Sustainable Development in Practice: A Case Study of the Iracambi Research Center

Jaim Coddington, School of International Service, American University

University Honors

HNRS 490-013H

Professor Eve Bratman, School of International Service, American University

December 20th, 2012 (Fall 2012)

TABLE OF CONTENTS

ABSTRACT: This research uses the Iracambi Atlantic Rainforest Research Center, located in the Rosário da Limeira municipality of Minas Gerais, Brazil, as a case study to synthesize specific methods and practices in sustainable development. This study of Iracambi is important because it investigates an underrepresented and arguably successful development organization which operates in the Mata Atlântica, a highly threatened forest biome. After establishing the theoretical foundation for the study through an examination of development theories and specific frameworks for sustainable development, the researcher uses literature review and semi-structured interviews to evaluate Iracambi's specific development initiatives. These include the organization's environmental education program, medicinal plants program, and payment for environmental services initiatives. By analyzing these sustainable development initiatives in practice, this research endeavors to demonstrate real-world definitions and examples of sustainability, identify the most effective and enduring of Iracambi's development methods, and recognize which lessons can be taken away from the Iracambi model for potential implementation in other socioeconomic and environmental contexts.

Key terms: Iracambi, sustainable development, Mata Atlântica, smallholder, payment for environmental services

ACKNOWLEDGEMENTS

PREFACE

This paper represents both my American University Honors Capstone and my first serious foray into international relations research. Instead of manifesting in a strictly scientific research project, this Capstone has come to represent the beginning of my own intellectual journey through the fields of international development and environmental studies. I view this project as a jumping-off point for my ongoing education on social science research techniques and development issues in Brazil.

My opinions on the meanings and motivations of international development have evolved considerably during the course of this project. Development is a highly philosophical idea; in its most basic sense, it deals with the future of humanity and how to get there. In spite of many development success stories, the legacy of development is decidedly flawed. I have struggled to decide whether development is ethically or empirically valid, going back and forth between accepting and rejecting international development as a legitimate goal or policy.

The Western world has created a dynamic, prosperous global economic system which has nonetheless contributed, both directly and indirectly, to the general deprivation of millions of people around the world and the destruction of the natural environment. This system is not about to change, and if it does, it will do so gradually. In the interim period, wealthy societies like the United States have an obligation to share the world's resources more equitably and sustainably, and to involve less-developed countries in the decision-making process. I believe that the international development toolbox provides valuable help in achieving these goals.

In my opinion, sustainable development is both a useful term and a real possibility. It seeks to avoid the development mistakes of the past; it rejects both the arrogant patriarchy of raw neoliberalism and the stagnating, isolationist cynicism of post-development. It is not a top-down idea – it is meant for William Easterly's 'seekers'. It is for small, scrappy, independent organizations like Iracambi, the subject of this case study, which nurture a deep awareness of cultural context, and are socially, economically, and environmentally conscious. Sustainable development offers a bright future for the development field.

CHAPTER 1: Introduction & Theoretical Foundation

<u>1.1 Defining Development</u>

"Because 'development' means just about everything, from pulling up skyscrapers to putting in latrines, from drilling for oil to drilling for water, is a concept of monumental emptiness..It is a testimony to the power of ideas that an empty concept has towered over the discussions of half a century."

-Wolfgang Sachs[1]

This paper constitutes a case study grounded in the concept of sustainable development. It therefore becomes necessary to discuss and define 'development', as well as related concerns such as 'poverty' and 'sustainability'. Because there is no universally accepted definition for these terms[2], the author must clarify which definitions most closely correspond with the research. The author will evaluate the basic arguments of different schools of development, ultimately demonstrating the perspective that sustainable development provides both an accurate and specific framework for this research and that sustainable development is a meritorious model which considers both environmental and economic concerns.

In order to preserve objectivity, the author will give due consideration to other theories of development. This discussion will help define 'development' and lead into a discussion of what defines 'poverty' and 'sustainability'. The author agrees with Leftwich's notion that "...'development' is not a 'technical' process, where a number of elements are assembled, combined, and deployed; it is a *political process...*"[3] The author must acknowledge that his own political and social biases have led to several key assumptions about development. The first is that the history of development reflects the Western belief that wealthy, industrialized

---

[1] Wolfgang Sachs et al, *The Development Dictionary,* 2nd ed., (New York: Zed Books), 2010.
[2] Adrian Leftwich, "Progress, Growth, and Modernization: Antecedents of the Development Idea ," *States of Development: On the Primacy of Politics in Development*. (Oxford: Polity Press), 2000. 16
[3]*Ibid.*

societies are superior, and that these societies have an obligation to help 'develop' non-

Western societies to similar levels of wealth and industrialization.

Primitive forms of this patriarchal perspective can be found in the cultural vestiges of

Western imperialism. Whether or not Kipling's 1899 poem "The White Man's Burden" was

meant to be satirical or not, the popular response to it suggested widespread public sympathy

for a literal interpretation[4]. American and European expansionists and colonizers justified their

exploitation of non-Western lands and peoples through the belief that they were improving the

lives and legacies of these 'uncivilized' nations. After World War II and decolonization, Western

beliefs about development manifested in two overarching forms: modernization theory, and

the technology and knowledge transfer of Norman Borlaug's Green Revolution.

Modernization theory, first incarnated in 1960 by Rostow[5], defines five stages of

economic growth, the uppermost of which characterizes wealthy, mostly Western countries

with 'high mass consumption.' Rostow's assumptions about the inevitable trajectory of

socioeconomic evolution, such as the importance of industrialization and comparative

advantage, reinforce neoliberal concepts of trade and commerce.   Rostow viewed the world as

an essentially globalized free market in which all societies must compete, moving up or down

the linear path of modernization in accordance with certain pre-requisites for growth and de-

growth[6]. The concept that wealthy, industrialized countries like the United States should serve

as economic models for growth in non-Western countries is precipitated by modernization

---

[4]Stuart C. Miller, *Benevolent Assimilation: The American Conquest of the Philippines, 1899–1903*, 1st ed., (New Haven: Yale University Press) 1982.
[5]W.W. Rostow, *The Stages of Economic Growth: A Non-Communist Manifesto* (Cambridge: Cambridge University Press), 1960.
[6]*Ibid.*

theory, and later by neoliberalism. This latter ideology holds that all markets should be free

and open to maximize economic benefits for society[78*].

The Green Revolution echoed some aspects of modernization theory. It focused on

providing societies characterized by the lower stages of Rostow's development model with

Western agricultural methods and technologies. Some argue that Borlaug's initial efforts to

increase agricultural productivity in countries such as India and the Philippines saved millions of

people from starvation in the 1960's and 70's[9]. Others argue that the Green Revolution forced

resource-intensive Western agricultural and economic practices on traditional societies,

cementing Western countries' roles as outside developers and providers of manufactured

goods[10]. These arguments are not mutually exclusive, although both beg the question: was the

Green Revolution the necessary result, or the ongoing cause of the massive population growth

which created famine conditions in non-Western countries? In either case, increasing

agricultural yields in these countries allowed many to both feed their population and export

cheap food to wealthier states.

Dependency and post-development theorists take issue with development initiatives

such as the Green Revolution. Figures such as Gustavo Esteva believe that these kinds of

development schemes, often backed by Western-dominated institutions such as the World

---

[7]Taylor C. Boas & Jordan Gans-Morse, "Neoliberalism: From New Liberal Philosophy to Anti-Liberal Slogan", *Studies in Comparative International Development,* Vol. 44, No. 2, (Providence :Watson Institute), 2009.

[*]It is important to note that Soviet theories of development during this period also emphasized modernization, although this process focused largely on ideological goals such as enlarging the proletariat population through industrialization and the expansion of factories. *See* Paul Robinson and Jay Dixon, "Soviet Development Theory and Economic and Technical Assistance to Afghanistan, 1954-1991", vol. 72, no. 3, *The Historian*, (Hoboken: Wiley-Blackwell), 2010.

