Kriterien und Indikatoren zugeteilt, und mit unterschiedlichen Wichtungen kombiniert. In einem zweiten Schritt werden die Kapazitäten dieser relevanten Länder hinsichtlich einer umfassenden Berichterstattung bewertet.

Die Ergebnisse zeigen, dass klimarelevante Waldländer über die ganze Welt verteilt sind und sich nicht auf eine homogene Gruppe von Ländern beschränken lassen. Dabei werden auch solche Länder identifiziert, die zwar auf globaler Ebene keine Rolle spielen, aber aufgrund ihrer nationalen Abhängigkeit von vorhandenen Waldressourcen im Verhandlungsprozess besonders engagiert sind. Hinsichtlich der Kapazitäten gibt es eine Handvoll sogenannter Schwellenländer, die ab 2020 in der Lage sein sollte umfassend über Emissionen aus Wäldern zu berichten. Die Mehrheit wird jedoch weiterhin auf Investitionen für den Aufbau von nationalen Kapazitäten angewiesen sein. Durch den Aufbau von Kapazitäten werden mit der Zeit mehr und mehr Länder in der Lage sein, den monetären Gegenwert für Emissionsminderungen durch den Rückgang von Entwaldung einzufordern. Somit stellt die Bereitstellung von Finanzmitteln, sei es für Kapazitätsaufbau oder in der Folge für ergebnisabhängige Zahlungen, eine Kernvoraussetzung für ein umfassendes und damit effektives Abkommen dar.

Keywords: UNFCCC, Klimarelevanz, Berichterstattung, Kapazitäten, Non-Annex I, Kriterien und Indikatoren, post 2020, Wald, Landsektor, REDD+, FAO-FRA

English

The international community has committed itself to adopt a global climate agreement in Paris in 2015, which shall enter into force in 2020. Common guidelines and commitments have to be developed for two distinctive groups of countries. On the one hand, there are developed countries with comprehensive emission reporting guidelines and – depending on national ambitions – emission reduction commitments, the so called Annex I countries. On the other hand, there is the group of Non-Annex I countries. This group consists of emerging economies and least developed countries, with different economic and technical capacities regarding emission reporting and accounting. At the same time, the group of Non-Annex I countries significantly contributes to global emissions, inter alia with deforestation and non-sustainable forest management.

In the light of ongoing negotiations, we dissolve the given distinction between Annex I and Non-Annex I countries and ask, which countries are actually relevant for an effective climate agreement for the forest sector. To assess the countries' relevance, we assign public available data sets to a set of criteria and indicators and combine these C&I with flexible weighting. In a second step we use the same method but different C&I, to assess the countries' capacities regarding a common emission reporting for the forest sector.

The results show that climate relevant countries are distributed all over the world and cannot be narrowed down to one group or continent. Further, we identified countries which might not be climate relevant on the global scale, but which are highly engaged under climate negotiations because of national circumstances. The capacity assessment shows that some developing countries, including the emerging economies, should have the capacities to report reliably on forest related emissions from 2020 onwards. However, the majority of developing countries will rely on capacity building programs financed by the international community. With increasing capacities, more and more countries will be able to reduce emissions and demand for result-based payments. Thus, a common and effective climate agreement post 2020 depends on reliable financial commitments.

Keywords: UNFCCC, climate relevance, reporting, capacities, Non-Annex I, criteria and indicators, post 2020, forest, land sector, REDD+, FAO-FRA

1 Introduction

Land use in the form of agriculture and forestry contributes just less than a quarter of total greenhouse gas emissions, mainly from deforestation, livestock, and agricultural soils (IPCC 2014). Despite the attention on policy concerning the reduction of deforestation, 13 million ha of forest continue to be lost every year, mainly in the tropics where people strongly depend on forests (FAO 2010). Forests' ecological functions include watershed regulation, regional climate control and soil management; they host 90 percent of the world's terrestrial species and provide livelihood for millions of people (Stern 2007).

The challenge of stopping global deforestation has been addressed by three United Nations Conventions; among others, the Convention on Biodiversity and the Convention to Combat Desertification (Ferretti-Gallon et al. 2014). Due to the role of forests as a carbon pool that can serve as sink or source of atmospheric carbon dioxide, the United Nations Framework Convention on Climate Change (UNFCCC) entitled the protection of forests' carbon stocks a fundamental part of its treaty in 1992 (UNFCCC 1992). The convention differentiates between the so called 'developed countries' which have been identified as a major factor responsible for human induced climate change and which are listed in Annex I of the Convention, and the 'developing countries', known as Non-Annex I. Due to the UNFCCC principle of 'Common But Differentiated Responsibilities and Respective Capabilities' (CBDR-RC), the developed countries were supposed to '*take the lead in combatting climate change*' Art.3 (UNFCCC 1992). Binding reporting and accounting requirements for Annex I parties evolved, most prominently the Kyoto Protocol. Non-Annex I commitments remained voluntary. Twenty years later, in 2012, the parties to the Convention decided '… *to launch a process to develop a protocol, another legal instrument or an agreed outcome with legal force under the Convention <u>applicable to all Parties</u>* …' (UNFCCC 2012a). Furthermore, it was decided that this process should be completed at the meeting 2015 in Paris and that the new protocol should enter into force in 2020.

Ongoing negotiations face the challenge that the world, according to the Convention, is divided into two groups- the Annex I and the Non-Annex I parties with different responsibilities and, even more important, different capacities. The clear distinction between these groups was maintained during negotiations and led to large differences in reporting and accounting of emissions and emission reductions. Nevertheless some Non-Annex I countries have developed strongly with high shares in actual overall emissions since the ratification of the convention in 1994. The new protocol, *applicable to all Parties*, offers the possibility and the need to rethink the historical categories of Annex I and Non-Annex I against the background of the CBDR-RC principle. In order to limit the anthropogenic global warming to 2 degrees Celsius, the challenge will be to cover all emissions. As a high share of emissions is caused by land use-changes, mainly deforestation, the forest sector will play a crucial role in reaching comprehensive emission reductions on the global scale. Despite some shifts in the balances of power across the globe, many developing countries still lack capacities for reporting and accounting of the land use sector. In order to develop a powerful climate regime with a high impact on emissions from forests, it will be important to

build capacities especially in those countries where forests have a high impact on the global or national emission balance (Parker et al. 2014). Most of them are already engaged under the REDD+ mechanism ('reducing emissions from deforestation and forest degradation and the conservation and enhancement of forest carbon stocks and the sustainable management of forests in developing countries' (UNFCCC 2010))

The objective of this study is therefore to identify relevant players and capacity-lacking countries, to quickly and efficiently accompany the process towards a common accounting approach post 2020[1]. Therefore, we built up a database containing forest-related data of all Annex I and Non-Annex I countries to establish comparisons and analyses among the countries. Against this background we developed an assessment tool based on criteria and indicators to identify, in a transparent manner, forest relevant players and their capacities towards emission reporting for forests. Depending on their national capacities, the relevant parties could be classified into countries with a high potential impact on emissions and removals from the forest sector, but lacking capabilities to report on them. Special consideration should be given to these countries when it comes to financing capacity building. Parties considered as having the technical and economic potential to engage in ambitious reporting should be invited to take their share in the responsibility towards limiting anthropogenic climate change.

This report summarizes results from the Research and Development Project *Environmental implications of Land Use, Land Use-Change and Forestry under a future climate regime* (R&D 3712 41 105) running from December 2012 to February 2015 and financed by the German Federal Environment Agency (Umweltbundesamt, UBA).

2 Methodology and Data

Although three different United Nations Conventions address the challenge of global forest loss, reliable data regarding forest cover and land use change for all countries is scarce. The concept of criteria and indicators to assess countries' relevance and capacity was chosen. To assure transparency the indicators had to be defined by publicly available data.

2.1 Assessment with Criteria and Indicators

Criteria and indicators (C&I) are widely known and established in the context of sustainable forest management (Brand 1997), (Castañeda 2000), (McDonald et al. 2004), (Wijewardana

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[1] We do not address the challenge of bringing the variety of existing instruments and engagements together. For more on this topic see Canaveira 2013, Parker et al. 2014, Pauw et al. 2014, Estrada et al. 2014.

2008). The Food and Agriculture Organisation of the United Nations (FAO) defines C&I as information on forests used to monitor and assess their status (FAO 2014a). These C&I are used for the compilation of the Forest Resource Assessment (FRA), a compendium of global data on forests on national scales (FAO 2010). Other international organizations that have established monitoring and assessment with C&I are the International Tropical Timber Organization (ITTO 2005) and the Center for International Forestry Research (Namkoong et al. 1996).

The assessment approach based on C&I used for this report is shown schematically in

Figure 1 (for a comparable assessment based on C&I see also (Romijn et al. 2012)). In general a criterion is used as a reason for making a judgment or decision. Each criterion is defined by a set of indicators that show the condition or existence of something. Following this approach, criteria for the assessment of relevance and capacity were defined and, depending on the available data, several indicators were assigned to each criterion.

Figure 1: Schematic figure of the assessment with C&I. Data behind the indicators is grouped and a score is assigned to each group. Within the assessment the indicators are weighted, which influences the indicator's share in the overall score.
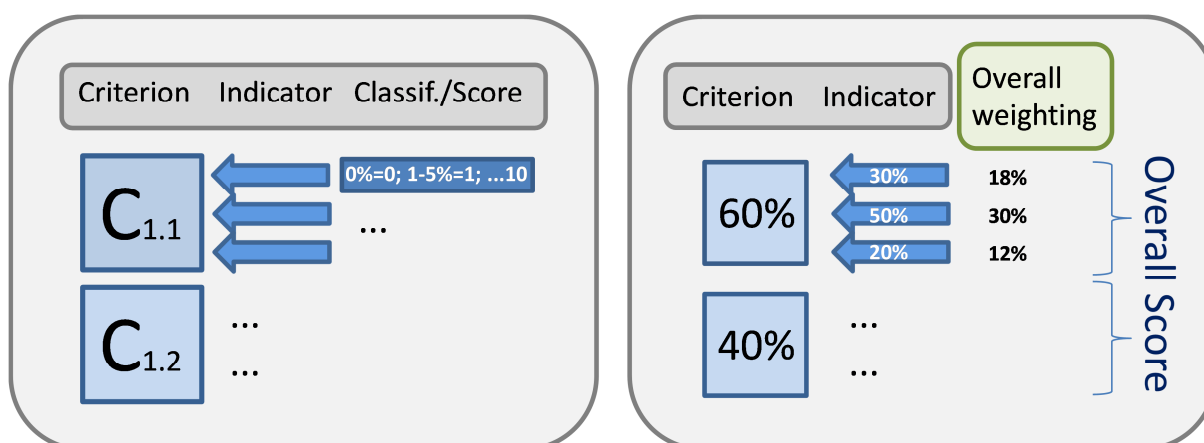
Within each indicator the data was divided into groups/classes and scores were distributed from lowest to highest class in order to scale the importance of each country for each indicator. The criteria and, within the criteria, the indicators, were weighted. Each indicator's score for a country was multiplied by the associated overall weighting and summed up to an overall country's score. Classifying the countries from the highest score to the lowest resulted in a ranking. The ranking depended on the sum of the scores the countries gained under each indicator. A flexible weighting of C&I allows assessments with different focusses.

2.2 Data on forests

The restrictions in data availability strongly influenced the selection of indicators. Uncertainty about the data's accuracy and the value of conclusions based on the analysis of selected datasets comes along with the usage of different sources for global forest data. Therefore, the quality of those data and considerations which lead to the use of certain data sets for the subsequent assessments are discussed.

2.2.1 State of availability

Due to fragmented reporting requirements under the climate convention, the data basis regarding the climate contribution of the forest sector is quite heterogeneous. While Annex I parties report annual emissions and removals from the year 1990 onwards (UNFCCC 2003a), the only available source for nationally reported emissions from Non-Annex I countries are the irregularly submitted National Communications (UNFCCC 2003b). The analysis of available National Communications of some major emerging economies like Mexico (Mexico 2012), Brazil (Brazil 2010), India (India 2012), China (China 2012) and South Africa (South Africa 2011) shows that even within this Non-Annex I group of countries, the quality of emission data diverges strongly, reported years and categories are not comparable as shown in Table 1.

Table 1: Available emission data and use of IPCC Guidelines as presented in the last available National Communications from Brazil, China, India, Mexico and South Africa. Brackets indicate the use of different IPCC Guidelines compared to the most recent National Communication.

Country	Emission Data	Use of IPCC Guidelines
Brazil	1990-2005	IPCC 2006/GPG 2003
China	(1994) 2005	(IPCC 1996) IPCC 2006
India	1994/2000	IPCC GPG 2003
Mexico	1990-2010	IPCC 1996
South Africa	(1990/1994) 2000	(IPCC 1996) IPCC 2006

The reasons for this divergence of submitted Non-Annex I National Communications can be attributed to the agreed reporting rules that form the basis for the use of Intergovernmental Panel on Climate Change (IPCC) Guidelines, and which define how to recalculate emissions from previous years after changing the IPCC Guidelines: in any case, the use of specific methods or sets of data is not mandatory but only encouraged in most cases (UNFCCC 2003b). Furthermore, no review has been implemented on the quality and amount of information that was submitted. With the new reporting requirements through the Biennial Update Reports from December 2014 onwards, and the International Consultation and Analysis process (UNFCCC 2012c), these deficiencies in greenhouse gas reporting of Non-Annex I countries are supposed to shrink.

On a regular basis, the FAO publishes the results of an international Forest Resource Assessment (FRA) including country-specific information on forest area, carbon stock and forest types (FAO 2010). The data that has been compiled in the FAO-FRA of the year 2010 is the only available basis for comparable data of all countries with time coverage of the years 1990, 2000, 2005 and 2010.

Based on the FAO-FRA 2010 data and the IPCC Guidelines 2006 for emission reporting, the FAO Statistics Division (FAOSTAT) has carried out national forest emission estimates for 1990-2010 (Tubiello et al. 2014) which can be downloaded from the FAO emission database (FAO 2014b). As FAO-FRA 2010 data only show the net forest area change in total, for plantations and primary forests, no gross deforestation and afforestation data is extractable. Only the dominant activity is observable. Thus, the resulting emission time series are available for *forest* and *net forest conversion*[2].

