

Improving the effectiveness of legal arrangements to protect biodiversity: Australia and Brazil

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ABSTRACT

Brazil and Australia are both mega-diverse countries that are currently suffering from a severe and serious loss of biodiversity. Whilst there are significant differences between the two natural resource governance systems, there are several common challenges that each jurisdiction faces in their attempt to protect biodiversity. This paper examines the effectiveness of biodiversity protection in Brazil and Australia by considering the legal mechanisms that are in place to implement their international commitments to biodiversity protection, empirical evidence of the effectiveness of these, and the causes of insufficient performance, and prescriptions for reform and improved implementation. Invasive species management in Australia and the protection of rainforests in Brazil are used as examples of natural resource issues where improved governance systems are required for more effective biodiversity protection. To improve the effectiveness of environmental laws, the authors suggest that more emphasis must be placed on the overall system of governance, including the meta-governance issues of transparency and integrity. The paper concludes by drawing attention to the similarities in the challenges faced by both countries in terms of institutional arrangements, economic and political pressures for farming expansion, behavioral effectiveness of biodiversity protection laws, political commitment and social justice issues.

Keywords: Natural resource governance. Environmental law. Meta-governance. Invasive species. Conservation units. Rainforest.

1. INTRODUCTION

The aim of this paper is to analyze the effectiveness of biodiversity protection in two jurisdictions which are characterized by significant biodiversity, and by significant biodiversity loss. It considers the legal mechanisms that are in place to implement their international commitments to biodiversity protection, empirical evidence of the effectiveness of these, and the causes of insufficient performance, and prescriptions for reform and improved implementation.

Even though the two jurisdictions have significant natural and governance system differences, the paper identifies that they have many challenges in common in attempting to protect biodiversity. Both Australia and Brazil are

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mega-diverse, and both are suffering serious biodiversity loss. Whilst both countries have entered into international biodiversity protection agreements, and have formalized these by local laws and government institutions that have legal responsibility, their biodiversity values are in marked decline. This suggests that the fundamental challenges are not the formal instruments (though these are implicated) but the ‘meta-governance’ arrangements to ensure implementation given the pressures against effectiveness in the natural and human context within which legal governance strategies operate.

In this paper we take an institutional perspective, defining governance as rules, strategies and organizational structures that together control or guide how natural resources are used or conserved. Legal institutions and legal instruments are part of the governance system, alongside economic and social interventions. The system not only governs the protection or restoration of the environment, it also governs actions that harm the environment, such as commercial exploitation. Meta-governance refers to how governance itself is governed. This incorporates consideration of how laws are made and implemented, and how the integrity of the governance system is protected.

This paper considers particularly

1. Indicators of the effectiveness of the governance of biodiversity in both jurisdictions, including legal instruments and strategies;
2. How the politics of competing social and economic interests and values affect the implementation of biodiversity protection;
3. The effects of the economics of effective governance, including the economic capacity of government agencies and private resource users and the costs of implementation;
4. The challenges of meta-governance that are identifiable through considering the effectiveness of laws intended to protect biodiversity.

This paper suggests that improving the effectiveness of environmental laws requires greater attention to the performance of the overall system of governance of which the law is a part, including to the meta-governance issues such as the integrity and transparency of the overall system of governance.

2. TRAJECTORIES OF BIODIVERSITY PROTECTION AND RESTORATION IN BOTH COUNTRIES

The following table provides a snapshot comparison of the two countries, to provide a context for the discussion that follows.

Tabela1

	Brazil	Australia
Land mass ¹	8,514,876.599 sq km ²	7,682,300.0 sq km
Population ³	205,867,372 ⁴	23,470,118
Gross National Income per person ⁵	\$US 11,790	\$US 64,600
Forest cover ⁶	59% of landmass	16.2% of landmass
Economic equality (Gini co-efficient, 0= equality) ⁷	58	34
Environmental Performance indicators, biodiversity and habitat protection ⁸	92.62 % score Ranking 40 th	87.18% score Ranking 68 th
Species under threat ⁹	82 mammal species 516 higher plant species 85 fish species	56 mammal species 92 higher plant species 111 fish species
Protected areas	17,2% of landmass (2122 areas) 1,5% of marine area (156 areas) ¹⁰	16.25% of landmass (10 008 areas) 36.2% of marine area (300 areas) ¹¹
Governing structure	Federation, with 26 states + Federal District and 5.570 municipalities. Environmental governance responsibilities are divided between national, state and municipality bodies (all those entities integrate the SISNAMA (National Environmental System).	Federation, with 8 states and territories. Environmental governance responsibilities are divided between national, state and 565 local councils, with 56 regional natural resource management organizations ¹² .
Biodiversity Convention Ratification year	1994	1993
Cartagena Protocol Ratification year	2003	---

	Brazil	Australia
Kuala Lumpur Supplementary Protocol Signature year	2012	---
Nagoya Protocol Signature year	2011	2012

Both countries have implemented their Biodiversity Convention commitments through a number of laws, regulations and other institutional arrangements. The strategies that are being used can be divided into structural and institutional initiatives, and management initiatives. Both countries have a network of conservation reserves with national parks being the centerpiece, and have many laws and other arrangements intended to govern land and water use to limit ecological harm or encourage restoration. However, as the data cited below indicates, in both cases the loss of biodiversity continues at an alarming rate.

