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Country Paper: Brazil and Indonesia (Land-use and agriculture)

Stephen Farshing and Jesse Libra
<http://blogs.utexas.edu/mecc/>

Supervisor: Dr. Joshua Busby
busbyj@utexas.edu



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EXECUTIVE SUMMARY

Brazil and Indonesia are the 5th and 7th largest sources of greenhouse gas emissions (including LUCF) respectively in the world. As large non-Annex I countries, with populations of over 200 million for Brazil and nearly 250 million for Indonesia, these are two extremely important countries to focus on with respect to climate change. However, these two countries have quite different emissions profiles than the rest of the world. While energy production and other sectors produce significant emissions, land use, land use change, and agriculture account for well over half of total emissions in both Brazil and Indonesia. These unique profiles highlight the importance of investigating land use and agricultural emissions in these countries and how to mitigate them. The size of these countries and their emissions underscore our rationale for focusing on them in this report.

This report analyzes current sources of greenhouse gas (GHG) emissions in Indonesia and Brazil's Agriculture, Forestry, and other Land Use (AFOLU) sectors. AFOLU is responsible for the majority of each country's GHG emissions. Deforestation is the primary driver of emissions in both countries and the majority of vulnerable forests are located in remote regions. Agricultural interests for palm (Indonesia) and beef and soy (Brazil) are the primary drivers of deforestation and forest degradation. While looking at sources and current emissions trends, this report discusses the agriculture landscape and the effect of the status quo on AFOLU emissions. Strategies for emissions mitigation, current initiatives and barriers to success are also discussed. Finally, we suggest strategies for weakening these barriers. Key findings are as follows:

- (1) Deforestation in Brazil's Amazon and Cerrado is driven by cattle pasture expansion and soy plantation expansion, which displaces cattle ranchers. Preventing this will require solutions at all levels of government that take into account large agribusiness incentives.
- (2) To meet its 36.1% to 38.9% emissions reductions target by 2020, Brazil's focus will almost absolutely be on deforestation. There is potential for emissions mitigation in the AFOLU sector. Current government initiatives including the ABC Plan, the PPCDAm, and the PPCerrado have set targets to reduce deforestation and deforestation through sustainable land management and agricultural practices.¹
- (3) Preventing peatland degradation and burning is particularly necessary if Indonesia is going to meet its emissions reduction commitment of 26 percent by 2020. This will require coordination among large palm producers, government entities, and smallholder farmers.
- (4) The majority of mitigation strategies will not be feasible until local governance improves in both countries, in terms of coordination with the national government, inter-agency coordination, and inclusion of stakeholders and civil society.

Barriers

- (1) **Legal uncertainty** regarding Brazil's Forest Code as well as lack of coordination among existing REDD+ initiatives and all levels of government put deforestation reduction in jeopardy. Despite some progress, Brazil's fragmented and politically polarized system is still a threat to REDD+ and the success of preserving the Forest Code.

¹ These plans are discussed in the "LUCF Mitigation Strategies and Policies" section for Brazil.

- (2) Agribusiness forms an immensely powerful lobby in both Brazil and Indonesia.** In Brazil this occurs most notably at the state level and in Indonesia at the province level. In addition, many of the countries' most powerful political actors are linked to these industries. In Brazil, this has led to Congressional policies that limit the ability and capacity for environmental NGOs and scientists to operate in the Amazon.
- (3) Access to credit and affordable financing instruments remain largely unavailable** for small to medium farmers. In addition, complicated and inefficient loan requirements by the Brazilian Development Bank (BNDES) hinder implementation of the ABC Plan.
- (4) Local government will and capacity** remain a major barrier in Indonesia. Due to the recent decentralization of Indonesia's government, coordination between local and national government as well as between government agencies is a major challenge.
- (5) Indonesians remain relatively apathetic towards environmental issues.** Forest and peatland preservation is not a priority among the Indonesian public. Consequentially, local politicians have little incentive to mitigate deforestation.

Recommendations

- (1) Improved policy transparency and inclusion of civil society/NGO/ relevant stakeholders in the process** in both countries. Climate policy makers must continue trying to include civil society groups, environmental NGOs, and relevant stakeholders (such as local and indigenous populations, forest managers, and public sector employees) to succeed in reducing GHG emissions.
- (2) Coordination between agribusiness and government in both countries to create sustainable supply chain standards**, especially for beef, soy, and palm industries. This could include providing economic incentives for firms complying with environmental recommendations and sustainable product labeling. In Indonesia cooperation over the swap of forest and peatland concessions for degraded land holds particular promise.
- (3) Increased funding for forest monitoring and law enforcement** in both countries. Brazil has made strides in monitoring with a sophisticated Landsat system, and Indonesia is currently building a similar system with the help of the World Resources Institute and funding from the Japanese government.
- (4) Brazil must improve the ABC Plan** by implementing a monitoring and evaluation group for the Plan. BNDES should revise ABC loan criteria by lowering interest rates for farmers who comply with environmental legislation.
- (5) Improve public training and education efforts in Brazil** to promote low-carbon practices for producers (small and large). Providing micro-credits for financing new techniques/technologies for smallholders can change farmer behavior.
- (6) Indonesia must address public indifference** by improving forest preservation advocacy through the work of local NGOs and sub-national REDD+ offices.
- (7) Improve local governance in Indonesia** through improving the quality of data available to local agencies and the capacity of agencies to share and standardize that data.

BRAZIL

RATIONALE

Brazil is the world's seventh largest economy with a current Gross Domestic Product (GDP) of \$2.253 trillion.² Covering 47% of the South American continent with over 200 million people, Brazil also boasts the largest area and population in Latin America and the fifth largest population in the world. Second in the world only to Russia, Brazil is home to nearly 4.8 million km² of forest cover, which is being deforested rapidly. In addition to its growing global economic prowess and relevance, the nature and volume of Brazil's greenhouse gas (GHG) emissions profile make it an unmistakably vital actor to include in this research project.

As one of the leading actors, especially in terms of the non-Annex I countries, in the United Nations Framework Convention on Climate Change (UNFCCC) Brazil deserves recognition for its GHG mitigation efforts. As seen in Figure 1 below, its overall emissions have remained relatively stable since 1990. Brazil has voluntarily committed to reducing its GHG emissions by 36.1% to 38.9% relative to Business as Usual (BAU) levels until 2020.³ Unlike many countries, a large proportion of Brazil's power generation, about 40%, comes from hydroelectricity and other renewable sources.⁴ In addition, it is consuming increasing amounts of biomass in the residential and industrial sectors. Also notable, Brazil is the world's second largest consumer and producer of ethanol behind the United States, making its transportation sector relatively cleaner than that of comparable emerging economies.

Brazil's emissions in 2009 amounted to 2,040.09 MtCO₂e including land-use change and forestry (LUCF), making it the fifth largest emitter responsible for about 4.5% of global GHG emissions.⁵ However, Brazil's GHG emissions profile is extremely unique as the land-use, forestry, and agriculture sector is by far the largest source of domestic emissions. While Brazil has seen progress in decreasing the deforestation of the rain forest and other sensitive biomes, it faces significant development challenges in combining the benefits of agricultural growth, environmental protection, and sustainable development.

Brazil's agricultural and LULUCF emissions were 604.54 and 973.58 MtCO₂e respectively in 2009, accounting for about 77.35% of its total emissions profile.⁶ Figure 2 below demonstrates that emissions in these sectors are extremely significant in the global context. Its agricultural and LULUCF emissions account for 10.36% and 37.26% respectively of the global totals for each sector. While energy production and transportation are relevant emitters as well in Brazil, its most significant strides can be made in land use and agriculture. Brazil should focus its efforts in these areas to reduce deforestation and promote low low-carbon agriculture so as to achieve maximum emissions reduction. In light of this atypical emissions profile, the scope of this paper's analysis focuses on deforestation and agricultural emissions in Brazil.

² World Development Indicators, The World Bank, 2012.

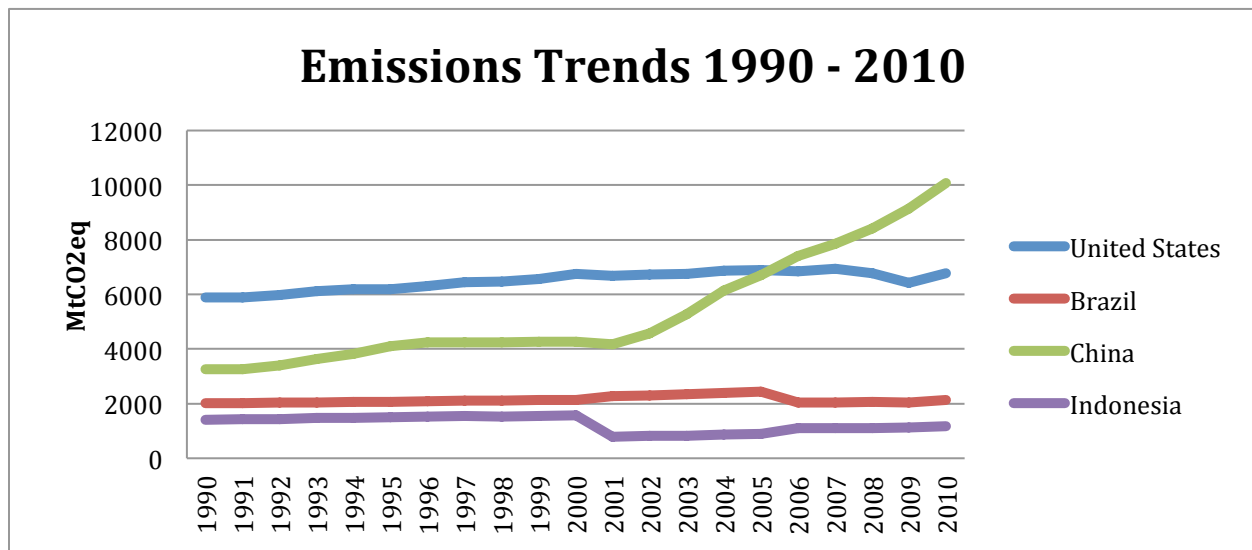
³ Briner and Prag, 2013.

