

Science and the Green Revolution in the Brazilian Amazon: The Establishment of Embrapa during of the Civilian-Military Dictatorship and the Emergence of Environmental Movements (1972–1991)

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ABSTRACT

The Empresa Brasileira de Pesquisa Agropecuária (Brazilian Agricultural Research Corporation), known by the acronym Embrapa, was established in 1972 under Brazil's civilian-military dictatorship with the purpose of fostering agricultural modernization through the incorporation of the Green Revolution's technology package, which included reliance on chemical inputs and high-yielding hybrid seeds and the mechanization of production. This article explores the context in which the agency was established and its scientific research agenda for Brazilian agriculture, while also examining both the influence of emerging environmentalist movements on discussions of the economic exploitation of the Amazon as well as the agency's profile during the period of redemocratization in Brazil. The focus of our analysis is on the agency branch known as the Humid Tropics Agricultural Research Center (Centro de Pesquisa Agropecuária do Trópico Úmido, or CPATU), which opened in Belém, Pará, in 1975. The text follows the path of the CPATU through 1991, when it became the Eastern Amazon Agroforestry Research Center (Centro de Pesquisa Agroflorestal da Amazônia Oriental), now Embrapa Eastern Amazon (Embrapa Amazônia Oriental).

Keywords: Embrapa; Green Revolution; civilian-military dictatorship; Brazilian Amazon; environmental movements.

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The timeframe in question covers the rise of environmentalism, the emergence of discussions about sustainable development, the end of Brazil's civilian-military dictatorship, and a series of international environmental meetings, such as the 1972 United Nations Conference on the Environment, also known as the Stockholm Conference. We draw from the intersection of the fields of the history of science and environmental history in our effort to better understand the role played by scientific disciplines and experts in the local environmental programs and projects that were part of global endeavors to exploit agricultural and mineral commodities and energy resources. Our perspective dialogues particularly with the work of Eric Carter, who has examined how developmentalist projects have used ecological thought in managing, planning, and optimizing the exploitation of natural resources.³ Carter argues that historiography must move beyond mere criticisms of the

³ Eric Carter. Development narratives and the uses of ecology: malaria control in Northwest Argentina, 1890-1940. *Journal of Historical Geography*, Amsterdam 33, 3 (2007): 619-650; Eric Carter. Malaria control in the Tennessee Valley Authority: health, ecology, and metanarratives of development. *Journal of Historical Geography*, Amsterdam 43, 1 (2014): 111-127.

development programs and their universal, uniformizing, stagist, and teleological intents. He suggests that examining regional frameworks from an ecological approach will shed light on local specificities and applications of international modernization projects and programs. With this in mind, our article analyzes how the Green Revolution figured into scientific research by Embrapa.

Sources for our study comprised records from the Embrapa Headquarters (Embrapa Sede) and Embrapa Eastern Amazon; federal government development plans; printed material from the Amazon Development Authority (Superintendência de Desenvolvimento da Amazônia, or SUDAM); environmental agreements signed by Brazil during this period; pertinent federal decrees and laws; and publications related to world environmental conferences. Sources also included articles published in newspapers and magazines.

AGRICULTURAL COOPERATION AND THE GREEN REVOLUTION

Embrapa was established to promote Brazilian agricultural production by disseminating the US agricultural model in Brazil, a model that must be understood within the international geopolitical context of the Cold War,⁴ which was an era of ongoing political, economic, and ideological rivalry between the United States and the Soviet Union, the two superpowers that emerged in the wake of World War II.

Latin America became central to US foreign policy during the Cold War, especially after the 1959 Cuban Revolution carried Fidel Castro to power.⁵ The formation of a socialist government in Latin America fueled fears that communism would spread throughout the region. Reflecting a belief that countries with financial problems might be more vulnerable to communist ideas, the United States drew up a financial aid program for the subcontinent.⁶

⁴ Eric Hobsbawm, *Era dos Extremos: O breve século XX - 1914-1991* (São Paulo: Companhia das Letras, 1995), 223.