Is the ongoing loss of biodiversity an indication that biodiversity protection laws have failed? At one level this is so, but it is also likely (though hard to prove) that these laws have prevented much harm that would otherwise have occurred, and what biodiversity remains intact is an indicator that law based governance has benefited biodiversity. Regardless of issues of empirical proof of effectiveness or otherwise, it seems to be absolutely clear that in both jurisdictions substantial improvement in the performance of environmental governance is essential, and within this the performance of the legal components of biodiversity protection.

2. REPORTED PERFORMANCE.

Each country has lodged a 5th National Report to the Convention on Biological Diversity, which provide a starting point for a discussion on effectiveness¹. While countries will naturally put a positive 'spin' on such reports, taking them as a starting point and then using scientific data and specific case studies can provide other insights into that performance, and reasons for the outcomes. Because these reports provide a great

1 CONVENTION ON BIOLOGICAL DIVERSITY. *Fifth National Report Information Portal*. Available from: <<https://www.cbd.int/nr5/>>. Accessed on: 3 May 2016.

deal of descriptive data, we do not need to repeat this information and so we can concentrate this paper on a discussion of issues touching effectiveness and possibilities for improvement.

National reports provide official information on biodiversity status and trends, governance arrangements, progress towards specified targets, and lessons about improvement, but naturally this data is presented within a political context that is unlikely to highlight the causes of implementation failures where these exist. To provide more detail on the causes of underperformance of legal arrangements we will report on detailed case study evaluations of particular issues in both countries that have been conducted by the researchers. Given the vast range of biophysical aspects of biodiversity and the governance of biodiversity, in both jurisdictions we have focused on particular challenges which we believe illustrate broader considerations.

3. AUSTRALIA'S PERFORMANCE²

The Australian government summarizes its biodiversity protection performance in the following words

Recent reports on the state of Australia's environment have found that, in general, population size, geographic range and genetic diversity are decreasing in a wide range of species across all groups of plants, animals and other forms of life³.

It couches this acknowledgement in the context of the many initiatives that are being undertaken, and highlights selected case studies to illustrate the good work that is being done. It does not provide an objective analysis of the apparent inconsistency between the good work that is discussed and the unsatisfactory outcomes that continue to be delivered.

Australia's biodiversity performance is not heartening, despite the existence of many legal and other instruments and programs.⁴ Threatened species in par-

2 DEPARTMENT OF THE ENVIRONMENT. *Australia's Fifth National Report under the Convention on Biological Diversity*. Canberra: Department of the Environment, 2014.

3 DEPARTMENT OF THE ENVIRONMENT. *Australia's Fifth National Report under the Convention on Biological Diversity*. Canberra: Department of the Environment, 2014. p. 2.

4 DEPARTMENT OF THE ENVIRONMENT. *Australia's Fifth National Report under the Convention on Biological Diversity*. Canberra: Department of the Environment, 2014. SOE COMMITTEE 2011. *Australia State of the Environment 2011*: Independent Report to the

ticular have suffered, with more than 50 animal species and 48 plant species listed as extinct since the passage of the Environment Protection and Biodiversity Conservation Act (EPBC).⁵ Independent authors have been more damning in their assessment of the performance of public governance.

Australia's highly diverse and predominantly endemic biodiversity is seriously imperiled. In the past two centuries, at least 27 mammals, 23 birds (including island species and subspecies), 4 frogs and over 60 plant species have vanished (Department of Sustainability 2009). In addition, over 1500 mammals, birds, reptiles, amphibians, and plants are currently threatened with extinction, along with over 3000 ecosystem types (Keith et al. 2013). In Victoria, for instance, only ~30% of the original native vegetation remains, and some vegetation types, such as grasslands and open woodlands, have been reduced by more than 99% since European settlement (Bradshaw 2012). The situation for marine systems is far more uncertain owing to data limitations even for economically important species (Beeton et al. 2012, FRDC 2012). In addition, Australia has the world's most recent mammal extinction, the Christmas Island pipistrelle bat (*Pipistrellus murrayi*) in 2009 (Martin et al. 2012). If current trends continue, many other species such as the Leadbeater's possum (*Gymnobelideus leadbeateri*) will suffer the same fate. Indeed, Lindenmayer and Possingham (2013) suggested that the Victorian government is knowingly condoning activities that will reduce the viability of this IUCN-listed endangered species.⁶

Australia has a National Strategy for the Conservation of Australia's Biological Diversity, dating from 1996 but updated periodically⁷. The strategy has priorities and targets that relate primarily to activities rather than biophysical outcomes. The responsibilities within Australia's biodiversity governance system are distributed between the national and state governments, with states traditionally having constitutional responsibility

for land management and the national government. The national government's responsibilities are focused around the national Environmental Conservation and Biodiversity Conservation Act (EPBCA). The Australian government reports many activities to implement its responsibilities, emphasizing legislation, strategic assessment, market instruments, controls over developments and processes that can significantly prejudice biodiversity ("key threatening processes"), recovery plans, protection of genetic resources, implementing the RAMSAR convention, a national conservation reserve system (which includes around 500 federal and State run national parks, including World Heritage Areas as well as public or private forestry and conservation reserves), indigenous protected areas, wildlife corridors, environmental research, biosecurity arrangements, and many different types of community grants.

Biodiversity governance at the State level includes State national parks and conservation reserves, control of land clearing and land use, planning controls, and laws governing things like soil conservation, land clearing⁸. Local government is principally concerned with land use (including development control) and local parks and gardens. Taken together the governance system for biodiversity protection is extraordinarily complex and detailed⁹.