Further data used were the number of UNFCCC submissions by parties between 2007 and October 2013 (UNFCCC 2014b), the most recent FAO data regarding the contribution of the forestry sector to gross domestic products for 2006 (Lebedys 2008) and economic classifications by the World Bank and the United Nations Development Program. Online information regarding capacity building programs like Forest Carbon Partnership Facility (FCPF 2014), UN-REDD (UN-REDD 2014) and Forest Investment Programm (FIP 2014) were used; further information gathered under The REDD Desk (the REDD Desk 2014), Southern African Development Community (SADC 2014), CD-REDD (CD REDD 2014), International Climate Initiative (BMU 2014), information about countries' involvement in Clean Development Mechanism (UNFCCC 2014a) and in Voluntary Partnership Agreements under the Forest Law Enforcement, Governance and Trade (VPA-FLEGT) (EUFLEGT Facility 2014).

2.2.2 Discussion on data quality

Olander et al. (2008) list the main weaknesses of FAO-FRA data which include the lack of consistency between countries, changing forest definitions, different methods to assess deforestation, as well as unreliable and missing data in some cases. Although these critics refer to older versions of the FRA, and the FAO is continuously improving its data collection process (FAO 2010), deficiencies remain as showed by our analysis of reported data from Annex I countries under UNFCCC and FAO-FRA (Figure 2).

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[2] For Brazil, FAOSTAT reports a decrease in emissions from net forest conversion for 2009 and 2010 that is not explainable with FAO-FRA 2010 data. Therefore, FAOSTAT data was corrected through personal consultation of FAOSTAT-staff.

Figure 2: Comparison of total forest area in km^2 reported under FAO-FRA 2010 and UNFCCC Submission 2014 for Australia (Australia 2014), Canada (Canada 2014) and Russia (Russian Federation 2014) for the year 2010.
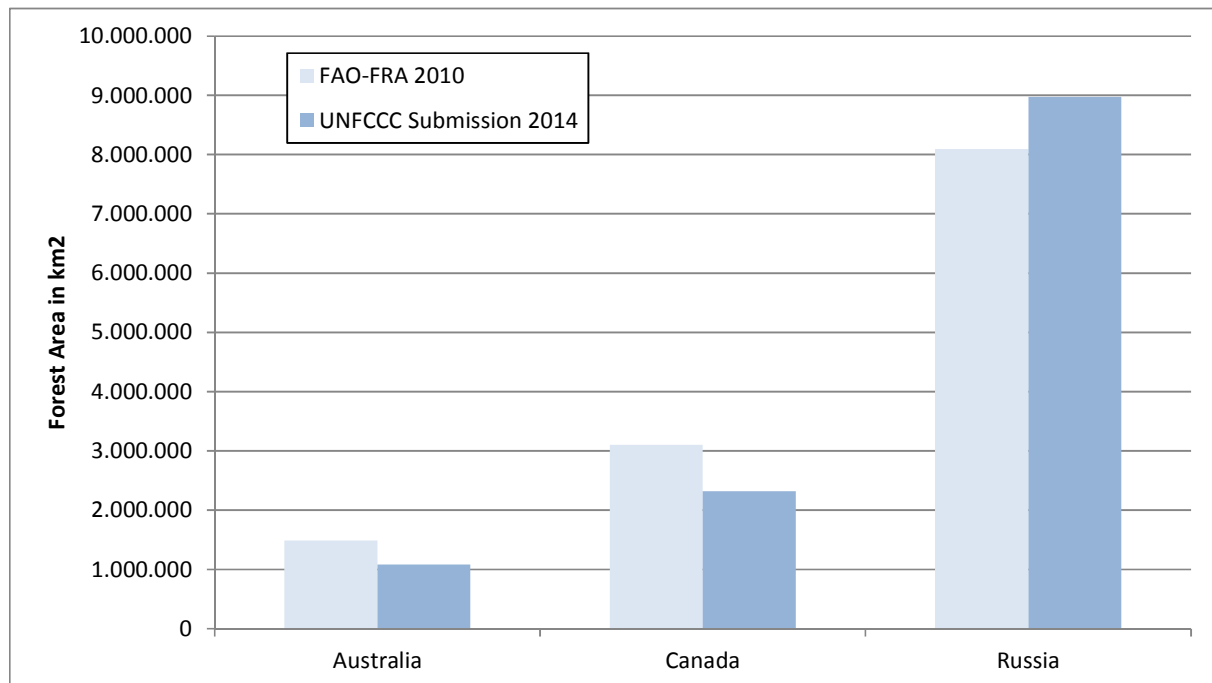
Discrepancies could be caused, among other reasons, by different forest definitions (e.g., FRA offers the additional category 'other wooded land') or different institutional competences under different reporting requirements. Although data on forest area and on changes of forest area included in the FAO-FRA 2010 may differ widely from those numbers which are reported under UNFCCC, they are still the best available *global* dataset for common years (Grainger 2008).

A comparison of forest emissions from Annex I countries under UNFCCC and those calculated by the FAOSTAT for 2000-2010 based on FAO-FRA 2010 shows differences that are based on the different assumed forest areas. Figure 3 shows the differences between emission data for Australia (Australia 2014), Russia (Russian Federation 2014) and Canada (Canada 2014) calculated by FAOSTAT and the emission data reported in the inventories 2014 under the Convention.

Figure 3: Differences between FAOSTAT emissions/removals from forests and data reported under UNFCCC 2014 (Forest land remaining and land converted to forest land) for the years 2000-2010. No trends in emissions can be concluded from the figure.
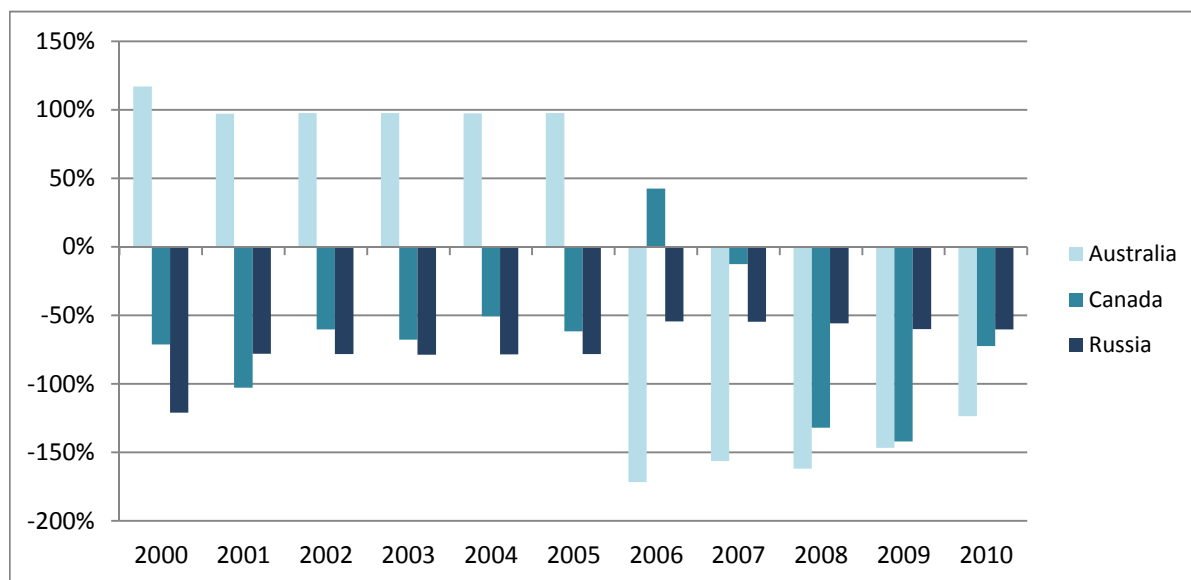
FAOSTAT data based on FAO-FRA 2010 underestimate the reported removals for Russia for all years between 2000 and 2010. For Australia, FAOSTAT data underestimates removals between 2000 and 2005, and after 2005 removals are heavily overestimated. Canada reports under UNFCCC emissions/removals with strong inter-annual oscillations that could not be displayed by five years steps under FAO-FRA, even if data was the same for 2000, 2005 and 2010. As there are no disaggregated time rows for Non-Annex I under the Convention, a comparison of emission data for developing countries is not possible. Concerning the influence of reporting capacities under UNFCCC on FAO-FRA reporting of Non-Annex I, Romijn et al. (2012) concluded '*that the data used to report under FRA are usually reflecting the country status of 2-3 years before, (…) and thus do not allow for assessing an actual 'REDD effect' for the FRA*'. Nevertheless, FAO and IPCC are in the process of harmonising data requirements for reporting under FAO-FRA and the use of IPCC Guidelines which can contribute to common post-2020 requirements (IPCC 2010).

As no comparable data for at least one common year has been available under the UNFCCC until today (compare with Table 1), the data reported under UNFCCC is at the moment not applicable for a *global* comparison and assessment of forest related emissions and forest area change. Nevertheless, to assess the national share in emissions from the land sector for the last available year for each country UNFCCC data was used. For the global comparison, data from FAO-FRA 2010 and FAOSTAT was used.

3 Relevance Assessment

3.1 Defining Criteria and Indicators for the Relevance Assessment

Most important for a successful post 2020 climate agreement in the forest sector under the aspect of climate effectiveness, is the inclusion of countries with large forest carbon stocks on the global scale. Further, the integration of those countries that already have, or will have, a high interest in using their national forest resources will be important, to formulate decisions which are supported by a broad base of parties. In order to evaluate the potential climate impact and engagement of countries, three criteria that are shown in Table 2 were identified, namely global relevance, national relevance and engagement in climate politics.

Table 2: Relevance assessment – C&I for countries' relevance for climate negotiations in the forest sector

Evaluation	Criteria	Indicator
1.Climate Relevance for Forest Sector	1.1 Global Relevance	1.1.1 Share of global Forest Emissions
		1.1.2 Share of global Forest Area
		1.1.3 Share of global annual Net Forest Area Change
		1.1.4 National share of Primary Forest
	1.2 National Relevance	1.2.1 Share of Land Sector in total Emissions
		1.2.2 Share of Forest Sector in GDP
	1.3 Climate Political Engagement	1.3.1 Formal participation under UNFCCC

- Global relevance: countries that influence the global carbon cycle in a significant manner due to their forest area and/or forest area change 2000-2010;

Under the aspect of global relevance, countries with a high share of global forest area in 2010 (Indicator 1.1.2) were defied as important for conservation and enhancement of forests' carbon stocks. Countries with a high dynamic in forest area (Ind. 1.1.3) between 2000 and 2010 were defined also as important, as they are potential carbon dioxide emitters or removers. In the FAOSTAT emissions estimates, emissions from forest degradation (an important aspect under the REDD+ Mechanism) are taken into account additionally to emissions from forest conversions and removals from forests. Therefore, the share of global emissions/removals from forest and net forest conversion was chosen as additional indicator (Ind. 1.1.1). Since afforestation and reforestation, mainly in the form of plantations, do not have the same ecological value as primary forests, the share of primary forest in the national forest area in 2010 was considered, too (Ind. 1.1.4).

- National relevance: these countries are potential catalysts or opponents of forest-related decisions negotiated under UNFCCC that could influence national management decisions, because they depend strongly on their forests and/or their forest sector has the potential to take a relevant share in fulfilling national emission reduction commitments and/or generating certificates for carbon trade;

The share of the forest sector in the Gross Domestic Product (GDP) (Ind. 1.2.2) was defined as an indicator of the relevance of the forest sector for national economies and politics. A high share, and correspondingly a high dependency on forests, could be a barrier for political interventions, or at the same time an indicator for high sensibility towards a more sustainable management of these national resources. Further, the share of the land sector in total national emissions (Ind. 1.2.1) was chosen as an indicator of the importance of land uses for the national economy[3]. With the exception of Scandinavia and the Baltic States, the land sector has the highest shares of total emissions in weak economies from developed countries, where removals in the land sector can even overlie all other emissions including energy and industry sectors (e.g., Chad, Congo and Malaysia). Reduced emissions or alternatively enhanced removals could be traded in carbon markets, used to fulfill emission reduction commitments or be financed under REDD+, and thus are a potential branch of the economy. As described in Chapter 2.2 *Data on forests* the emission data are not comparable to each other since the IPCC Guidelines from 1996 and 2003 used are not comparable and emissions are not reported for a common year. The forest related emissions/removals are not extractable from the majority of Non-Annex I data based on IPCC Guidelines from 1996, so data for the whole land sector had to be considered.

- Engagement in climate politics: rather the interests and negotiating positions of countries that are highly engaged in the design of a future climate treaty have to be taken into account, than those of passive parties;

To incorporate the parties' engagement in international climate negotiations, parties' submissions from all relevant work streams[4] with reference to forests from 2007-2013 were considered with the restriction that the party's name had to be displayed in the submission. This was due to the changing composition of coalitions and may cause an under- or overrepresentation of some parties' engagement. It was not possible to evaluate the submissions regarding the quality of the statements.

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[3] The UNFCCC emission data for Guinea-Bissau was deleted as it reported the land use sector as a net sink of 11 billion kt CO_2 for 1994, which is obviously wrong (China emitted 5.5 billion kt CO_2 in 2005 over all sectors.)

[4] Submissions were counted for 2007-2013 for the work streams: Subsidiary Bodies for Scientific and Technical Advice (SBSTA) and for Implementation (SBI), Conference of the Parties (COP), Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP), Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP), Long-term Cooperative Action (AWG-LCA), and Durban Platform for Enhanced Action (AWG-ADP).

Table 3 shows criteria and indicators with data sources and the methods used for clustering the data. For all types of relevance indicators, except the formal participation under UNFCCC (Ind. 1.3.1), a cluster analysis was carried out. As the results of different methods for clustering were quite similar, it was decided to use the Ward method with standardized data to cluster the countries into eleven classes[5]. This number of classes was chosen to evaluate the data on a scale from 0 to 10, scoring zero for the smallest shares or no data, up to 10 for the highest shares.

Table 3: Indicators for the relevance assessment, the assessed year, data sources and methods for clustering

Indicator	Year	Data Source	Method
1.1.1 Share of global Forest Emissions	2010	FAOSTAT	only value; JMP cluster; score 0-10
1.1.2 Share of global Forest Area	2010		JMP cluster; score 0-10
1.1.3 Share of global annual Net Forest Area Change	2000-2010	FAO-FRA 2010	only value; JMP cluster; score 0-10
1.1.4 National share of Primary Forest	2010		JMP cluster; score 0-10
1.2.1 Share of Land Sector in total Emissions	last available	UNFCCC Reporting	only value; JMP cluster; score 0-10
1.2.2 Share of Forest Sector in GDP	2006	FAO Forest Finance	JMP cluster; score 0-10
1.3.1 Formal participation under UNFCCC	2007-2013	UNFCCC Submissions Online	score 0-10

For the indicators 1.1.1 'share of global forest emissions', 1.1.3 'share of global annual net forest area change' and 1.2.1 'share of land sector in total emissions', the values of the data were clustered, irrespective of whether the algebraic sign were positive or negative. The idea behind this approach is that, from a purely climatic point of view, a country with a lot of afforestation activity on the global scale, like China, is as important for the global forest cover and the carbon dioxide concentration in the atmosphere as a country with high deforestation activity, like Brazil. A comparison of these two countries' shows that between 2000 and 2010 China afforested more than Brazil deforested[6].