⁵ Paulo G. Fagundes Vizentini, "A Guerra Fria", in *O século XX*, org. D. A. Reis Filho, J. Ferreira; C. Zenha (Rio de Janeiro: Civilização Brasileira, 2005), 202.

⁶ Carlos Fico, "O Brasil no contexto da Guerra Fria: democracia, subdesenvolvimento e ideologia do planejamento (1946-1964)", in *Viagem Incompleta: a experiência brasileira (1500-2000) - a grande transação*, org. C. G. Mota (São Paulo: Editora Senac São Paulo, 2000), 178.

As part of this push to expand US influence, the United States crafted its Point Four Program for economic aid to countries in Latin America, Africa, and Asia.⁷ In conjunction with the program, two mechanisms would be used to combat Soviet expansion: development projects, deemed synonymous with economic growth, and technical cooperation agreements. Point Four was launched in June 1952 under the Act for International Development, which laid out US foreign policy for the era.⁸ Although, strictly speaking, international aid programs had been operating in a number of Latin American countries since the early twentieth century under the aegis of US government agencies, philanthropic organizations, and private enterprise, the Point Four Program institutionalized technical assistance.⁹

The United States began stepping up its involvement in agricultural cooperation in Latin America in the 1940s, starting with countries such as Mexico and Costa Rica. One specific characteristic of these cooperation efforts was to encourage more widespread use of chemical products and machinery in general. During World War II, most agricultural program funding was earmarked for the purchase of equipment, machinery, and chemical products, like fertilizers and fungicides. The process meant that local technicians and agronomists adopted US agricultural knowledge, while it also opened new markets for the chemical industry.¹⁰

In addition to encouraging reliance on chemical fertilizers and agricultural mechanization, the US model also spurred the inauguration of agricultural research centers in Latin America and the formation of a network for information exchange and technology transmission through a technology package.¹¹ This model, which promoted the use of high-yielding hybrid seeds, was expanded to a number of countries around the world, like Pakistan, India, and Turkey, through the process known as the Green Revolution.

⁷ Rômulo de P. Andrade, "Contribuições para um debate: a antropologia do desenvolvimento e a valorização econômica da Amazônia (1951-1955)", *Cadernos do Desenvolvimento* 10, 16 (Janeiro/Junho 2015): 53-72.

⁸ Wilson P. Umaña; José A. Fernández Molina, "Programas agrícolas de Estados Unidos en América Latina desde la Segunda Guerra Mundial: Entre el mejoramiento de plantas y clonación de instituciones (1939- 1955)", *XV Congreso Internacional de História Agrária* (Janeiro 2016): 6.

⁹ Marcos Cueto, "International Health, the Early Cold War and Latin America", *Canadian Bulletin of Medical History* 25, 1 (2008):19.

¹⁰ Umaña; Molina, "Programas agrícolas de Estados Unidos", 9-10.

¹¹ Idem.

The term “Green Revolution” was first used in 1968 by William Gaud, then director of the United States Agency for International Development (USAID).¹² During a talk before the Society for International Development in Washington DC, Gaud said that high-yielding varieties of wheat seed had proven successful in Asia and that the world was witnessing a veritable agricultural revolution, or Green Revolution. He said it would be a “benign revolution” intended to contrast with the violent red, or communist, revolutions then threatening stability on the Asian continent. Gaud’s statement signaled a strong US government commitment to containing the advance of communism in Southeast Asia, at a moment when Soviet interests were expanding, and communist China was consolidating itself.¹³

Following Gaud’s talk, the term “Green Revolution” gained popularity and began to be used somewhat imprecisely to refer both to a process geographically located in Southeast Asia as well as to a macroprocess involving technological changes in the Third World in the post-war era. Because a gamut of possible meanings could be ascribed to this process, it became interpreted as an “inevitable” phenomenon, that is, as reflecting a universal need to foster agricultural production in response to problems like land shortages, hunger, and a growing population’s higher demand for food.¹⁴

Some interpretations of the Green Revolution have contributed to this view of the process as an inevitable technological transformation. One such interpretation is the idea that the Green Revolution was related to variables like food insecurity, an understanding that endows the process with a kind of moral validity and sense of mission. From this perspective, the Green Revolution can be understood as a product of the mission or will of US scientists who went on a campaign against hunger. Similarly, the Rockefeller Foundation’s agricultural program in Mexico is interpreted as a spontaneous response to the Mexican government’s need to expand agriculture.

