FOREST AND LAND USE POLICIES ON PRIVATE LANDS: AN INTERNATIONAL COMPARISON

ARGENTINA, BRAZIL, CANADA, CHINA, FRANCE, GERMANY, AND THE UNITED STATES

INPUT
Iniciativa para o Uso da Terra

CLIMATE POLICY INITIATIVE

Under the Paris Climate Agreement, Brazil has committed to taking concrete steps to restore land and protect its forests. The new Brazilian Forest Code (Law No. 12.651/2012) governs the use and protection of public and private lands in Brazil and is one of the most significant pieces of legislation with the potential to drive efficient land use in the country and become an effective tool against climate change.

Other important agricultural producing countries are also striving to develop their rural economy while protecting their natural resources.

This exploratory legal analysis compares forest protection and land use legislation of some of the world s top ten exporters of agricultural products, including Argentina, Brazil, Canada, China, France, Germany and the United States, in order to understand:

What does compliance with the Brazilian Forest Code mean compared to what other countries are required to do by law?

• What, aside from regulation, are the other tools available to achieve conservation of vegetation?

This study primarily focuses on answering the first question by investigating whether other countries have limitations on the use of rural properties similar those imposed by the Brazilian Forest Code. It does this by establishing a comparative legal framework that analyzes:

(i) riparian buffer zones and other ecological buffers policies, and;

(ii) biodiversity conservation policies.

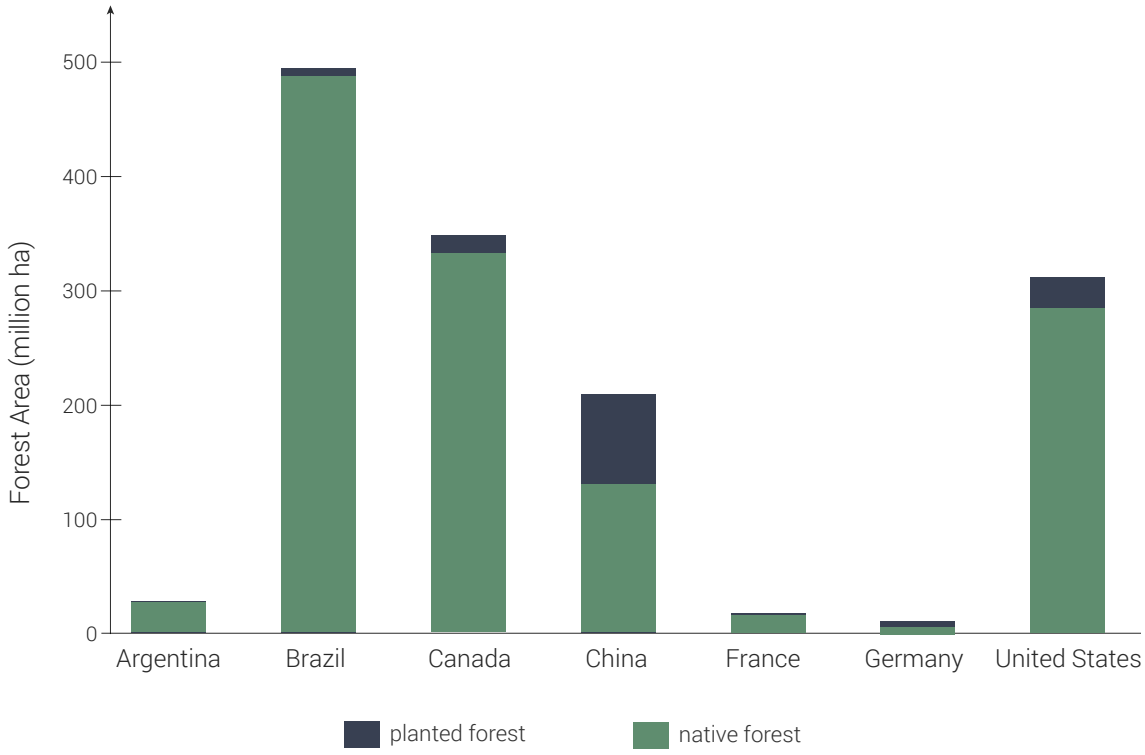
The results of this comparison are expected to benefit countries with relevant climate and environmental commitments, providing transparency about each country's contributions to the development of a low-carbon development pathway. In addition, instruments used by other countries provide lessons learned and shed light on tools that could be applied to improve forest conservation and compliance with the Forest Code in Brazil.

This summary provides a brief overview of the forestry landscape as well as the methodology and major findings of the analysis. It includes two tables that summarize key differences among the countries in how they govern riparian buffer zones and biodiversity conservation. A full report including a more detailed legal analysis is available at https://goo.gl/gxGqkq.