It is not possible to address every aspect of this complicated system, so we will concentrate on a few. The causes of biodiversity loss in different countries vary with local conditions, but for Australia five causes are as the most significant: habitat loss, degradation and fragmentation; invasive species; unsustainable use and management of natural resources; changes to the aquatic environment and water flows; changing fire regimes; climate change. In this discussion we will concentrate

Australian Minister for Sustainability, Environment, Water, Population and Communities. Canberra: Commonwealth of Australia.

5 AUSTRALIAN BUREAU OF STATISTICS. *Australia's Biodiversity 1301.0 - Year Book Australia, 2009-10*. Available at: <<http://www.abs.gov.au/ausstats/abs@.nsf/Previousproducts/1301.0?feature=20&article=12009%E2%80%9310?opendocument&tabname=Summary&prodno=1301.0&issue=2009%9610&num=&view=>>>. Accessed on: 3 May 2016.

6 RITCHIE, Euan et al. Continental-Scale Governance Failure Will Hasten Loss of Australia's Biodiversity. *Conservation Biology*, v. 27, n. 6, p. 1133-1135, 2013.

7 NATURAL RESOURCE MANAGEMENT MINISTERIAL COUNCIL. *Australia's Biodiversity Conservation Strategy 2010-2030*. Canberra: Australian Government, Department of Sustainability, Environment, Water, Population and Communities, 2010.

8 See for example BYRON, Neil et al. *A review of biodiversity legislation in NSW Final Report*. Sydney: Independent Biodiversity Legislation Review Panel, 2014. Available at: <<http://www.environment.nsw.gov.au/resources/biodiversity/BiodivLawReview.pdf>>. Accessed on: 11 May 2016.

9 RYAN, Sarah et al. *Australia's NRM Governance System. Foundations and Principles for Meeting Future Challenges*. Canberra: Australian Regional NRM Chairs, 2010. HAWKE, Allan. *The Australian Environment Act: Report of the Independent Review of the Environment Protection and Biodiversity Conservation Act 1999*. Canberra: Commonwealth of Australia, 2009 with complexity exemplified by the development approval process JOHNSON, J. Commonwealth Environmental Assessment and Approval. In: FARRIER, David; STEIN, Paul (Ed.). *The Environmental Law Handbook*. 5th ed. Sydney: Thomson Reuters, 2011.

on the first two, habitat loss and invasive species. The national strategy also highlights that “(t)he continued contribution from farmers (who manage over 60% of the Australian landscape), primary industries and community groups will be important in meeting this challenge” and so we will focus on the rural face of terrestrial biodiversity¹⁰.

4. OVERCOMING HABITAT LOSS AND FRAGMENTATION

Avoiding habitat loss, or the restoration of prior losses, involves a number of actions: creating a system of conservation reserves, protecting or restoring habitat connectivity, and controlling harmful activities on both public and private lands. Some aspects of this are structural or institutional (e.g. the creation of laws and the creation of publicly owned reserves) and others are behavioral (e.g. stopping harmful action on private land, or encouraging private conservation). The first are in the direct power of government, and the second requires the voluntary cooperation of the community. The performance issues are different for the institutional and the behavioral aspects.

Australia has a National Reserve System (“NRS”) intended to protect a “Comprehensive, Adequate and Representative” set of ecosystem types.¹¹ The NRS system is a mixture of national parks, other conservation reserves and private reserves and has grown by more than 40% in just over a decade, with a substantial part of the growth being “Indigenous Protected Areas”, (representing 7% of the landmass), where stewardship lies substantially in the hands of Aboriginal and Torres Strait Islander owners.^{12 13}

10 NATURAL RESOURCE MANAGEMENT MINISTERIAL COUNCIL. *Australia's Biodiversity Conservation Strategy 2010-2030*. Canberra: Australian Government, Department of Sustainability, Environment, Water, Population and Communities, 2010.

11 DEPARTMENT OF THE ENVIRONMENT. *Australian Bioregions (IBRA)*. Available at: <<http://www.environment.gov.au/land/nrs/science/ibra>>. Accessed on: 11 May 2016.

12 TAYLOR, Martin et al. *Building Nature's Safety Net 2011: The state of protected areas for Australia's ecosystems and wildlife*. Sydney: WWF Australia, 2011. Available at: <http://awsassets.wwf.org.au/downloads/bi037_building_natures_safety_net_2011_6jul11.pdf>. Accessed on: 11 May 2016.

13 DEPARTMENT OF THE ENVIRONMENT AND ENERGY. *Ownership of protected areas*. Available at: <<http://www.environment.gov.au/land/nrs/about-nrs/ownership>>. Accessed on: 11

Private conservation reserves are also increasingly important, particularly to restore connectivity between habitats. Around 5% of the NRS reserves are on private land.¹⁴ However caution should be exercised in interpreting all these statistics. In Australia's rush to develop, many habitats were destroyed, and recovery through reserve system will often require very long times, perhaps centuries for habitats to recover¹⁵ and many habitat types are under-represented in the reserve system. Roughly half of the lands that are nominated as conservation reserves are in categories that allow farming and mining activities. There is ongoing pressure to allow non-conservation activities (e.g. hunting, recreation, tourism infrastructures, grazing), and there are political pressures to restrict some management activities that are desirable to protect biodiversity values of this estate (e.g. wild horse culling, closing off areas from use).