As the European Union (EU) has been negotiating as one stakeholder under the UNFCCC for over 20 years now, it was decided to assess its relevance rather as one party than for 28 parties. This reduced the total number of countries from 227 to 199.

3.2 Scenarios for the Relevance Assessment

Two different scenarios were calculated for the purpose of demonstrating different interpretations of 'climate relevance'. In order to set different focuses, the weighting of criteria was changed between both scenarios. The relevance results in this report should not be understood as an ultimate advice for setting up negotiation tactics. The assessment illustrates an

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[5] To read more about the Ward method see Ward 1963 and Jain et al. 1999.

[6] Quality differences of these forests are accounted for under Ind. 1.1.4, 'national share of primary forest'.

approach to explore potential climate relevance in the context of emissions from forests on the basis of officially accessible data in a transparent and objective manner.

3.2.1 Scenario 1

In Scenario 1 all criteria were considered. Not only was the global relevance taken into account, but also national circumstances and the countries' engagement in climate negotiations. With these considerations, this scenario is close to negotiations where all parties have the opportunity to represent their national interests and influence the negotiation process. As a result, countries that scored highest in the sum of all three criteria were identified as not only climate relevant but also engaged in climate politics, and thus potentially interested negotiating partners.

Weighting

In Scenario 1 the focus was put on the global climate relevance with 18 % each on forest area (1.1.2), net forest conversion (1.1.3) and forest related emissions (1.1.1), plus 6 % on the share of primary forests (1.1.4). The indicators for the national relevance- share of land-use emissions/removals in total national emissions (1.2.1) and share of forest sector in GDP (1.2.2) were weighted equally and contributed with the sum of 20 % to the overall score. Another 20 % were attributed to the engagement under climate negotiations (1.3.1). The weighting for all C&I in Scenario 1 is displayed in Table 4.

Table 4: Weighting of criteria and indicators for the relevance assessment Scenario 1

	Criteria		Indicator	
60%	1.1 Global Relevance	30%	1.1.1 Share of global Forest Emissions	18%
		30%	1.1.2 Share of global Forest Area	18%
		30%	1.1.3 Share of global annual Net Forest Area Change	18%
		10%	1.1.4 National share of Primary Forest	6%
20%	1.2 National Relevance	50%	1.2.1 Share of Land Sector in total Emissions	10%
		50%	1.2.2 Share of Forest Sector in GDP	10%
20%	1.3 Climate Political Engagement	100%	1.3.1 Formal participation under UNFCCC	20%

As illustration the results are exemplarily shown for Brazil (compare also with the assessment scheme in

Figure **1** and the data given in Annex I – Results of the Relevance Assessment (Scenario 1).

Example Brazil:

Ind. 1.1.1:   *(+) 22,8 % share of global forest emissions 2010 = 8 (score)*18 %*

Ind. 1.1.2:   *12,9 % share of global forest area 2010 = 9*18 %*

Ind. 1.1.3:   *(+) 50,5 % share of global annual forest area change 2000-2010 = 9*18 %*

Ind. 1.1.4:   *91,7 % share of primary forest in total forest 2010 = 10*6 %*

Ind. 1.2.1:   *(+) 61 % share of land sector-emissions in total emissions = 2*10 %*

Ind. 1.2.2:   *2.8 % share of forest sector in GDP = 5*10 %*

Ind. 1.3.1:   *9 forest related submissions = 4*20 %*

Overall Score = 1,4 + 1,6 + 1,6 + 0,6 + 0,2 + 0,5 + 0,8 = 6,8

Results

The relevance assessment was carried out for all countries listed in the FAO-FRA 2010 while the EU was handled as one, and resulted in a ranking based on the above defined importance of indicators. Annex I shows all indicators' scores for the top 51 countries[7].

Out of the 51 countries identified as potentially most relevant[8], most important in overall relevance are Brazil, Indonesia, the US, DR Congo, EU, China, Australia, Papua New-Guinea and Bolivia, followed by India and Russia.

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[7] Guinea-Bissau and Dominica scored same on rank 50/51.

[8] The threshold of 50 countries equals 25 % of all assessed countries.

Figure 4: 51 most relevant countries according to Scenario 1 from relevant (light blue) to very relevant (dark blue)
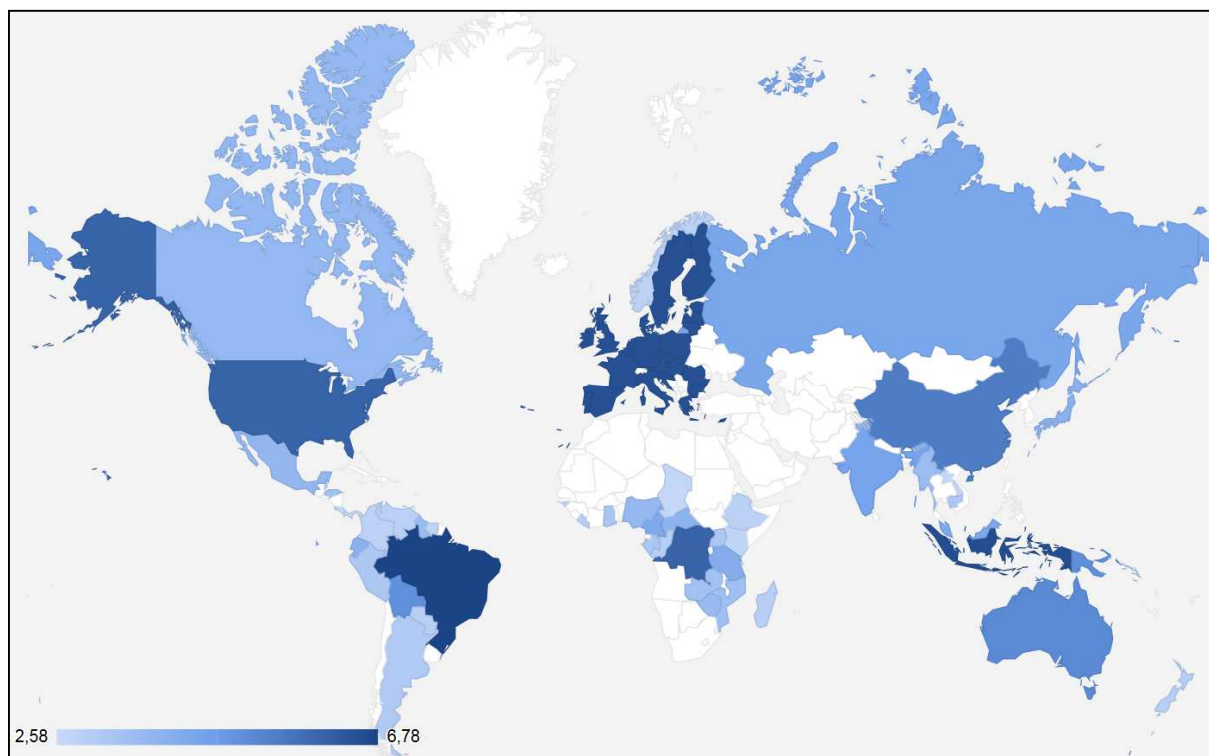
As Figure 4 shows, the potentially most relevant countries are distributed all over the world with 18 African countries, 17 American and eight Asian countries, three from the European continent plus Australia, Papua New-Guinea, New Zealand; Solomon Islands and Dominica as only countries in the Caribbean. Almost all Latin American countries are relevant, only missing Uruguay, Chile and French Guyana. No potentially relevant countries seem to be in the North of Africa and the Middle East, although Turkey has a share of global forest area comparable to Chad or Norway and is number 58. Eight parties are listed in the Annex I of the Convention, five of them are very large countries like the U.S., EU, Australia, Russia and Canada. Regarding the countries that are most vulnerable to climate change, 15 out of 51 are *Least Developed Countries*, 12 of them located in Africa. Seven parties belong to the *Association of small island states* namely Belize, Dominica, Guinea-Bissau, Guyana, Papua New-Guinea, Solomon Islands and Suriname.

The 51 most relevant countries under Scenario 1 cover almost 90 % of the global forest area, including Russia (20,1 %), Brazil (12,9 %), Canada (7,7 %) and the U.S. (7,5 %) with the highest shares of forest (Ind. 1.1.2). They are responsible for 90 % of global deforestation including high deforestation countries like Brazil (50,5 % global share), Australia (10,7 %), Indonesia (9,5 %), Nigeria (7,8 %), and Tanzania (7,7 %); and high re- and afforestation countries like China (-57 %),

EU (-10 %), the U.S. (-7,3 %), and India (-5,8 %) (Ind. 1.1.3). For the 51 most relevant countries, emissions and removals from forests in 2010[9] sum up to 1,3 million kt CO_2. 39 countries emit net 2,9 million kt CO_2 with Indonesia and Brazil as major emitters, emitting 0,9 respectively 0,3 million kt CO_2. The remaining 11 countries remove up to net 1,6 million kt CO_2 from the atmosphere, mainly because of US and China who are removing 0,5 respectively 0,3 million kt CO_2 through forests and afforestation (Ind. 1.1.1). Suriname (94.9 %), Brazil (91.7 %), Papua New-Guinea (91,2 %) and Peru (88.5 %) have the highest shares of primary forest (Ind. 1.1.4). The highest relevance of the land use sector for total national emissions was reported for Malaysia, Zimbabwe, Kenya, Cambodia, Chad, and the relatively lowest relevance for Mexico, China and Japan (Ind. 1.2.1). From the seven countries where the forest sector has the highest shares in GDP (Ind. 1.2.2), six are located in Africa, with highest shares in GDP in Liberia (almost 18 %) and the Central African Republic (11 %). Countries with most UNFCCC submissions concerning forests (Ind. 1.3.1) are the EU, Papua New-Guinea, Australia, DR Congo and Solomon Islands; and the least Venezuela and Peru.

3.2.2 Scenario 2

The second scenario was focused solely on the global relevance of countries without consideration of national circumstances and engagement. Thus, all indicators not purely connected with contribution to the global carbon dioxide circle were excluded. This scenario resulted in a list of countries which are climate relevant because of their forest resources and its management, not taking into account whether they have a high national interest in forests or in climate negotiations.

Weighting

As shown in Table 5, only data concerning forest area, its changes in the last decade and forest emissions and removals were assessed. As indicators 1.1.2 and 1.1.3 are the basis for the calculation of emissions and removals under 1.1.1, this indicator was weighted a little bit higher than the others. All other indicators were excluded from the assessment by a weighting with zero.

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[9] According to FAOSTAT (*forest* and *net forest conversion*).

Table 5: Weighting of criteria and indicators for the relevance assessment Scenario 2

	Criteria		Indicator	
100%	1.1 Global Relevance	40%	1.1.1 Share of global Forest Emissions	40%
		30%	1.1.2 Share of global Forest Area	30%
		30%	1.1.3 Share of global annual Net Forest Area Change	30%
		0%	1.1.4 National share of Primary Forest	0%
0%	1.2 National Relevance	0%	1.2.1 Share of Land Sector in total Emissions	0%
		0%	1.2.2 Share of Forest Sector in GDP	0%
0%	1.3 Climate Political Engagement	0%	1.3.1 Formal participation under UNFCCC	0%

Results

The most relevant countries according to Scenario 2[10] are shown in Figure **5**.

Figure 5: The 53 most relevant countries according to Scenario 2 from relevant (light aqua) to very relevant (dark aqua)

1,1   ▼   8,6
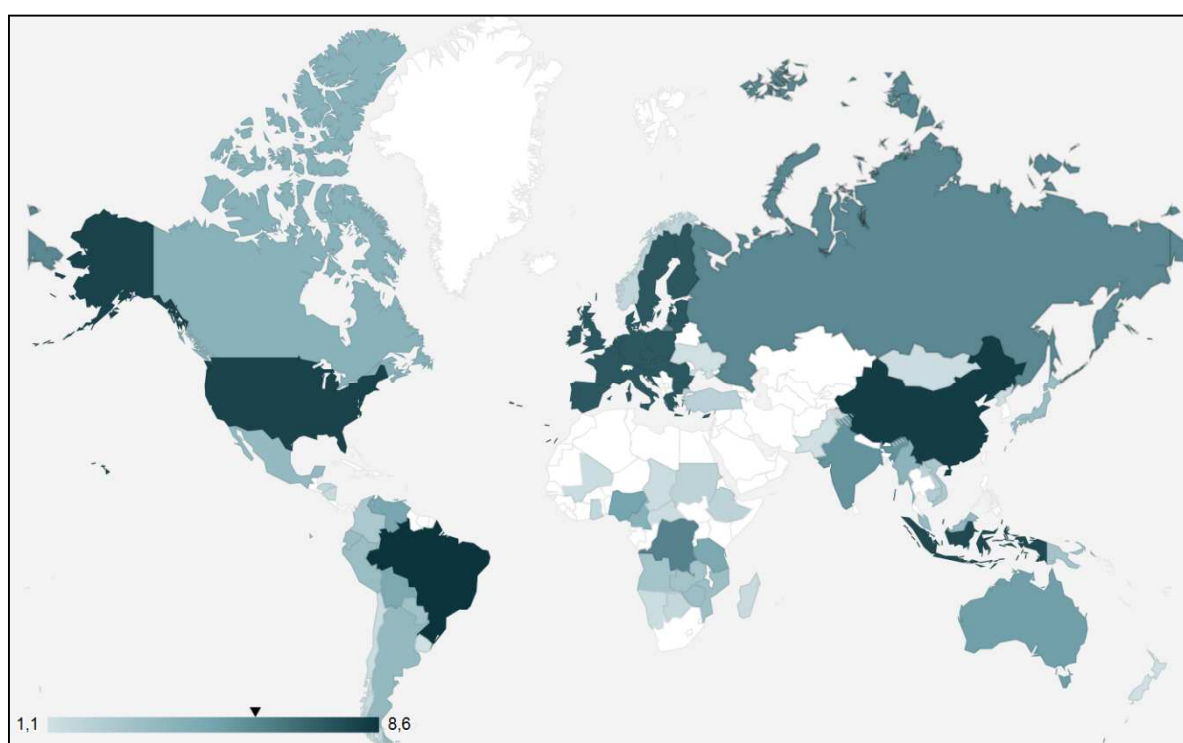
[10] The threshold of 50 countries equals 25 % of all assessed countries.