FORESTRY LANDSCAPE

The countries in this study differ greatly in their geography and amount of forest cover.[1] Figure 1 shows that, amongst the compared countries, Brazil has the most extensive forest area, roughly 490 million hectares. Another important characteristic of the Brazilian forests is the predominance of native forests, with only a minimal percentage of planted forests. [2]

Figura 1: Total Forest Area per Country



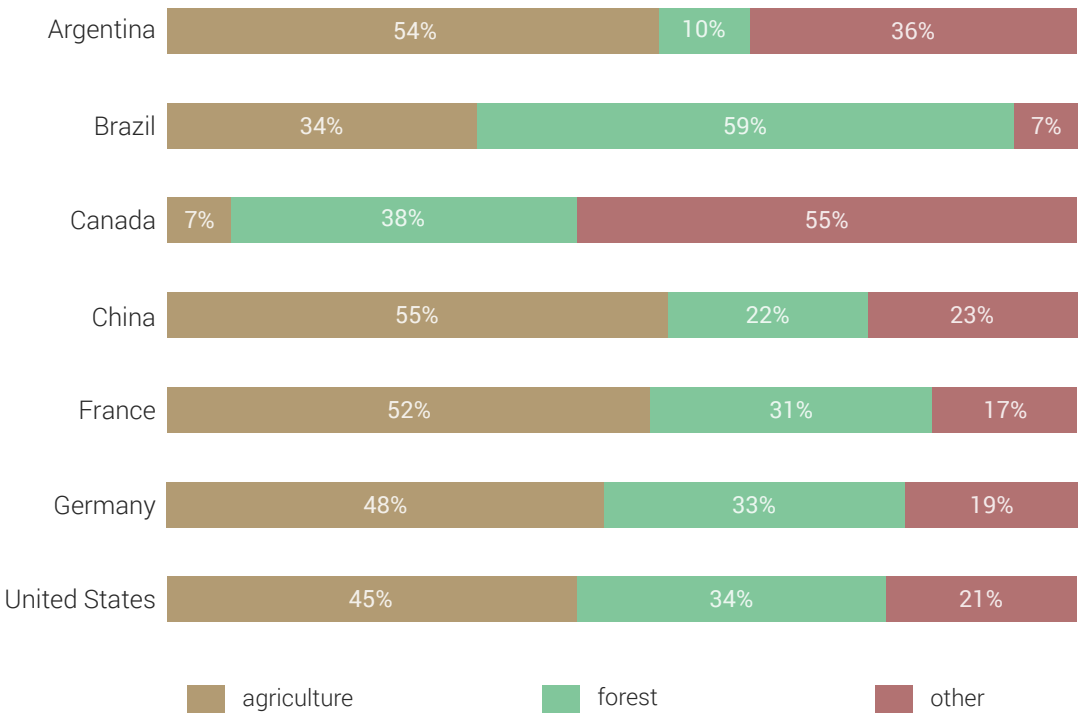
Source: FAO, 2015

1 The forest data used in this study covers forests as defined by FAO: land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use (FAO 2012).

2 FAO. 2015. Food and Agriculture Organization of the United Nations. Global Forest Resources Assessment 2015. Desk Reference. Rome: FAO.

Figure 2 shows that the area of productive land also varies greatly among selected countries. For instance, although Brazil has an average forest cover of 59%, almost double that of the other countries, agriculture land occupies just 34% of its territory, most of which is used for cattle production. In France, on the other hand, forest areas cover 31% of its territory, but agriculture land covers over 52% of the country.

Figura 2: Land Use by Country



Source:FAOSTAT, 2014

How land is divided in countries creates different pressures for how countries address conservation, leading to distinct policy approaches.

While some of the assessed countries still have vast extensions of preserved native vegetation and forest policies focused on conservation, such as Brazil and Canada, other countries have enacted policies focused on recovering and protecting forests, often including some sort of compensation. . For example, China, after losing almost all its native forests, is now striving to increase the amount of area covered by forests. For a long time, the official government policy encouraged the planting of exotic rapid-growth species to supply raw industrial materials. However, the Chinese government recently adopted a new forest policy that aims to repopulate areas that are deemed more ecologically sensitive with native species and to protect the remaining natural forests.[3]

3 Zhang P. et al. 2000. China's forest policy for the 21st century. Science. 288: p. 2135.

Western Europe's forest history differs substantially from most other countries covered in this project. Traditional agricultural practices, shaped over the centuries, have created rich landscape diversity and many of the semi-natural habitat types in Europe are dependent on the continuation of appropriate farm management. Moreover, traditional agricultural landscapes form part of the cultural European heritage. The conservation of farmed ecosystems is an explicit objective of the European Union s (EU) environment and rural development policies.[4] To achieve biodiversity protection goals in rural areas, the EU provides economic incentives and advice to landholders for a continuation of wildlife-friendly forest and farming practices.