⁴ U.S. Energy Information Administration, n.d.

⁵ World Resources Institute, n.d.

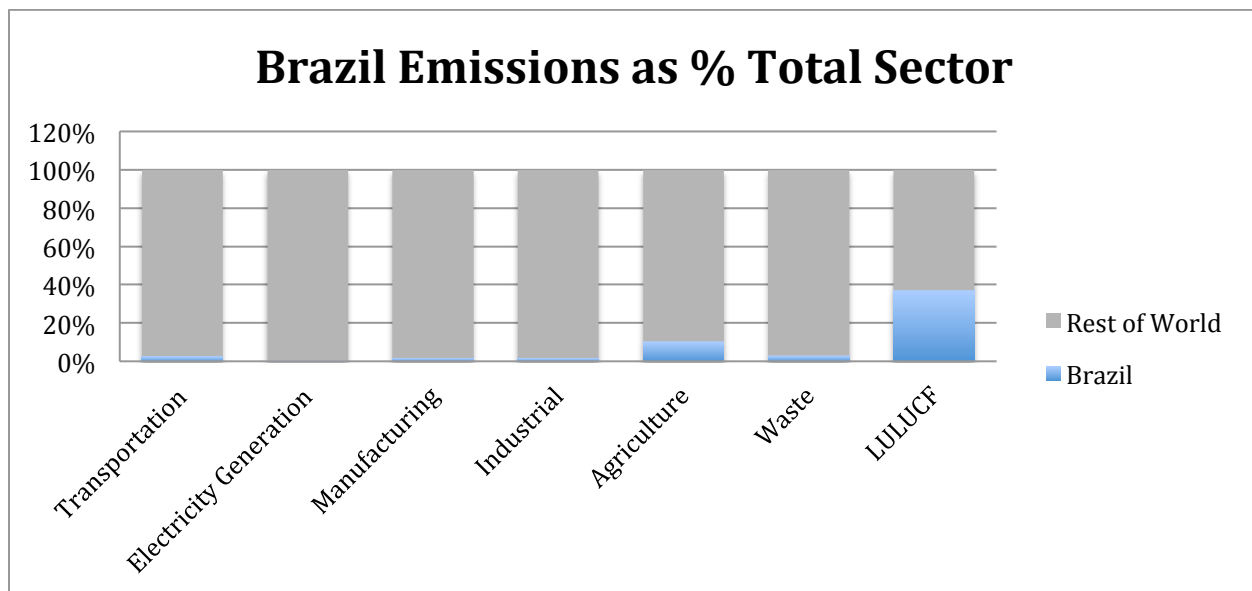
⁶ Ibid.

Figure 1



Source: World Resources Institute CAIT 2.0 Climate Data Explorer, 2010

Figure 2



Source: World Resources Institute CAIT 2.0 Climate Data Explorer, 2010

One final note should be added before further analysis. Deforestation has become Brazil's main GHG emissions source but agriculture and livestock have become key sectors for growth. This has led to steady territorial expansion of farmland and pastureland over time and resulted in the conversion of significant native vegetation and forestland. Therefore, it is clear that agriculture has been the major driver of deforestation in Brazil. This leads to a somewhat blurred line as to what constitutes strictly agricultural emissions or what constitutes strictly

LULUCF emissions. Should deforestation emissions that are brought about by agricultural expansion be accounted for as agricultural emissions? This subject is not debated in this paper but should serve as a justification for combining both LULUCF and agriculture into the same sector solely for the purpose of this analysis. If agriculture leads to deforestation, then agricultural solutions will have to be incorporated to slow deforestation. Thus, what follows is an in depth analysis of the Agriculture, Forestry, and Other Land Use (AFOLU) sector in Brazil.

SECTOR OF IMPORTANCE

AGRICULTURE, FORESTRY, AND OTHER LAND USE (AFOLU)

As noted above, AFOLU emissions account for over three-fourths of Brazil's total emissions as well as for 10.36% and 37.26% in the total global agriculture and LULUCF sectors respectively. It is no surprise then that Brazil is world's largest LULUCF emitter and the second largest agricultural emitter only behind China. Framed in a different way, Brazil's AFOLU emissions alone account for nearly 2.8% of total global GHG emissions in all sectors combined.

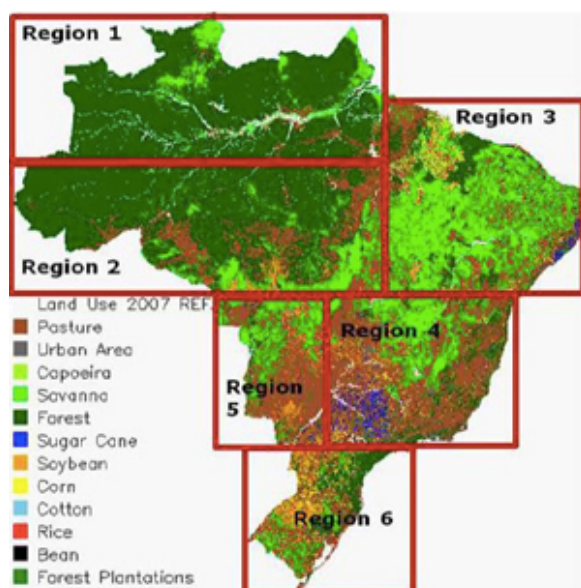
A simple explanation of how the process of deforestation leads to increased emissions is as follows. In Brazil, deforestation contributes to climate change first when forests are burned, and GHGs are released. Burning, both legal and illegal, is widely used in the Amazon region to prepare new crop and pasture land. When forests are cleared, carbon that was held in the soil is also released as carbon dioxide or methane. Natural decomposition within intact forests is a further source of carbon dioxide and methane emissions. Demand for wood further drives deforestation, as does the demand for land for large soybean plantations and extensive cattle rearing. Significant institutional gaps, especially between legislative power and legal authorities, make enforcing environmental laws in the Amazon region extremely difficult. As a result, illegal logging and/or burning are common practices that are not easily resolved. Map 1 below shows the distribution of Brazilian land by activity. The locations of soy production and pastureland should be noted. Map 2 displays the location of Brazil's major ecological biomes. Note the Amazon and Cerrado (savannah) regions, as these are the most critical areas in terms of deforestation and forest/land degradation due to their intersection with pastureland and soy production.

To understand the challenges Brazil faces in agricultural emissions mitigation, it is necessary to acknowledge the sheer scale at which the agriculture industry has grown in recent years. FAOSTAT notes that agricultural output has increased steadily in Brazil since 2003. Now it is the world's third largest agricultural exporter, accounting for around 9% of total world exports.⁷ In addition, its agricultural exports more than doubled from 2007 to 2011. Table 1 summarizes the 2011 value of Brazil's top ten agricultural exports along with the five-year growth rates of each. Notably, Brazil is the world's top beef exporter, accounting for over 20% of total world exports. The significance of beef production emphasizes why emissions from enteric fermentation are Brazil's largest source of agricultural emissions. With over 200 million

⁷ FAO, n.d.

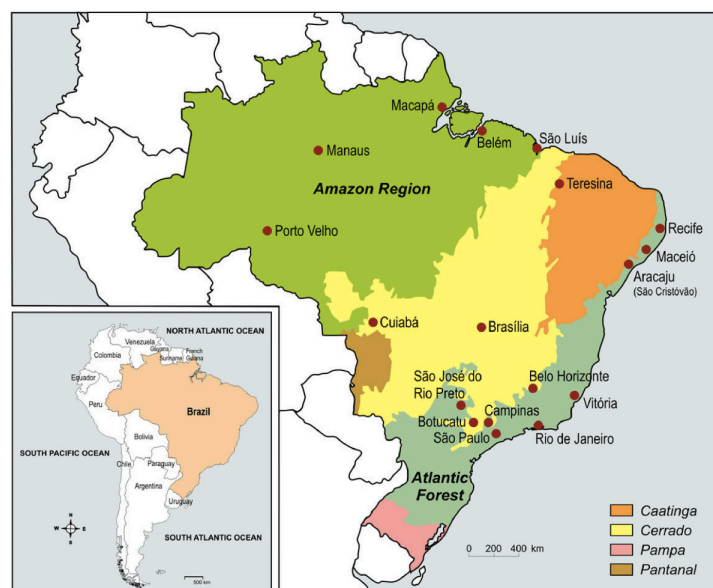
cattle, over one per person, methane from cattle digestive systems is a significant source of GHG emissions.⁸

Map 1. Brazil Land-Use Map



Source: PROFOR 2014

Map 2. Brazilian Biome Map



Source: Malaria Journal 2010

Table 1. Brazil: Agricultural Commodity Exports by Value (5 year avg.)

Rank	Commodity	Value (million \$)	% Increase from 2007-2011
1	Soybeans	11,291	143%
2	Sugar, raw centrifugal	7,375	174%
3	Coffee, green	5,290	130%
4	Chicken meat	4,869	109%
5	Soybeans meal	4,261	82%
6	Meat-cattle boneless	3,527	41%
7	Sugar, refined	2,943	55%
8	Tobacco, unmanufactured	2,525	46%
9	Maize	1,997	42%
10	Soybean oil	1,567	24%

Source: FAOSTAT database 2013

⁸ Economist, 2011.