Even accepting these difficulties, progress has been achieved towards a network of protected areas. The limits to effective implementation of the national reserve policies are

1. The limited availability of some under-represented habitats, because of past destruction and the value of their economic use (and thus the cost of putting them into the conservation estate);
2. The challenges in re-establishing connectivity between protected areas, given this difficulty;
3. Demands for competing uses of the land, which translates into political pressures and partly compromises biodiversity conservation.
4. The effects of economic disadvantage on the ability of some landholders (notably Aboriginal land stewards) to adequately conserve and restore habitats.
5. Limited funds compared to what is needed to create and manage a comprehensive well-

May 2016. DEPARTMENT OF PRIME MINISTER AND CABINET. *Indigenous Protected Areas*. Available at: <<https://www.dpmc.gov.au/indigenous-affairs/environment/indigenous-protected-areas-ipas>>. Accessed on: 11 May 2016.

14 Agreements must last for 99 years at least, and ideally in perpetuity. While they can be terminated, both parties must first agree. CARING FOR OUR COUNTRY. *Standards for inclusion in the National Reserve System*. Available at: <<http://www.environment.gov.au/system/files/pages/46ff7210-376f-4402-9883-7a6f74b89fb5/files/inclusionstandards.pdf>>. Accessed on: 11 May 2016.

15 BRADSHAW, Corey. Little left to lose: Deforestation and forest degradation in Australia since European colonization. *Journal of Plant Ecology*, v. 5, n. 1, p. 109–120, 2012.

connected conservation reserve system, including on private and Indigenous lands.

Protection of habitat outside the formal reserve system is far less encouraging, with clearing of remaining habitats for agriculture and to a lesser degree urban expansion or mining resulting in ongoing declines in high quality native habitat. Whilst there are debates about the extent of land-clearing for farming and urban expansion, due of definition and measurement issues, tree cover continues to decline. In the context of the Australian ecology where trees are naturally sparse in many parts of the country the loss of tree cover is an inadequate indicator of habitat loss¹⁶. There are credible claims that land clearing is far greater than government statistics suggest, whilst in most states there are political pressures to reduce or remove the existing prescriptive controls¹⁷. While many landholders resent the controls imposed on them, this does not mean that they are antagonistic to maintaining or protecting native vegetation, and a simplistic imposition of legal controls could have counterproductive effects¹⁸.

5. THE EFFECTIVENESS OF INVASIVE SPECIES MANAGEMENT

Australia places control of invasive species as its second priority in its national biodiversity strategy. The country is home to more than 400 invasive species.¹⁹ The Australian 2011 *State of the Environment Report* indi-

cated that the impact of invasive species on biodiversity is 'high' to 'very high' and conditions are deteriorating and the impact on inland waters is 'high' and conditions are deteriorating. Of the 21 key threatening processes identified under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) as requiring priority action, 11 are invasive species²⁰. Thirty-two weed species have been identified as being of 'national significance'. Systemic harms include hotter fires in northern Australia from the burning of Gamba grass, potentially causing fundamental changes to tropical ecosystems. The economic costs of invasive species are also substantial²¹.

The management of invasive species threats to biodiversity is very complicated. It involves preventative biosecurity to avoid new species being established, early response to threats as they emerge, and ongoing control. By their nature many invasive species are extremely difficult to control particularly if they are fertile and mobile (for example feral pigs or water borne weeds). Their control requires costly coordinated action spanning many land tenures, and control effort must be ongoing. There are many social, economic and institutional barriers to effective management, particularly in rural areas where incomes are often insufficient to meet the challenge, economic incentives low, and human or financial capacity fluctuates significantly between seasons²². For many reasons an effective approach will often require a great deal of voluntary well-coordinated action across a large area. Traditional regulatory approaches are largely ineffective at forcing landholders to act positively and in a coordinated manner, and so controlling this aspect of Australia's biodiversity protection performance requires behavioural management for which the law is not well suited.

In response to the failings of prior laws, both state and national governments have undertaken (or are in the process of undertaking) radical reform focused

16 LINDENMAYER, David; BURGMAN, Mark. Vegetation loss and degradation. In: LINDENMAYER, David; BURGMAN, Mark (Ed.). *Practical Conservation Biology*. Canberra: CSIRO Publishing, 2006.

17 BYRON, Neil et al. *A review of biodiversity legislation in NSW Final Report*. Sydney: Independent Biodiversity Legislation Review Panel, 2014. Available at: <<http://www.environment.nsw.gov.au/resources/biodiversity/BiodivLawReview.pdf>>. Accessed on: 11 May 2016.

18 HARRIS-ADAMS, Keely; TOWNSEND, Phil; LAWSON, Kenton. *Native vegetation management on agricultural land*. Canberra: Department of Agriculture, Fisheries and Forestry, 2012. There are also complex issues of social justice, given the large areas of intact native vegetation held under Indigenous people's tenure. MC-CARTHY, Marty; SEXTON-MCGRATH, Kristy. *Tree clearing*: Indigenous leader Noel Pearson hits out at changes to Queensland's Native Vegetation Act. Available at: <<http://www.abc.net.au/news/2016-03-09/indigenous-leader-hits-out-at-qld-land-clearing-laws/7230726>>. Accessed on: 11 May 2016.

19 INVASIVE SPECIES SPECIALIST GROUP. *Global Invasive Species Database*. Available at: <<http://www.issg.org/database/welcome/>>. Accessed on: 11 May 2016.

20 Listed at DEPARTMENT OF ENVIRONMENT AND ENERGY. *Species Profile and Threats Database*. Available at: <<http://www.environment.gov.au/cgi-bin/sprat/public/publicgetkeythreats.pl>>. Accessed on: 11 May 2016.