[9]Peter Hazell, *The Asian Green Revolution*, (Washington: International Food Policy Research Institute), 2009.

[10] Bernhard Glaeser, *The Green Revolution Revisited: Critique and Alternatives,* (Crows Nest: Allen & Unwin), 1987. <http://www.cabdirect.org/abstracts/19876704055.html;jsessionid=8C5C54F2D14E1A25C55C2F6B0B1213BF?gitCommit=4.13.8-6-g6e31ff9>

Bank, have failed in their stated goals and fortified Western hegemony: "Bretton Woods

codified the US as the financial center of the world...Mexico got the Green Revolution and

obsessive industrialism and urbanism..."[11]. Post-development essentially rejects further

development aid originating from the West, insisting that non-Western countries should set

their own internal development goals based on social needs and traditional values and

knowledge[12].

The author sees intrinsic value in each side of the development debate. Those who

argue against the contemporary development paradigm argue that development can be

culturally and economically intrusive, ineffectual, and even counter-productive. The failure of

highly visible development initiatives over time, such as World Bank loans in Sub-Saharan

Africa, has been well-documented[13]. On the other hand, those in favor of development argue

that its less-developed countries cannot avoid participating in the global economy, and that

until these countries gain full and effective participation in the existing system of international

trade, their people will be tragically, yet systemically deprived of the living standards enjoyed

by wealthier countries. The majority of people in highly 'developed' countries like the United

States enjoy lives in which physical pain and the threat of premature death are minimized, and

some of the most basic development goals of preventing famine and disease are benevolent

ones. Jeffrey Sach's case for development aid as a tool for helping less-developed countries

---

[11]Gustavo Esteva, "What is Development? " In Robert Denemark et. al. eds. The International Studies Compendium Project (Oxford: Wiley-Blackwell), 2011.
[12]*Ibid*.
[13]Bryan T. Johnson, "The World Bank and Economic Growth: 60 Years of Failure", (Washington: Heritage Foundation), 1996. < http://www.heritage.org/research/reports/1996/05/bg1082nbsp-the-world-bank-and-economic-growth>

achieve the 'bottom rung' of economic development[14] is ultimately a compassionate argument based on the poverty trap concept[15]. The idea that poverty alleviation facilitates economic growth and a higher quality of life does have merit. Of course, those in favor of international development define 'poverty' and 'quality of life' differently than those opposed.

Sachs and the other neoliberals maintain fairly standard definitions for these terms. Sachs subscribes to the World Bank definitions for poverty and extreme poverty: incomes of between $1 and $2 per day and incomes of less than $1 per day, respectively[16]. Sachs sees quality of life as defined by basic indicators such as access to education and medical care[17]. Post-development theorists, as well as some scholars who fall into a more neutral category, tend to argue that these mundane, quantified definitions for poverty and quality of life overlook the variant cultural perceptions of quality and value occurring across different societies. According to Meadows, "Quality of life can be understood on an intensely personal level and also on a universal level. It seems to be both consistent and inconsistent with rationality, with progress, with profit. It is something that can be created and detected both by the individual and by society; it is also something that inheres in the interface *between* the individual and society."[18] Meadows argues that traditional Western perceptions of quality of life fail to account for the non-quantifiable measures of happiness and life fulfillment that are often independent of monetary and material constraints. She also acknowledges that "Of

---

[14]Jeffrey Sachs, *The End of Poverty: Economic Possibilities for Our Time*, (London: Penguin Books), 2005.
[15]Paul Collier, *The Bottom Billion: Why the Poorest Countries are Failing and What Can Be Done About It,* (Oxford: Oxford University Press) 2007.
[16]Ibid. *End of Poverty*, 21
[17]Ibid. *End of Poverty*, 20
[18]Donella H. Meadows, "Quality of Life", *Earth '88: Changing Geographic Perspectives.* (Washington: National Geographic Society), 1988. 333

course it is much easier to experience Quality when you are not ill or starving, when your babies are not dying, when you can read and write and find a decent job, when your country is at peace and its per capita G.N.P. is high. "[19] Meadows admits the value of using traditional, quantitative barometers for development, such as infant mortality rates and income levels, but claims that the preeminence of these measures in development circles underestimates the impact of non-numeric factors like happiness and fulfillment. This more subtle interpretation of living quality relates closely to similar, non-numeric definitions for poverty.

In contrast with poverty based strictly on income, Amartya Sen proposes a measure of poverty based on 'capabilities deprivation'. Sen argues that monetary measures of and explanations for poverty fail to account for purchasing power parity, non-quantitative measures of well-being, and the opportunities and benefits provided by the presence or absence of social services. "…the creation of social opportunities, through such services as public education, health care, and the development of a free and energetic press, can contribute both to economic development and significant reductions in mortality rates."[20] Sen's measured approach coalesces with arguments from many sides of the development debate, although scholars like Sachs and Esteva would likely disagree on how societies can best achieve Sen's described freedoms.

The author acknowledges both sides of the ongoing development debate, but must ultimately argue that many of the components and ideals of international development are both good and beneficial to humankind. Aside from the accusations, justified or not, of Western imperialism, hegemony, and neo-mercantilism in international development, the basic

---

[19]Ibid, 340.
[20]Amartya Sen, *Development as Freedom*, (Oxford: Oxford University Press), 2001. 40.

goal of alleviating human suffering and premature death is morally appealing. In its entirety, the field of international development has witnessed both failure and success. The author believes that the evolving concept of sustainable development has emerged from careful consideration of past development lessons, taking into account the importance of economic growth, the social and intrinsic value of the environment, and the primacy of intuitively understanding the socioeconomic and cultural context of societies which are potential participants in a development exchange.

While describing development as a "catchword used to sell toxic products"[21] is overly cynical, development's track record is nothing if not a mixed bag. While development success stories abound[22], the example of the Green Revolution demonstrates the dual nature of large-scale, top-down development plans. Although the transfer of Borlaug's methods and techniques helped less-developed countries feed themselves and alleviate famine, the new agricultural system resulting from the Green Revolution made these countries dependent on a resource-intensive system requiring huge inputs of irrigation, fertilizer, and arable land.[23] Scholars like Shiva argue that development schemes like the Green Revolution are ecologically unsustainable because they use environmental inputs at rates that do not allow for natural replenishment of those inputs. As a result, these resources are rapidly depleted, leaving producers economically and ecologically impoverished[24]. Sustainable development seeks to address both of these problems: the negative economic and environmental side effects of growth and development.

---

[21]Ibid. Esteva, 1
[22]UNEP, "Green Economy – Developing Countries Success Stories", (New York: United Nations), 2010.
[23]Vandana Shiva, *The Violence of the Green Revolution: Third World Agriculture, Ecology, and Politics*, (London: Zed Books), 1991.
[24]Ibid.

Sustainable development is not a new idea, although the development community remains divided on its usefulness as a development descriptor or specific development approach. Hopwood et al maintain that the term 'sustainable development' first came into "important use" during a World Conservation Strategy [conference] in 1980[25], and was popularized by the 1987 Brundtland Report's famous definition of meeting "the needs of the present without compromising the abilities of future generations to meet their needs."[26] Hopwood et al tend to agree with the report, maintaining that "The development proposed is a means to eradicate poverty, meet human needs and ensure that all get a fair share of resources – very different from present development. Social justice today and in the future is a crucial component of the concept of sustainable development."[27] The idea is to avoid future scenarios of economic collapse when non-renewable resources run out, or when environmental resources like ground water are unable to naturally replenish themselves at a rate which can meet human demand.