As shown in Table 2, enteric fermentation accounts for well over 60% of total agricultural emissions. Direct N₂O emissions from crop residue management and manure management and fertilizer use are also major sources. From 2000-2010, agriculture emissions from Brazil increased by 25%, whereas those in the U.S. only increased by 3%. According to McKinsey Solutions Climate Desk Tool, using 2005 as the base year, Brazil's agricultural emissions are projected to rise nearly 23% by 2020 and another 13.5% above 2020 levels by 2030. To meet its emissions reduction pledge of 36.1% to 38.9%, the agriculture and livestock sectors will have to contribute a reduction of 133 to 166 MtCO₂e. Government investments in agriculture are absolutely vital to complement the efforts from the sectors to reach these targets.⁹

While it is common in most tropical countries for the majority of deforestation to result from the practices of poor subsistence farmers, this is not the case in Brazil. In the Amazon region, about 60-70% of deforestation can be attributed to cattle ranches.¹⁰ The majority of soy and sugar cultivation takes place outside of the Amazon in regions that have already been cleared. However, it should be noted that cattle farms are often converted to soy plantations, and cattle ranchers are forced to clear forests to create new grazing land. Thus, soy cultivation is a considerable indirect driver of deforestation in the Amazon but cattle ranching is the main direct driver.

Table 2. Agricultural Emissions by Activity – Brazil (2010)

Activity	% Total Agriculture Emissions (in Brazil)
Enteric Fermentation	63.66%
Manure left on Pasture	24.55%
Synthetic Fertilizers	4.48%
Manure Management	2.22%
Crop Residues	2.05%
Manure applied to Soils	1.81%
Rice Cultivation	0.90%
Burning crop residues	0.32%
Cultivated organic soils	0.00%
Total	100%

Source: FAOSTAT database 2013

The Brazilian cattle and soy industries, relatively recently liberalized along with the agricultural sector as a whole, are extremely concentrated in large agribusiness companies with medium-sized companies and farmers operating on the fringes. For example, JBS, Mafrig, and Minerva are responsible for over 35% of the market share in the beef industry according to the Brazilian Association of Meat Exporters. Similarly, five companies (Bunge, Cargill, Coimbra, ADM, and Granoleo) own about 60% of Brazil's soy crushing capacity according to the Brazilian

⁹ Cerri et al., 2010.

¹⁰ Mueller et al., 2011.

Association of Vegetable Oil Industries (ABOIVE). To demonstrate the lobbying power of some of these large firms, Brazil's Economic Development Bank (BNDES) owns a 20% interest in the market actions of JBS and 30% in Maufrig.¹¹ Interestingly, Brazilian agricultural subsidies have been relatively low at about 6% of farm income in 2005-2007, compared to 12% in the U.S. and 29% in the E.U.¹² Most support to the sector is provided through preferential public credit to producers to offset high market interest rates and support income generation for the rural poor.¹³

LUCF MITIGATION STRATEGIES AND POLICIES

I. AVOIDED DEFORESTATION

As deforestation alone is responsible for well over half of Brazil's GHG emissions inventory, the sector has received considerable attention from all levels of government, NGOs, and various domestic and international stakeholders. Simply stated, Brazil must stop cutting down forests to achieve significant emissions reduction targets. The Action Plan to Control Deforestation in the Amazon (PPCDAm) and the Action Plan to Control Deforestation and Fire in the Cerrado (PPCerrado) aims to reduce deforestation in these respective areas by 80% and 40% respectively by 2020 compared to historical deforestation rates.¹⁴ Based on these commitments, the annual emissions reductions from reduced deforestation would be 668 MtCO₂e (see figure 3).¹⁵

Actions outlined in the National Plan on Climate Change to achieve these reduction goals include the implementation of the National Public Forests Register (CNFP), territorial and land organization, incentives for sustainable productive activities, and strengthening environmental enforcement. As this plan showed moderate success while still allowing beef and soy production to grow, deforestation rates in the Amazon began to climb again by 28% in 2013 alone. Possible reasons for this increase are discussed in the barriers section. Much of Brazil's previous success in avoided deforestation is attributable to its sophisticated systems for monitoring forest areas, which cover half of the country. The Brazilian National Institute for Space Research (INPE) runs a remote sensing-based monitoring system for the Amazon. There is also a similar LIDAR-based system for monitoring forest-burning activities.

II. FINANCING INITIATIVES

¹¹ Meat Trade News Daily, 2011.

¹² Economist, 2010.

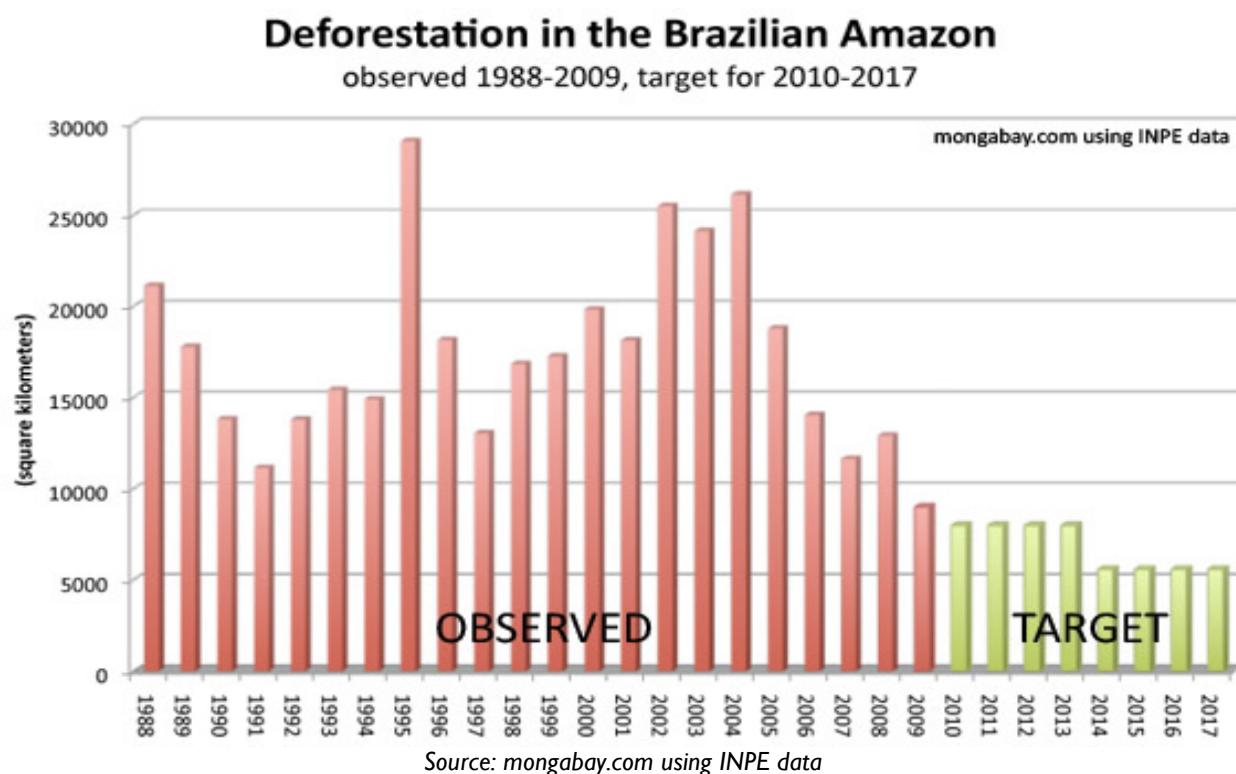
¹³ MAPA 2008.

¹⁴ Gebara and Thuault, 2013.

¹⁵ Brazil, 2010.

Brazil currently has two legally established federal financing initiatives to address climate change due to deforestation. The Amazon Fund, according to the Brazilian government, “is aimed at raising donations for non-reimbursable investments in efforts to prevent, monitor and combat deforestation, as well as to promote the preservation and sustainable use of forests in the Amazon Biome.”¹⁶ The Brazilian National Bank for Social and Economic Development (BNDES) manages the Fund and makes all major grant decisions. To date, \$129 million has been disbursed to the Fund for 36 initial projects and \$1 billion has been pledged by Norway contingent upon decreased deforestation rates.¹⁷

Figure 3



The National Fund on Climate Change finances undertakings that seek to mitigate climate change. It provides refundable resources (managed by BNDES) and non-refundable resources (managed by the Ministry of the Environment) as well as technical support for projects or studies. A main goal of the Fund is combating deforestation, and financial resources are allocated from a variety of public and private grants, both domestic and international.¹⁸

III. REDD+ AND THE FOREST INVESTMENT PROGRAM

¹⁶ Fundo Amazonia, n.d.

¹⁷ Gebara and Thuault, 2013.

¹⁸ Climate Fund Program – BNDES, n.d.

Brazil is one of eight pilot countries participating in the Forest Investment Program (FIP), a World Bank-administered financing instrument that helps developing countries reach their REDD goals by providing funds to bridge the investment gap and initiate “reforms identified through national REDD readiness strategy building, while promoting sustainable forest management.”¹⁹ REDD+, a United Nations program, stands for Reducing Emissions from Deforestation and forest Degradation in developing countries. REDD+ is a mechanism to financially compensate developing countries for their verified efforts to reduce emissions through sustainable forest management.

REDD+ specifies five general activities that countries may implement to achieve success as: (1) reducing emissions from deforestation; (2) Reducing emissions from forest degradation; (3) Conservation of forest carbon stocks; (4) Sustainable management of forests; and (5) Enhancement of forest carbon stocks.²⁰ The idea is that countries will receive money through the REDD agency to not cut down their forests. As a participant in REDD and the FIP, Brazil has the potential to complement financial resources received from the other two funds and move toward sustainable forest management practices to reach mitigation goals.

Working with civil society, private sector actors, and the Ministry of the Environment, the government of Brazil began developing a national REDD+ strategy in 2010. The draft plan looks at three national plans as the avenue to implement REDD+ in Brazil. These plans are the *Low-Carbon Agriculture (ABC) Plan*, the *Action Plan to Prevent and Control Deforestation and Fire in the Brazilian Cerrado (PPcerrado)*, and the *Action Plan to Prevent and Control Deforestation in the Amazon (PPCDAm)*. The strategy is aimed at establishing rules and safeguards so that REDD+ activities do not inflict social or environmental harm.²¹

IV. THE FOREST CODE

A final significant policy to examine before moving on to agricultural mitigation policy is Brazil’s Forest Code and its revision. The 1965 Code established guidelines called “legal reserves” that stated the proportion (80%) of individual rural land plots in the Amazon should be maintained permanently as forest. The Code also prohibited the clearing of vegetation in “areas of permanent protection” – such as on steep slopes and along the margins of rivers and streams.²² Currently, a large share of landowners including agricultural companies, do not meet the 80% requirement and agricultural interests are pushing for reform to lower the limits. While the final revision is not complete, elements likely to be included are amnesty for select cases of illegal clear-cutting prior to 2008, a reduction to 50% from the 80% legal reserve requirement, weakened stream-buffer protections, removing hilltops under 100 meters from protected status, eliminated intermittent stream protections, and decreased safeguards for mangrove forests.²³

¹⁹ The Bank Information Center, n.d.