¹² According to Rodrigo Patto Sá Motta, USAID, established in 1961, was part of a US project to foster modernization in Latin America through technical and financial investments, thereby blocking the advance of communism. Rodrigo P. S. Motta, “Modernizando a repressão: a USAID e a polícia brasileira”, *Revista Brasileira de História* (Impresso) 30, 59 (2010): 237-266.

¹³ Wilson P. Umaña, “Ciencia y geopolítica en los orígenes de la Revolución Verde”, *Revista de Ciencias Ambientales* 36, 2 (Dezembro 2008): 47.

¹⁴ Wilson P. Umaña, “Los significados de la revolución. Semántica, temporalidad y narrativa de la Revolución Verde”, *HALAC* 3, 2 (2014): 491.

This view assigns Henry Wallace, then US vice president, a key part in negotiations between the Foundation and the Mexican government.¹⁵

Another interpretation sees the Green Revolution as a consequence of technical and institutional transformations related to how producers, scientists, and politicians responded to the availability of production factors.¹⁶ From this standpoint, the development of genetically modified seeds stemmed from two concerns: the need to economize land, a scarce production factor where population density was high, as in Asian countries, and the need to take advantage of the day's extremely abundant supply of chemical fertilizers.¹⁷

Since the 1940s, rural extension and credit programs in Brazil had factored into initiatives to promote the US agricultural model.¹⁸ But implementation and dissemination of the Green Revolution's technology package took place during the civilian-military dictatorship, when the Brazilian government's agricultural modernization policy was crucial to the so-called "economic miracle". This process led to the predominance of industrial and monoculture agriculture on large landholdings over alternative agricultural models, funding and subsidies for farm inputs that greatly benefitted multinational capital, re-education of farmers in technical and entrepreneurial rationality, and the transfer and dissemination of technologies heralded as exclusive pathways to achieving "modernity in the countryside." Making the Amazon region a more integral part of the global commodities chain was in fact the central goal of government policy, as we will now see.

¹⁵ Idem, 506-508.

¹⁶ Ibidem, 507.

¹⁷ Ibid., 495-496.

¹⁸ Claiton Marcio Silva. *De agricultor a farmer: Nelson Rockefeller e a modernização da agricultura no Brasil* (Curitiba/Guarapuava: UFPR/Unicentro, 2015).

REVOLUTION IN THE COUNTRYSIDE UNDER THE MILITARY DICTATORSHIP

In 1964, the Brazilian military launched a coup¹⁹ that ousted then-president João Goulart, ushering in a civilian-military dictatorship that lasted until 1985, when indirect elections placed a new, civilian president in office.

Political instability was a hallmark of the early years of the dictatorship. A government opposition group named the Broad Front (Frente Ampla) was formed with the main goal of urging the struggle to redemocratize Brazil; it held anti-regime protests, which were harshly repressed by the government, and promoted two labor strikes, one in Contagem, Minas Gerais,²⁰ and another in Osasco, in Greater São Paulo. Repression intensified after 1968, when the military decreed Institutional Act 5, known as AI-5. These years saw much government propaganda about falling inflation, a fast-growing construction industry, and industrial recovery, inaugurating a period dubbed the “economic miracle.” In official communications, the government began using this term to qualify the economic boom, which was partly a result of higher exports in a context of growing world trade.²¹

The military government adopted a policy to advance agriculture, which included the 1965 introduction of the National Rural Credit System (Sistema Nacional de Crédito Rural, or SNCR), which provided credit to help farmers increase agricultural productivity.²² But it was under Brazil’s third dictatorial president, Emílio Garrastazu Médici, that agriculture became a fulcrum of economic policy, with the goal of sparking a rural revolution through reliance on technology and knowledge that were considered modern.