Under the 53[11] most relevant countries for Scenario 2, ten are Annex I parties, with additional consideration of Turkey and Ukraine compared to Scenario 1. When it comes to the countries that are most vulnerable to climate change, 14 out of 52 are *Least Developed Countries*, 11 located in Africa and three in South-east Asia (Cambodia, Lao People's Democratic Republic and Myanmar). Papua New-Guinea is the only small island state, directly threated by sea level rise. Regarding the global distribution, 17 countries belong to Africa, 13 to Asia and 15 to North and Latin America. All countries cover 93 % of the total forest area, and the total emissions/removals balance adds up to 1,6 million kt CO_2.

3.3   Discussion and conclusions regarding the Relevance Assessment

Comparison of scenarios

The relevance assessment was carried out for two different scenarios. The first scenario could be described as a comprehensive one, as not only the contributions to forest area and forest emissions on global scale were considered, but also national circumstances and engagement in climate politics. The second scenario was solely focused on influence on climate change due to shares in global forest area and (net) forest area change. In Figure 6 the results of Scenario 2 are compared with those of Scenario 1.

As the shares in forests and their contribution to the atmospheric carbon cycle are the most important indicators under both scenarios, the majority of countries are defined as relevant under both scenarios. While 39 parties are generally relevant (yellow), 12 are relevant under Scenario 1 but not under Scenario 2 (red)[12]. They are defined by high shares in primary forests (Suriname, Dominica and Gabon), high shares of land sector emissions in total emissions (Kenya, Dominica, Panama, Gabon), high shares of forest sector in GDP (Liberia, Solomon Islands) and a high engagement in climate negotiations concerning the forest sector (Panama, Guyana, Uganda, Solomon Islands, Belize, Costa Rica). They include some very small countries with almost no share in global forest area. Nevertheless, for seven of them forests play an important role in national economics as their shares of the forest sector in GDP are above the global average. Further all mentioned parties are defined by an above-average engagement under climate negotiations.

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[11] New Zealand, Pakistan, Ukraine and Uruguay all scored same on the last rang.

[12] Belize, Congo, Costa Rica, Dominica, Gabon, Guyana, Kenya, Liberia, Panama, Solomon Islands, Uganda, Suriname.

Figure 6: Comparison of results from Scenario 1 and 2; yellow are countries which are relevant under both scenarios, red are those considered as relevant only in Scenario 1, blue only in Scenario 2.
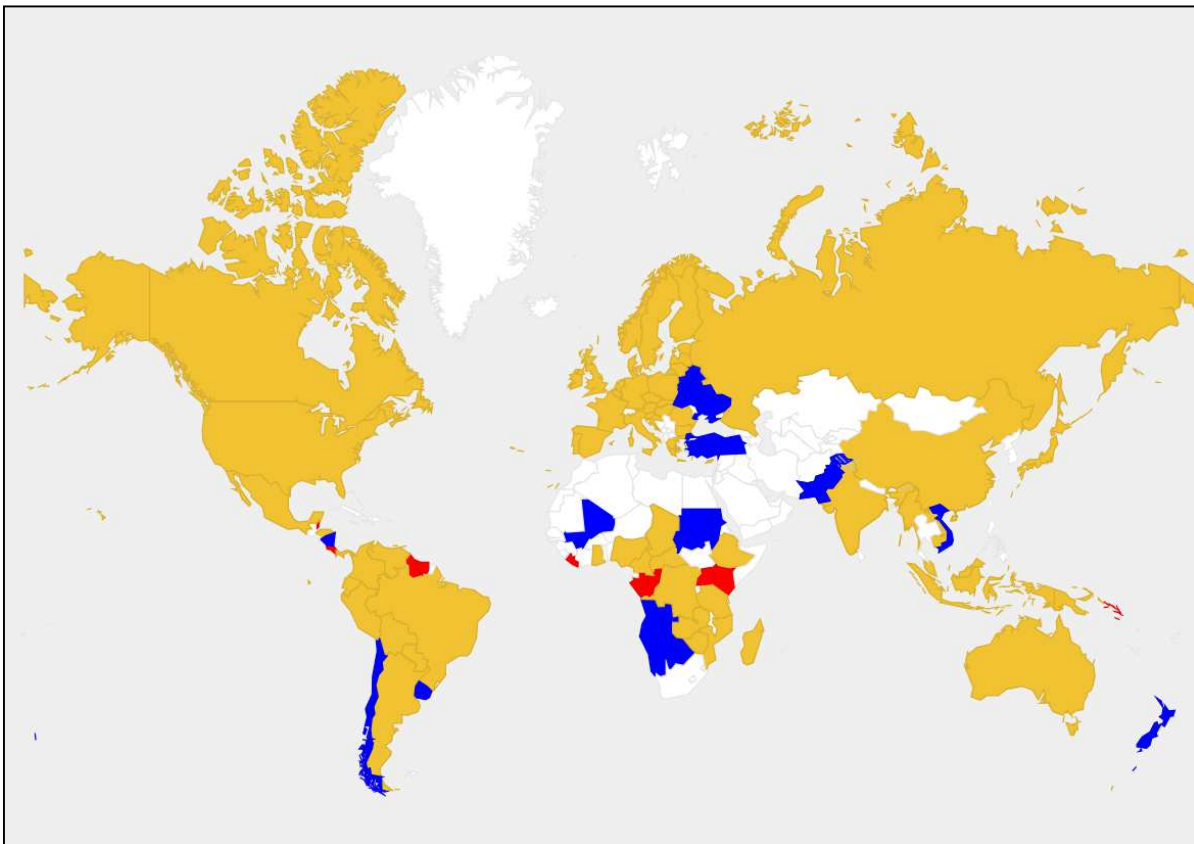
On the other hand, under Scenario 2, 14 parties are relevant that are not included under Scenario 1 (blue) [13]. Their shares of the forest sector in GDP are below the global average, the same applies to their engagement under UNFCCC. However, they have in common that between 2000 and 2010 their forest area changed due to deforestation or afforestation. Hence, they had greater influence on the current global carbon cycle than the 12 missing countries.

Discussion on data and methodological aspects

The relevance assessment is mainly based on FAO-FRA 2010 data which are controversially discussed, but nevertheless accepted as the only global data set and used for climate related research by the scientific community (Olander et al. 2008), (Köthke et al. 2014), (Romijn E. et al. 2012). The largest uncertainties exist regarding the actual deforestation rates which are masked by the net forest area changes of national FAO-FRA 2010 data. This uncertainty is carried to

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[13] Angola, Belarus*, Botswana, Chile*, Mali, Namibia, New Zealand*, Nicaragua, Pakistan, Sudan, Turkey*, Ukraine*, Uruguay*, Viet Nam* (*net afforesting countries)

estimations of emissions and removals from FAOSTAT, as these calculations are based on FAO-FRA 2010 data (Tubiello et al. 2014). Uncertainties also exist for national estimations of emissions and removals from the land sector, as reported under UNFCCC and used for the national relevance assessment[14].

The number of submissions concerning forests as proxy for climate political engagement can be an appropriate approach to determine the formal engagement under the UNFCCC, but it is not comprehensive. To incorporate a second indicator under the criterion of 'Climate Political Engagement', a survey was carried out among EU experts involved in climate negotiations for the land sector, to consider the parties' engagement, constructiveness and influence during negotiations in a subjective way. The survey was carried out online and anonymously during the technical session under the UNFCCC in June 2014 in Bonn. Unfortunately, the feedback was not sufficient to carry out a statistical analysis, taking into account the different negotiation streams of the participants (land sector for Annex I or Non-Annex I countries), and the time frames the experts covered. Thus, the results could not be incorporated in this assessment.

In this assessment no qualitative differentiation was made between the directions of forest area change; afforesting countries were assessed as being as relevant for the global carbon cycle as deforesting countries. Regarding the emissions/removals from forests, the group of Annex I are mainly carbon dioxide removers due to the sustainable management of forests and the net forest area gain[15]. On the other hand, Non-Annex I countries are mainly emitters due to deforestation and degradation with the exceptions of Costa Rica, Viet Nam, India and especially China as afforesting Non-Annex I parties.

Natural forests versus plantations

China, as an example for a highly developed Non-Annex I country, is relevant on the global scale because of an incomparable afforestation project called *The Three-North Shelterbelt Development Program* or the *Great Green Wall* that almost doubled the forest area since its beginning in 1978. Although the focus lies on stopping desertification, the impacts on global forest cover and natural carbon cycles are huge due to the afforestation of 3.000.000 ha annually between 2000 and 2010 (Luoma 2012). The long term success is controversially discussed (Wang et al. 2010), but the planting of non-native plant species and monocultures has already been highly criticized (Cao et al. 2011). In this context, it is important to emphasize that most national

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[14] As an example for Annex I parties with highest reporting capacities, the German inventory 2014 states uncertainties for the category 'Forest Land remaining Forest Land' emission factors ranging from 56 % for biomass, up to 180 % for organic soils. The overall uncertainty for the German land use inventory in 2012 was 23 % (Federal Environment Agency (UBA) 2012) and 22 % in 2014 (Federal Environment Agency (UBA) 2014). Between both inventories, the emission data reported for 'Forest Land remaining Forest Land' for the year 2008 has been recalculated from -25,5 (2012) to -52,5 million kt CO_2 (2014).

[15] Exceptions are Canada and Australia (according to FAOSTAT).

and international forest definitions, like FAO and UNFCCC, do not differentiate between plantations and primary forests. Taking only the net forest area change 2000-2010 into account, China has afforested more than Brazil deforested (FAO 2010). Whether a planted forest can replace the former natural forest's carbon stock, depends on the stock of the replaced vegetation (Schroth et al. 2002),(Mackey et al. 2008), (Liao et al. 2010), (Chen et al. 2005).

Climate relevance and biodiversity

The absence of differentiation between primary and planted forests within forest definitions can be even more problematic, when it comes to benefits for biodiversity conservation under the UNFCCC. REDD+, the climate mechanism for forests in developing countries, recognizes sustainable management of forests which can include the restoration of degraded forests and the protection of primary forests, thus maintaining biodiversity (Edwards et al. 2010). Still, there is reason to fear that REDD+ activities mainly take place in forests with lower biodiversity (Paoli et al. 2010). When comparing the list of climate relevant countries with the world's ten most threatened forest hotspots by Conservation International from 2011 (Myers et al. 2000), it becomes obvious that only the Atlantic forest in Brazil, the mountains of Southwest China, Madagascar and the California Floristic Province in the U.S. lie within definite borders of relevant parties. Most threatened forest biodiversity hotspots are located on small islands that are less climate relevant due to their size, like New Caledonia, Sundaland and Philippines, or extend across national borders like Indo-Burma, Coastal Forests of Eastern Africa, the Indian Ocean Islands and the Eastern Afromontane. However, as the protection of biodiversity is located under the Convention of Biodiversity and not part of the UNFCCC, this means no restriction for the results of the relevance assessment. Still, negative effects on biodiversity from investments and policies under the climate framework should be avoided (Chazdon 2008), (Paoli et al. 2010), (Ring et al. 2010), (Potts et al. 2013).

Conclusions

The analysis of the relevance assessment's results for two different scenarios allows for four general conclusions. The first conclusion is that although there are some very large countries with the highest shares in forest cover, climate relevant parties are distributed almost all over the world, due to their contribution to global change of forest cover. Exceptions are some of the most sparsely wooded regions like North Africa, the Middle East and Central Asia. Both, Annex I and Non-Annex I parties, are relevant for the global carbon cycle regarding forests. While most Non-Annex I parties are deforesting, most Annex I parties are afforesting or stabilizing their forest cover. Beside the quite obvious challenge of stopping global deforestation and its emissions, the conservation of existing carbon stocks is an important part of the Convention, as every carbon stock can become a source. Therefore it is not only important to implement the REDD+

mechanism in the developing world, but also to engage all Annex I countries under a future climate regime[16].

The second conclusion is that although some countries seem to be not that relevant on the global scale due to their small size, on the national level they depend highly on their forest resources and thus have a high interest in participating in forest relevant political decisions (compare with Figure 6). In this context it is not important whether the dependency is actually economic (share of forest sector in GDP) or only likely to be economic (share of land emissions in total emissions); those countries are engaged in climate politics well above the average of other relevant countries. It is thus reasonable to actively include such parties in bilateral or informal negotiations, as they might withhold consent in final decisions.

This leads to the third conclusion: the engagement under UNFCCC does not necessarily correlates with the global relevance. With the exception of New Zealand, the countries considered only under the second scenario (compare Figure 6) are characterised by very low forest related engagement under UNFCCC. This means no restriction for the climate effectiveness of the UNFCCC process, as long as they take part in the final climate agreement.

The fourth conclusion is that the ranking is determined by the weighting. Therefore, the presented approach should be understood as decision support tool. Depending on the (political) argumentation, a determined weighting results in a certain ranking of climate relevant countries. Further it would be possible, to extended the tool with other data sets (share of plantations in national forests, forest area change dynamics, forest area under management, forest area in relation to potential forest area etc.) to assess countries under other potential research questions.

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[16] Especially the US and those countries that have withdrawn from the Kyoto Protocol like Canada, Russia, New Zealand and Japan, are important for a comprehensive and effective post 2020 climate agreement.

4 Capacity Assessment

4.1 Defining Criteria and Indicators for the Capacity Assessment

In analogy to the relevance assessment, the capacities towards the reporting of emissions from forests are based upon several criteria. This capacity assessment considers a range of criteria as shown in Table 6: development capacity, engagement in reporting, technical capacity and capacity building.