The concept of 'social justice' also plays an important role in the sustainable development model. This emphasis seeks to address dependency and post-development theorists' arguments about the questionable motivations and fairness of traditional development schemes and mechanisms. Hopwood defines sustainable development as based on five principles of *equity:* "…futurity – inter-generational equity; social justice – intra-generational equity; transfrontier responsibility – geographical equity; procedural equity –

---

[25]Bill Hopwood et al, "Sustainable Development: Mapping Different Approaches", *Sustainable Cities Research Institute,* (Newcastle on Tyne: University of Northumbria Press), 2005.
[26]Ibid, 39
[27]Ibid.

people treated openly and fairly; interspecies equity – importance of biodiversity…"[28]. The

author believes that this set of parameters for sustainable development serve as useful

guidelines for development initiatives. They will serve as standards for judging Iracambi, the

subject organization of this research, in the conclusion of this article.

Some critics argue that sustainable development is a masked continuation of Western

imperialistic attitudes because it champions both conservation and development[29]. However,

given the previously mentioned set of 'equities', the framing of sustainable development as a

neoliberal conspiracy (at worst) or misguided idealism (at best) is inaccurate and deceptive.

Fundamentally, sustainable development is a process in which development initiatives are the

product of socially equitable cooperation and exchange of knowledge, ideas, and even labor

and capital[30]. Another criticism of sustainable development is that it ignores socioeconomic

issues in favor of environmental ones. Agrawal claims that "One of the most potentweapons

that has emerged to permit successful interrogation of "development" is environmental

conservation[31]. It is true that sustainable development does prioritize conservation and

ecological awareness. This is because the proponents of sustainable development believe that

humanity is ultimately dependent on fragile, limited ecological resources, and that current

trends of resource utilization will result in irretrievable loss of those resources. "The reality is

that humanity is dependent on the environment, with society existing within, and dependent

on, the environment, and the economy exists within society [sic]. Humans live within the

environment and depend on it for survival and well-being; we cannot ignore the

---

[28]Hopwood et al, 40
[29]Ibid. Agrawal, 463
[30]Ibid. Hopwood et al, 49
[31]Arun Agrawal, "The Politics of Development and Conservation: Legacies of Colonialism", *Peace and Change*, vol. 22, no. 4 (Hoboken: Wiley-Blackwell), 1997.

environment."[32] Sustainable development prioritizes environmental considerations, not

because of ecological fascism, but because the natural environment is the lifeblood of human

society. The environmental history of the Atlantic rainforest, the biome in which Iracambi

operates, plays an important role in the organization's goals and motivations, and therefore a

thorough understanding of this biome is necessary before further discussion of the Iracambi

NGO.

1.2 Environmental & Social Context

*"Human interventions never quite realize human expectations. Their fields go plow sick, their
pastures become coarse and woody, their cities collapse. The natural world, simplified, not in
accordance with human desires but in response to their acts, is turned into a vast cosmopolitan
weed patch."*

-Warren Dean[33]

The protection and preservation of South America's Amazon rainforest represents one

of the world's most socially fashionable and well-publicized environmental causes. Particularly

in Brazil, whose northwestern states contain the greatest territorial expanse of the Amazon, the

deforestation and destruction of the sylvan environment has led to widespread domestic and

international concern. According to current estimates, the Brazilian Amazon has lost 18.2% of

total forest coverage since 1970[34]. While human activities such as cattle ranching, mining, and

logging continue to threaten the health of the Amazon, numerous politicians and civil society

groups have recognized the importance of protecting and preserving the rainforest. Those in

---

[32]Ibid. Hopwood et al, 48

[33] Warren Dean, *With Broadax and Firebrand*: *The Destruction of the Brazilian Atlantic Forest*, (Berkeley: University of California Press), 1995. 5

[34] Brazilian Ministry of Science and Technology, "Project PRODES - Monitoring of the Brazilian Amazon by Satellite". < http://www.obt.inpe.br/prodets/index.php>, Accessed December 09, 2012.

favor of Amazon conservation argue that the fate of the rainforest will have far-reaching effects on biodiversity, world socioeconomic structures, and the global climate[35]. For conservationists, the Amazon has economic, environmental, and intrinsic value.

In contrast, the Mata Atlântica, or Atlantic forest, is far less visible and popularized within the public eye. Currently at 7.5% of its pre-colonial size, the Mata Atlântica is more deforested and yet more biodiverse than the Amazon, in spite of its diminished size and fragmented state.[36] In addition to providing important organic and mineral resources to its human residents over the years, this land is home to more than a thousand endemic plants and animals, including rare primates, such as the woolly spider monkey[37], and medically significant plants like the *Capeba* species[38]. In many ways, the Mata Atlântica represents the potential outcome of continued deforestation in the Amazon. However, the story of this forgotten forest and current efforts to use its resources more sustainably provide valuable lessons on the long-term cost of deforestation and on conservation methods that address both social and environmental concerns.

The saga of the contemporary Atlantic forest covers hundreds of thousands of years. The pre-human Brazilian Mata Atlântica originally extended across the eastern coast of South America between the latitudes of 8° and 28° south, extending inland from between 100 kilometers near present-day Salvador to 500 kilometers from the coast of present-day Santa

---

[35] William F. Laurance *et al*, "The Future of the Brazilian Amazon", *Science Magazine*, 291 (2005), p. 433.

[36] Robin Le Breton, "Land Management and Sustainability Development in the Atlantic Rainforest of Brazil: The Iracambi Experience", (Rosario da Limeira, MG, Brazil: Iracambi Atlantic Rainforest Research Center), 2000.

[37] *Ibid.* 5

[38] Zita Van Ree, "The Motivation of Farmers to Apply Sustainable Agricultural Methods", (Rosario da Limeira, MG, Brazil: Iracambi Atlantic Rainforest Research Center), 2007. 45

Catarina state[39]. For long intervals during the Quaternary Period, the Atlantic forest expanded

far enough west to come into contact with the larger Amazon. Intermittent glacial phases

caused the Atlantic and Amazon forests to recede and advance multiple times, resulting in

theorized exchange of species and further speciation as a result of each biome's eventual

isolation from the other.[40] These intricacies in the forest's ecology made it vulnerable to the

kind of sudden species loss and ecological change caused by the arrival of humans.[41]

Figure 1.0: The Atlantic forest in Brazil

Pre-colonial expanse of the Atlantic forest in beige; remaining forest in green
Source: SOS Mata Atlantica; Dean, 1995: 5

---

[39] Dean, 18
[40] *Ibid.*
[41] Dean, 19-20

The first people to populate the Atlantic forest were hunter-gatherers who arrived on the scene as early as 11,000 years ago.[42] This group first began to manipulate the forest by burning it to drive game into the savannah and make the hunting process easier.[43] Later, cultures such as the Tupi engaged in slash-and-burn practices to enlarge the land area available for cultivation.[44] Historical evidence suggests that pre-colonial forest management, consisting largely of rotational, fire-based forest clearing, was both highly sophisticated and relatively sustainable in relation to the ecological health of the forest and the social and economic needs of the settlers. The Atlantic forest was vast enough, and both the hunter-gatherer and swidden-farming tribes had small enough populations, that the burned tracts of forest generally several decades to recover from each bout of cultivation. The fact that these areas were surrounded by virgin forest also allowed the biome to replenish itself, eventually restoring regular growth[45]. In essence, at the time of European colonization, humanity and the Mata Atlântica had reached a state of relative equilibrium: humans burned parts of the forest for subsistence agriculture, and the forest ultimately re-grew itself over the course of fifty or a hundred years. [46*]

The arrival of Portuguese and French settlers changed the Atlantic forest's ecological dynamic. As the first colonies grew, the Europeans began to extract resources from the natives through trade and tribute. These resources included organic goods from the forest such as

[42] Dean, 20
[43] Dean, 27

[44] Dean, 38
[45] Dean, 45
[46] *Ibid*

* I*bid:* It is important to note historian Warren Dean's argument that in spite of this apparent ecological balance, the agricultural tribes had begun to intensify farming practices shortly before Europeans arrived in South America.

orchids, parrots, and jaguar pelts[47]. The extraction of these resources precipitated the

population reduction of many species in the Mata Atlântica. Simultaneously, the Europeans

had begun to harvest valuable brazilwood from the littoral forests. Initially, these colonists and

mercantilists did not venture much further into the interior of the continent because they could

not survive in the Atlantic forest without native guides. In fact, after the first few decades of

European presence on Brazil's eastern coast, the massive resultant decline and migration of

coastal indigenous populations allowed the forest ecosystem to re-assert itself and move back

toward the coast. According to Dean, "Firebrands and broadaxes would have to keep at bay an

advancing forest that the Tupi had maintained in a secondary state, and the neo-Europeans

would struggle to prevent its penetration into areas that had long before been denuded of

forest cover and had stabilized in open prairies. "[48] The subsequent introduction of multiple

cash crops to the colonies catalyzed the eventual European penetration of the Atlantic forest.