Brazil's approach to forest preservation has evolved over the years, responding to an evolving landscape with new pressures for conservation. In 1934 Brazil passed its first Forest Code, which was motivated more by the demand to regulate logging activities than to protect the forests' environmental benefits. A more modern version of the code was enacted in 1965, which increased forest protection substantially; however, enforcement of these tougher rules languished.[5]

In the early 1990s, the rate of deforestation in the Amazon was once again on the rise, peaking in 1995. The imminent publication of the official deforestation statistics showing the rise of deforestation in the Amazon and worries about the national image abroad arguably pushed the Brazilian government into adopting tighter controls.[6][7] The result was the Provisional Measure 1511 of July 25, 1996, which altered the 1965 Forest Code to increase protection of natural vegetation in rural properties in the Amazon. This change in legislation generated strong reactions from the productive sector and from its representatives in Congress, and ended up stimulating a movement in favor of its revision.[8]

After more than a decade of intense dispute and after concessions by both environmentalists and rural producers, the new Forest Code was enacted in 2012. It retains the same structure and basic concepts as the old code but offers greater leniency for areas that were deforested prior to July 2008. Small landholders with these areas inside their properties receive even more benefits than large landholders. It also establishes new instruments to help ensure compliance with the legislation.[9]

In addition to the different pressures countries face in their land use, they also vary in how forest is divided between public and private lands. Figure 3 shows that, in most countries, forests are divided evenly between public and private lands. Forest ownership in Canada is mostly public, unlike in France where most of the forests are located primarily on private land.

4 European Commission. 2012. Eurostat. Agri-environmental indicator - Natura 2000 agricultural areas. Available from: http://ec.europa.eu/eurostat/statistics-explained/index.php/Agri-environmental_indicator_-_Natura_2000_agricultural_areas.

5 Chiavari J, Lopes C. 2015. Brazil's new Forest Code: How to navigate the complexity. Climate Policy Initiative [Internet]. Available from: https://climatepolicyinitiative.org/publication/brazils-new-forest-code-how-to-navigate-the-complexity/.

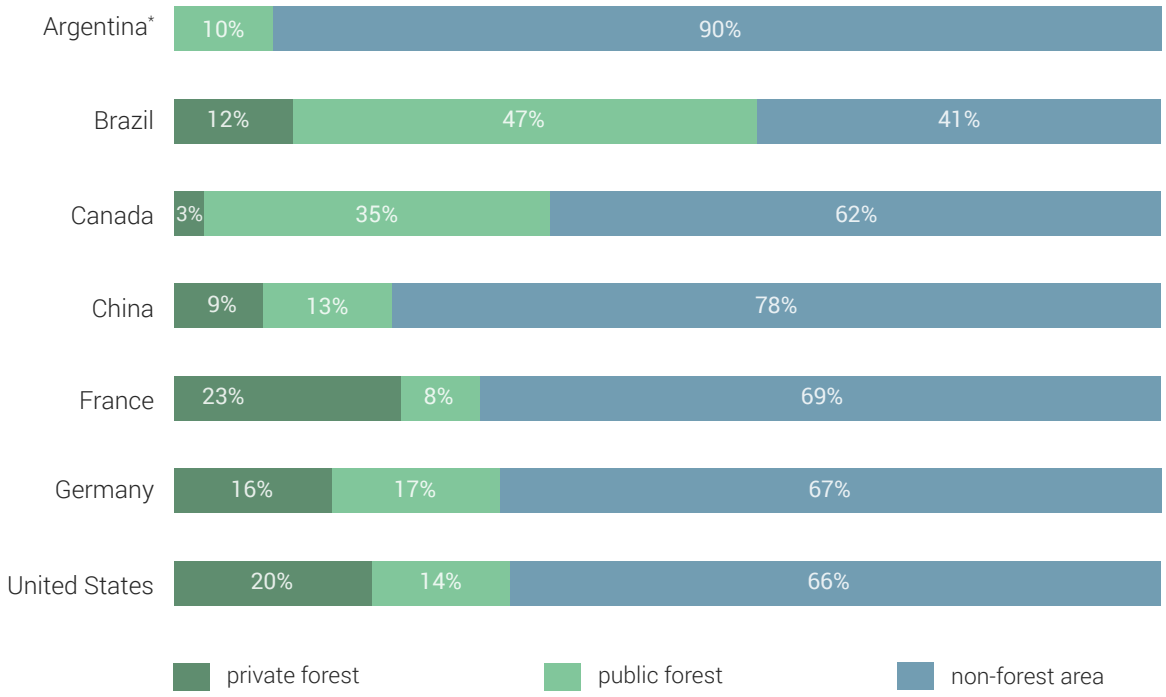
6 Benjamin, AH de V. 2000. A proteção das florestas brasileiras: ascensão e queda do Código Florestal. Revista de Direito Ambiental. 5(18). Available from: http://bdjur.stj.jus.br/xmlui/handle/2011/896.

7 Cunha, PR. 2013. O Código Florestal e os processos de formulação do mecanismo de compensação de reserva legal (1996-2012): ambiente pol'tico e pol'tica ambiental. Disserta o (Mestrado) Universidade de S o Paulo, S o Paulo.