Table 6: Capacity Assessment - criteria and indicators for countries' capacities to report on emissions/removals from the forest sector

Evaluation	Criteria	Indicator
2.Reporting Capacity	2.1 Development Capacity	2.1.1 Classification Income-economy
		2.1.2 Classification Human-Development-Index
	2.2 Engagement in Reporting	2.2.1 Time series of emission data
		2.2.2 Completeness of emission data
	2.3 Technical Capacity	2.3.1 Forest Area Change Monitoring Capacity
		2.3.2 Forest Inventory Capacity
		2.3.3 Carbon Pool Reporting Capacity
	2.4 Capacity Building	2.4.1 Level of Capacity Building

- Development capacity: is detached from any reporting requirements, but it can be assumed that countries with a high development capacity can implement reporting requirements more easily than those with lowest development capacities; those will depend highly on financial support for building reporting capacities;

For the evaluation of the development capacity the World Bank offers an annual classification of income economies (Ind. 2.1.1) based on the Gross National Income per capita. The World Bank classification includes low-income economies ($1.045 or less), lower-middle-income economies ($1.046 to $4.125), upper-middle-income economies ($4.126 to $12.745) and high-income economies ($12.746 or more) (World Bank 2014). Another development indicator is the Human Development Indicator (HDI, Ind. 2.1.2) by the United Nations Development Program (UNDP) between zero and one, '*A composite index measuring average achievement in three basic dimensions of human development—a long and healthy life, knowledge and a decent standard of living.*' (UNDP 2013). The UNDP classification covers low human development (<0,493), medium human development (0,493-0,614), high human development (0,614-0,735) and very high human development (> 0,890).

- Engagement in reporting: based on the quality and quantity of the submitted data under UNFCCC, assumptions can be made regarding the existing capacities;

Reporting requirements under the UNFCCC are more advanced for Annex I than for Non-Annex I parties. The tables and reports under Kyoto Protocol and Convention reporting for Annex I offer a comprehensive basis for a first assessment of data on emissions and removals from forests. The inconsistencies in the presentation of data in Non-Annex I National Communications make their assessment rather difficult. Nevertheless, these submitted reports were chosen as basis for the assessment of reported years (Ind. 2.2.1) and of emission data's completeness (Ind. 2.2.2).

As first indicator (Ind. 2.2.1) the time covered with emissions data was evaluated for each party. Annex I countries have to submit time series from 1990 onwards, and for Kyoto Protocol parties the inventory for the first commitment period 2008-2012 are available additionally. For Non-Annex I the Convention asks for emission data for at least two years (1990/1994/2000, (UNFCCC 2003a)). Thus two comparable years of emission data for all parties were defined as minimum requirement (one point) under Ind. 2.2.1, everything less scored zero points. As 'comparable' data calculated with the same IPCC Guidelines were defined. Everything between two and five comparable years was evaluated with two points, and five and more years covering the year 2000 scored with three points. Annex I and Kyoto Protocol parties all scored three, the relevant Non-Annex I parties scored from zero to three.

The second indicator was the completeness of the emission data for the last available time point (Ind. 2.2.2). Here several restrictions were made. Monitoring and reporting of emissions and removals from soils is quite sophisticated. Soils are so far no explicitly restricting pool under REDD+ (compare with Brazil 2014). Therefore CO_2 emissions and removals from soils were not mandatory for the group of Non-Annex I. For Annex I/Kyoto Protocol parties the focus was on the forest categories/activities[17], so it was not important if other land use change-categories were not complete (e.g., the U.S. missing 5.D2 and 5.E2, Lands converted to Wetlands and to Settlements). On this basis full forest reporting under IPCC Good Practice Guidance 2003, as carried out by the Annex I countries, was defined as potential target system (three points), reached only by India in its second National Communication. As solely land sector reporting on the basis of IPCC Guidelines from 1996 is not sufficient to evaluate the quality of forest reporting, additional information were required as brought by Brazil, China or Viet Nam (two points). Non-Annex I countries using IPCC Guidelines from 1996, reporting without any additional information, but well comprehensible data presentation, like DR Congo, Mexico or Suriname, were assessed with one point. The remaining countries were evaluated with zero points as they did not fulfill the defined minimum requirements for Non-Annex I parties (like Nigeria, Cambodia or Colombia). The assessment was carried out by taking into account all National Communications submitted until July 2014.

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[17] Annex I: Forest land remaining forest land, land converted to forest land, forest land converted to other land; Kyoto Protocol: Forest management, afforestation/reforestation, deforestation.

- Technical capacity: this criterion focussed on the actual existing forest monitoring capacities that are not necessarily directly linked to an effective emission reporting system, but are required to implement one;

For the criterion of technical capacity, exiting indicators from Romijn et al. (2012) were incorporated in the capacity assessment. In their assessment the *Existing monitoring capacities* were evaluated on the basis of FAO-FRA 2005 and 2010 data. As these data sources offer valuable insights in national capacities on monitoring deforestation, which are not necessarily extractable from information presented under UNFCCC, the three indicators were included in our capacity assessment. The first indicator Forest Area Change Monitoring Capacity (Ind. 2.3.1) is based on *Forest area change time series and remote sensing capacities*. According to Romijn et al. (2012) this indicator is based on the number of existing forest cover maps (from zero maps (low) to four maps (very good)). The second indicator Forest Inventory Capacity (Ind. 2.3.2) is based on *Forest inventory capacity on growing stock and/or biomass* which assessed the number of forest inventories (no forest inventory (low) to multiple forest inventories, most recently after 2005/2010 (very good)). Carbon Pool Reporting Capacity as the last indicator (Ind. 3.3.3) under this criterion was based on *Reporting on carbon for different pools* (no reported carbon stocks (low) to various carbon pools reported (very good)). Romijn et al. (2012) classified each indicator's values into five groups scoring from 0 to 4. This classification was adapted to the four scales chosen for this capacity assessment. Therefore the values *good* (3) and *very good* (4) from Romijn et al. (2012) were merged into one group scoring 3. For further information regarding these indicators please see Romijn et al. (2012). Annex I parties' capacities were assumed to score highest (3) under all three indicators.

- Capacity building: the participation in capacity building programs for the implementation of the REDD+ mechanism is an important step for Non-Annex I countries to close the existing capacity gap between Annex I and Non-Annex I;

Under the criterion of capacity building, the reporting capacity of Annex I parties was defined as potential target system for Non-Annex I parties, similar to the approach for Indicator 2.2.2. Therefore, the focus was set on Non-Annex I countries and their engagement in international REDD+ programs. The level in capacity building (Ind. 2.4.1) can be assessed by the countries engagement in different programs and initiatives like Forest Carbon Partnership Facility (FCPF, FCPF 2013), UN-REDD (UN-REDD 2014) and Forest Investment Program (FIP, FIP 2014), the Clean Development Mechanism (UNFCCC 2014a), International Climate Initiative (BMU 2014) and Voluntary Partnership Agreements (VPA-FLEGT, EUFLEGT Facility 2014) (see Table 7).

All other criteria determine the status quo this criterion is rather forward looking. As countries are engaged in various capacity-building programs under REDD+ right now, it can be assumed that their capacity will improve until 2020. Exceptions are the Annex I countries with already highest capacities and the emerging economies Brazil, India and China. Those countries are (partly) not involved in any of the above mentioned programs because they are economically

strong enough to build capacities without financial support or have their own programs (Amazon Fund for Brazil). Countries engaged in two of the major three capacity building projects (FCPF, FIP, UN-REDD) were assumed effectively to build their national capacities. The same was assumed for countries that are implementing a VPA-FLEGT with the EU which requires the implementation of relatively advanced forest monitoring capacities in order to identify illegal logging. Countries at least taking part in one of the three major programs and/or that participated in the Clean Development Mechanism in the first commitment period of the Kyoto Protocol, scored two points; countries taking part at any international program scored one.

Table 7: Scores and required programs under the criterion of capacity building

Level of Capacity Building		
Scores	Programs	Capacity
3	all Annex I; countries engaged under UN-REDD and FCPF and/or FIP; implementing VPA FLEGT; emerging economies	Countries will be capable to report comprehensively on emissions post 2020
2	engagement under FCPF or UN-REDD; implemented CDM projects	Countries are engaged in most relevant capacity building programs
1	candidate for FCPF and/or UN-REDD; participation in any international program	Countries take part in overall REDD+ process
0	no engagement	No visible capacities

As it was due to limited capacity not possible to take all existing international initiatives into account, in addition to the official information under the above mentioned initiatives, further information platforms were used. Information was taken from The REDD Desk (the REDD Desk 2014), the Southern African Development Community (SADC 2014), CD-REDD (CD REDD 2014) and the International Climate Initiative (BMU 2014). Assembled were information about countries' involvement in Clean Development Mechanism (UNFCCC 2014a) and in Voluntary Partnership Agreements under the Forest Law Enforcement, Governance and Trade (VPA-FLEGT) (EUFLEGT Facility 2014).

A classification into four groups was chosen for the capacity assessment (instead of 11 groups for the relevance assessment). This was based on the four groups' classification for income economy by the World Bank and for the Human Development Index by the UNDP that could be matched to a scale from zero to three. Therefore, no cluster analysis was carried out. The indicators, their data sources and the methods for classification are displayed in Table 8.

Table 8: Criteria and indicators for the capacity assessment, the assessed year, the data sources and methods for classification

Indicator	Year	Data Source	Method
2.1.1 Classification Income-economy	2014	World Bank	4 groups given; scale 0-3
2.1.2 Classification Human-Development-Index	2013	UNDP	4 groups given; scale 0-3
2.2.1 Time series of emission data	1990-(2011)	UNFCCC Reporting	scale 0-3
2.2.2 Completeness of emission data	last available year		
2.3.1 Forest Area Change Monitoring Capacity	2000-2010	Romijn et al. (2012)	5 groups given, adapted to the scale 0-3
2.3.2 Forest Inventory Capacity	2000-2010		
2.3.3 Carbon Pool Reporting Capacity	2000-2010		
2.4.1 Level of Capacity Building	Status 2014	FCPF, UN-REDD, FIP, The little REDD-desk, CD-REDD, VPA-FLEGT, ICI, SADC, CDM	scale 0-3

4.2 Scenarios for the Capacity Assessment

Based on the ranking resulting from the relevance assessment Scenario 1, the parties identified as relevant were analysed regarding their capacity under two scenarios (1A and 1B). In order to set different focuses on 'capacity', the weighting of criteria was changed between both scenarios.

4.2.1 Scenario 1A

Scenario 1A was focused on actual capacities linked with reporting under the UNFCCC and its technical basis. Therefore, all criteria were weighted similar with the exception of the criterion Development Capacity. This criterion is not necessarily directly linked to reporting capacities.

Weighting

This scenario considered the overall development capacity of the countries, while the priority was set on the engagement in reporting (Criteria 2.2 and 2.3) and capacity building (Criteria 2.4). Within those, the capacity to report on all carbon pools (Ind. 2.3.3) was weighted least, as the UNFCCC requires to report primarily on 'significant' carbon pools under REDD+ (UNFCCC 2012b). The weighting chosen for the first scenario is displayed in Table 9.

Table 9: Weighting of criteria and indicators for the capacity assessment scenario 1A.

	Criteria		Indicator	
10%	2.1 Development Capacity	50%	2.1.1 Classification Income-economy	5%
		50%	2.1.2 Classification Human-Development-Index	5%
30%	2.2 Engagement in Reporting	50%	2.2.1 Time series of emission data	15%
		50%	2.2.2 Completeness of emission data	15%
40%	2.3 Technical Capacity	40%	2.3.1 Forest Area Change Monitoring Capacity	16%
		40%	2.3.2 Forest Inventory Capacity	16%
		20%	2.3.3 Carbon Pool Reporting Capacity	8%
20%	2.4 Capacity Building	100%	2.4.1 Level of Capacity Building	20%

Results

The capacity assessment was carried out for relevant parties identified under Scenario 1 of the relevance assessment. The results are given in Figure 7 and in Annex II. Under Scenario 1A, six out of eight Annex I countries scored full under all criteria and reached overall results of three. Only the EU[18] and Russia did not reach the highest score under HDI (Ind. 2.1.2). According to the above described weighting, the Non-Annex I party with highest capacity is Brazil, followed by Mexico, India and Indonesia. Close together are Bolivia, Ghana, Argentina and China. These top eight Non-Annex I countries cover 28 % of global forest area and are, with the exception of India and China, high deforestation countries.

DR Congo, Panama, Congo, Peru and Laos are following in capacity, all above a threshold of 2. While 11 Non-Annex I countries scored 3 under time series of emission data (Ind. 2.2.1), India was the only Non-Annex I country scoring highest under emissions data completeness (Ind. 2.2.2) due to reporting on the basis of IPCC Good Practice Guidance 2003, and the comprehensible presentation of its results (India 2012). This valuation is confirmed by the results under the criterion technical capacity, where India was the only Non-Annex I party scoring highest under all three indicators. An outlier in the negative sense is Venezuela. Venezuela's development capacity is comparable to those of Brazil, Mexico or Costa Rica, but its reporting capacity is the lowest in Latin America (average 1,78).

As Figure 7 shows, the most heterogeneous and at the same time lowest capacities are in Africa (average 1,36). The six countries with highest shares of global net deforestation are Brazil and Indonesia, followed by four African countries namely Nigeria, Tanzania, Zimbabwe and DR Congo. The African countries cover the entire range from relatively high capacities (DR Congo) to lowest

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[18] The EU HDI was calculated as average from all 28 Member States.

capacities (Zimbabwe). Ghana is the country with the most advanced capacities in Africa, comparable with Costa Rica or Argentina. Overall highest capacities exist in Asia (2,12).