Sugar was an important good since beginning of Portuguese colonial activity in Brazil,

and both sugar plantations and sugar mills soon led to forest clearing for fuel and farmland

beginning in 1530[49]. Also, as the mestizo population grew, the colonies gained access to more

of the indigenous peoples' traditional knowledge, allowing Europeans to traverse the forest and

discover new resources[50]. The growth of sugar cultivation and refining led to European

expansion into reforested areas by the mid-17th century[51]. During this period, colonial sugar

farmers began pushing further inland as their coastal lands deteriorated in productivity due to

---

[47] Dean, 48
[48] Dean, 65
[49] Dean, 90
[50] Dean, 64
[51] Fernand Braudel, trans. Sian Reynold, "The Perspective of the World: Civilization and Capitalism, 15th-18th Century", Volume 3, 1st Ed., (Berkeley: University of California Press),1984.

intensive cultivation[52]. These farmers cleared additional forest to create new farmland. As the Brazilian sugar industry waned because of British and Dutch sugar colonies in the West Indies during the early 18th century, the discovery of gold and diamonds in present-day Minas Gerais and elsewhere incentivized further European expansion into the Mata Atlântica and further clearing of the forest[53].

Finally, in the nineteenth century, coffee rose to prominence in the economy of newly independent Brazil. Like sugar, coffee required cultivators to clear forest in order to acquire the requisite fertile land. Coffee actually depleted the soil of nutrients even faster than sugar, and resulted in more deforestation than any other colonial export before it. According to Dean, "It was believed that coffee had to be planted in soil overlain by "virgin" forest. Capital and labor were too scarce to expend them in planting on soils that were less fertile."[54] Coffee exports soon became vital to the Brazilian economy, and coffee revenues combined with the cycle of forest clearing and coffee planting led to the unprecedented construction of a well-paved road network extending far into the interior of the continent. This newfound infrastructure facilitated both the transportation of coffee to the ports and the expansion of coffee plantations into previously forested areas.[55] This, in turn, led to railroads, industrialization, urbanization, and yet more deforestation.[56,57] In Dean's words, "Just as the eighteenth century had been for Brazil the century of gold, the nineteenth was to be the century of coffee. But for the Atlantic Forest the introduction of this exotic was to pose a more intense threat than any

---

[52] Dean, 88
[53] *Ibid.* Braudel
[54] Dean, 181
[55] Dean, 209
[56] Dean, 191
[57] *Ibid:* The expansion of coffee cultivation also contributed to the continuation of plantation slavery in Brazil after the waning of the sugar industry.

other event of the previous 300 years."[58] Throughout Brazil's colonial and early independent

history, the exploitation of forest resources and the planting of cash crops, especially coffee,

contributed to massive deforestation in the Mata Atlântica. This deforestation did not begin to

manifest in economic and social costs until the twentieth century.

Evidence of basic conservationism and awareness of ecological concerns can be found in

mid-nineteenth century Brazil. These actions and beliefs came from the business and political

spheres, and were precipitated by real concerns about economic and public health. "…another

belief, that deforestation of watersheds caused the drying up of springs, which impelled the

first official attempt at conservation. This initiative was undertaken in 1862, as the increasing

precariousness of the environment of the capital persuaded the imperial government to invest

a modest level of resources into a program of reforestation."[59] These resources were

concentrated in the immediate vicinity of the imperial capital, which at the time was Rio de

Janeiro. The reforestation program often devolved into sluggish and frivolous planting of

exotics such as eucalyptus and pandanus[60]. Still, this precedent gave rise to a new

environmental awareness amongst the Brazilian elite, leading to the creation of Brazil's first

proto-environmental agencies[61].

Throughout the twentieth century, public interest in the natural environment became

more and more prominent in Brazil. This new awareness was more the result of economic

practicality and public benefit than an intrinsic concern for nature itself. The 1934 Water Code,

for example, sought to protect and secure Brazil's wealth if renewable freshwater resources for

---

[58]Dean, 178
[59] Dean, 223-224
[60] *Ibid.*
[61]Warren Dean, "Forest Conservation in Southeastern Brazil: 1900 to 1955", Vol. 9, No 1., *Environmental Review*: *ER*, (Durham: Forest History Society), 1985. < http://www.jstor.org/stable/3984115>

future hydroelectric dams[62]. The 1934 Water Code, as well as similar measures like the

simultaneous Mining and Forestry Codes, were largely the results of a populist national political

movement led by President Gétulio Vargas[63]. The rise of developmentalism in the mid-

twentieth century and the military *coup d'état* of the Brazilian government in 1964 led to a

more visible political discourse on the exploitation and conservation of the country's natural

resources. In the 1960's and 70's, the military government began a modernization campaign

involving "the mechanization of agriculture, promotion of agro-business, electrification of

rural areas, reform and control of land use, exploitation of natural resources (such as

minerals and water), and the creation of technological centers"[64].   Nascimento argues that

in spite of the environmental (and social) degradation of this modernization effort, many public

policies put forth during the same time period reflect a growing emphasis on environmental

concerns and environmental protection. Examples of this trend include the establishment of

the National Council for the Control of Environmental Pollution in 1967 and the executive office

of the Special Secretary for the Environment in 1973.[65]

This period also witnessed the evolution and growth of civil society groups opposed to

the central government's rapid exploitation of environmental resources. These organizations

included rural workers' unions and indigenous groups affected by the environmental impact of

government projects. One of these organizations, SOS Mata Atlântica, was established to

---

[62]Helen Kerr do Amaral, "Brazilian Water Resource Policy in the 90's", *Institute of Brazilian Business and Public Management Issues,* (Washington: George Washington University Press), 1996. <http://www.gwu.edu/~ibi/minerva/Fall1996/Helena.Kerr.Amaral.html>
[63]Amós Nascimento, "Environmental Philosophy in Brazil? : Theoretical and Practical Reflections on a South American Question", *ISEE Occasional Papers, no. 8,* 2010. 3 <http://www.cep.unt.edu/papers/nascimento-eng.pdf>
[64]Ibid, 4
[65]Ibid.
Ibid, 5-6

address environmental concerns specifically in the Atlantic forest biome.   In some cases, these groups' struggle for environmental self-determination coincided with other national movements advocating a greater level of democracy and sociopolitical equity in Brazil. These movements often conflicted with the federal government's authoritarian views of economic development and modernization[66].

The Brazilian political transition from dictatorship to democracy from 1985-1986 led to a more open and democratic dialogue on environmental issues. Nascimento points out that many environmentalist groups at this time developed conflicting positions on how to best manage national environmental resources[67]. However, several concrete developments, such as the founding of the Brazilian Green Party in 1986, did strengthen the environmental movement in the country[68]. Finally, in 1988, the new Brazilian Constitution set a new international precedent for institutionalized environmental management and protection. It was the first national constitution that included 'the environment' as a separate and distinct concept. Article 225 states that: "All have the right to an environment that is ecologically in equilibrium and that is available for shared use by the people, essential to a healthy quality of life, which imposes on both the government and society as a whole the duty of protecting it and preserving it for both the present and future generations."[69] The Constitution allowed for the creation and enforcement of environmental protection and usage laws through administrative, criminal, and civil mechanisms[70].