²⁰ UN-REDD Programme, n.d.

²¹ Gebara and Thuault, 2013.

²² World Wildlife Fund, 2012.

²³ Purdom and Nokes, 2014.

AGRICULTURAL MITIGATION STRATEGIES AND POLICIES

I. LOW CARBON AGRICULTURE PLAN

The 2010 Low Carbon Agriculture (ABC) Plan's objective is to promote and stimulate sustainable practices in agriculture that reduce GHG emissions and increase carbon sequestration. The Plan proposes annual reductions of 133 to 166 MtCO₂e by 2020 by providing farmers with the necessary resources and financial incentives to use sustainable agricultural techniques.²⁴ The Plan is implemented through the Interministerial Committee on Climate Change and will provide information, training, loans and credit, and construction of state-level plans for farmers to adopt strategies that limit deforestation and increased emissions.

Actions to be undertaken by the Plan include recovery of degraded pastures, integrated crop-livestock systems, recuperation of degraded areas, no-till planting, biological nitrogen fixation, planted forests, and animal waste treatment. The ABC Plan represents a dedicated line of credit to finance these best practices. This strategy claims to adopt a “one size does not fit all,” approach and is a sign that Brazil is indeed committed to more efficient agriculture and livestock production with lower GHG emissions. It could not only accomplish reduced emissions, but also potentially generate income for vulnerable rural communities that rely on agriculture. However, full implementation of the plan is moving slowly for reasons that are discussed in the barriers section.

The most important GHGs for arable land are CO₂ and N₂O and land management practices have a huge impact on these emissions. CH₄ and N₂O are important for cattle ranching emissions in terms of enteric fermentation and manure management. Reducing emissions revolves around improving the entire agricultural production system's efficiency.²⁵ The following section outlines and describes specific mitigation strategies that are suitable and applicable to the Brazilian agricultural and livestock sectors both for large-scale as well as smallholder farms. While this list is far from exhaustive, it addresses a few of the most potentially effective interventions for GHG mitigation.

II. AGRICULTURAL EMISSION MITIGATION STRATEGIES

RESTORATION OF DEGRADED PASTURELAND

The Brazilian government has set a target through the ABC Plan to recover 15 million acres of degraded pastureland, making it suitable again for the production of agricultural as well as forestry products. The idea is to improve the soil organic carbon of the degraded grasslands through activities such as improved grazing, fertilization, lime, irrigation, planting more productive grass species, and seeding legumes to restore nitrogen to the soil. Improved grassland management through less intensive grazing pressure is the key to this strategy. When

²⁴ Gebara and Thuault, 2013.

²⁵ Muller et al., 2010.

combined with one or more of the above activities, this has been shown to produce significant results amounting to ~20% increases in soil organic carbon.²⁶

NO-TILLAGE AND COVER-CROPPING

No tillage systems have been shown to increase carbon sequestration and accumulation in soil systems. Essentially, farmers simply plant their new crops directly into the organic waste of the previous harvest instead of removing the waste through tillage. The soil is undisturbed from harvest to new planting. This protects the soil, increases water retention, and can significantly lower machine and labor costs for large-scale agribusiness companies.²⁷ Cover crops produce similar results while also increasing soil nutrients by planting grasses, legumes, or forbs to provide seasonal soil cover and protection when the soil would otherwise be bare. This method can also help reduce overall costs by controlling pests, weeds, and diseases while also improving soil quality.²⁸

INTEGRATED CROP AND LIVESTOCK SYSTEMS

This strategy basically rotates grassland used for pasture with arable crops on a season-by-season basis. Some Brazilian farmers are implementing this by integrating trees (agroforestry), soy, rice, eucalyptus, and livestock into the same yearly rotation system. The results have been shown to increase livestock productivity, improve soil quality and carbon sequestration, as well as increase arable crop productivity.²⁹ Figure 3 demonstrates the potential of a basic 10-year integrated system plan.

IMPROVED MANURE MANAGEMENT

Animal waste and manure can be collected, treated, and used to produce organic fertilizer compounds and energy sources such as biogas (anaerobic digestion). Manure can be treated and stored in either wet or dry form. Wet storage tends to produce higher methane emissions while dry storage produces higher nitrous oxide emissions. Most livestock systems in Brazil use dry management systems. The type of management system to be undertaken depends largely on environmental conditions of the particular area. Wet systems should be paired with anaerobic digestion to keep methane emissions from rising to higher levels than they already are.³⁰

ENTERIC FERMENTATION MITIGATION

Methane emissions from enteric fermentation, as Cerri et al. notes, “are impacted by a number of factors including the animal traits (e.g. age, bodyweight, and genetics), feed quality,

²⁶ Muller et al., 2010.

²⁷ Brazil, 2010.

²⁸ Gebara and Thuault, 2013.

²⁹ Gouvello, 2012.

³⁰ Muller et al., 2011.

and environmental parameters (e.g. temperature). Therefore, mitigation options would have to address those drivers.”³¹ The Brazilian government and cattle industry is currently doing very little to address enteric fermentation increases. Feed switching and enrichment with concentrates and other additives, along with longer-term strategies such as changes in animal breeding are the main two options available. Some additives such as ionophores, propionate

Figure 4



Source: Gouvello, 2012, World Bank

precursors, or condensed tannins directly affect methanogenesis inside the rumen. The addition of oil seeds to cow diets has also been shown to decrease methane emissions.³² Decreasing the slaughter age in cattle is also an option that has been proposed. Finally, methane capture is a technology similar to carbon capture and sequestration that catches methane emissions and then flares them to create heat and/or electricity.

BARRIERS

³¹ Cerri et al., 2010.

³² Ibid.

While many of the strategies outlined above could produce real and noticeable results in GHG emissions mitigation, Brazil's landscape and system is burdened with significant barriers to implementation. What follows is a brief outline of some of the most salient barriers divided into five categories.

I. POLITICAL BARRIERS

In addition to overall problems of corruption at all levels of government, a fragmented bureaucracy, and constant political opposition along party lines, below are a few significant political barriers to implementing sustainable forestry and land management policies.

Although the Brazilian government has been developing a comprehensive REDD+ Strategy for almost four years, there is still a large lack of coordination among existing REDD+ initiatives and the different levels of government. A key aspect of the Strategy is to lay out a set of criteria, rules, and safeguards to ensure mutual effort and harmonization of policies among federal, state, and municipal levels. REDD+ project implementation is absolutely reliant on this level of cooperation and until Brazil's fragmented and politically polarized system can achieve this, the overall success of REDD+ is in jeopardy.

Political and procedural constraints have also threatened and complicated allocation of financial resources from the Amazon Fund and the National Fund on Climate Change. The National Fund on Climate Change currently faces significant political opposition and up to 60% of the Fund's resources come from Brazilian oil production, creating questionable incentives.³³ In addition, both funds are wholly or in part managed by the Brazilian banking system. The fact that all Amazon Fund resources must come through BNDES raises questions of improper fund allocation, nepotism, and corruption, all of which the Brazilian banking sector has been known for at some point. Politically motivated requirements imposed by BNDES have made it unfeasible for some private banks and credit unions to work with these funds. Civil society organizations, community associations, private sector organizations, and state governments who see themselves as central actors and beneficiaries appear frustrated with the limitations, complexities, tight specifications, and lack of transparency in BNDES's control of the funds.³⁴

Finally, uncertainty about the future of the Forest Code has weakened law enforcement for illegal logging and farm expansion. This has led to many previously law-abiding farmers and citizens to opt for more short-term gains in the absence of a legitimate Code. Retroactively forgiving illegal behavior (another aspect of the new Code) could actually incentivize more illegal behavior and undermine enforcement systems that have taken decades to put into place. This combined with institutional weakness at the state level makes the transition to sustainable practices more complicated.

II. MARKET AND INDUSTRY BARRIERS

Cattle ranching companies and agribusinesses form an immensely powerful lobby in Brazil, most notably at the state level. In addition, many of the country's most powerful political

³³ Gebara and Thuault, 2013.

³⁴ Ibid.

actors are somehow linked to one or more of these industries.³⁵ This has led to Congressional policies that limit the ability and capacity for environmental NGOs and scientists to operate in the Amazon.³⁶ This combined with rampant corruption in Amazon frontier areas has led to land acquisitions without titles, illegal logging, and illegal farm and ranch expansion. This is part of the reason why deforestation has begun to climb again in the region.

Rising commodity prices, namely for soy, threaten to encourage increasing deforestation rates as the profitability of converting forest to crop or pastureland is too high for many producers to resist. Brazil's relatively weak currency, combined with soy prices nearly at their all time high make Brazilian commodity exports extremely attractive. This has incentivized soy producers to expand production and displace livestock producers. As described earlier, this pushes livestock ranchers to move further into the Amazon frontier and increases deforestation immensely. This combined with less cattle intensification (less production per hectare) means increased inefficiency and more emissions.³⁷

Carbon markets, REDD+ initiatives, and payments for environmental services face severe barriers in Brazil. REDD+ does not directly fund local level projects. It only allocates money at the federal level to set up jurisdictional facilities at the state level that will make countries REDD ready. Poor implementation of the jurisdictional facilities has resulted in a loss of producer and investor confidence that these systems will provide incentives to maintain forests on private land. The pillar of REDD+ is good governance and the key to systems that deal with carbon credits is figuring out how to share the benefits fairly throughout a society. Brazil has yet to accomplish this.