8 Chiavari J, Lopes C. 2016. Os caminhos para a regularização ambiental: decifrando o novo Código Florestal. In: Mudanças no código florestal Brasileiro: desafios para a implementação da nova lei. Moreira da Silva AP, Rodrigues Marques H, Sambuichi RHR, editors. Rio de Janeiro: IPEA.

9 Chiavari and Lopes. 2015. Ibid.

Figura 3: Percentage of Public and Private Forest Cover by Country



* Data on private forest area not available

Source: FAO, 2015

Many countries adopt different forest policies depending on whether landownership is public or private. In Brazil, the rules of the Forest Code are equally applicable to public and private lands. On the other hand, the French Forest Code establishes two different juridical procedures, one for public and the other for private forests.

Results from the legal analysis should be interpreted in the light of these differences and the peculiarities of each country regarding forest extension, forest ecosystems, and forest characteristics (e.g., native or planted).

METHODOLOGY

Countries for comparison were selected from the world s top ten exporters of agricultural products based on data from Food and Agriculture Organization of the United Nations (FAO). These include Argentina, Brazil, Canada, China, France, Germany, and the United States.

The study does not assess the application and compliance of the rules imposed by the examined legislation, nor does it evaluate the effectiveness of the identified policies. It strictly provides a legal analysis of forest protection and land use legislation in force in the selected countries, and it presents a framework with a series of indicators to compare countries policies.

Challenges for mapping the legislation

CPI researchers conducted an ample literature review and examined the applicable legislation from every one of the selected countries. This information was supplemented with data collected through a questionnaire distributed to agricultural attach s working in Brazilian embassies and to a network of local law firms based in selected countries covered in the study. A large number of specialists provided valuable feedback and input to the legal analysis presented in this study through a peer review process.

The different languages of some of the selected countries created an obstacle in this review. Researchers had to rely on the English translation of the legislation, which was not always available. In these cases, analysis was based on existing literature and experts' consultation.

Another barrier was identifying the most recent status of the legislation and whether it was actually in force – in other words, whether it was legally operative. Environmental legislation is dynamic and evolves quickly, and it has recently been amended in several countries.

A relevant issue that arose from the mapping exercise was that in several countries, especially those with a federal structure, such as the United States, Argentina, and Germany, the police powers and regulation of health, safety, environment, and land-use planning are the realm of the states and/or local governments. In the United States, for example, anything not specifically assigned to the federal government under the Constitution is in the hands of the state, but the tension between the states and the federal government is long-standing and the contours are hard to determine. Even in countries with a more centralized structure, provinces and regions are often granted administrative and normative autonomy, as is the case of China and France. Therefore, in addition to reviewing the pertinent national legislation, it was also important to analyze legislation from key states and provinces from each of the selected countries.

Analysis for member countries of the EU required an additional layer of consideration. Since the legal framework of the EU includes several directives on environmental and agricultural matters that are binding on all member states, CPI researchers also reviewed these directives so that CPI could, *a posteriori*, analyze how each of the selected European countries implemented the guidance from the European Union within their national laws.

Challenges in comparing forest protection and land use laws and policies

The comparison of forest laws and policies from different countries is very challenging, especially when this analysis involves countries from different legal traditions, such as *civil law* (Romano-Germanic legal family) and common law.

It is particularly difficult to identify common trends among policies that govern land use and forest protection since these are commonly defined by national and sub-national

governments in very different ways. For example, forest and land use policies can be set through voluntary or mandatory rules. In addition, policies may focus exclusively on procedural rules or may be 'substantive,' specifying on-the-ground behavior.[10] For example, requiring that certain management objectives, such as riparian protection, be addressed in management plans is different from prescribing specific on-the-ground practices, such as the establishment of a 30-meter buffer zone. This does not imply that one approach is necessarily better than the other. However, it imposes non-trivial comparison challenges.

KEY FINDINGS

Over recent years, most of the countries assessed significantly changed their national forest policies, adopting a more stringent posture and assigning greater importance to the environmental value of forests. While an environmental component is present in all forest policies analyzed, in most countries these policies focus mainly on economic activity. Most countries adopt other kinds of policies, such as water resources, soil, biodiversity, protected areas, at-risk species, and landscape protection policies to protect forests and natural habitats with the objective of preserving biodiversity, aquatic ecosystems, and soil.

Key findings from the two analyses are summarized below and Tables 1 and 2 provide a synthesized overview.

Riparian buffer zones and other ecological buffers (see Table 1)

Of all the countries considered in the study, **Brazil has the most stringent rules on private land regarding riparian buffer zones and other ecological buffers**. Most of the analyzed countries allow some degree of forest management and agricultural activities. Some countries do not establish minimum widths for riparian buffer zones, and in many countries, landowners can apply for compensation due to income loss.