---

[66]Ibid, 5-6
[67]Ibid, 6
[68]Ibid.
[69]Antonia de Aguiar Patriota, "An Introduction to Brazilian Environmental Law", *George Washington International Law Review*, (Washington, George Washington University Press), 2009. 613
[70]Ibid, 612

Soon after, the 1992 United Nations Earth Summit in Rio de Janeiro popularized the concept of sustainable development in Brazil. Nascimento characterizes the outcome of the summit as "the affirmation of the principle of sustainable development as a compromise between the different social and political actors."[71] However, Nascimento also maintains that Brazilian environmental activists remained skeptical about the idea of sustainable development becoming a guiding philosophy for conservation and development in Brazil[72]. In the two decades since the 1992 UN summit, the disparate interests of environmental conservation and economic development have continued to expand into the national consciousness, often competing with each other directly in policy decisions at the federal, state, and municipal levels.

In summary, the environmental history of Brazil, and the Atlantic forest specifically, has been characterized by three main ecological phases. First, as early as 9,000 BCE, the first human settlers in South America engaged in small-scale forest clearing and swidden agriculture. The environmental impact of these activities was limited by humans' small population size relative to the availability of land, as well as the ecosystem's ability to regenerate deforested areas over long periods of time. European contact and colonization beginning in 1500 led to massive resource extraction from the Mata Atlântica, with the most popular goods being brazilwood and biological trophies such as jaguar pelts. The Portuguese colonies on Brazil's eastern coast grew in the 1600's because of the growing profitability of sugarcane, resulting in large-scale deforestation, rapid depletion of the land's fertility, and further forest clearing. In the 1700's, sugarcane cultivation was accompanied by gold and diamond mining which

---

[71]Ibid, Nascimento 7
[72]Ibid.

penetrated the farthest reaches of the Atlantic forest and led to significant demographic shifts away from the coastal settlements.

In the 1800's, coffee became Brazil's most important export. This cash crop required the continual clearing of forest as it quickly depleted the soil of nutrients, causing even more widespread deforestation and the building of Brazil's first major inland roads and railroads. Finally, in the 1900's, growing public awareness of the negative economic and social effects of environmental degradation led to some policy changes in natural resource use. The military government's modernization campaign in the 1960's and 70's created a civil society backlash to what was perceived as inequitable exploitation of Brazil's natural and human resources. The 1988 Constitution and 1992 Earth Summit emphasized the Brazilian government's growing commitment to conservation and sustainable development. In spite of this new focus on sustainability issues, Brazil's expanding economy has often taken precedence over environmental concerns. Deforestation in the Atlantic forest is less rampant now than in the past, but remains a problem in many areas.

1.3 Intro to Iracambi

Iracambi was founded in 1999 by Robin and Binka Le Breton, Kenyan and English nationals (respectively) who emigrated to Brazil in the late 80's and later acquired Brazilian citizenship[73]. The Le Bretons began buying farm and forest land in the Rosario da Limeira municipality of Minas Gerais state beginning in 1987, and their total land holdings eventually

---

[73]Robin Le Breton, interview by Jaim Coddington, personal interview, Rosario da Limeira, Minas Gerais, Brazil, 23 May 2012.

exceeded 500 hectares.[74] After more than a decade of experience in sustainable agriculture in

Rosario, Robin and Binka Le Breton founded the Iracambi initiative as two separate

organizations: a private enterprise called Iracambi Recursos Naturais, Ltda., and an NGO called

the Iracambi Atlantic Rainforest Research Center.

The Le Bretons founded Iracambi out of concern for what they saw as unsustainable

farming and land use in the municipality and the larger Zona da Mata of the Atlantic forest[75].

According to Le Breton, the goal of Iracambi was and is "to make conservation of the forest

more attractive than its destruction"[76]. Iracambi aims at both conservation and development,

recognizing that "biodiversity conservation can only be secured over the long term if the private

sector assumes a greater level of responsibility for it"[77] and that "the prime cause of

deforestation…stems not from mere wanton destruction, but from the poverty of the

inhabitants who are driven to destroy the forest in order to make a living."[78] Iracambi's

motivations and mission statement, by taking development and conservation into equal

consideration, seek to avoid the environmental recklessness of modernization and the post-

development criticisms of ignorance and arrogance in large-scale, top-down development

schemes.

---

[74]Fraser Bush, "Iracambi Farm Projects – The Download Document Conversations with Robin Le Breton", *Iracambi Atlantic Rainforest Research Center* (Rosario da Limeira: Iracambi Atlantic Rainforest Research Center) 2006.
[75]Robin Le Breton, " Land Management and Sustainable Development in the Atlantic Rainforest of Brazil: The Iracambi Experience*". Iracambi Atlantic Rainforest Research Centre*, (Rosario da Limeira: Iracambi), 2000.
[76]Ibid.
[77]Ibid.
[78]Ibid.

CHAPTER 2: Literature Review

Since its founding in 1999[79], Iracambi has hosted a large number of researchers in various fields. These researchers come from a diverse array of academic institutions and professional organizations, and have produced a substantial amount of research relating to Iracambi and its activities. This research has involved ecosystem monitoring, GIS work, community engagement, sustainable agriculture, and other topics. This literature review will focus on the research dealing with Iracambi's initiatives for sustainable development, including the organization's environmental education program, farm producers' group, and payment-for-environmental-services initiatives.

2.1 Medicinal Plants and Producers' Co-Op

Le Breton indicates that the coffee cultivation cycle described by Dean as being responsible for much of the deforestation in the Atlantic forest is still widespread throughout Minas Gerais[80]. For this reason, Iracambi has sought to develop alternatives to coffee growing and forest clearing for further coffee planting. The cultivation of medicinal plants through agro-forestry presents one of the alternatives that Iracambi has been working one.

Van Ree's study on the local community's motivation to pursue sustainable agriculture innovations provides a thorough analysis of Iracambi's medicinal plants program, as well as Iracambi's civic engagement and community outreach abilities. Van Ree frames her research through Roger and Shoemaker's theory of innovation diffusion, which holds that innovations spread through four threshold 'functions': knowledge function, persuasion function, decision

---

[79]Iracambi, "About Us". (Rosario da Limeira: Iracambi Atlantic Rainforest Research Center). 2012. <http://en.iracambi.com/about-us>
[80]Ibid, Le Breton, 4

function, and confirmation function[81]. According to Roger and Shoemaker, the likelihood of an innovation succeeding in a community and progressing through the hierarchy of functions depends on the innovation's specific characteristics and the traits of potential innovators[82].

Van Ree indicates that Iracambi's proposed innovation, a farmer producers' group of medicinal plants as an alternative for coffee, was mostly between the knowledge and persuasion functions in 2007[83]. The large majority of her interview participants indicate an awareness or knowledge of medicinal plants as an agricultural alternative or auxiliary crop providing potential extra income[84]. Many of these potential innovation stakeholders also fall into the 'persuasion' functionary category; they see the economic and environmental benefits of cultivating medicinal plants[85]. Van Ree contends that the success of the subsequent functions of innovation, decision and confirmation, will become measurable given a sufficient volume of production and marketing initiatives in the future[86].

Van Ree's assessment of the characteristics of the innovation and the potential innovators reflect positively on Iracambi's medicinal plants initiative in regard to Hopwood et al's five equities. Van Ree highlights the fact that Iracambi's decision to promote sustainable alternatives to coffee was based on economic and environmental problems with coffee farming that had previously been identified by the community[87]. Furthermore, the decision to pursue

[81]Zita Van Ree, "Farmer Motivation to Apply Sustainable Agricultural Methods", *Iracambi Atlantic Rainforest Research Center,* (Rosario da Limeira: Iracambi), 2007. 9-10
[82]Ibid, Van Ree 10-11
[83]Ibid, Van Ree 93
[84]Ibid.
[85]Ibid.
[86]Ibid, Van Ree 94
[87]Ibid, Van Ree 50

medicinal plants cultivation was based on pre-established local traditional knowledge about the

usefulness of medicinal plants and methods for household cultivation[88].