The absence of market regulation and zoning in Brazil's biome means a lack of information of what lands are available or not available for crop or livestock expansion. This is magnified by the lobbying efforts of many large agribusiness actors described above. In a sense, market and industrial barriers are more likely to disappear when governance improves and more industry regulation is present.

III. CULTURAL/SOCIAL BARRIERS

When discussing cultural and social barriers it is first necessary to note that Brazil has an extremely well organized and vocal environmental NGO and civil society community. These groups, both domestic and international, have pushed for reform in terms of government transparency and laws related to product labeling and deforestation. The first significant cultural barrier relates to smallholder behavior. Small holders use crop residue as forage for livestock because it is cost-effective for them in the short-run. They are also more likely to participate in burning activities and less labor-intensive practices. Clearly these practices are detrimental for soil carbon sequestration and GHG emissions. Still, Brazilian smallholders have short-term planning horizons for financial reasons and are generally more risk averse and less likely to adopt unfamiliar techniques. These psychological barriers are persistent and can only be affected by short-term actions that produce real and measurable results.

³⁵ Butler, 2009.

³⁶ Mongabay, 2008.

³⁷ Nepstad, 2013.

Another important set of cultural and social barriers in Brazil relates to indigenous and other human rights movements that outwardly oppose REDD+ initiatives and payments for environmental services (PES). This has been especially prevalent in the state of Acre. One professor in Acre describes carbon-trading schemes as “a frontal attack on forest peoples’ autonomy, freedom, and control over their territories, in addition to erroneously ‘offsetting’ continued pollution in the industrialized countries of the North.”³⁸ Small indigenous communities argue that they are coaxed into signing contracts that prohibit them from hunting, fishing, or removing wood in a sustainable manner as their ancestors have done for centuries.

Poorer citizens in places like Acre argue that carbon-trading programs favor large landowners. They oppose programs like REDD+ arguing they are too top-down and forced upon them by the often-corrupt state governments. Furthermore traditional and tribal leaders are left out of the consultation and decision making process when it comes to REDD+ implementation unless they belong to a registered NGO or government-financed institution.³⁹ Indigenous communities in places like Acre depend on the forest for their way of life and traditions to continue. While this is a concept often overlooked in the West, these people see PES systems as offensive market-oriented ways of viewing their forest.

This cultural debate is extremely complicated and too philosophical for the scope of this paper. However, it is important to keep in mind that there are important groups in the Brazilian Amazon who believe that REDD+ and PES systems undermine their ability to care for their land. To them these programs will put their food security and health at risk, thus driving their populations out of the Amazon. REDD+ is profit driven and the question is whether or not it can be harnessed efficiently and fairly to share the benefits and profits with the people it affects most. Until then, carbon credit systems will face significant cultural barriers in rural Brazil.

IV. FINANCIAL BARRIERS

The first major financial barrier involves access to credit, especially for small to medium producers. As these producers tend to have worse credit history, lack financial knowledge and training, do not have proper land titles, or do not comply with environmental legislation, they will generally not gain access to low-interest credit. As a result, these producers take out personal loans that are not government subsidized and pay high interest rates.⁴⁰ When they are paying high interest rates, they are (rationally so) unlikely to experiment with unknown sustainable practices or low-carbon investments. They direct the money from this credit to what they know as most profitable, usually behaviors that increase GHG emissions. Thus high interest rates and costs to comply with environmental legislation can be prohibitive and self-reinforcing for small to medium farmers.

As described above, the BNDES has imposed requirements that complicate the use of the \$1.6 billion that the government has made available for the ABC Plan. The 5.5% annual interest rate on ABC loans to farmers does not reflect the full cost of receiving a loan.⁴¹ There

³⁸ Lang, 2012.

³⁹ Ibid.

⁴⁰ Caminada, 2008.

⁴¹ Gebara and Thuault, 2013.

have been reports of some local financial institutions imposing conditions, such as taking on other loans or financial services, on producers to receive loans. In addition, coordination between banks and the federal government has been limited. Many banks have a limited or nonexistent understanding of the ABC Plan and do not know how to access its resources.

The ABC Plan also requires producers to have their project proposals signed off on by a certified agricultural engineer. The cost of this process can represent a significant percentage of total project cost. Furthermore, producers must register with the Rural Environmental Registry (CAR) to even qualify for an ABC loan. While this may not seem like a huge barrier, one must note that the CAR is not yet available in all of the states that need it. Many producers also lack the financial resources to even register with the CAR.⁴²

As a result of these factors, the ABC Plan only approved five projects during its first year. This number has grown and as of January 2013, there had been over 4,500 contracts.⁴³ This is still low considering the available financial resources for the Plan. High risk of loaning ABC funds for banks (who naturally take on the risk) in general has been a driver of lack of contracts as banks look to make loans for less risky, non-GHG mitigating agricultural practices.

V. TECHNICAL BARRIERS

In general, Brazil's public agencies that are supposed to provide technical assistance in implementing sustainable land use and agricultural practices are understaffed and lack the proper structural organization to train producers that do not belong to large scale agribusiness companies. For example, the Brazilian Agriculture and Livestock Research Agency (EMBRAPA), despite its high quality research, has been unable to influence small to medium farmer practices. This means farmers who need the most guidance and training are in many cases the least likely to receive it. Although small and medium farmers are not currently the major source of the problem, focusing on influencing their behavior can change the structure of incentives in the industry as a whole.

Specifically, EMBRAPA has not been successful at demonstrating the positive economic results of integrating crops, livestock, and forests. Lack of publicity for EMBRAPA's field research studies and practices has made dissemination of information difficult. Basically and most importantly, producers who want to take part in the ABC Plan face information gaps and lack of technical assistance in monitoring and evaluating their projects. This, along with implementation costs, is an extremely significant barrier.

Technology is key to GHG mitigation and has been and will be critical to implementation of all major climate change agreements.⁴⁴ Existing lower-or non-greenhouse-gas-emitting technologies are generally only available in developed countries. It is therefore very difficult for developing countries to shift away from carbon-based production and increase their levels of efficiency. Technologies and know-how that could assist in preparing for adaptation to climate change (e.g. computer models, more sophisticated engineering, etc.) are also rare in the

⁴² Ibid.

⁴³ Ibid.

⁴⁴ Da Motta et al., 2011.

South.⁴⁵ While Brazil has made grade strides in developing a sophisticated satellite monitoring system to account for and measure forest stocks, implementing a similar plan and system to monitor deforestation and forest degradation in the Cerrado biome in real time is still challenging. Thus monitoring technology remains a barrier to preventing deforestation and fires in the Cerrado but this could be seen as low-hanging fruit as Brazil clearly has the capacity and know-how to create such a system as it has already done in the Amazon.

RECOMMENDATIONS

As made evident, challenges and barriers to AFOLU emissions reductions are prevalent in Brazil. But not all are insurmountable. This section focuses on a set of recommendations to overcome some of the barriers outlined above. What does the future hold and what can be done to begin to create legitimate long-term behavioral change? In some cases government, private sector, and NGO actors are already taking strong meaningful action. Ideally, these actions must be harnessed and sustained so that spillovers will happen to change business as usual for good.

GENERAL RECOMMENDATIONS: MARKET, POLITICAL, AND SUPPLY CHAIN

Brazil needs improved transparency, coordination, and integration of existing land use, agricultural, and environmental policies. Climate policy makers must continue working hard to include civil society groups, environmental NGOs, and relevant stakeholders (such as local and indigenous populations, forest managers, and public sector employees) to succeed in reducing GHG emissions. To some extent these stakeholders may have to earn their way to the table through lobbying efforts. Transparent governance and inclusion of stakeholders will create dialogue to identify where the largest strides can be made. This process could realistically have a positive impact on the climate and environmental preservation debate, especially if more pro-climate voices are included. Ideally, this would improve the technical quality of government and independent institutions through increased information sharing.

To achieve its deforestation goals Brazil must dedicate itself to stronger enforcement of existing environmental laws. With proper policy coordination and improved enforcement, the government should adopt a 5-10 year moratorium on deforestation. This will clearly require increased funding for forest monitoring and law enforcement. The Forest Code should remain intact and ensure that landowners keep 80% of their land forested. There must be policy and institutional coordination and enforcement at all levels of government, both horizontally and vertically. Furthermore, legal clarity must be present regarding laws and government structures to ensure the success of existing policy instruments and mechanisms.⁴⁶ Public and private investments that currently promote deforestation should be redirected to sustainable land use programs.

⁴⁵ Ibid.

⁴⁶ Gebara and Thuault, 2013.

In addition to government and civil society, the private sector agribusiness industry must be brought to the table. Industry leaders such as soy producer Cargill and beef producer JBS have immense potential and power for creating sustainability through product labeling and other corporate social responsibility (CSR) efforts. Most of Brazil's soybeans are exported to Europe and increasingly to China. Nonetheless, sustainability standards are becoming widespread throughout the European Union, forcing an incentive on Brazilian soy producers and other supply chain members to adopt sustainable practices. This was a main driver behind the Brazilian Vegetable Oils Industry Association (ABIOVE) Soy Moratorium in 2006. This initiative led ABIOVE, who accounts for over 90% of Brazilian soy crush, to refuse buying soybeans produced on deforested land.⁴⁷

The Soy Moratorium was seen as a great success and should be extended to include soy plantations that displace cattle ranchers, as these indirectly promote further deforestation. Similar actions are in the making for the cattle industry. The Global Roundtable on Sustainable Beef includes all of the major Brazilian producers and is basically creating a black list of companies that do not meet certain standards. More outside pressure will probably be required to seriously implement a comparable beef moratorium. However, the Brazilian government must recognize these efforts by the private sector and harness them. The real power to change incentives lies in the hands of large agribusiness companies who make up the global supply chain. Government regulation and financial incentives for sustainable practice in the soy and beef industries should become the norm.