Figure 7: Capacity assessment A for the 51 relevant countries according to Scenario 1, ranging from 0 to 3. Red indicates lowest capacities, dark green highest capacities as they exist today under Annex I (white are not-assessed countries).
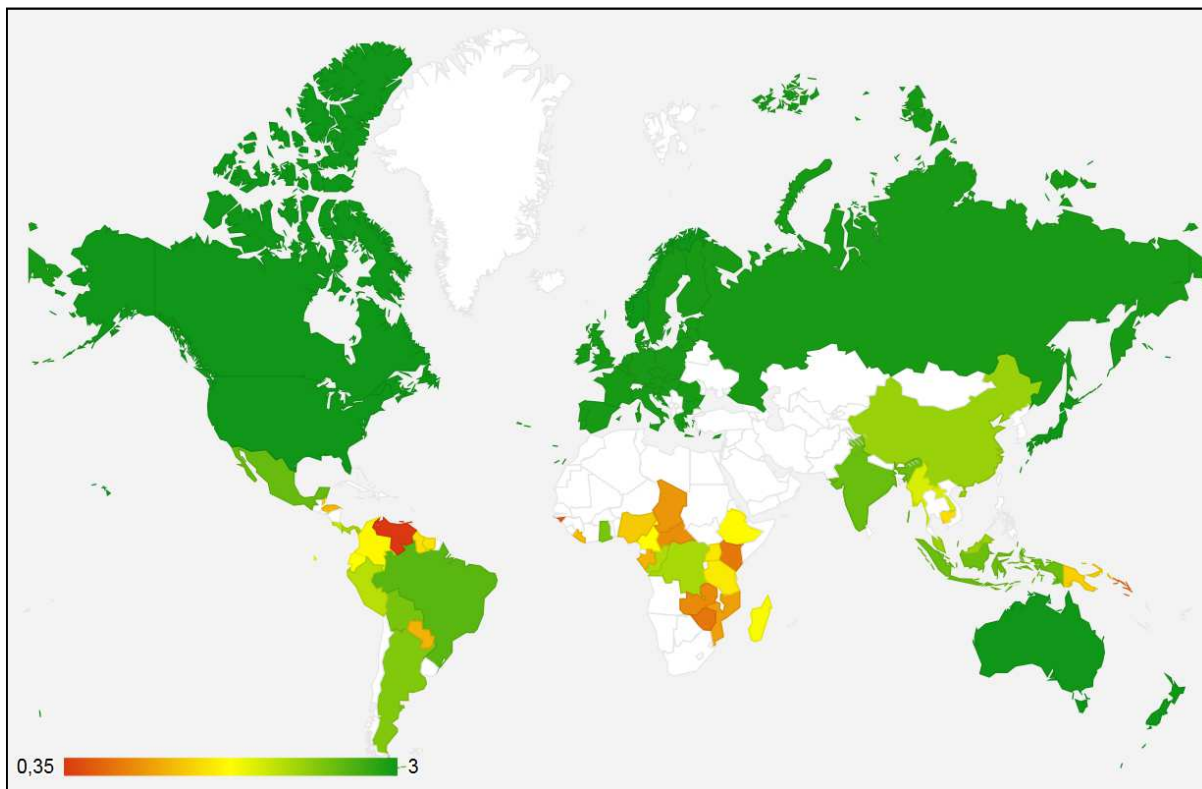
Under the FCPF Carbon Fund for result-based payments of REDD+ projects, 11 countries are in the so called FCPF Pipeline[19]. These countries have developed relatively high capacities towards REDD+ reporting and have qualified themselves for an assessment under the Carbon Fund. Seven out of these 11 parties are among the relevant countries under Scenario 1[20] and all scored higher than 1,9. When defining an overall score of 1,9 or more as threshold for the capability in participating under REDD+ from 2020 onwards, 28 of 42 relevant developing parties fall below this threshold.

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[19] http://www.forestcarbonpartnership.org/er-pins-fcpf-pipeline

[20] Chile, Costa Rica*, DR Congo*, Ghana*, Guatemala*, Indonesia*, Mexico*, Nepal*, Peru*, Congo*, Vietnam (*relevant)

4.2.2 Scenario 1B

Scenario 1B was focused on the development and technical capacities, not necessarily linked to the reporting of emissions under UNFCCC. Technical capacities regarding forest monitoring can be implemented to meet national needs, like forest management or the prevention of natural disturbances. Therefore, this scenario assesses existing capacities which would qualify for the implementation of advanced reporting under UNFCCC.

Weighting

This scenario set the priority on the developmental stage of the countries, with consideration of existing technical capacities (Criterion 2.3). Aspects directly connected with emission reporting were excluded from the assessment by weighting with 0. The weighting for scenario 1B is displayed in Table 10.

Table 10: Weighting of criteria and indicators for the capacity assessment scenario 1B.

	Criteria		Indicator	
60%	2.1 Development Capacity	50%	2.1.1 Classification Income-economy	30%
		50%	2.1.2 Classification Human-Development-Index	30%
0%	2.2 Engagement in Reporting	0%	2.2.1 Time series of emission data	0%
		0%	2.2.2 Completeness of emission data	0%
40%	2.3 Technical Capacity	40%	2.3.1 Forest Area Change Monitoring Capacity	16%
		40%	2.3.2 Forest Inventory Capacity	16%
		20%	2.3.3 Carbon Pool Reporting Capacity	8%
0%	2.4 Capacity Building	0%	2.4.1 Level of Capacity Building	0%

Results

The capacity assessment was carried out for relevant parties identified under Scenario 1 of the relevance assessment. The results are given in Figure 8. For Annex I parties, the same ranking as under Scenario 1A resulted under 1B. According to the above described weighting, the Non-Annex I parties with highest developmental and technical capacities are Mexico, Argentina and Peru, all with the same result (2,32). This group is followed by Brazil, Malaysia and Panama (2,24). China is at Rank 15 and India at Rank 17 (with Costa Rica in between). 35 of 51 parties are below a threshold of 1,9 and they cover 23 % of global forest area. From the ten countries with lowest developmental and technical capacities, nine are located in Africa; Chad, Central Africa and Solomon Islands are at the bottom of the league. Comparing the continents, Latin America and Asia have comparable average capacities of 1,64 respectively 1,67. Africa has lowest capacities in average of 0,89.

Figure 8: Capacity assessment B for the 51 relevant countries according to Scenario 1, ranging from 0 to 3. Red indicates lowest capacities, dark green highest capacities as they exist today under Annex I (white are not-assessed countries)
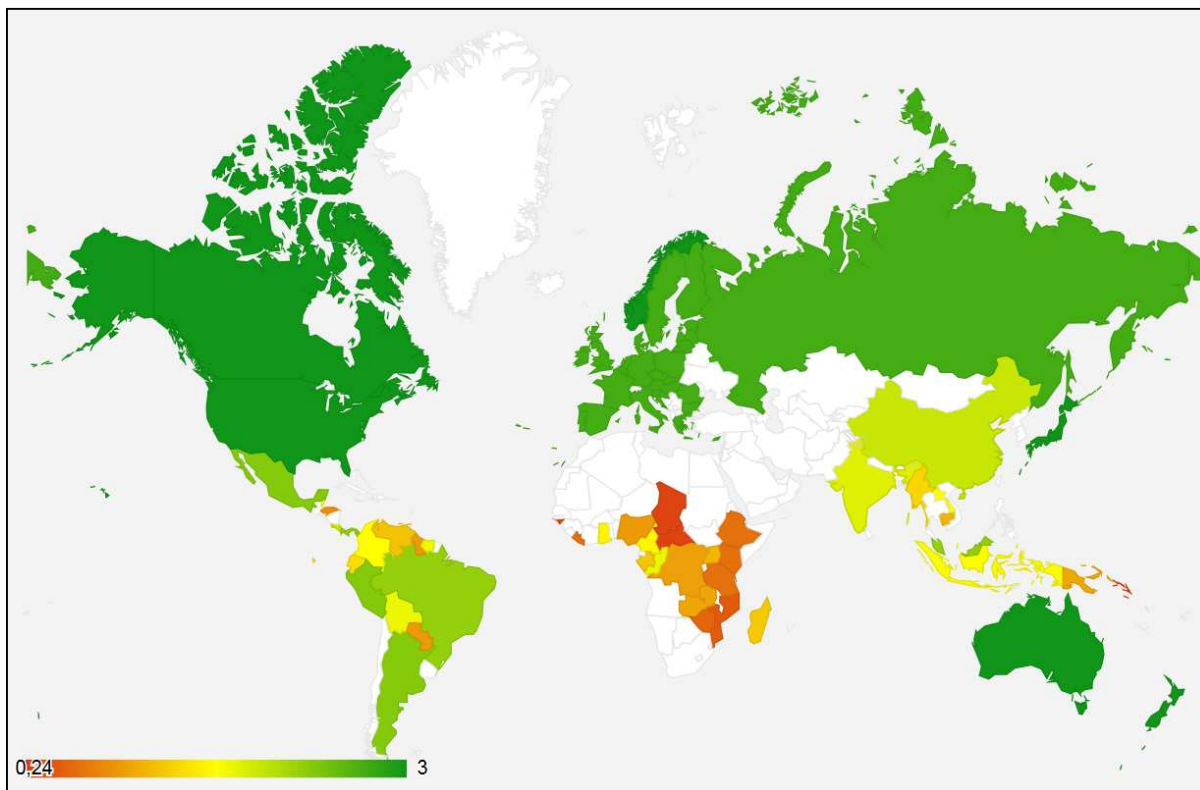
4.3 Discussion and conclusions regarding the Capacity Assessment

Comparison of scenarios

The capacity assessment was performed for parties identified as relevant under Scenario 1 of the relevance assessment. Two different scenarios were assessed, Scenario A including all criteria with the focus on existing and potential future reporting capacities, and Scenario B only taking into account developmental and technical capacities, which are not necessarily linked with reporting under UNFCCC. To compare the results of both scenarios, for each country the overall score under Scenario 1B was subtracted from the overall score under 1A. For countries which scored similarly under both scenarios (+/- 0,5), it can be assumed that they build reporting capacities according to their developmental and technical capacities. For those countries that scored lower under Scenario 1A than under 1B, it can be assumed that their reporting performances lag behind their developmental potentials; they are potential 'under performers'. On the other side, for countries that scored higher under 1A than under 1B it can be assumed

that they invest more in their reporting than they are supposed to, according to their developmental and technical capacities. Therefore, they are potential 'over performers'.

Figure 9: Comparison of capacity scores from Scenarios 1A (focus: reporting) and 1B (focus: developmental and technical capabilities). Countries with similar scores in both scenarios are displayed in yellow, (+/-0,5), 'under performers' compared to Scenario 1B (<-0,5) in red and 'over performers' (>+0,5) in blue.
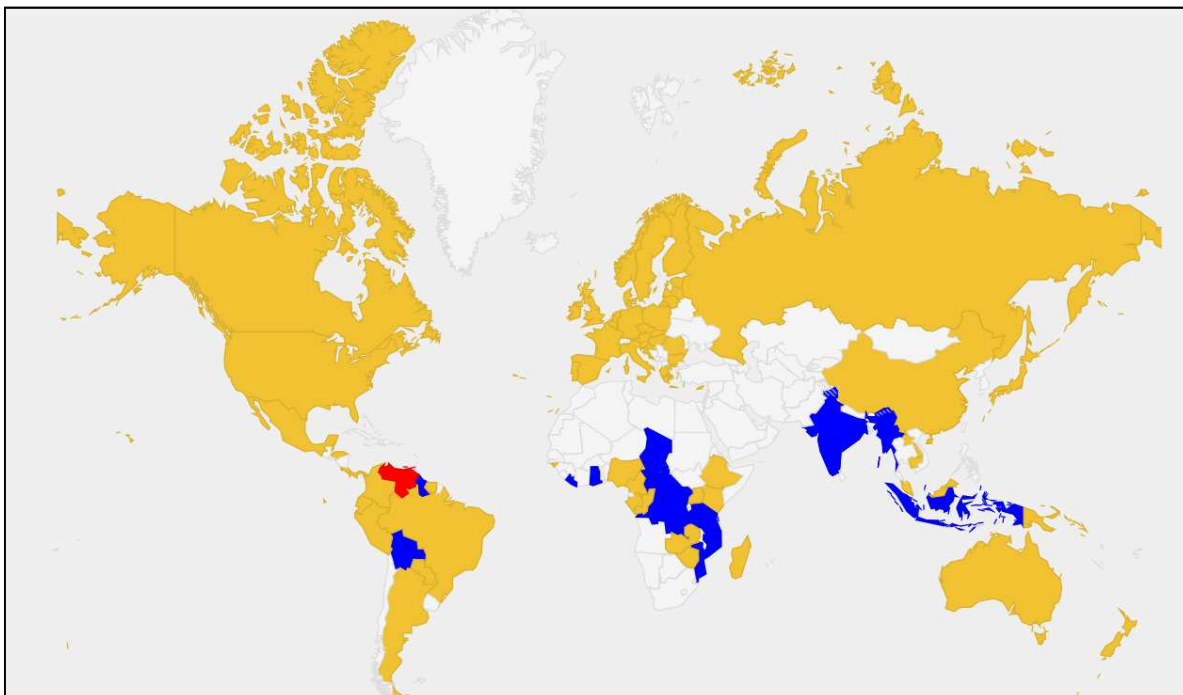
Discussion on data and methodological aspects

The capacity assessment is mainly based on UNFCCC and FAO-FRA data (used by Romijn et al. 2012), of which the latter has already been discussed in detail under the relevance assessment. Under UNFCCC submitted data and reports are basis for the assessment of parties' data capacities and several restrictions have to been made regarding its validity.

First, the evaluation of the National Communications was not conducted by trained reviewers. Problems of comprehension were caused by the use of UN languages beside English and varying quality in presentation of data. Second, the submitted reports do not necessarily represent the actual capacities. An advanced status of reporting can be in progress at the moment. Further, more parties could present time series of emission data by filling up incomplete data via interpolation. And third, it has not been evaluated to what extent the reporting capacity shown in the national inventories was based on national or foreign capacity.

Based on the countries' participation in international capacity-building programs, assumptions have been made regarding the reporting capacities in the near future. This approach has its limitations, as solely participation in a program is no guarantee for the sustainable development of national capacities. Further, the engagement in the reporting and accounting process depends not only on the capability, but also on the political will as the withdrawals of Canada and Russia from the Kyoto Protocol have shown. Two countries scored zero under Level of Capacity Building. For Dominica and Venezuela, no participation in any REDD+ program could be detected. This finding confirmed the results for Venezuela under Indicator 1.3.1. According to the counted submissions, Venezuela only submitted two forest related submissions in seven years, which is the lowest among the relevant parties under Scenario 1 (under Scenario 2, Democratic People's Republic of Korea and Mongolia both have no submissions at all). According to the REDD+ Database, funding for Dominica exists but it could not be attributed to any programs. The classification of all relevant parties due to engagement in international programs was presented to experts and 4 countries were upgraded due to expert guess, namely Costa Rica, Ecuador, Guyana (all from 2 to 3) and Malaysia (from 1 to 2).