The use of the word “revolution” was not incidental but strategic, because the term allowed a parallel to be drawn not only with the 1964 coup, which the armed forces called a “revolution,” but also with the Green Revolution. This is evident from the elements that were deemed essential to promoting agriculture, such as

¹⁹ Lucília A. N. Delgado, “O Governo João Goulart e o golpe de 1964: memória, história e historiografia”, *Tempo* (online) 28 (2010): 123-144.

²⁰ Bóris Fausto, *História do Brasil* (São Paulo: Editora da Universidade de São Paulo, 2012), 407-408.

²¹ Luiz C. D. Prado; Fábio S. Earp, “O Milagre Brasileiro: Crescimento Acelerado, Integração Internacional e Concentração de Renda (1967-1973),” in *O Brasil Republicano: O Tempo da Ditadura*, orgs. Jorge Ferreira, Lucília A. N. Delgado (Rio de Janeiro: Civilização Brasileira, 2003), 226.

²² Nelson G. Delgado, “O papel do rural no desenvolvimento nacional: da modernização conservadora dos anos 1970 ao Governo Lula”, in *Brasil rural em debate – coletânea de artigos*, org. Nelson G. Delgado (Brasília, CONDRAF/MDA, 2010), 34-35.

machinery, fertilizers, genetic research, and foreign support, that is, technical cooperation fostered by the United States.

In 1971, the government issued its First National Development Plan (I Plano Nacional de Desenvolvimento, or I PND), whose guidelines were meant to pave the way for Brazilian development.²³ The document argued that economic growth would depend increasingly on technological progress.²⁴ The plan also underscored the need to define priority technological areas, such as nuclear energy, space, and oceanography; develop technology industries; consolidate infrastructure technology, like transportation, oil, and communications; and draw up a “Programa Intensivo de Pesquisa Agrícola, notadamente com relação às principais culturas, à agricultura dos cerrados, às técnicas de irrigação, e à tecnologia de alimentos tropicais” (Intensive agricultural research program, especially in relation to the main crops, agriculture in scrublands, irrigation techniques, and tropical food technologies).²⁵

In the eyes of the military, achieving technological autonomy from industrialized nations was essential to building a developed country, and so heavy investments were directed toward science and technology (S&T), research centers, graduate schools nationwide (through the Sistema Nacional de Pós-Graduação, or National Graduate System), and research agencies.²⁶ ²⁷ It is worth noting, however, that the idea of framing S&T as key elements of economic growth was not specific to Brazil’s military presidents but was a cornerstone strategy of the development ideal, which was promoted especially during the Cold War.

Much of Brazil’s current S&T system took shape under the civilian-military dictatorship, particularly from 1968 to 1980. The system expanded thanks to factors such as economic growth, which reached rates of 7% to 10% per year, as well as

²³ Governo do Brasil, *I Plano Nacional de Desenvolvimento* (PND) 1972-1974 (Rio de Janeiro: Presidência da República, 1971), 14.

²⁴ *Idem*, 55.

²⁵ *Ibidem*, 57.

²⁶ It is important to stress that initiatives in science and technology were not homogeneous under the military government. These areas received much more support under certain administrations and less under others. Shozo Motoyama, Francisco de A. Queiróz, Milton Vargas, “1964- 1985: Sob o Signo do Desenvolvimentismo” in *Prelúdio para uma história: ciência e tecnologia no Brasil*, org. Shozo Motoyama (São Paulo: Edusp/Fapesp, 2004), 317-386.