Smallholder farmers are much easier to deal with after large-scale successful political and legal reform has taken place. Therefore, smallholders should be dealt with in the last stage. However several recommendations to change smallholder behavior are feasible such as micro-credits for financing investments in new techniques or technologies. Education in climate-friendly practices through agricultural extension services should also be more widespread. Finally, common management of pastureland and woodlands through rural cooperatives could combat forest degradation. These should all be supported through official agricultural policy and targeted by NGOs and civil society.

RECOMMENDATIONS FOR ABC PLAN IMPLEMENTATION

To make the Low-Carbon Agriculture Plan efficient and successful, the Brazilian Development Bank (BNDES) should revise its loan criteria for ABC funds. Reducing interest rates for farmers and producers who legitimately comply with existing environmental legislation or who make payments on time is an example. BNDES should also train other banks in the specifics and potential of the ABC Plan to promote more movement of funds. Innovative financial instruments that favor environmental compliance and best practices by producers should be explored by BNDES to exploit the ABC Plan to its maximum potential.

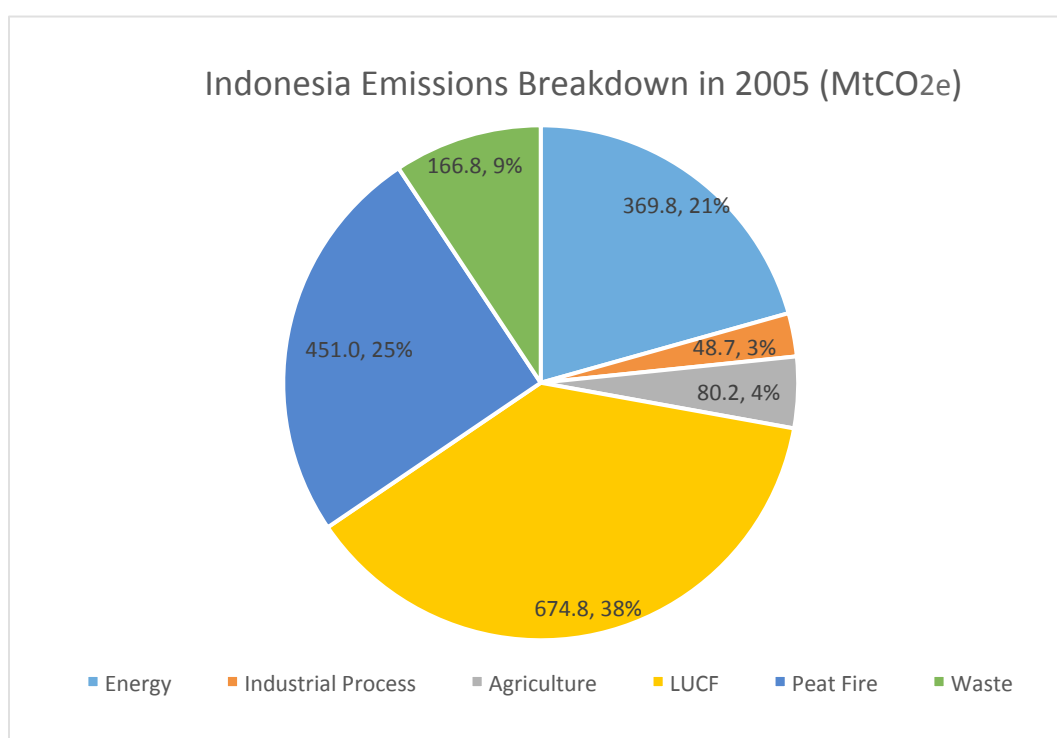
⁴⁷ Ecologist, 2014.

The ABC Plan should also implement certification programs that promote best practices for agricultural and livestock producers. Coordinating with REDD in this space could have huge potential, as has been demonstrated by the RT-REDD Project in which the Amazon Environmental Research Institute (IPAM) participates. This project links the benefits of REDD with sustainable supply chain benefits. Expanding certification programs to the beef industry could unlock the full potential of the ABC Plan and advance low-carbon agriculture in what is currently the most detrimental sector to deforestation.

Public and technical assistance should be strengthened for small to medium farmers to allow them access to ABC funds. Field days, rural site visits, technical workshops, and other public relations efforts could improve inclusion of all stakeholders along the supply chain from farmer to exporter. Training experts and producers through official courses to carry out these efforts could have serious positive impact and spillover effects on the promotion of low-carbon agriculture. Finally, the Brazilian government should create and back a monitoring and evaluation group for the ABC Plan. This is written in the Plan but has not yet been created. It seems almost futile to successfully implement such a large-scale plan without a group to evaluate its success and economic indicators. Therefore, this is a key requirement for a successful ABC Plan.

Indonesia is the fourth most populous country in the world—with approximately 250 million inhabitants. It has a GDP of \$878 billion USD, with an average growth rate of 4-6 percent, making it the third fastest growing economy in the G20, behind India and China. Major commodities include coal, liquefied natural gas, and palm oil. Despite this rapid growth, approximately 43 percent of the population was living below the poverty line in 2012.⁴⁸ Infrastructure and access to healthcare lags, especially in provinces far from the central administration. With economic growth at the forefront of its development strategy and large swaths of land available for development, Indonesia is poised for rapid economic expansion. This expansion, however, has the potential to be accompanied by large increases in greenhouse gas emissions.

Figure 5



Indonesia's greenhouse emissions come primarily from destruction of forests and peatlands, through either agricultural development or natural fires. The remainder comes from the energy sector, which has experienced rapid expansion in recent years. This section focuses on these two sectors, especially forestry and land-use, which offers the largest benefits for

⁴⁸ World Bank, 2014.

relatively low economic cost. Additionally, due to the nature of peat degradation, which can continue to emit CO₂ over periods of decades and even centuries, mitigating land-use change in Indonesia is particularly important.

SECTORS OF IMPORTANCE

AGRICULTURE, FORESTRY, AND OTHER LAND-USE (AFOLU)

Emissions in Indonesia come largely from land-use, specifically deforestation and peatland degradation due to encroaching agricultural activities. This section examines the political, economic, and social factors influencing this expansion and discusses mitigation strategies concerning forestry and peatland conversion. Conversion of peatlands is particularly concerning, because, while it may constitute up to 65 percent of Indonesia's greenhouse gas emissions, the exact emission numbers are unknown, and the data available concerning the exact amount of carbon stored, as well as precise locations and thickness of the nation's peat swamps are poor.⁴⁹

PEATLANDS

Peatlands are swampy areas, which—due to their anaerobic conditions—allow for the building up of organic matter. The accretion of organic matter creates an extremely carbon-rich soil called peat, which essentially serves as a reservoir for terrestrial carbon, preventing the release of CO₂ into the atmosphere. When peatlands are drained for agricultural use, the sequestered carbon becomes exposed to oxygen and begins to rapidly decompose. Emissions from degraded peatlands, however, are fundamentally different than those from deforestation because degraded peatlands continue emitting CO₂ until the organic matter in them has been completely decomposed, a process that can last for centuries.⁵⁰ As a result, while emissions from deforestation decrease with deforestation rates, emissions from peatland degradation increase even as peatland degradation rates go down (Figure 6). The only way to reduce emissions from peatland conversion is to halt peatland degradation completely while restoring already-degraded peatlands to their original state.⁵¹ Because of the additive nature of peatland emissions, it is estimated that in 2010, peatland decomposition may have been responsible for up to 60 percent of Indonesia's greenhouse gas emissions, a number much higher than previously thought.⁵² Agriculture, particularly palm oil production, is the primary driver of peatland drainage in Indonesia.

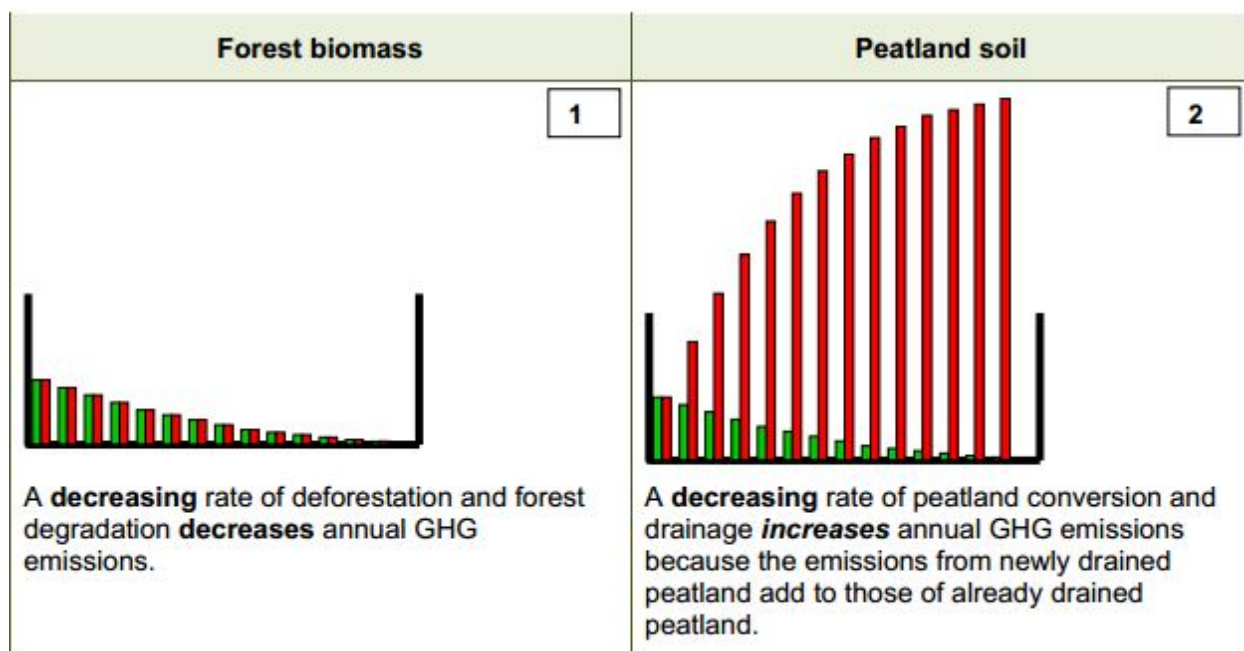
Figure 6

⁴⁹ UNFCCC, 2010.