Countries adopt rules on riparian buffer zones and other ecological buffers for different reasons. Depending on the objective of the riparian buffer zones, the size of vegetation strip varies greatly. In Brazil, riparian buffer zone policies aim at protecting both water resources and biodiversity. Therefore, vegetation in that zone must be fully preserved as a no-harvest zone, and, if destroyed for any reason, it must be recovered using only native species. On the other hand, in countries where riparian buffer zone policies aim exclusively at protecting water quality, such as nitrate reduction, legislation merely requires landowners to keep a strip of grass, shrubs, or tree vegetation.

10 McDermott et al. 2010. Global environmental forest policies: An international comparison. Earthscan. London, New York. p.71-123.

Examples from selected countries

Brazil s riparian buffer zones are by far the largest of all the countries studied. The Brazilian riparian no-harvest zone varies from 30 to 500 meters wide depending on the width of the river. However, small landowners who fall under a special regime are allowed to restore smaller areas that vary according to their property size, regardless of the size of the body of water. Under this special regime, riparian zone protection varies from five to 100 meters wide.

In **Germany**, the Federal Water Act prescribes a minimum width of five meters for compulsory buffer zones, which is applicable only to non-built-up areas. Agriculture and the application of fertilizers are still allowed in these zones as long as good agricultural practices are adopted. However, the conversion from grassland to cultivated land is forbidden and sustainable forest management is permitted. Removing naturally occurring trees and bushes is prohibited unless done in accordance with good forestry practice. Regulations in federal states can be stricter than the federal law.

Canada does not have any federal legislation establishing mandatory riparian buffer zones, but almost all provinces have developed substantive rules for buffer zone protection. The province of Quebec, for example, has a protection policy for lakeshores, riverbanks, littoral zones, and floodplains. The width of the shore or bank to be protected varies from 10 to 15 meters, and cultivation of soil for agricultural purposes may be permitted provided that a strip of vegetation, at least three meters wide, is preserved.

In the **United States**, no comprehensive federal statutory law exists that deals directly with riparian buffer width, since the federal government, at least in theory, cannot engage in land-use planning. This is identified as the realm of the states. Some states developed guidelines to protect and manage forest riparian resources. A commonly recommended riparian management zone is 15 meters wide, but the specific guidelines in each state vary tremendously. Riparian rules are often regulated not only at state level but also at county and local government level. Many states have water or public utility districts that establish such rules, which means that there are several layers of government regarding riparian zones. In fact, to identify a riparian setback for a particular river, it is necessary to look at federal, state, county, and water district rules.

In **France**, the protection of riparian areas stems from the eco-conditionality rules of the Common Agricultural Policy (CAP), from the EU Nitrates Directive, and, more recently, from the "Grenelle II Law." According to the French Rural and Maritime Fishing Code, farmers who receive financial aid from the EU must keep a strip of vegetation (grass, shrubs, or trees) of at least five meters along watercourses, serving as buffer zone between watercourses and plantations. The areas classified as nitrate vulnerable

zones must also keep a riparian vegetated strip of five meters. The "Grenelle II Law" has expanded the application of mandatory riparian buffer rules to water bodies listed by an administrative authority. Furthermore, the French Environmental Code establishes the protection of a network of ecological corridors, known as ***Trame verte et bleue*** (TVA), that can also play an important role in the protection of riparian zones. The water bed and the terrestrial ecosystems on each side of the water body identified by the authorities in the scope of the TVA must have its riparian area preserved.

Argentina and **China** do not establish mandatory riparian buffer zones.

Biodiversity conservation (see Table 2)

Biodiversity conservation has been established as a core goal of sustainable forest and land management in all of the reviewed countries' policies. The main policies adopted by assessed countries to protect biodiversity in private lands include: **protected areas, the identification and protection of species at risk and their habitats, forest zoning, and the conversion of forest land to non-forest land.** Among the cases covered in this study**, Brazil is the only country that requires all private properties to set-aside land for biodiversity protection (known as Legal Forest Reserves) without any compensation.**

The concretization and implementation of the biodiversity conservation measures in federal countries lies mainly with the states, provinces, and local authorities. In consequence, regulations, concepts, methods, and land use limitations within the countries are diverse. In **Germany**, the Federal Forest Act is the legal basis for the states to enact their own legal provisions regarding the legal status of forests. For instance, Bavaria adopted ten different classifications for forest reserves, each with its own legal status. These include areas that forbid any kind of forest activity; forests where forest activity is admitted, but cannot be converted to other uses; and forests where conversion to other uses is permitted but must be previously authorized. **Canadian provinces** have enacted legislation that specially protects biodiversity and endangered species. Provincial legislation varies greatly. While some provinces do not have specific legislation to protect endangered species, the Quebec Act Respecting Threatened or Vulnerable Species requires the protection of both species and habitat on all lands, public and private.

Protected areas: Although most of the fully preserved protected areas fall under public domain, in some countries, such as Brazil, Canada, Germany, and the United States, they can also be created on a voluntary basis by private owners. Less strictly protected areas on private lands can be instituted by law or by legal agreements such as easements or covenants.