Van Ree also discusses several criticisms of Iracambi's organizational structure. She

asserts that Iracambi's lack of many full-time employees and centralized community

participation mechanism makes organizing initiatives like the medicinal plants project difficult[89].

She recommends that Iracambi make greater efforts to partner with local research and

academic institutions, including universities, to help legitimize and study the medicinal plants

project, making it more commercially visible[90]. Furthermore, Van Ree asserts that a noticeable

social and experiential gap exists between Iracambi and the local population[91]. She

recommends that Iracambi make attempts to improve relations with some of the (relatively

few) individuals who view Iracambi as meddlesome and interfering with their traditional

economic means[92].

2.2 Alternative Use and Payment for Environmental Services

Iracambi's medicinal plants project represents an alternative or auxiliary crop which can

be grown using agro-forestry, but Iracambi has also worked on developing alternative use

strategies and payment-for-environmental-services (PES) schemes which can help generate

income for rural landholders. Brickle's study defines PES initiatives as "projects [which] are

[designed] to generate an alternative income for local farmers in the target area, while

---

[88]Ibid, Van Ree 55
[89]Ibid, Van Ree 47
[90]Ibid, Van Ree 97
[91]Ibid, Van Ree 44
[92]Ibid, Van Ree 96-97

simultaneously improving the ecosystem services of their land and surrounding areas (sic)."[93]

According to Brickle, Iracambi's PES initiatives mainly involve protecting water tables, local

biodiversity, and reforestation as a method of carbon sequestration. Iracambi proposes that

landowners in the region be offered the option of entering into a contractual environmental

service agreement with respective municipalities' environmental departments. These

environmental departments, having recognized the important services provided by existing

ecological conditions on private land, will compensate landowners for their protection and

preservation of these ecosystems (primarily by protecting the forest)[94]. Iracambi believes that

this financial incentive will help prevent further deforestation and even encourage farmers to

reforest parts of their land.

Brickle analyzes several crucial aspects of Iracambi's plan. One of the most important of

these is general availability of cartographic data in the area; Rosario da Limeira and the

surrounding municipal governments lack the resources to provide or create accurate and up-to-

date maps of the region. This deficiency is especially impactful in the potential implementation

of a PES scheme. Real-time maps of deforestation and land degradation are important if

enforcing PES contracts and environmental protection laws is to be successful. To address this

issue, Iracambi has become an important provider of GIS data to the local community[95].

Brickle also identifies the issue of recognition as potential barrier to PES in the Rosario

da Limeira municipality. This view relates closely to Van Ree's earlier interpretation and

---

[93]Lindsey Brickle, "Reconciling Conservation and Social Development in Brazil'sAtlantic Rainforest through the Application of Payments for Environmental Services", *Iracambi Atlantic Rainforest Research Center*, (Rosario da Limeira: Iracambi), 2010. 16

[94]Ibid.
[95]Ibid, Brickle 16-17

description of innovations entering a community: PES is a relatively new concept and is

essentially an innovation in Iracambi locale, especially for rural landowners with less access to

centers of innovation.[96] According to Brickle, PES has barely reached the knowledge function of

Roger and Shoemaker's four levels of innovation function. Iracambi's efforts to promote the

idea of PES in the community have resulted in partial awareness of the idea, but this knowledge

has not yet translated into the persuasion function[97].

   Brickle also presents some doubts about Iracambi's proposed parameters for PES. One

of Iracambi's most important ideas for PES, which involves the creation and maintenance of

forest corridors, may be ineffective from a conservation standpoint and logistically prohibitive

for rural landholders[98]. Brickle cites studies of forest corridors in the Amazon which suggest

that forest corridors must be approximately 400 meters in width to realize intended ecological

benefits such as biodiversity and watershed protection[99]. Ultimately, Brickle argues that while

Iracambi's pilot PES projects lack widespread public recognition[100], if Iracambi is able to

strengthen government officials' and rural landowners' perception of the link between

sustainable innovations like PES and the outcomes of these innovations, PES could become an

important driver of sustainable development in the region[101].

---

[96]Ibid, Brickle 24-25
[97]Ibid, Brickle 25
[98]Ibid, Brickle 26

[99]Ibid.
[100]Ibid, Brickle 33
[101]Ibid, Brickle 38-39

2.3 Environmental Education

   As more literature has begun to accumulate on Iracambi's achievements over time, a

number of researchers have studied the successes and failures of Iracambi's initiatives for

sustainable development. Many of these studies, including the two evaluated above, have

emphasized the importance of Iracambi's environmental education program in helping to

facilitate a local sustainability dialogue and build support for development and conservation

concepts like the medicinal plants and PES initiatives. However, the author did not encounter

any studies focusing specifically on environmental education through Iracambi or the local

school system.

   Van Ree recognizes the centrality of environmental education within Iracambi's vision

for sustainability. Her study describes Iracambi's environmental education as a holistic program

which seeks to both spread ideas about sustainability and conservation within the community,

but also as a mechanism for the promotion and incorporation of traditional knowledge and

values into sustainability initiatives[102]. According to Van Ree, "This education clearly has had its

results during the past years, since farmers now talk about their parents "who didn't know

about the importance of the forest," though television, school and experiencing the

consequences of removing trees probably contributed to this insight too (sic)."[103] Van Ree

concludes that environmental education would be highly effective in promoting a social

atmosphere open to sustainability innovations[104].

---

[102]Ibid, Van Ree 86-87
[103]Ibid, Van Ree 87
[104] Ibid, Van Ree 96-97

Brickle, in contrast, characterizes Iracambi's existing environmental education program as a two-way dialogue between Iracambi and the local community. She identifies certain engagements, such as Iracambi's Participatory Rural Appraisal sessions as effective mechanisms for fostering meaningful exchange of ideas on sustainability and conservation[105]. Brickle's observations may reflect improvements in Iracambi's environmental education program and in community perceptions of Iracambi since Van Ree's study.

Other studies, such as Schmidt's 2008 study of success-based capacity building in the local municipality, suggest that Iracambi's environmental education program is a good idea that merits further attention and development. Schmidt recommends that Iracambi enhance its environmental education program in order to facilitate its other communal initiatives, such as the Iracambi Producers' Group[106]. He maintains that Iracambi should expand its environmental education initiatives for youth by helping local students to better explore their economic and employment opportunities, thereby preventing ex-rural migration and brain drain[107].

CHAPTER 3: Research Methodology

3.1 Research Design

This paper represents the author's first attempt at a full-scale research project. The author's original research proposal was for a grant from American University to intern and study at the Iracambi research center during the summer of 2012. The initial proposal was as follows:

---

[105]Ibid, Brickle 39
[106]Blake Schmidt, "Looking Backward, Moving Forward: Success-Based Capacity Building in Rural Brazil", *Iracambi Atlantic Rainforest Research Center,* (Rosario da Limeira: Iracambi), 2008. 24
[107]Ibid. 24-25

My project's central concern will be evaluating Iracambi's unprecedented approach to environmental education in Rosario da Limeira. This evaluation will assess Iracambi's accomplishments over time and its relationships with key figures in the environmental education community in Minas Gerais. I will emphasize the organization's relationship with rural farmers and youth because their support and cooperation is crucial to the success of community forest management (CFM).

Over the course of a summer internship at Iracambi's Rosario da Limeira location, I plan on interviewing Iracambi staff, volunteer Iracambi instructors, representatives from the Rural Workers' Union, officials from the State Agricultural Extension Agency EMATER, and, most importantly, the individual smallholders and their families participating in Iracambi's environmental education system, on a semi-structured basis. It is crucial that I make contact with members of these organizations during my preliminary research period in order to secure interview subjects.