21 For example the estimated cost of \$A3,300 million per year to Australian grain growers from weeds. LLEWELLYN, Rick et al. *Impact of Weeds on Australian Grain Production*: The cost of weeds to Australian grain growers and the adoption of weed management and tillage practices. Canberra: Grains and Research Development Corporation, 2016.

22 For a detailed diagnosis see MARTIN, Paul et al. *Effective Citizen Action on Invasive Species*: The Institutional Challenge. Canberra: Invasive Animals Cooperative Research Centre, 2016.

around concepts of a citizen/government partnership and a legal duty of care by landholders to control invasive species on their land (sometimes termed the ‘general biosecurity obligation’)²³. While new instruments could reduce some of the legal impediments to effective implementation of policy (assuming that they are energetically implemented), many institutional impediments will remain. The seven issues impediments listed below have been identified from invasive species control, most are relevant to any biodiversity conservation strategy that depends on citizen action.

1. A lack of resources to do what is required. This includes insufficient resources for the government agencies that are meant to lead implementation, but even more important is the need for action to be feasible for those being regulated.
2. The need for clear accountability, including clear principles for when enforcement should (or should not) proceed, and mechanisms that can evaluate and report on the integrity and effectiveness of implementation of legal arrangements.
3. Overcoming the political, legal and management problems of achieving coordinated and sustained action across private boundaries that arise because landholders have property rights and diverse interests and incentives.
4. Reducing the high costs and frustrations of bureaucracy which can make it harder for responsible citizens to take action and which can fragment the strategies used by different government agencies and by industry.
5. The need for more sophisticated behaviour management. Science and industry have sophisticated methods for engagement and communications which do not seem to be widely used in biodiversity governance programs.
6. Public communications needs to be more

effective in dealing with the politics that can undermine implementation (for example, for unpalatable actions like killing species like wild cats, dogs, rabbits or horses, or actions that impose a cost or inconvenience).

7. New skills and knowledge to manage complex citizen-based programs to protect biodiversity need to be developed and practiced in order to make new legal arrangements effective.

6. BRAZIL’S PERFORMANCE

Brazil is a mega diverse country due to its huge extension, most of all located in tropical zones. It is home to 6 different biomes or bioregions which include tropical forests, grasslands, wetlands, savannas and semi-arid zones: Amazon Tropical Forest²⁴, Atlantic Coastal Forest²⁵, Caatinga²⁶, Cerrado²⁷, Wetlands²⁸ and Grasslands²⁹.

Home to 2 tropical forests and some other very diverse biomes, as the Midwest Wetlands and the Cerrado, it houses the biggest biodiversity in the world, with more than 20% of the world’s species, many of which are endemic. Nevertheless most of the Brazilian economy is based on exotic species like soya, orange, cacao, corn, sugar-cane, coffee, rice and wheat that are responsible for more than 30% of the Gross National Product³⁰ and for large rates of deforestation, as the monocultures advance through the North of the country and, therefore, through Amazon. Cattle raising is also an important economic activity that is itself responsible too for a large amount of deforestation. This paradox leads to forest degradation, fragmentation of habitats and loss of biodiversity, creating crescent problems to any public policy related to biodiversity conservation, especially after year 2015, when Brazil entered in one of the worst economic crisis of its history and, more

23 BEALE, Roger et al. *One Biosecurity: The Independent Review of Australia’s Quarantine and Biosecurity Arrangements*. Report to the Australian Government. Canberra: National Biosecurity Committee, 2008. NATIONAL BIOSECURITY COMMITTEE. *Modernising Australia’s approach to managing established pests and diseases of national significance Discussion paper*. Canberra: Department of Agriculture, 2015. To illustrate the approach in various states see: NSW GOVERNMENT. *Proposed Framework for a NSW Biosecurity Act*. Sydney: NSW Department of Primary Industries, 2014. BIOSECURITY QUEENSLAND. *New biosecurity laws for Queensland*. Brisbane: State of Queensland, 2016.

24 A biome located in the North of Brazil.

25 A biome located in the Brazilian shore that goes from the north of the Northeast Region, until the South of Brazil.

26 A biome located in the Northeast semiarid.

27 A biome located in the Midwest, similar to the African Savanas.

28 A biome also located in the Midwest, but only in the wet parts of the States of Mato Grosso and Mato Grosso do Sul.

29 A biome located in the South of Brazil, in the State of Rio Grande do Sul.

30 BRASIL. Ministério do Meio Ambiente. *Biodiversidade Brasileira*. Available at: <<http://www.mma.gov.br/biodiversidade/biodiversidade-brasileira>>. Accessed on: 10 May 2016.

than ever, depends on the export of commodities to maintain its trade balance.

Brazil signed the Convention on Biological Diversity during the United Nation Conference on Environment and Development (Rio/92) and it was ratified by the Brazilian Parliament on February 3rd, 1994, by the Legislative Decree n° 2. In the same year the Brazilian Government created an Inter-ministerial Commission for Sustainable Development that led to the creation of a Coordination Body on Biodiversity within the Environmental Ministry, the National Program on Biological Diversity (PRONABIO). The competences of this body include the coordination and implementation of the CBD, the elaboration of a National Strategy on Biological Diversity and the proposal of priorities and guidelines³¹. A National Commission on Biodiversity (CONABIO) was created in 2003, to coordinate and evaluate the program, composed by representatives of the government and the society. It plays an important role in the discussion and implementation of the National Biodiversity Policy established by Decree n° 4.339/2002³².