Examples from selected countries

In **Brazil**, two of the more common categories of protected areas in private properties are: Private Natural Heritage Reserves (RPPN) and Areas of Environmental Protection (APA) (IUCN category V). RPPN are created voluntarily by the landowners and provide a high level of biodiversity protection. APA are the most common typology of protected areas in private properties. They can be created by the federal, state and local governments, and in these areas agriculture and livestock activities are permitted provided that they are carried out on a sustainable basis.

- Conservation easements are one of the primary tools used in the **United States** for conserving biodiversity on private land. Conservation easements permanently limit uses of the land in order to protect its conservation value and prevent development. The hallmark of a conservation easement in the United States is that they are all different. Many of them may allow farming, forestry, and ranching, but others might be very specific and set rules about habitat conservation and riparian buffers.

In **Canada**, protected areas in private lands are usually voluntary and landowners receive government incentives. Canada also uses conservation easements as a tool to protect biodiversity on private lands.

Natura 2000, a network of protected areas, which also allows the interchange of species, is the core pillar of the **EU**'s biodiversity conservation policy, besides international obligations like the Bern Convention, Bonn Convention, and Ramsar Convention. The network is established and managed according to the legally-binding provisions of the EU Birds Directive and the EU Habitats Directive. Natura 2000 sites include public and privately owned lands, as well as both strictly protected nature reserves and protected areas where human activities are allowed. It can allow for the continuation of land uses (e.g., agriculture, forestry) as long as they do not significantly compromise conservation objectives for habitats and species within and beyond the network. In **France**, the government can create protected areas, such as national parks and nature reserves, on private lands without any compensation. In **Germany**, the Federal Nature Conservation Act contains strict conservation areas as nature reserves, national parks, or prospected landscapes.

Species at Risk policies: All assessed countries adopt species at risk policies as an important instrument to conserve biodiversity, including prohibitions on killing endangered species and requirements to protect their habitat.

Examples from selected countries

In **Canada**, at the national level, the Species at Risk (SARA) Act is the main policy to protect biodiversity that imposes some degree of limitation on private land use. The main objectives of the act include prohibiting the killing of extirpated, endangered, or

threatened species and the destruction of the critical habitats of designated species anywhere in Canada. On private lands, the general prohibitions apply mainly to aquatic species and migratory birds. However, there are other norms which can be issued pursuant to SARA to protect critical habitat on private land.

The **United States** Endangered Species Act (ESA) aims at protecting and recovering imperiled species and the ecosystems upon which they depend. The ESA requires the government to list species as endangered or threatened and to undertake steps to bring about the recovery of that species. The law prevents the federal government from undertaking or approving any activity that will risk the continued existence of a species or adversely modify critical habitat. In private lands, the act protects endangered and threatened species and their habitats by prohibiting the harm, hunt, capture or collection of listed animals, as well as interstate or international trade of listed plants and animals, except under federal permit. Such permits generally are available for conservation and scientific purposes. However, private landowners can apply for a permit that allows them to conduct activities that may damage endangered and threatened species and their habitats, provided that they submit a habitat conservation plan to minimize their impacts and perhaps create another habitat. The US Healthy Forests Reserve Program helps landowners restore, enhance, and protect forestland resources on private lands through easements and financial assistance and aids in the recovery of endangered and threatened species under the ESA.

Brazilian legislation also establishes a list of endangered and threatened species and bans their capture, harm, commercialization, among other actions, without a permit.

In the **EU**, the Natura 2000 network is the core policy for the conservation, restoration, and monitoring of endangered and threatened species and their habitats. Member states may have stronger national frameworks. For instance, in **France**, the protection of species at risk relies on the Law on Nature of 1976 that establishes the mechanism to list endangered and threatened species at national and local levels.

China also has a policy to protect endangered and threatened species and their habitats. The Nature Reserve System draws a certain area for typical ecosystems and concentrated areas of endangered wild fauna and flora, allowing only protection, scientific research, and tourist appreciation activities with prior permission. In addition, the Wildlife Conservation Law of the People s Republic of China, revised in 2016, establishes a list of endangered and threatened wild animals, prohibiting their capture, harm, and commercialization without a permit.

Forest zoning policies: Forest zoning policies of assessed countries impose different types of forest land limitations, ranging from fully protecting forests to granting permission to convert forests into other land uses.

Examples from selected countries

The **Chinese** Forest Law classifies Chinese forests into five categories: (i) protection forests; (ii) timber forests; (iii) economic forests; (iv) fuel forests; and (v) special-purpose forests. These categories can be further classified as either for public benefit or commercial use. If a forest is identified as a public benefit forest (protection forest or special-purpose forest), it is supposed to remain in a natural state to provide ecological and human health benefits.