Comparison with another study regarding 'Capacity Assessment'

The overall Non-Annex I capacity assessment of Romijn et al. (2012) identified the highest capacities for forest monitoring in the context of REDD+ for China, India, Mexico and Argentina. While our capacity assessment confirms the high reporting capacities of Mexico and India, we estimate capacities in Brazil, Indonesia, Bolivia, Ghana and Argentina higher than those in China. As Romijn et al. (2012) have not presented their evaluation's overall scores; no direct comparison with our results is possible. Besides the criterion of technical capacity, their forest monitoring capacity assessment additionally takes into account national circumstances regarding tree canopy cover, annual cloud coverage, topography and other remote sensing parameters. Romijn et al. (2012) also take into account national engagement via the indicators *Level of engagement in UNFCCC REDD process*s and *Completeness of national UNFCCC reporting on GHG inventory*. Under *Level of engagement in UNFCCC REDD process*s, countries score medium on a three-part scale from low to high, when they have submitted one National Communication and/or at least one REDD submission under UNFCCC. In light of the fact that 146 of 157 Non-Annex I parties have submitted at least one National Communication, this approach seemed not to sufficiently distinguish engagement within the Non-Annex I group. But transferring a three-part scale (low, medium, high) to the relevance indicator 1.3.1 (Formal participation under UNFCCC) which was assessed by the number of submissions from all work streams, the results of both assessment methods are almost congruent. This leads to the conclusion that the labor-intensive counting of submissions might not be necessary, and the approach by Romijn et al. (2012) comes to a similar valuation.

They also assessed the *Completeness of national UNFCCC reporting on GHG inventory* under the Criterion of *Understanding of IPCC guidelines for reporting* (Romijn et al. 2012). The 'Note by UNFCCC Secretariat on financial support provided by the Global Environment Facility for

preparation of national communications 2008' (UNFCCC 2008) was used to assess the inventories' completeness. Unfortunately, the completeness status of the parties' inventories is not linked to the data quality or quantity, but to the working status towards the inventory finalization at the reported moment. It can be assumed that this status does not allow the drawing of any conclusions towards the use or the *understanding* of IPCC Guidelines. As an example, India's status report according to the note was 'less than 25 % completed' (UNFCCC 2008); Romijn et al. (2012) concluded that India would have low understanding of IPCC Guidelines. But after revising India's second National Communication, we came to the result that this inventory is quite exceptional within the group of Non-Annex I, due to the use of IPCC Good Practice Guidance 2003. In contrast to the indicator's comparison described above, for this aspect, our assessment of inventories' data quality and quantity is the better approach.

The different criteria chosen for our capacity assessments and the one conducted by Romijn et al. (2012) indicate that a wide range of economic, political and technical aspects influence a country's capability towards emission reporting for the land sector.

Combination with other information

In the following we will refer to the results of relevance Scenario 1 and capacity Scenario 1A if not otherwise specified. Annex I countries are climate relevant due to the carbon stored in their mainly large, mainly managed and mainly extending forests. Although Annex I countries have differences and deficiencies in capacities too, their overall reporting capacity could be a target system for a global emission accounting system. Therefore, the capacity assessment was focused on the majority of countries which have not yet committed to binding emission reductions, the so called Non-Annex I parties. They are responsible for the main share in global deforestation.

Bolivia, Brazil, Cameroon, DR Congo, Ghana, Indonesia, Malaysia and Papua New-Guinea were responsible for half of the global deforestation area between 2000 and 2005. Grieg-Gran (2008) identified these eight countries as target countries to reduce deforestation. According to our results, from these countries Brazil, Ghana, Indonesia and Malaysia have the highest capacities in reporting. Bolivia has withdrawn from the REDD+ process and developed an own mechanism under UNFCCC for joint mitigation and adaptation, and in this regard is still engaged in national capacity building (Bolivia 2013). Papua New-Guinea and Cameroon seem not to maintain sufficient capacities for reporting, although Cameroon has to improve its monitoring capacity as it is implementing a Voluntary Partnership Agreement under FLEGT with the EU.

Considering national development capacities, Venezuela's low reporting capacity and engagement is quite exceptional. Because of low engagement in submissions, relatively low quality and quantity of emission data and missing participation under capacity building programs, it may be concluded that Venezuela is not engaged in climate negotiations. Nevertheless, it is the country with fifth highest emissions from forests, and thus has a relevant share of global deforestation. Brazil on the other hand, has recently proved its high reporting capacity by being

the first Non-Annex I country to submit a REDD+ reference level under UNFCCC (Brazil 2014). The reference level only comprises emissions from deforestation from living biomass and litter for the Amazon biome. However, this first submission can be seen as a strong signal towards the international community. In December 2014, five other countries submitted their REDD+ reference levels to the UNFCCC, namely the relevant countries Mexico, Malaysia, Indonesia, Colombia and Guyana (UNFCCC 2014c). Mexico, Malaysia and Indonesia reached capacities scores above the threshold of 1,9 in Scenario 1A. According to our capacity assessment, Colombia (1,77) and Guyana (with a score of 1,47) would not have been able to submit a reference level at this point of time, although Guyana has been identified as 'over performer'. This shows the limitations of conclusions that can be drawn from the assessment on the basis of the chosen indicators. Nevertheless, as these reference levels have neither been assessed nor are online available at the moment, no final evaluation of the actual data quality can be given.

Implications for post 2020 agreements

Some emerging economies should be able to report on forest emissions from 2020 onwards as the developmental and technical basis is given. Beside Brazil, Mexico, India, China and Argentina; Indonesia, Bolivia, Ghana and Malaysia are promising candidates for advanced emission reporting. Highest capacities exist in Asia, followed by Latin America, both regions where the overall and averaged emissions from deforestation and degradation are highest on the global scale. Simonet et al. (2014) showed that most REDD+ projects on the ground to date can be found in Latin America (44 % of projects), while the rest is equally distributed between Africa (28 %) and Asia 29 %). Nevertheless, as both capacity scenarios have shown, developmental, technical and reporting capacities are lowest in Africa. At the same time, the comparison of both scenarios has shown that the most 'over performers' regarding reporting capacities are in Africa. It is most likely that the 'over performers' reached comparably high scores under reporting capacities because of existing capacity-building initiatives by donor countries (Cerbu et al. 2011), (Simonet et al. 2014). This leads to the conclusion that in relation to the number of capacity building programs, capacity building in Africa has a relatively high impact on the existing capacities. Nevertheless, most Non-Annex I countries, especially in Africa, still lack capacities in reporting and most likely will not be able to comprehensively report on forest emissions in 2020. In conclusion to that, it would be feasible, to introduce step-wised approaches for emission reporting under a post 2020 framework as already decided under the REDD+ mechanism.

5 Outlook

In the light of ongoing negotiations towards a common climate agreement applicable for all parties, historically manifested differences in reporting and reduction commitments of emissions have to be resolved in the long term. Therefore we identified potential relevant players and within this group, capacity-lacking countries to quickly and efficiently accompany the process towards a common accounting approach post 2020. The potential climate relevance of countries and their capacities for reporting have been assessed in two different blocks. Both assessments were based on C&I that could be flexibly weighted and were derived from official data sets.

We found that relevant parties are distributed all over the world and include industrialized countries, emerging economies and least developed countries. While the relevance of countries with large forest areas is rather obvious, there are a number of very small countries that are quite engaged in forest relevant climate politics, as they highly depend on their forest resources. Most of these small countries are engaged under REDD+ capacity building and have capacities ranging from very low to good, like the rest of Non-Annex I parties. While capacities are relatively homogeneously distributed within Latin America and within Asia, we identified the largest capacity gap towards post 2020 reporting for Africa. From ten relevant countries with the lowest capacities towards emission reporting, seven are located in Africa. They have lowest capacities in income-economy and human development (HDI), which means that there are fundamental needs for human development. In order to build reporting capacity in such countries, economic and social development and environmental policies need to be strengthened first.

The countries' assessment on the basis of C&I is a transparent manner to structure existing data sets and combine them in order to provide input to different research questions. It can be a useful tool for political decision support. But the tool can only be as good as the chosen indicators and data sets behind them. Upcoming updates on datasets used are for example the FAO-FRA 2015 with current data on forest area change, and the new Biennial Update Reports under UNFCCC with improved and updated data on countries' emissions. Also additional C&I could be defined for the assessment tool, to broaden the scope of application (e.g., share of forests under management, share of forests under REDD+ projects, engagement under the CBD etc.).

In Non-Annex I countries emissions from the land sector often make the main share of national emissions. Most likely, the REDD+ mechanism will play an important role for global deforestation in a post 2020 agreement. Financing emission reductions under REDD+ can be an attractive option, generating co-benefits as forest management plans and implementation of civil society participation in decision-making processes. As more and more Non-Annex I parties might take this chance and follow the example of Brazil under the UNFCCC (Brazil 2014) or Nepal under the FCPF Carbon Fund (Nepal 2014), the financing of reduced emissions from deforestation and degradation will be important to accelerate worldwide engagement towards the post 2020 climate regime. Comparing assumed emissions from the Brazilian reference level with actual

PRODES deforestation data for the year 2010, and calculating with 5 $ per reduced ton CO_2 as agreed under the Amazon Fund, payments of around $2,5 billion would be needed for this single year only for Brazil[21]. This rough calculation shows that reducing deforestation under REDD+ will mostly be a financial challenge. Based on the different stages of capacity development it can be assumed that parties will enter into the phase of results-based payments at different points of times. Thus, reliable and predictable financing for capacity building and result-based payments, especially in the context of reducing emissions from deforestation and degradation in developed countries, will be the key for comprehensive post 2020 emission reductions (CIFOR 2014).

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[21] [907.970.000 tCO_2 (RL) − 413.490.000 tCO_2 (PRODES)] * 5 $/$tCO_2$ = $ 2.472.396.086

Data taken from Brazil (2014) and http://www.obt.inpe.br/prodes/index.php.

Annex I – Results of the Relevance Assessment (Scenario 1)

Country	Share of global forest emissions		Share of global forest area 2010		Share of global annual net forest area change		National share of primary forest 2010		Share of LULUCF emissions in total		Share of forest sector in GDP 2006		Formal participation under UNFCCC 2007-2013		Relevance	Ranking
Brazil	22,8%	8	12,9%	9	50,5%	9	91,7%	10	61%	2	2,8%	5	9	4	6,78	1
Indonesia	73,1%	10	2,3%	5	9,5%	8	50,0%	7	60%	2	2,5%	4	20	7	6,56	2
US	-39,4%	9	7,5%	8	-7,3%	7	24,8%	4	-15%	1	0,8%	2	16	6	6,06	3
DR Congo	11,6%	6	3,8%	6	5,9%	6	no data	0	135%	4	2,3%	4	30	10	6,04	4
EU	-8,0%	4	3,9%	6	-9,9%	8	2,9%	1	-7%	0	1,5%	3	35	10	5,6	5
China	-23,2%	8	5,1%	7	-57,0%	10	5,6%	1	-6%	0	1,5%	3	8	3	5,46	6
Australia	2,3%	2	3,7%	6	10,7%	8	3,4%	1	-8%	0	0,8%	2	32	10	5,14	7
Papua New Guinea	3,4%	2	0,7%	3	2,7%	4	91,2%	10	-9%	0	6,7%	8	32	10	5,02	8
Bolivia	6,9%	4	1,4%	4	5,5%	6	65,0%	8	52%	2	2,7%	4	19	7	5	9
India	-10,8%	6	1,7%	4	-5,8%	6	22,9%	4	-17%	1	0,9%	2	12	5	4,42	10
Russian Federation	-16,8%	7	20,1%	10	0,3%	0	31,7%	5	-37%	2	0,8%	2	8	3	4,36	11
Malaysia	8,6%	5	0,5%	2	2,2%	3	18,7%	3	822%	10	3,0%	5	9	4	4,28	12
Cameroon	8,6%	5	0,5%	2	4,2%	5	no data	0	50%	2	1,9%	3	21	8	4,26	13
United Republic of Tanzania	7,0%	4	0,8%	3	7,7%	7	0,0%	0	96%	3	1,9%	3	13	5	4,12	14
Ecuador	6,5%	4	0,2%	1	3,8%	5	48,7%	7	40%	2	2,3%	4	15	6	4,02	15
Japan	-11,4%	6	0,6%	3	-0,2%	0	19,0%	3	-6%	0	0,7%	2	27	10	4	16
Central African Republic	1,1%	1	0,6%	2	0,6%	1	10,5%	2	137%	4	11,1%	9	26	9	3,94	17
Mexico	1,9%	2	1,6%	4	3,7%	5	52,9%	7	6%	0	0,9%	2	15	6	3,8	18
Canada	6,5%	4	7,7%	8	0,0%	0	53,3%	7	11%	0	2,7%	4	9	4	3,78	19
Nigeria	13,6%	6	0,2%	1	7,8%	7	no data	0	32%	1	1,4%	3	10	4	3,72	20
Zimbabwe	3,0%	2	0,4%	2	6,2%	6	5,1%	1	452%	7	5,3%	7	5	2	3,66	21
Guyana	0,0%	0	0,4%	2	0,0%	0	44,7%	6	106%	3	4,1%	6	28	10	3,62	22
Solomon Islands	0,1%	1	0,1%	0	0,1%	0	49,9%	7	no data	0	16,7%	10	30	10	3,6	23
Myanmar	4,7%	3	0,8%	3	5,9%	6	10,0%	2	167%	4	0,3%	1	9	4	3,58	24