I will conduct interviews in Portuguese, and will use Spanish and English when necessary. To this end, I have already begun brushing up on my Portuguese language skills through Rosetta Stone. I will have access to Portuguese-speaking Iracambi volunteers who can assist me with interview material should the need arise.

The interviews themselves will seek to familiarize the researcher with each individual person within the study, in addition to the organization that person may represent. I will ask the interviewee about his or her definitions of sustainability, deforestation, environmental education, community forest management, and other key terms. The interviewee will also be queried as to his or her perceptions of Iracambi, its environmental education program, and its success over time. I will pay special attention to the interviewee's awareness of the problems facing the Mata Atlântica, including habitat destruction, water contamination, and the loss of endemic species. Finally, I will ask the interviewee about the upcoming United Nations Rio+20 conference and about his or her views on the international community's role in Brazilian sustainability practices.

This research design, while made in good faith, was quite vague, imprecise, and unscientific. As a result, the author experienced significant difficulties in following through with the outlined methodology, especially in securing interviews with civil society groups. Because of the author's early difficulties in communicating with Iracambi, the host institution, the author was unable to arrange any interviews prior to his arrival in Brazil in May 2012.

Upon arrival, the author was confronted with several logistical and scholarly obstacles in carrying out the research. The unavailability of previously established local contacts like Robin Le Breton, combined with inclement weather, poor road conditions, and lack of transportation

options, made conducting interviews not feasible for the first couple weeks during the research period. When Mr. Le Breton was finally available to assist the author, he revealed the existence of many previously existing research studies on Iracambi. These studies covered diverse topics, and many of them overlapped directly with the author's research focus. After the discovery of these previously unknown documents, the author realized that his initial research design lacked originality.

The author's research changed significantly after this revelation, and the author began reviewing the newly available secondary sources. These sources coalesced into a comprehensive picture of Iracambi's various sustainability initiatives, as well as the successes and failures of these initiatives, over the last 10 years since the beginning of the author's research period. The author decided that the original research design was moderately infeasible, and would not contribute greatly to the existing literature. Because of this, the author resolved to alter the research methodology to evaluate the success of Iracambi's sustainability initiatives over time, including its environmental education program. The author felt that this up-to-date survey of Iracabi's achievements and failures comprised the best opportunity to conduct meaningful, non-redundant research.

3.2 Interviews & Observation

The author chose to use interview and participant observation research techniques to evaluate the current state of Iracambi's development initiatives in relation to the analysis and descriptions present in the literature. The interviews aimed at gathering information on three main topics:

1. Iracambi's evolution as an organization and its success over time in conservation and development.

2. Iracambi's relationship with members of the local community.

3. The characteristics and overall effectiveness of specific initiatives such as Iracambi's environmental education program.

The author chose these three information goals in order to compare the results of the research with Hopwood et al's five principles of equity for sustainable development: "…futurity – inter-generational equity; social justice – intra-generational equity; transfrontier responsibility – geographical equity; procedural equity – people treated openly and fairly; interspecies equity – importance of biodiversity…"[108]. Analyzing Iracambi's success in meeting these standards of equity allowed the author to determine the extent to which Iracambi can be defined as a sustainable development organization, and to what extent Iracambi's development initiatives have been effective.

3.3 Use of Secondary Sources

As previously mentioned, the author's discovery of a wealth of existing literature on subjects relevant to the author's research changed the nature of the project design. The author used many of these secondary sources to address and answer initial research questions. Because of this, the literature review constitutes a fundamental part of the research. Conclusions from the literature review will be incorporated into the presentation of data.

---

[108]Ibid, Hopwood et al 40

CHAPTER 4: Presentation of Data & Analysis

4.1 Literature

As previously stated, the literature review completely changed the nature and design of

the research. The author sought to avoid redundancy and preserve originality in this study, and

therefore began a thorough review of the existing, previously unheard of literature. This review

yielded several answers to the author's original research questions, including the question of

whether Iracambi can be characterized as a sustainable development organization.

Van Ree, Brickle, Schmidt, Le Breton, and others' work suggested that Iracambi's work

does pertain closely to the definition of sustainable development. Its initiatives for

development and conservation, including the medicinal plants project and the PES project,

indicate that Iracambi meets the standards of Hopwood et al's equities of futurity, transfrontier

responsibility, and interspecies equity. Furthermore, the literature on Iracambi's

environmental education program indicates that the organization makes great efforts to

maintain a two-way sustainability dialogue with the community, which characterizes the

organization as possessing and promoting inter-generational and procedural equity: social

justice and people treated openly and fairly. Because of these revelations, the author chose to

conduct a closer investigation of Van Ree, Brickle, and Schmidt's claims, criticisms, and

recommendations regarding improvements for Iracambi's environmental education and

community outreach initiatives.

4.2 Interviews

Because of aforementioned time, logistical, and academic resource constraints, the

author was only able to conduct ten interviews representing two groups. The interview

selection process was originally somewhat structured, but the dearth of interview participant

availability later obliged the author to conduct interviews with any and all available

participants. The first set of interviews involved rural landowners in the countryside

surrounding the town of Rosario da Limeira, and sought to understand how the participants

viewed Iracambi and general principles of conservation and development. Table 4.2 indicates

the responses to the first set of interviews:

Table 4.1

Question	Yes	No	Not sure	Total
Heard of Iracambi?	3	1	1	5
Agree with Iracambi's work?	3	1	1	5
Forest conservation important?	4	0	1	5

The author was very surprised to learn that many people near Iracambi's center of operations

had not heard of the organization or were unsure of its goals. These interviews, though limited

in scope and complexity, indicated that Iracambi's recognition amongst the local population

could be improved.

The author conducted the second set of interviews without the help of an interpreter.

These interviews were aimed specifically at judging the effectiveness of Iracambi's

environmental education program in promoting ideas of sustainability and an intrinsic valuation

of the forest amongst local students. The sample population for these interviews, much like the first set, was selected somewhat haphazardly because of many constraining variables. The interview participants are local students ages 10-11. The author chose these participants because of their median position within the environmental education program: they have been a part of it for some time, but still have many future opportunities to participate in the program.

The questions used in this interview set were all qualitative and semi-structured, seeking to understand the participant's opinions on conservation, development, and Iracambi as an organization. The responses to these questions were generally in consensus with each other. The participants' understanding of Iracambi's work closely resembled Iracambi's stated mission and goals; likewise, the participants all responded that their understanding of forest ecology and the importance of conservation had changed since they began participating in Iracambi's environmental education program. The participants also maintained positive views of Iracambi's operations and intentions, and two of the four participants said that they were interested in future careers such as eco-tourism and environmental research. However, the participants also unanimously stated that they had not seen any significant improvements in the local economy or the health of the forest because of Iracambi's actions. This perspective may be the result of the participants' short-term frame of reference for this question.

CHAPTER 5: Conclusions

Throughout the course of this study, the author has evaluated the definition and relevance of sustainable development, the historical context and the socioeconomic and environmental impact of deforestation in the Mata Atlântica, and the methods, successes, and deferred successes of the Iracambi Atlantic Rainforest Research Center. The research indicates several important conclusions about the organization in question.

The first is that Iracambi meets a broad range of standards as a sustainable development organization. Its several well-developed initiatives, including its medicinal plants, payment for environmental services, and environmental education initiatives all contribute to the organization's sponsorship of the five sustainability equities. Iracambi strives to promote both conservation and development in a non-intrusive, communally involved, culturally sensitive manner.