Argentina s Forest Law classifies existing forest into three conservation categories. Category I is comprised of areas with a high conservation value and must be fully preserved, allowing only protection, research, and tourism. Category II relates to areas with a medium conservation value where their resources can be exploited in a sustainable manner. Category III is made up of areas with a low preservation value, thus allowing for the conversion of woods into other land uses, such as agriculture, raising livestock, and planting exotic species. Every Argentinian Province must promote forest zoning in its territory, establishing different conservation categories.

Forest areas can be designated as protection forest in **Germany**, if this is necessary to avert or avoid hazards, significant detriment, or significant nuisance for the public.

In **Brazil**, the Brazilian Forest Law requires that rural landowners designate and maintain a percentage of their property area, under forest cover, as Legal Forest Reserve. The goal is to preserve the remnants of native vegetation on rural lands and to conserve biodiversity. This protected percentage varies from 20 to 80% depending on the type of vegetation present and the property's geographical location in the country. The Brazilian Forest Code framework requires all landowners to restore deforested areas on their properties. However, landowners who fall under a special regime have the option to offset their own Legal Forest Reserve requirements through a different property.

Regulations on the conversion of forest lands to non-forest lands: Most countries have adopted regulations on the conversion of forest lands to non-forest lands. Some policies are very restrictive aiming at preserving the total remaining forests of the country.

Examples from selected countries

The **Chinese** Forest Law prohibits the conversion of forest lands into non-forest lands.

In **Germany**, the Federal Forest Act requires government permission to convert forest lands to agriculture and other uses, and it prohibits the granting of deforestation permits if the use is considered to be against the public interest. However, in some cases where deforestation is considered to be against the public interest, the government does have a margin of discretion to allow it. The rights, duties, and interests of the forest owners are weighted against the needs of the general public.

The conversion of forest lands to non-forest lands in **Brazil** depends on a previous authorization by the competent environmental authority and forest compensation is based on the area and type of vegetation suppressed.

- Similarly, per **France s** Forest Code, the deforestation of an area greater than four hectares depends on previous authorization, and deforestation of an area equal to or above 25 hectares is subject to a management plan. However, deforestation does not require authorization if the land in question was a former agricultural land, no matter the surface.

Financial compensation and incentives: Most of the reviewed countries use some type of financial compensation or government incentive to promote the conservation of natural resources and biodiversity.

Examples from selected countries

The **United States** Department of Agriculture offers a portfolio of incentive programs to assist producers and landowners who wish to practice conservation of agricultural and forest lands. Under the 2014 Farm Bill, approximately U$29 billion went toward conservation programs for the period 2014-2018. The Conservation Reserve Program (CRP), for example, provides 10- to 15-year contracts to remove land from agricultural production and replace it with grasses or trees to conserve and improve soil, protect water quality, and provide wildlife habitat. The Forest Legacy Program (FLP), another federal program, supports the protection of sensitive forest lands, through the acquisition of conservation easements in privately owned forestlands. Most FLP conservation easements restrict development, require sustainable forestry practices, and protect other values. In addition to gains associated with the sale or donation of property rights, many landowners also benefit from reduced taxes associated with limits placed on land use.

- A number of EU funds co-finance the conservation of biodiversity. In **France**, for example, the Natura 2000 contract, an agreement between the government and the landowner, establishes management measures to conserve or restore the natural habitat and it gives rise to financial compensation. In **Germany**, some states already apply compensation instruments, such as nature conservation contracts (e.g., Bavaria and Hesse) or lump sum payments (e.g., North Rhine Westphalia and Baden–Württemberg).

Table 1: Riparian buffer policies

	ARGENTINA	BRAZIL	CANADA	CHINA	FRANCE	GERMANY	UNITED STATES
Riparian buffer rules: mandatory or voluntary	No federal riparian buffer rules. In some provinces, protection forests are instituted to protect riverbanks and lakes on a case-by-case basis.	Mandatory riparian buffer rules for all rural properties, including agriculture and forest activities.	No federal legislation. However, almost all provinces have developed rules for riparian buffer zone protection.	No national riparian buffer rules. Central government can designate a protection forest to protect water resources on a case-by-case basis.	Mandatory riparian buffer rules for farmers receiving EU financial aid; nitrate vulnerable zone properties; and water bodies listed by an administrative authority. Ecological corridors also protect riparian zones.	Mandatory riparian buffer rules at federal level. State regulations can be more strict than the federal law.	No federal riparian buffer rules. State rules, guidelines vary widely. Some develop forest riparian zone protection guidelines; some have mandatory forest riparian rules; almost none regulate agriculture riparian buffers.
Riparian buffer width	Not applicable.	Varies from 5-500 m.	Varies from 10-15 m. (Quebec Province)	Not applicable.	Minimum width of 5 m.	Minimum width of 5 m. (Federal)	Common state width guidelines range from15-25 m.
Riparian buffer legal regime	Forest sustainable management permitted.	No-harvest zone.	Forest sustainable management permitted. Agriculture may be permitted if a strip of vegetation >3m wide is preserved. (Quebec Province)	Not applicable.	Forest sustainable management permitted. Grassy strips can be used as pasture.	Forest sustainable management permitted. Agriculture allowed with good practices. Voluntary no-harvest buffer zone adoption under financial compensation.	Very few states (i.e., Washington and Oregon) have no-harvest riparian zones. Most states establish sustainable management guidelines.
Riparian vegetation	Not applicable.	Native vegetation.	Plants, shrubs, or trees. (Quebec Province)	Not applicable.	Grass, shrubs, or trees.	Native vegetation to the extent that it is possible	Grass, shrubs, or trees.
Landowner financial compensation	Yes	No	Yes	Yes	Yes	Yes	Yes
Other ecological buffers	Protection forests.	Native vegetation on hilltops, slopes, top of mountains, mangroves, sandbanks.	Not identified.	Protection forests and hillsides with slope > 25 degrees.	Protection forests on hilltops, slopes on a case-by-case basis.	Non-built-up areas in a 50 m zone next to big waterbodies. Forest areas can be designated as protection forests when applicable.	Some states have buffer zone regulations to protect wildlife (e.g., to protect nest sites).