This National Policy, however, does not present any concrete action or measure that can be adopted to reduce the loss of biodiversity. In fact, it basically repeats the CBD principles and guidelines and establishes 7 components that should be considered as theme axes that will guide the implementation of the Policy. Those axes are: 1) Knowledge of biodiversity; 2) Biodiversity conservation; 3) Sustainable use of biodiversity; 4) Monitoring, evaluation, prevention and mitigation of impacts on biodiversity; 5) Access to genetic resources and associated traditional knowledge and benefit sharing; 6) Education; 7) Legal and institutional strengthening for biodiversity management.

Each of those axes is then unfolded with a general objective and guideline and specific objectives. None of those objectives present any instrument or practical actions to be taken so to make the Policy effective.

Some projects were developed, like the Project for Conservation and Sustainable Use of the Brazilian Bio-

logical Diversity (PROBIO I) and the National Project for Public-Private Integrated Actions for Biodiversity (PROBIO II), without, once again, any concrete results other than a Map of Priority Areas for the Conservation of the Brazilian Biomes and Recommendations for the Priority Areas³³.

The Recommendations have been largely used to ground the creation of conservation units³⁴, substituting specific studies that should be done before a conservation unit is established. Although a scientific study that guides the government in choosing priority areas where conservation units should be created can be considered to be a good tool, specific studies cannot be despised, because these are the documents that should support the choice of a certain category of conservation unit, along with its size, shape and objectives.

Another problem that can be mentioned in the field of conservation units is the lack of effectiveness caused by the lack of investments that leads to a lack of public servers and infrastructure. The Ministry of Environment budget, that includes the budget of the bodies related to environment protection and conservation units creation and management, has been maintained the same for more than a decade – around R\$ 1,3 billion (Reais) per year, that is approximately, one of the smallest budgets within the Brazilian Ministries³⁵.

Therefore, the budget available for Chico Mendes Institute for the Conservation of Biodiversity (Instituto Chico Mendes de Conservação da Biodiversidade – ICMBio), the body in charge of the creation and management of federal conservation units has also been the same since 2001, R\$ 300 million per year. The problem is that the total area covered with conservation units since 2001 practically doubled, what means a significant reduction on the amount of Reais invested per year

33 BRASIL. Ministério do Meio Ambiente. *Áreas Prioritárias*. Available at: <<http://www.mma.gov.br/biodiversidade/projetos-sobre-a-biodiversidade/projeto-de-conserva%C3%A7%C3%A3o-e-utiliza%C3%A7%C3%A3o-sustent%C3%A1vel-da-diversidade-biol%C3%B3gica-brasileira-probio-i/%C3%A1reas-priorit%C3%A1rias>>. Accessed on: 9 May 2016.

34 In Brazil, protected areas are divided in conservation units, regulated by Law n° 9.985/2000, Indigenous' and Quilombola's lands and other types of environmental spaces, regulated by different legislations. The most important types of protected areas, however, are the conservation units, that have a legal regime established by Law and make up a system managed by an specific body: Chico Mendes Institute for the Conservation of Biodiversity (ICMBio).

35 GODOY, Larissa R. da Cruz. *Compensação ambiental e financiamento das áreas protegidas*. Porto Alegre: Fabris, 2015.

31 INSTITUTE OF ADVANCED STUDIES OF THE UNIVERSITY OF SAO PAULO. *Home*. Available at: <www.ica.usp.br>. Accessed on: 10 May 2016.

32 BRASIL. Ministério do Meio Ambiente. *Comissão Nacional da Biodiversidade*. Available at: <<http://www.mma.gov.br/biodiversidade/comissao-nacional-de-biodiversidade>>. Accessed on: 11 May 2016.

per hectare, that is around R\$ 4,00, including the employees' salaries³⁶.

Without investments and monitoring, the percentage of the Brazilian territory protected with conservation units, as shown by the Brazilian government in the official documents presented, does not correspond to the reality. In fact, only a few conservation units have been really implemented, with reasonable infrastructure, employees, and management plans.

The creation of conservation units without the correspondent means for their implementation is a government maneuver to pretend to meet the Convention obligations.

Another Government ploy happened with the substantial changes made in the National Goals for Biodiversity (Metas Nacionais de Biodiversidade). The goals established for 2010 by Resolution CONABIO n° 3/2006, due to the Global Goals established by the 8th Conference of the Parties – 10% of each ecological region of the world effectively conserved by 2010 - included protecting at least 30% of the Amazon Biome and 10% of the other Biomes with conservation units.

The 10th Conference of Parties rose to 17% of terrestrial areas and 10% of continental waters that should be protected by 2020. Therefore, Brazil edited another Strategic Plan for Biodiversity 2011-2020, this time including all types of protected areas and not only conservation units, as it was before. Because Indigenous Lands sum a big amount of terrestrial areas, the goal will be met much easier. The problem is that Indigenous Lands do not have as their most important objectives the conservation of biodiversity, but the conservation of the Indigenous cultures.

But Brazil advanced at least in one point directly related to the conservation of biodiversity: the protection of the rain forests. The protection of forests played a great role within the government efforts to protect biodiversity. The first successful measure was the edition of Law n° 11.428, in 2006, that provides for the protection of the Atlantic Rain Forest. This important Brazilian biome, extremely rich in biological diversity, is the most impacted one, because it is located in the Brazilian shore, from the north of the Northeast Region until the south of the country, where the colonization process

began, followed by the implantation of monocultures, like sugar cane and coffee, and in more recent years, the implantation of the Brazilian industry. Less than 9% of its original forest cover was left over 100 hectares³⁷ and the new law was issued to discipline the suppression of the remaining forest, as it is still located in the most populated and developed parts of the country.