⁵⁰ Wetlands International Indonesia, 2011.

⁵¹ Ibid.

⁵² Ibid.



Source: Wetlands International, 2011

CURRENT INITIATIVES

The Indonesian government has taken a number of steps to demonstrate their commitment to climate change mitigation and sustainable development. In 2009, the government announced a commitment to cut greenhouse gas emissions by 26 percent by 2020, 87 percent of which is expected to come from preventing deforestation and further degradation of peatlands.⁵³ The government has since worked with a number of development partners, including Norway, REDD+, and Australia, to fund government capacity building initiatives aimed at furthering climate goals.

The Indonesian government, in cooperation with the Norwegian government and REDD+'s Forest Carbon Partnership, has agreed to establish a national REDD+ agency. This agency is in charge of monitoring land-use in vulnerable provinces and establishing a national Monitoring, Reporting, and Verification (MRV) institution for land-use activities. A number of initiatives have been set into motion through this agreement, with the aim of:

- ❖ establishing sub-national REDD+ offices
- ❖ carrying out land tenure reform
- ❖ improving and consolidating geospatial data
- ❖ building capacity in terms of monitoring and enforcement
- ❖ preventing further deforestation until land-use governance improves—Indonesia's forest moratorium

⁵³ WRI, 2012.

FUNDING MECHANISMS

Over the past 10 years, international agencies have been lining up to support Indonesia's efforts to reduce deforestation. As part of the partnership between Indonesia and Norway, Norway pledged 1 billion USD to further deforestation prevention initiatives in Indonesia. This money is available on a 'contributions-for-deliverables' basis—in other words, it is contingent upon results.⁵⁴ As of June 2014, only \$170 million had been disbursed.⁵⁵ This money was disbursed for phases one and two of the agreement, which aim to prepare Indonesia for the third phase, during which the government will only receive funds for verified emission reductions. The agreement is currently near the close of phase two, which focused on building governance capacity and reforming legal structures involving land tenure and use.⁵⁶

Indonesia also has received approximately 70 million dollars from the Forest Investment Program (FIP) under the Climate Investment Fund to enhance institutional capacity for land-use management, and promote sustainable practices in industries contributing to forest degradation. To this end, Indonesia is expected to receive an additional 105 million from multilateral development banks and sources within the private sector.⁵⁷

INDONESIA'S FOREST MORATORIUM

In May 2011, Indonesia announced a two-year moratorium on new licenses in 28.4 million ha of primary natural forests and 14.8 million ha of peatlands, a commitment that was extended for an additional 2 years in 2013. The carbon protected under the moratorium is equivalent to 92 Gt CO₂e—almost triple annual global greenhouse gas emissions. While important in terms of providing time for reforms—such as building coordination capacity to enforce and monitor land-use related change—it has been suggested that the moratorium does not go far enough. First, it does not revoke pre-existing concessions, which represent 16.3 percent of the area within the moratorium. Secondly, the moratorium does not protect secondary forest, which make up 15.6 million ha—36 percent—of the moratorium area.⁵⁸

⁵⁴ Letter of Intent, 2010.

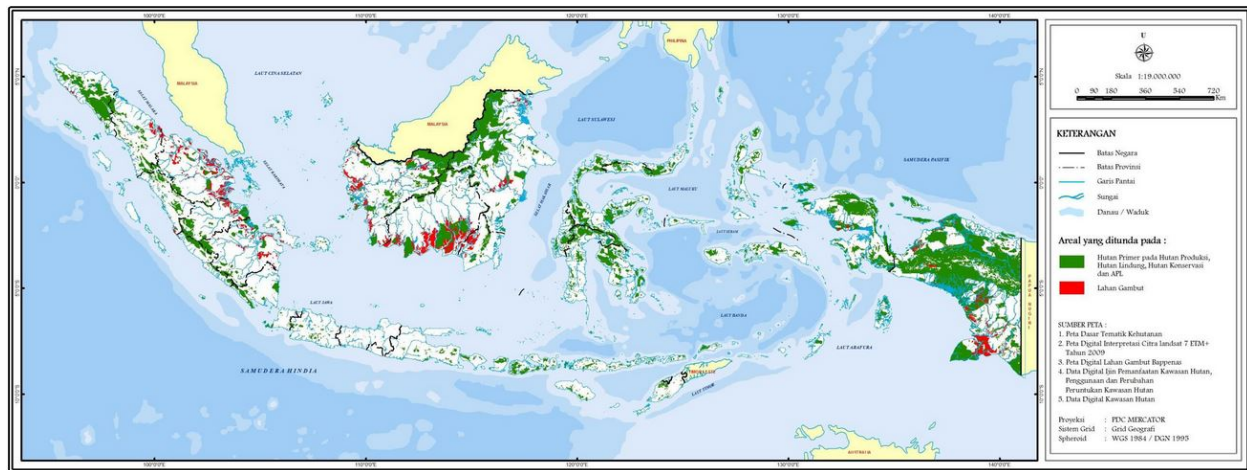
⁵⁵ Wulandari, 2014.

⁵⁶ Letter of Intent, 2010.

⁵⁷ Forest Investment Program, 2013.

⁵⁸ WRI, 2012.

Figure 7: Moratorium area; forest in green, peatlands in red



Source: Wetlands International, 2011.⁵⁹

Despite these exemptions, initiatives within the moratorium have served to improve the government's capacity to monitor and enforce land-use regulations. The moratorium mandates the improvement of forest management through gathering and consolidating geospatial data, standardizing this information across ministries, and improving the permitting process through streamlining regulations and increasing transparency.

One such initiative is the development of a moratorium map, called One Map, which aims to standardize data on land-use throughout various Indonesian ministries. Prior to this initiative, each ministry and local government used their own maps, often showing different moratorium boundaries in line with their institutional priorities. As a result, coordination between ministries on permitting and moratorium enforcement was virtually impossible, and issues concerning overlapping permits were common. By standardizing maps across agencies, One Map has improved the ability of agencies involved in forestry and land-use management to coordinate, however, coordination between the federal and local governments is still a major issue.⁶⁰

⁵⁹ Kaat, 2011.

⁶⁰ WRI, 2014.

Box I

ENFORCEMENT BARRIER: MORATORIUM UNDERSTANDING AMONG LOCAL MINISTRIES

One of the biggest challenges facing the moratorium is lack of local enforcement, in large part due to local understanding and will. In a 2014 WRI study attempted to evaluate local understanding of the moratorium within five agencies responsible for moratorium enforcement. Representatives from eight districts within Riau and Kalimantan were asked about their responsibilities under the moratorium in three key areas: awareness, monitoring, and enforcement. Overall, there were very low levels of understanding regarding key aspects of the moratorium, especially within the agency responsible for determining whether agricultural permits violate the moratorium, and the agency responsible for managing permit data. When surveyed, representatives from these agencies in 6 out of the 8 districts could only answer 1-2 questions about the moratorium. The agency responsible for monitoring private sector activities on peatlands only answered 1-2 questions in half of the districts surveyed.¹

1. WRI, 2014.

SUPPLY CHAIN PRESSURE

Growing pressure on palm and paper producers has resulted in a number of firms reconsidering their environmental impacts. Wilmar International, which controls more than a third of the world's palm oil supplies, committed to a goal of zero deforestation in December 2013, when it announced its No Deforestation, No Peat, No Exploitation Policy. The policy prohibits knowingly developing or knowingly sourcing from regions with high carbon stocks, high conservation value, or peat swamps.⁶¹ Since then a number of other companies have followed suit. L'Oreal, Unilever, Nestle, Kellogg's, and Colgate among others have policies similar to Wilmar's, while others, including P&G have begun the process of tracing their supply chain and increasing transparency with respect to the company's role in deforestation. A number of these companies are certified members of the Roundtable on Sustainable Palm Oil, which requires that members maintain traceability within their supply chains and undergo supply chain evaluations by a third party every 5 years.⁶²

In September 2014, the New York Declaration on Forests was announced as part of the UN Climate Summit. More than 30 countries and 30 corporations supported this non-binding agreement with the goal of cutting tropical deforestation in half by 2020 and stopping it by 2030. The declaration included a number of major companies involved in the palm oil trade such as Cargill. This agreement will put more pressure on company supply chains to restrict deforestation through their operations and production.⁶³

⁶¹ Wilmar International, 2013.

⁶² RSPO, 2007.

⁶³ Gillis, 2014.

The success of the previously mentioned soybean moratorium in mitigating Amazonian deforestation shows the potential of supply-chain based initiatives, especially supply-chain based initiatives initiated by producers rather than the government; however, it is too early to assess the impact of the commitments made in Indonesia. Supply chain transparency is difficult, especially with a commodity with a complex supply chain, like palm oil. Additionally, aligning actions on the ground with policies coming from corporate headquarters can be both challenging and expensive. Whether these corporations have the will and capacity to stand behind their policies is still an open question.

OTHER MITIGATION STRATEGIES

PEATLAND RESTORATION

Because peatlands continue releasing CO₂ long after they are drained, peatland restoration must play a role in Indonesia's reduction strategy if Indonesia is to meet its emissions reduction target. Restoring destroyed ecosystems, however, is very difficult, and peatland restoration in particular faces a lot of technical and ecological barriers beyond those confronting land-use management generally in Indonesia. During the process of peatland restoration, fire events and deep flooding can contribute to the loss of seedlings and woody vegetation.⁶⁴ This results in the domination of the ecosystem by secondary growth, such as brush and ferns, which in turn further increases the likelihood of fire.⁶⁵ General recommendations to confront these issues include "fire prevention" and installing canals to prevent deep flooding. These recommendations are both expensive and difficult logistically, especially in a country with poor local government coordination.⁶⁶ If peat land restoration is going to be a significant strategy in Indonesia's emissions reduction strategy, improved coordination between government ministries is the first step. Funding for such projects may be less of a barrier for Indonesia, given the funds available through REDD+ and the Norwegian government; however, these funds are contingent upon increasing government capacity.