Table 2: Biodiversity policies

	ARGENTINA	BRAZIL	CANADA	CHINA	FRANCE	GERMANY	UNITED STATES
Protected areas in private lands	Private owners can voluntarily create less strictly protected areas. Some provincial regulations provide tax and financial incentives.	Private owners can voluntarily create fully preserved protected areas. The government, at federal, state and local level, can institute less strictly protected areas in private lands. Landowners receive tax exemptions.	Landowners voluntarily create and may receive government incentives to protect areas in private lands.	Private individuals or organizations cannot own land, but can lease it from the state or community and create privately protected areas.	Protected areas on private lands can be created by government or regions based on national legislation or EU directives (Natura 2000 network). Recently a NGO volunteered to create wildlife reserves in private lands.	Protected areas on private lands can be created by federal states based on national or state legislation, or on EU directives (Natura 2000 network). Despite lack of legal provision, privately protected areas have been created by NGOs and private foundations.	Private owners can voluntarily create protected areas, including: freehold private reserve (full ownership); conservation easements; and less-binding (time-limited) conservation tools, (Conservation Reserve Program). Also public incentives, support for voluntary land conservation.
Species at risk policies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Forest zoning policies	Every province must promote forest zoning in their territory and establish conservation areas of high, medium, or low conservation value.	Compulsory set-aside land in all private properties of 20-80% area for biodiversity protection (Legal Forest Reserve). Amazon basin states have special forest zoning regulations. Properties within Atlantic Forest biome must follow stricter rules.	Forest zoning policies adopted at provincial and local level, such as special management zones (i.e., British Columbia).	The Chinese Forest Law classifies Chinese forests into five categories.	Environmental agricultural, urban, and forest zoning policies (*i.e., espaces boiss classes, zones spciales de conservation et protection*) directly or indirectly affect private property activities.	Forest zoning policies can be adopted at state level. Bavaria, for example, adopted 10 different classifications for forest reserves, each with its own legal status.	Zoning regulations are the most common state and local government forest and land use policies.
Conversion of forest lands policies	Depends on forest classification. Category I is a no-harvest zone. Category II allows sustainable management. Category III allows conversion of forests to other land uses.	Depends on previous authorization and requires forest compensation.	Not identified.	Prohibited by law.	Deforestation of area > 4 ha depends on previous authorization; deforestation of area ≥25 ha is subject to environmental impact assessment, public hearing.	Depends on previous authorization. The law prohibits granting deforestation permits if deemed against public interest.	Regulated at state and sub-state level. According to California forest rules, conversion of forest lands outside timberland production zones require Timberland Conversion Permit.

CONCLUSION

Brazil's environmental legislation stands out in an international context, particularly given the nation's prominence in global efforts to guarantee food security and mitigate climate change. Its new Forest Code (Law No. 12.651/2012), governing the use and protection of public and private lands, sets stringent rules on private land regarding riparian buffer zones and other ecological buffers and requires all private properties to set-aside land for biodiversity protection without any compensation. Nevertheless, the Forest Code has yet to be fully implemented, and it is only through the effective implementation and enforcement of these rules that Brazil will be able to truly emerge as leader in environmental protection and create the necessary conditions to reconcile increasing agricultural productivity while also protecting its forests.

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*The **Land Use Initiative** (INPUT Iniciativa para o Uso da Terra) is a dedicated team of specialists who work at the forefront of how to increase environmental protection and food production. INPUT engages stakeholders in Brazil s public and private sectors and maps the challenges for a better management of its natural resources. Research conducted under INPUT is generously supported by the Children s Investment Fund Foundation (CIFF) through a grant to the Climate Policy Initiative. www.inputbrasil.org. This study is also the result of a partnership between CPI and BNDES that contributed with data on hydropower plants as well as technical support and comments.*