Secondly, Iracambi has met with notable success in achieving some of its goals. The organization's medicinal plants program has taken root as an innovation, and may become a viable alternative or auxiliary crop alongside coffee, helping to prevent further destruction and deforestation of the Atlantic forest. The primary problem confronting this initiative is scale of production. Meanwhile, Iracambi's payment for environmental services scheme shows promise in helping to increase rural landowners' incomes by encouraging forest conservation and environmental services protection. Like the medicinal plants program, the PES scheme requires additional local recognition and support before it can achieve the scale and consensus required for meaningful local policy changes. Finally, Iracambi's environmental education program has met with considerable success in promoting sustainable ideas and participatory community

forest management. The success of this program indicates that environmental education

opportunities should be expanded to help promulgate sustainable development in the area.

Furthermore, Iracambi's unique approach to development can be shown to have

contributed to its success. By incorporating years of Robin and Binka Le Breton's (as well as

many others') personal experience, Iracambi benefits from a profound understanding of local

ecological and economic trends over the course of more than two decades. This perspective

undoubtedly helps Iracambi avoid the pitfalls of top-down development schemes, which often

lack contextual knowledge. Because of the long-term nature of Iracambi's growth and

evolution, it might be difficult to replicate the founders' profound levels of relevant knowledge

in more immediate development contexts.

In terms of future research on Iracambi, the author would recommend a thorough study

of Iracambi's environmental education program. The author did not come across any studies of

this kind in the literature, and believes that the proliferation and success of this program merits

further study. The author would also advocate for better communication between Iracambi

and incoming volunteers, interns, and researchers. These visitors' lack of prior knowledge

about local contexts and conditions is a major obstacle for effective research and promotion of

Iracambi's operations and objectives.

The author would also be interested in conducting a comparative study of sustainable

development organizations like Iracambi in similar environmental and socioeconomic

circumstances. Iracambi's efforts seem relatively effective and laudable on the ground, but the

availability of similar cases for a comparative study might help to identify best practices in

sustainable development. The author hopes to pursue this research in future studies.

BIBLIOGRAPHY

Agrawal, Arun, "The Politics of Development and Conservation: Legacies of Colonialism", *Peace and Change*, vol. 22, no. 4 (Hoboken: Wiley-Blackwell), 1997.

Boas, Taylor C. & Gans-Morse, Jordan, "Neoliberalism: From New Liberal Philosophy to Anti-Liberal Slogan"*, Studies in Comparative International Development,* Vol. 44, No. 2, (Providence :Watson Institute), 2009.

Braudel, Fernand, trans. Sian Reynold, "The Perspective of the World: Civilization and Capitalism, 15th-18th Century", Volume 3, 1st Ed., (Berkeley: University of California Press),1984.

Brazilian Ministry of Science and Technology, "Project PRODES - Monitoring of the Brazilian Amazon by Satellite". < http://www.obt.inpe.br/prodets/index.php>, Accessed December 09, 2012.

Brickle, Lindsey, "Reconciling Conservation and Social Development in Brazil'sAtlantic Rainforest through the Application of Payments for Environmental Services", *Iracambi Atlantic Rainforest Research Center*, (Rosario da Limeira: Iracambi), 2010.

Bush, Fraser, "Iracambi Farm Projects – The Download Document Conversations with Robin Le Breton", *Iracambi Atlantic Rainforest Research Center* (Rosario da Limeira: Iracambi Atlantic Rainforest Research Center) 2006.

Collier, Paul, *The Bottom Billion: Why the Poorest Countries are Failing and What Can Be Done About It,* (Oxford: Oxford University Press) 2007.

Dean, Warren, *With Broadax and Firebrand*: *The Destruction of the Brazilian Atlantic Forest*, (Berkeley: University of California Press), 1995.

Dean, Warren, "Forest Conservation in Southeastern Brazil: 1900 to 1955", Vol. 9, No 1., *Environmental Review*: *ER*, (Durham: Forest History Society), 1985. < http://www.jstor.org/stable/3984115>

Esteva, Gustavo, "What is Development? " In Robert Denemark et. al. eds. The International Studies Compendium Project (Oxford: Wiley-Blackwell), 2011.

Glaeser, Bernhard, *The Green Revolution Revisited: Critique and Alternatives,* (Crows Nest: Allen & Unwin), 1987. http://www.cabdirect.org/abstracts/19876704055.html;jsessionid=8C5C54F2D14E1A25C55C2F6B0B1213BF?gitCommit=4.13.8-6-g6e31ff9

Hazell, Peter, *The Asian Green Revolution*, (Washington: International Food Policy Research Institute), 2009.

Hopwood, Bill et al, "Sustainable Development: Mapping Different Approaches", *Sustainable Cities Research Institute,* (Newcastle on Tyne: University of Northumbria Press), 2005.

Iracambi, "About Us". (Rosario da Limeira: Iracambi Atlantic Rainforest Research Center). 2012. http://en.iracambi.com/about-us

Johnson, Bryan T., "The World Bank and Economic Growth: 60 Years of Failure", (Washington: Heritage Foundation), 1996. < http://www.heritage.org/research/reports/1996/05/bg1082nbsp-the-world-bank-and-economic-growth>

Kerr do Amaral, Helen, "Brazilian Water Resource Policy in the 90's", *Institute of Brazilian Business and Public Management Issues,* (Washington: George Washington University Press), 1996. http://www.gwu.edu/ ~ibi/minerva/Fall1996/Helena.Kerr.Amaral.html

Laurance, William F. *et al*, "The Future of the Brazilian Amazon", *Science Magazine*, 291 (2005),

Le Breton, Robin, interview by Jaim Coddington, personal interview, Rosario da Limeira, Minas Gerais, Brazil, 23 May 2012.

Le Breton, Robin, "Land Management and Sustainability Development in the Atlantic Rainforest of Brazil: The Iracambi Experience", (Rosario da Limeira, MG, Brazil: Iracambi Atlantic Rainforest Research Center), 2000.

Leftwich, Adrian, "Progress, Growth, and Modernization: Antecedents of the Development Idea ," *States of Development: On the Primacy of Politics in Development*. (Oxford: Polity Press), 2000

Meadows, Donella H., "Quality of Life", *Earth '88: Changing Geographic Perspectives.* (Washington: National Geographic Society), 1988.

Miller, Stuart C., *Benevolent Assimilation: The American Conquest of the Philippines, 1899–1903*, 1st ed., (New Haven: Yale University Press) 1982.

Nascimento, Amós, "Environmental Philosophy in Brazil? : Theoretical and Practical Reflections on a South American Question", *ISEE Occasional Papers, no. 8,* 2010. 3 http://www.cep.unt.edu/papers/nascimento-eng.pdf

Patriota, Antonia de Aguiar, "An Introduction to Brazilian Environmental Law", *George Washington International Law Review*, (Washington, George Washington University Press), 2009.

Robinson, Paul and Dixon, Jay, "Soviet Development Theory and Economic and Technical Assistance to Afghanistan, 1954-1991", vol. 72, no. 3, *The Historian*, (Hoboken: Wiley-Blackwell), 2010.

Rostow, W.W., *The Stages of Economic Growth: A Non-Communist Manifesto* (Cambridge: Cambridge University Press), 1960.

Sachs, Jeffrey, *The End of Poverty: Economic Possibilities for Our Time*, (London: Penguin Books), 2005.

Sachs, Wolfgang et al, *The Development Dictionary,* 2nd ed., (New York: Zed Books), 2010.

Schmidt, Blake, "Looking Backward, Moving Forward: Success-Based Capacity Building in Rural Brazil", *Iracambi Atlantic Rainforest Research Center,* (Rosario da Limeira: Iracambi), 2008.

Sen, Amartya, *Development as Freedom*, (Oxford: Oxford University Press), 2001.

Shiva, Vandana, *The Violence of the Green Revolution: Third World Agriculture, Ecology, and Politics*, (London: Zed Books), 1991.

UNEP, "Green Economy – Developing Countries Success Stories", (New York: United Nations), 2010.

Van Ree, Zita, "The Motivation of Farmers to Apply Sustainable Agricultural Methods", (Rosario da Limeira, MG, Brazil: Iracambi Atlantic Rainforest Research Center), 2007