Another biome that is being severely impacted lately is the Amazon Forest. Brazil is home to part of the Amazon Forest, that represents 67% of the world tropical forests, has 6,9 millions square kilometers and spreads through 9 South American countries: Brazil, Peru, Bolivia, Ecuador, Colombia, Venezuela, Guiana, Suriname and French Guiana. It is estimated that 1/3 of the world trees are located in that region, approximately 40.000 species of plants, 3.000 species of fish and more than 400 mammals. The birds sum more than 1.300 different species. It also produces 20% of all the world fresh water³⁸.

In Brazil, the Amazon Forest covers 49% of the Brazilian territory (4,2 million square kilometers), spreading through 9 States, and is home to 24 million people, less than 10% of the total population. The State that suffered more with deforestation is Rondonia, which lost almost 30% of its natural vegetation³⁹.

The rhythm of deforestation is very high. According to Greenpeace, until 1970 deforestation did not exceed 1% of the whole Brazilian Amazon Forest. Since then, almost 18% has been deforested⁴⁰. Different governmental programs, like the National Integration Program (Programa de Integração Nacional - PIN) and the First National Development Program (I Programa Nacional de Desenvolvimento - I PND) encouraged, in the late 1960's and early 1970's, the occupation of the Amazon region, aiming to integrate the region to the national economy. The internal migration and the lack of sur-

36 GODOY, Larissa R. da Cruz. *Compensação ambiental e financiamento das áreas protegidas*. Porto Alegre: Fabris, 2015.

37 SOS MATA ATLÂNTICA. *SOS Mata Atlântica exists to protect one of the most endangered forests in the world: the Atlantic Forest and its associated ecosystems and people*. Available at: <<https://www.sosma.org.br/nossa-causa/a-mata-atlantica/>>. Accessed on: 14 Apr. 2016.

38 GREENPEACE. *Fascínio e destruição*. Available at: <<http://www.greenpeace.org/brasil/pt/O-que-fazemos/Amazonia/>>. Accessed on: 14 Apr. 2016.

39 GREENPEACE. *Fascínio e destruição*. Available at: <<http://www.greenpeace.org/brasil/pt/O-que-fazemos/Amazonia/>>. Accessed on: 14 Apr. 2016.

40 GREENPEACE. *Fascínio e destruição*. Available at: <<http://www.greenpeace.org/brasil/pt/O-que-fazemos/Amazonia/>>. Accessed on: 14 Apr. 2016.

veillance opened the door to fraud in property titles and illegal deforestation, either for wood, pastures or, more recently, soya⁴¹.

The concept of deforestation can be defined in a broad or in a more restricted way. The broad concept involves a process that begins with the extraction of trees that have high economic value leading, in the sequence, to the extraction of the other trees which price is not as high. Pastures start then to be planted under the few trees that were left and the forest begins to be more vulnerable to the action of winds, rains and water currents. The end of the process is the complete extraction of the forest cover. The restrict way of defining deforestation takes into consideration only the last phase, when erosion begins to be a great threaten to soil and the loss of biodiversity is intense because of the habitats and natural ecosystems fragmentation⁴².

The rate of deforestation in Brazil has dramatically increased in the 1990's, especially in 1995, when there was a record, as shown in Figure 2, that presents the annual rates of deforestation in the Legal Amazon⁴³. The data was collected by satellites and processed by The National Institute for Space Research (Instituto Nacional de Pesquisas Espaciais – INPE), the governmental body in charge of producing science and technology in space and environmental areas.

Figure 2 also shows that the years 2003 and 2004 presented again crescent rates of deforestation, due mostly to the increase of livestock⁴⁴ and led to the deve-

lopment of an official program called The Action Plan for the Prevention and the Control of Deforestation in the Legal Amazon (Plano de Ação para a Prevenção e o Controle do Desmatamento da Amazônia Legal – PPCDAm). The strategy used by PPCDAm combined 4 axes of intervention: 1) land use planning; 2) monitoring and environmental control; 3) promoting sustainable productive activities; 4) sustainable infrastructure. The first actions involved fighting corruption, with the help of the Federal Police, and the creation, by INPE, of the system called DETER, which is meant to detect deforestation in almost real time. The federal environmental agency - Brazilian Environmental and Renewable Resources Institute (Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis – IBAMA) - increased field operations and the Ministry of Agrarian Development demanded a new registration of rural properties. Another action was the creation of protected areas of different types in Amazon.

The results were a gradual reduction in the deforestation rates, with a little increase in 2008, due to political problems experienced by the disagreement of the heads of the agribusiness, including, at that time, the governor of Mato Grosso State and President's Lula ally, Blairo Maggi. In 2013 and 2015, as can be seen in Figures 3 and 5, the rate of deforestation increased again, due this time to the edition of the New Forest Code, in 2012 (Law n° 12.651/12). This new law is understood as the major setback in the Brazilian Environmental legislation because it not only granted amnesty to rural proprietors who illegally degraded the environment but it also turned some protected areas that had to be respected in rural properties more flexible.