USE OF DEGRADED LAND

One of the biggest challenges to peat preservation is the large number of pre-existing concessions for peatlands within the moratorium. A strategy for lowering emissions from peat while simultaneously allowing for increased palm production is to transfer these pre-existing concessions to already-degraded areas.⁶⁷ This solution may be viable, as many palm oil producers claim to have no preference between peatlands and degraded areas. It would require, however efficient government coordination as well as consistent data across ministries in terms of where concessions are, where peatlands are, and to whom concessions belong. Currently, this is not realistic, as there are large issues with consistency and coordination at the local level. One Map and other initiatives under REDD+ could greatly reduce this barrier in the near future, however, currently such a scheme would be impractical.

⁶⁴ Page et al., 2009.

⁶⁵ Page et al., 2009.

⁶⁶ Page, 2009.

⁶⁷ Wetlands International, 2011.

BARRIERS

POLITICAL BARRIERS

Despite this showing significant signs of commitment, political action in Indonesia faces a number of barriers due to coordination issues, and perverse incentives. The Indonesian government was a highly centralized authoritarian regime until 1998, when President Suharto resigned and the government was restructured into a democratic republic with a presidential system. Since 1998, governance authority has been dramatically decentralized, with power moving from the federal government to both province and municipal levels. This has resulted in poor coordination horizontally between ministries and vertically between government levels.⁶⁸ This shift and the resulting political challenges have important ramifications for both government enforcement capacity and will concerning land-use management.

Land-use management is intimately connected to development and economic growth—any policy change limiting land-use is going to change the way a population can relate to its surroundings economically. Local politicians in Indonesia are elected directly by their constituents and tend to be in favor of policies that promote local development and increase investment opportunities. Palm oil companies, in particular, are important sources of employment and provide badly needed investments in basic infrastructure.⁶⁹ As a result, the interests of local politicians are often opposed to national initiatives combating peatland degradation and deforestation.

Interestingly, local governments currently have the authority to issue land-use change permits outside of the “forest area” under Forest Ministry control—a process that generates revenue.⁷⁰ They are also responsible for monitoring land-use and enforcing permits and regulations. A study by WRI examining local understanding of national laws concerning land-use, found that a number of local ministries in key areas lacked the knowledge necessary to enforce national deforestation laws (see box 1). Additionally, the federal government has no legal authority over the actions of local governments, despite the fact that about 70 percent of local government funding comes from federally allocated funds. Increasing the will and capacity of local governments to deal with deforestation and land-use is the biggest challenge facing Indonesia’s emissions reduction effort. Imbalances of power between ministries at a national and local level complicate this issue. The Ministry of Forestry, which owns 70 percent of the land in Indonesia, has been firmly against land-use regulations in the past.⁷¹

In addition to these governance issues, the palm oil industry contributes directly to government revenues in the form of export taxes.⁷² These export taxes change depending on the reference price per tonne, but can reach rates of up to 25 percent (when the reference

⁶⁸ UNFCCC, 2010.

⁶⁹ Obidzinski, 2013.

⁷⁰ WRI, 2014.

⁷¹ WRI, 2013.

⁷² <http://blog.cifor.org/17798/fact-file-indonesia-world-leader-in-palm-oil-production#.UIZrrvldVuA>

price exceeds 1300 USD per tonne). In 2008, the Indonesian government procured 1 billion USD in export tax from crude palm oil alone.⁷³

MARKET BARRIERS

About half the world's palm oil is produced in Indonesia, and the Indonesian government plans to have over 10 million ha dedicated to the crop by 2015.⁷⁴ Palm oil production is one of the major market forces driving peatland conversion as well as deforestation. In addition to the palm oil industry, the timber and mining industries also play a role. A small number of powerful players within the Indonesian economy, including Asia Pulp and Paper, Cargill, Wilmar International, and Triputra Agra Persada, represents these industries. Palm oil processors, in particular, are highly concentrated, with nine company groups comprising 90 percent of Indonesian palm oil processing capacity.⁷⁵

Palm oil producers, in particular, comprise a strong lobby, donating large amounts of money to both local and federal political campaigns. This adds to the reluctance of local governments to comply with and enforce national regulations. Additionally, it has been suggested that some agricultural producers are willing to pay smallholders to burn forests and drain peatlands. This opens up the land for legal development and permitting, as it is already degraded. Of course, this kind of under-the-table activity is difficult to confirm, and even more difficult to prevent. On the other side of the issue, many of these companies have recently committed to zero-deforestation policies. Whether these commitments are genuine remains to be seen.

CULTURAL/SOCIAL BARRIERS

One of the biggest cultural barriers to action on deforestation and peatland preservation is the lack of a strong environmental movement in Indonesia. Because it is both a newly democratic nation with a number of structural concerns and a developing nation, the environment is not a huge rallying point. Indonesians, in general, remain more concerned with government corruption, improving employment numbers, and building a diverse economy than with preventing global warming.

RECOMMENDATIONS

POLITICAL RECOMMENDATIONS

One strategy for increasing coordination between local and national governments that Indonesia has already started to implement is the creation of subnational REDD+ offices. The

⁷³ Ibid.

⁷⁴ Greenpeace, 2011.

⁷⁵ Friends of the Earth, 2004.

formation of within-government subnational REDD+ offices was one of a number of requirements upon which Norway's Forest Carbon deal was contingent. These REDD+ offices have the potential for increasing local management capacity; however, they are politically weak in many areas, especially relative to local branches of the Ministry of Forestry. Ensuring cooperation between these entities will require increased monitoring and law enforcement capacity.

Furthermore, prosecuting officials involved in forest-related corruption could drastically reduce local ambivalence to deforestation. Currently two institutions deal with corruption in Indonesia, the Corruption Eradication Commission, and the Corruption Court.⁷⁶ These institutions serve to investigate and prosecute high-level corruption cases. These should be strengthened and extended to the local level. Efforts to stamp out corruption at the local level, however, are nothing new to Indonesia.⁷⁷

MARKET RECOMMENDATIONS

Market forces represent the strongest drivers of deforestation in Indonesia, and, while a growing number of corporate policies against deforestation have surfaced in the last two years, the significance of these policies has yet to be determined. The government of Indonesia and other international actors should increase pressure on major palm oil and timber producers to follow-through with their commitments. The presence of on-the-ground whistle blowers could improve the likelihood of such action. REDD+ offices and local non-governmental agencies can fulfill this role, especially if local coordination and enforcement capacity is improved. Raising the threat of whistle blowing will further incentivize firms to follow through with zero-deforestation policies. The use of collaborative mapping initiatives such as WRI's Global Forest Watch, which allows users to report and track deforestation in real time,⁷⁸ can directly improve the capacity of NGOs and law enforcement to monitor deforestation, and thus target enforcement and watchdog efforts.

Additionally, the Indonesian government could create a series of economic incentives, such as low-interest loans and tax breaks for companies that meet certain environmental standards or best practices. For example, building economic incentives into a land-swapping scheme—wherein companies swap pre-existing concessions on vulnerable land for already-degraded areas—could increase firm participation. Setting up such a swapping system, however, requires increased coordination within the government, including the creation of an institution capable of licensing land-swaps, carrying out environmental and social impact assessments, and re-evaluating current land-classifications.⁷⁹

⁷⁶ Government of Indonesia, 2013.

⁷⁷ Rinaldi, 2007.

⁷⁸ <http://www.globalforestwatch.org/>

⁷⁹ WRI Legal Land Use, 2013.

CULTURAL/SOCIAL RECOMMENDATIONS

The largest sociocultural barrier to deforestation mitigation is a general lack of concern about environmental issues. Brazil was in a similar situation twenty years ago. However, the high concentration of NGOs who promote environmental advocacy and the increasingly vocal nature of Brazilian civil society have greatly improved the average citizen's level of awareness concerning deforestation and land-use issues. In Indonesia, REDD+ offices and other environmental NGO's should follow Brazil's example through building public knowledge about environmental impacts of deforestation and peatland degradation.

CONCLUSION

Indonesia and Brazil are both non-annex I countries with large populations—4th and 5th in the world, respectively. In both countries, land-use is closely linked to economic growth. This fact is a major driver of deforestation in both Brazil and Indonesia, where the encroachment of agricultural industries are the main driving force behind deforestation. In Brazil this is seen through the displacement of cattle ranchers by soybean cultivation, which pushes them further into the Amazon. In Indonesia, the primary driver is palm oil production. Deforestation and agricultural emissions present the biggest mitigation potential, but also large challenges for mitigation. The trade-off between economic development and forest preservation represents one of the biggest challenges to lowering forestry and land-use related emissions.

This report has outlined some of the main areas for potential AFOLU GHG emissions reductions in Brazil in Indonesia. In reality, the policy landscape in both countries is complicated and constantly undergoing change. Both countries deal with corruption at all levels of government and society, and both political systems are heavily influenced by powerful agribusiness lobbies (palm in Indonesia; soy and beef in Brazil). However, Brazil has a strong civil society and vocal environmental NGO community that Indonesia has yet to develop. Overall, organization and political participation is more advanced in Brazil, though still lacking in its own ways. To significantly reduce GHG emissions Indonesia must stop burning and converting peatlands to palm plantations. Brazil must simply stop deforesting in the Amazon and cerrado. This will require supply chain initiatives and cooperation between the palm, soy, and beef industries and each country's respective governments. There have been successful initiatives in both countries, but it is yet to be determined if they will seriously influence future behavior and deforestation rates. This report has attempted to identify some of the most salient barriers to success in each country, and potential recommendations to overcome them. While our analysis is not exhaustive, Brazil and Indonesia could make successful strides in reducing land use GHG emissions by implementing some or all of our recommendations.

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