Country	Share of global forest emissions		Share of global forest area 2010		Share of global annual net forest area change		National share of primary forest 2010		Share of LULUCF emissions in total		Share of forest sector in GDP 2006		Formal participation under UNFCCC 2007-2013		Relevance	Ranking
Mozambique	2,4%	2	1,0%	3	4,1%	5	0,0%	0	49%	2	3,1%	5	12	5	3,5	25
Zambia	2,4%	2	1,2%	3	3,2%	4	0,0%	0	10%	0	5,9%	8	12	5	3,42	26
Honduras	2,2%	2	0,1%	0	2,3%	3	8,8%	2	29%	1	1,8%	3	29	10	3,42	27
Ghana	2,5%	2	0,1%	0	2,2%	3	8,0%	2	23%	1	7,2%	8	20	7	3,32	28
Uganda	0,9%	1	0,1%	0	1,7%	2	0,0%	0	17%	1	4,0%	6	27	10	3,24	29
Gabon	0,0%	0	0,5%	2	0,0%	0	65,2%	8	111%	3	3,0%	5	23	8	3,24	30
Cambodia	1,8%	2	0,3%	1	2,8%	4	3,2%	1	348%	6	2,8%	5	9	4	3,22	31
Peru	5,5%	3	1,7%	4	2,3%	3	88,5%	10	47%	2	1,1%	2	4	2	3,2	32
Argentina	4,8%	3	0,7%	3	4,7%	5	5,9%	1	-18%	1	0,8%	2	9	4	3,14	33
New Zealand	-1,7%	2	0,2%	1	0,0%	0	25,9%	4	-23%	1	2,1%	3	25	9	2,98	34
Madagascar	2,1%	2	0,3%	1	1,1%	1	24,2%	4	114%	3	3,1%	5	17	6	2,96	35
Paraguay	5,7%	3	0,4%	2	3,4%	4	10,5%	2	95%	3	3,6%	5	5	2	2,94	36
Congo	0,6%	1	0,6%	2	0,3%	0	33,2%	5	103%	3	1,1%	2	23	8	2,94	37
Belize	0,3%	1	0,0%	0	0,2%	0	43,0%	6	92%	3	1,7%	3	24	9	2,94	38
Venezuela	8,8%	5	1,1%	3	5,5%	6	no data	0	-8%	0	1,0%	2	2	1	2,92	39
Liberia	1,2%	1	0,1%	0	0,6%	1	4,0%	1	109%	3	17,7%	10	17	6	2,92	40
Ethiopia	1,0%	1	0,3%	1	2,7%	4	0,0%	0	-26%	1	5,2%	7	14	5	2,88	41
Colombia	3,3%	2	1,5%	4	1,9%	2	14,1%	2	14%	1	0,7%	2	13	5	2,86	42
Norway	-2,1%	2	0,2%	1	-1,5%	2	2,2%	1	-107%	3	0,8%	2	18	7	2,86	43
Suriname	0,2%	1	0,4%	2	0,0%	0	94,9%	10	32%	1	0,9%	2	20	7	2,84	44
Kenya	0,7%	1	0,1%	0	0,2%	0	18,9%	3	429%	7	1,7%	3	20	7	2,76	45
Lao People's Democratic Republic	1,9%	2	0,4%	2	1,5%	2	9,5%	2	80%	2	3,0%	5	9	4	2,7	46
Chad	1,2%	1	0,3%	1	1,5%	2	1,6%	1	307%	6	1,9%	3	13	5	2,68	47
Panama	0,4%	1	0,1%	0	0,2%	0	0,0%	0	-149%	4	0,4%	1	28	10	2,68	48
Costa Rica	-0,6%	1	0,1%	0	-0,4%	0	23,9%	4	-41%	2	0,8%	2	25	9	2,62	49
Guinea-Bissau	0,2%	1	0,1%	0	0,2%	0	0,0%	0	no data	0	6,3%	8	21	8	2,58	50
Dominica	0,0%	0	0,0%	0	0,0%	0	60,0%	8	-235%	5	0,1%	0	21	8	2,58	51

Annex II – Results of the Capacity Assessment (Scenario 1A)

Country	Income-economy		Human Development Index		Time series of emission data		Completeness of emission data		Forest Area Change		Forest inventory Capacity		Carbon Pool Reporting Capacity		Level of Capacity Building		Capacity
Australia	HI	3	0,933	3	1990-2012	3	KP-LULUCF: complete under KP	3	AI	3	AI	3	AI	3	Annex I	3	3
Canada	HI	3	0,902	3	1990-2012	3	Annex I-LULUCF:under convention forest complete	3	AI	3	AI	3	AI	3	Annex I	3	3
Japan	HI	3	0,89	3	1990-2012	3	KP-LULUCF: ARD/FM complete	3	AI	3	AI	3	AI	3	Annex I	3	3
New Zealand	HI	3	0,91	3	1990-2012	3	KP-LULUCF: ARD/FM complete	3	AI	3	AI	3	AI	3	Annex I	3	3
Norway	HI	3	0,944	3	1990-2012	3	KP-LULUCF: ARD/FM complete	3	AI	3	AI	3	AI	3	Annex I	3	3
United States of America	HI	3	0,914	3	1990-2012	3	Annex I-LULUCF: 5A complete	3	AI	3	AI	3	AI	3	Annex I	3	3
EU	HI	3	0,843	2	1990-2012	3	KP-LULUCF complete	3	AI	3	AI	3	AI	3	Annex I	3	2,95
Russian Federation	HI	3	0,778	2	1990-2012	3	KP-LULUCF: ARD/FM complete	3	AI	3	AI	3	AI	3	Annex I	3	2,95
Brazil	UMI	2	0,744	2	1990-2005	3	NAI-LULUCF/Biome: complete + extra information	2	very good	3	intermediate	2	very good	3	(FIP, ICI, CDM)	3	2,59
Mexico	UMI	2	0,756	2	1990-2010	3	NAI-LUCF: complete (2.NC p.220)	1	very good	3	very good	3	intermediate	2	FCPF, UN-REDDother, FIP, ICI	3	2,52
India	LMI	1	0,586	1	1994/2000	1	NAI-LULUCF: complete (2.NC p.66-72)	3	very good	3	very good	3	very good	3	(FIP, CDM)	3	2,5
Indonesia	LMI	1	0,684	1	(1990-1994) 2000-2004	3	NAI-LUCF: complete + extra information (2.NC p.II-5)	2	very good	3	good	3	limited	1	FCPF, UN-REDD, FIP, VPA FLEGT, ICI	3	2,49
Bolivia	LMI	1	0,667	1	1990/1994/1998/2000/2002/2004	3	NAI-LUCF: LUCF complete (2.NC p. 120)	1	very good	3	good	3	intermediate	2	FCPF, UN-REDD; CDM;	3	2,42
Ghana	LMI	1	0,573	1	1990-2006	3	NAI-LUCF: complete + extra information (2.NC p.66-72)	2	good	3	intermediate	2	intermediate	2	FCPF, UN-REDDother, FIP, CD-REDD, VPA FLEGT	3	2,41
Argentina	UMI	2	0,808	2	(1990/1994/1997) 2000	2	NAI-LUCF: complete (2.NC p.56+Annex p.170)	1	good	3	good	3	intermediate	2	FCPF, CD-REDD, UN-REDDother; CDM;	3	2,37

Country	Income-economy		Human Development Index		Time series of emission data		Completeness of emission data		Forest Area Change		Forest inventory Capacity		Carbon Pool Reporting Capacity		Level of Capacity Building		Capacity
Malaysia	UMI	2	0,773	2	(1994) 2000 (1991-2007)	3	NAI-LUCF: complete (2.NC p.26)	1	very good	3	good	3	limited	1	UN-REDDother (upgraded)	2	2,24
China	UMI	2	0,719	1	1994/2005	1	NAI-LUCF: not complete but! extensive Forest Subcategories (2.NC p.66)	2	very good	3	very good	3	limited	1	(CDM)	3	2,24
Democratic Republic of the Congo	LI	0	0,338	0	1994/1999-2003	3	NAI-LUCF: complete (french) (2.NC p.66)	1	good	3	intermediate	2	intermediate	2	FCPF, UN-REDD, FIP, ICI, CDM;	3	2,16
Panama	UMI	2	0,765	2	1994/2000	1	NAI-LUCF: complete (spanish) (2. NC p.55)	1	very good	3	good	3	limited	1	FCPF, UN-REDD	3	2,14
Congo	LMI	1	0,564	1	1994/2000	1	NAI-LUCF: complete (french) (2. NC p.68)	1	good	3	very good	3	intermediate	2	FCPF, UN-REDD, VPA FLEGT	3	2,12
Peru	UMI	2	0,737	2	1994/2000	1	NAI-LUCF: missing soils and abandoned land (2.NC p.63)	0	very good	3	good	3	intermediate	2	FCPF, UN-REDDother, USAID, FAO-Finnland, FIP, ICI, CDM;	3	2,07
Lao People's Democratic Republic	LMI	1	0,569	1	1990/2000	1	NAI-LUCF: missing soils (2.NC p.42)	1	good	3	good	3	limited	1	FCPF, UN-REDDother, FIP, ICI	3	2,04
Costa Rica	UMI	2	0,763	2	1990/1996/2000 /2005	2	NAI-LUCF: complete (spanish) (2. NC p.88)	1	very good	3	limited	1	limited	1	FCPF, UN-REDDother, CDM; (upgraded)	3	1,97
Myanmar	LI	0	0,524	1	1990/1995/2000-2005	3	NAI-LUCF: no soils (1.NC p.36)	1	very good	3	very good	3	limited	1	UN-REDDother	1	1,89
Colombia	UMI	2	0,711	1	(1990/1994) 2000/2004	1	NAI-LUCF: complete (2.NC p.143)	1	very good	3	limited	1	limited	1	FCPF, UN-REDD, CDM;	3	1,77
Madagascar	LI	0	0,498	1	1994/2000	1	NAI-LULUCF: conform to LUCF A-D (french) (2.NC p.24)	1	intermediate	2	good	3	intermediate	2	FCPF, UN-REDDother	2	1,71
Ecuador	UMI	2	0,711	1	1990/1994/2000 /2006	2	NAI-LUCF: complete (2.NC p.115)	1	good	3	low	0	low	0	CD-REDD, UN-REDD, ICI (upgraded)	3	1,68
Cameroon	LMI	1	0,504	1	1994	0	NAI-LUCF: not comprehensible displayed	0	intermediate	2	very good	3	intermediate	2	FCPF, UN-REDDother, VPA FLEGT, ICI	3	1,66

Country	Income-economy		Human Development Index		Time series of emission data		Completeness of emission data		Forest Area Change		Forest inventory Capacity		Carbon Pool Reporting Capacity		Level of Capacity Building		Capacity
Ethiopia	LI	0	0,435	0	1990-1995	3	NAI-LUCF: Soils missing (1.NC p.47)	1	good	3	low	0	intermediate	2	FCPF, UN-REDDother, CDM;	2	1,64
Guyana	LMI	1	0,638	1	1990-2004	3	NAI-LUCF: missing soils (2.NC S.79)	1	low	0	limited	1	intermediate	2	CD-REDD, FCPF, UN-REDDother; ICI (upgraded)	3	1,62
United Republic of Tanzania	LI	0	0,488	0	1990/1994	1	NAI-LUCF: soils missing (1.NC S.11-12)	1	intermediate	2	limited	1	intermediate	2	FCPF, CD-REDD, UN-REDD, ICI	3	1,54
Uganda	LI	0	0,484	0	1994	0	NAI-IPCC1995: missing abandonment of managed lands (1.NC p.62)	0	good	3	good	3	intermediate	2	FCPF, UN-REDDother, CDM;	2	1,52
Suriname	UMI	2	0,705	1	2003	0	NAI-LUCF: complete (1.NC p.37)	1	limited	1	good	3	intermediate	2	FCPF, UN-REDDother	2	1,5
Cambodia	LI	0	0,584	1	1994	0	NAI-LUCF: incomplete (1.NC p.19)	0	very good	3	limited	1	intermediate	2	FCPF, UN-REDD, FIP	3	1,45
Belize	UMI	2	0,732	1	1994/1997/2000	2	NAI-LULUCF: not comprehensible displayed (2.NC, Tab.7, p. 37)	0	good	3	limited	1	limited	1	FCPFcandidates	1	1,37
Papua New Guinea	LMI	1	0,491	0	1994	0	NAI-LUCF: only some data regarding forest (1.NC p.33)	0	intermediate	2	intermediate	2	limited	1	FCPF, UN-REDD, FIP, Partnership with Australia, ICI	3	1,37
Nigeria	LMI	1	0,504	1	1994/2000	1	NAI-LUCF: complete (2.NC p.38)	1	low	0	limited	1	intermediate	2	CD-REDD, FCPF, UN-REDD	3	1,32
Liberia	LI	0	0,412	0	2000	0	NAI-LUCF: missing soils and abandonment of lands (1.NC p.57)	0	intermediate	2	limited	1	intermediate	2	FCPF, VPA FLEGT	3	1,24
Honduras	LMI	1	0,617	1	1995/2000	1	NAI-LUCF: complete + extra information (2.NC p.59)	2	low	0	limited	1	limited	1	FCPF, UN-REDDother	2	1,19
Gabon	UMI	2	0,674	1	1994/2000	1	NAI-LUCF: "Emissions from Abandonment of managed lands" is said to be neglectable (0) (2.NC p.56)	1	low	0	limited	1	intermediate	2	FCPF, UN-REDDother	2	1,17
Paraguay	LMI	1	0,676	1	(1990/1994) 2000	1	NAI-LUCF: missing soils and abandoned land (2.NC p.54)	0	intermediate	2	low	0	low	0	FCPF, UN-REDD, ICI, CDM	3	1,17

Country	Income-economy		Human Development Index		Time series of emission data		Completeness of emission data		Forest Area Change		Forest inventory Capacity		Carbon Pool Reporting Capacity		Level of Capacity Building		Capacity
Mozambique	LI	0	0,393	0	1990/1994	1	NAI-LUCF: missing soils and abandoned lands (2.NC p.43-44)	0	limited	1	limited	1	intermediate	2	FCPF, South-South REDD, ICI, CDM;	2	1,03
Chad	LI	0	0,372	0	1993/1998-2003	3	NAI-LUCF: not comprehensible displayed	0	low	0	limited	1	intermediate	2	FCPFcandidates, UN-REDDother	1	0,97
Central African Republic	LI	0	0,341	0	1994	0	NAI-LUCF: 1.NC not Online, only Hardcopy	0	low	0	limited	1	intermediate	2	FCPF, UN-REDDother, VPA FLEGT, ICI	3	0,92
Zambia	LMI	1	0,561	1	1994	0	NAI-LUCF: spare data (1.NC p.26, scaned NC)	0	limited	1	limited	1	limited	1	CD-REDD, UN-REDD	2	0,9
Kenya	LI	0	0,535	1	1994	0	NAI-LUCF: not comprehensible displayed (1.NC p.29)	0	low	0	limited	1	intermediate	2	FCPF, UN-REDDother, CDM;	2	0,77
Zimbabwe	LI	0	0,492	0	(1994) 2000	0	NAI-LUCF: only emissions for 5A (2.NC p.XI)	0	intermediate	2	limited	1	limited	1	UN-REDDother; ICI	1	0,76
Solomon Islands	LI	0	0,491	0	1994	0	NAI-LUCF: not comprehensible displayed (1. NC p.19)	0	low	0	limited	1	limited	1	UN-REDD	2	0,64
Guinea-Bissau	LI	0	0,396	0	1994	0	NAI-LUCF: not comprehensible displayed (2.NC p.41)	0	intermediate	2	low	0	limited	1	UN-REDDother	1	0,6
Dominica	UMI	2	0,717	1	(1994) 2000-2005	3	NAI-LUCF: incomplete (2.NC p. 30)	0	low	0	low	0	low	0	no engagement found	0	0,6
Venezuela	UMI	2	0,764	2	1999	0	NAI-LUCF: seems complete (spanish) (1.NC p.44-48)	1	no data	0	no data	0	no data	0	no engagement found	0	0,35

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