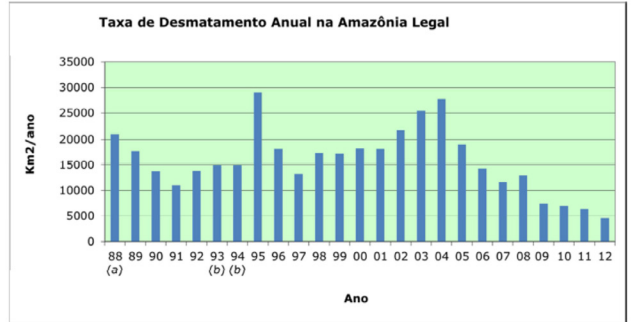
41 ARAÚJO, Ubiracy Craveiro de. A presença indígena nas unidades de conservação. In: BENJAMIN, Antônio Herman (Coord.). *Direito ambiental das áreas protegidas: o regime jurídico das unidades de conservação*. Rio de Janeiro: Forense Universitária, 2001.

42 PIRES, Mauro Oliveira. A política de combate ao desmatamento na Amazônia e no cerrado. In: LITTLE, Paul (Org.). *Os novos desafios da política ambiental brasileira*. Brasília: IEB, 2014.

43 The Legal Amazon is a concept created by the Brazilian government to promote the region's social and economic development. It includes the total territory of Acre, Amapá, Amazonas, Mato Grosso, Pará, Rondônia, Roraima e Tocantins and part of Maranhão. The extension of the Legal Amazon is 5.217.423 km², what represents 61% of the Brazilian territory. Although it is formed mostly by tropical forest, a part of the Legal Amazon is covered by Cerrado an Pantanal. O ECO. *O que é a Amazônia Legal*. Available at: <<http://www.oeco.org.br/dicionario-ambiental/28783-o-que-e-a-amazonia-legal/>>. Accessed on: 15 Apr. 2016.

44 Between 2002 and 2006, for each 4 cattle added to the Brazilian cattle herd, 3 were in Amazon. PIRES, Mauro Oliveira. A política de combate ao desmatamento na Amazônia e no cerrado. In: LITTLE, Paul (Org.). *Os novos desafios da política ambiental brasileira*. Brasília: IEB, 2014.

Figure 2- Deforestation rates in Legal Amazon from 1988 to 2012



Source: INSTITUTO NACIONAL DE PESQUISAS ESPACIAIS (INPE) – Projeto Prodes. Metodologia para o cálculo da Taxa Anual de Desmatamento na Amazônia Legal. 2013.

FIGURE 3 Deforestation rates in Legal Amazon from 2004 to 2015 per State

Taxas 2004 a 2015:

Ano\ Estados	AC	AM	AP	MA	MT	PA	RO	RR	TO	AMZ LEGAL
2004	728	1232	46	755	11814	8870	3858	311	158	27772
2005	592	775	33	922	7145	5899	3244	133	271	19014
2006	398	788	30	674	4333	5659	2049	231	124	14286
2007	184	610	39	631	2678	5526	1611	309	63	11651
2008	254	604	100	1271	3258	5607	1136	574	107	12911
2009	167	405	70	828	1049	4281	482	121	61	7464
2010	259	595	53	712	871	3770	435	256	49	7000
2011	280	502	66	396	1120	3008	865	141	40	6418
2012	305	523	27	269	757	1741	773	124	52	4571
2013	221	583	23	403	1139	2346	932	170	74	5891
2014	309	500	31	257	1075	1887	684	219	50	5012
2015	279	769	13	217	1508	1881	963	148	53	5831
Var. 2015-2014	-10%	54%	-58%	-16%	40%	0%	41%	-32%	6%	16%
Var. 2015-2004	-62%	-38%	-72%	-71%	-87%	-79%	-75%	-52%	-66%	-79%

Source: INSTITUTO NACIONAL DE PESQUISAS ESPACIAIS (INPE) – Projeto Prodes. Metodologia para o cálculo da Taxa Anual de Desmatamento na Amazônia Legal. 2013.

What can be extracted from the data collected by INPE is that the PPCDam Plan was successful until 2013, when an increase of the deforestation rate in Amazon can be seen, with all its consequences, especially for the conservation of biodiversity.

Those setbacks could be felt in other sectors much earlier, like in the controlling of genetically modified organisms (GMOs), for example. In this subject, Law n° 11.105, edited in 2005, is much more flexible than the latter one (Law n° 8.974/1995). The gain of political importance from representatives of the agribusiness in the Lower and Upper Houses of the Brazilian Parliament opened the doors to the reduction of environmental protection actions by the government, which, on the other hand, was fighting to license huge infrastructure projects that were very impactful for the environment.

7. CONCLUSIONS ACROSS BOTH JURISDICTIONS

In both jurisdictions, governments have demonstrated a willingness to put in place various laws and other institutional arrangements with the intention of mee-

ting biodiversity objectives. In both countries much can be said that is positive about this formal step.

In both jurisdictions, economic and political pressures for farming expansion (in particular) have resulted in severe compromises of implementation. In both countries the contest between environmental protection and farm economics continues to be the main feature of the implementation of biodiversity protection law. Traditional regulation is substantially impeded by both this contest and the underlying economic and social problems of attempting to enforce the law.

It is clear that the behavioral effectiveness of biodiversity protection laws is well short of what is needed, and that the causes for failure are complex. This suggests that the types of instruments and strategies being used are ill suited. A lot more innovation and probably a lot more resources are needed for effective implementation.

In both countries, political commitment is not followed by resourcing to fulfill that commitment, and in both countries the reports on implementation of the Biodiversity Convention are not characterized by rigorous independent analysis. Political rhetoric overrides the type of objective scientific and governance scrutiny that is needed.

Issues of social justice are deeply embedded in these problems. The issues are slightly different because of the differing history, but in both poverty and Indigenous people's issues are important variables that both complicate the achievement of biodiversity objectives but also offer the potential to combine environmental protection with social justice improvement.

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