²⁷ José E. F. Clemente, “Ciência e política durante a ditadura militar: o caso da comunidade brasileira de físicos (1964-1979)”, (Dissertação de Mestrado, Universidade Federal da Bahia, 2005), 63.

scientific community support for the policy,²⁸ despite some conflicts and the persecution of scientists.²⁹ One notable initiative under the dictatorship was the Strategic Development Program (Programa Estratégico de Desenvolvimento), pioneered in 1968 to help the country “set up its own basic industry, develop its own energy sources, and absorb the most recent advances in science and technology.”³⁰ That same year, Brazilian universities were restructured based on the US model: the *cátedra* system was replaced with departments, research institutes were opened, and a common core was introduced at universities and degree-granting graduate programs.³¹ Other fundamental changes were the inauguration of S&T agencies, like the National Science and Technology Development Fund (Fundo Nacional de Desenvolvimento Científico e Tecnológico, or FNDCT), established under Decree-Law No. 719, on July 31, 1969, with the principal task of providing financial backing for programs and projects in S&T development.³²

Decree No. 70.533, enacted under the Médici government, defined areas within the S&T sector.³³ The Médici administration also strengthened research institutions that would have a hand in producing the modern technologies needed for Brazil’s industrial and economic development. These received heavy funding from such S&T agencies as the Alberto Luiz Coimbra Institute for Graduate Studies and Engineering Research (Instituto Alberto Luiz Coimbra de Pós-Graduação e Pesquisa e Engenharia, or COPPE),³⁴ to cite just one among various examples.³⁵

In the agricultural sector, the Médici government had drawn up a research program that was already underway in 1970, even prior to publication of the First

²⁸ Simon Schwartzman (org), *Ciência e tecnologia no Brasil: uma nova política para um mundo global* (São Paulo: [s. n.], 1993), 5.

²⁹ While the government invested heavily in S&T, its persecution of scientists at institutions of both basic and applied research was fierce. See, for example, Rodrigo P. S. Motta, *As universidades e o regime militar*. Cultura política brasileira e modernização autoritária (Rio de Janeiro: Jorge Zahar, 2014); Daniel G. E. dos Santos, “Ciência, política e segurança nacional: o “Massacre de Manguinhos” (1964-1970),” (Dissertação de Mestrado, Casa de Oswaldo Cruz/Fiocruz, 2016).

³⁰ Schwartzman (org), “Ciência e tecnologia”, 6.

³¹ Motta, *As universidades e o regime*.

³² On the FNDCT, see: Gabriel A. Boscarol, “Os Planos Nacionais de Desenvolvimento e a institucionalização da ciência durante a ditadura militar (1964-1985): a defesa de uma ciência nacional pela comunidade científica,” (Dissertação de Mestrado, Universidade Estadual Paulista, 2013).

³³ Governo do Brasil, Decreto nº 70.533, de 17 de maio de 1972 (Brasília, 1972). Disponível em: <http://www2.camara.leg.br/legin/fed/decret/1970-1979/decreto-70553-17-maio-1972-418980-publicacaooriginal1-pe.html>. Acesso em 4 de abril de 2016.

³⁴ COPPE was founded by Alberto Luís Coimbra and is part of the Universidade Federal do Rio de Janeiro (UFRJ).

³⁵ Simon Schwartzman, “O Grande Salto à Frente” in *Um Espaço para a Ciência: a formação da comunidade científica no Brasil* (Brasília: MCT/CNPq/CEE, 2001), 13-15.

National Development Plan. This modernization project was intended to bolster rural credit, reinforce the rural extension system, expand the use of improved seeds, promote more widespread reliance on fertilizers and products for correcting soil acidity, expand and bolster Brazil's pesticide industry, and analyze Brazil's main crops to ascertain which would benefit most from mechanized means of production.³⁶ In other words, Brazil was embracing an agricultural model based on the Green Revolution's technology package, which explains why its agricultural research program enjoyed the financial and technological support of the US government.³⁷

In July 1970, as part of its drive to develop a program to expand agricultural sector activities, the government formed a High-Level Commission, whose primary purpose was to identify top priorities in government agricultural research.³⁸ The commission compiled a report and drafted an operational plan called the Special Program for Agricultural Research (Programa Especial de Pesquisa Agropecuária, or PEPA), whose goals were to enhance the technological capacity of Brazil's research agencies by improving researcher skill and furthering scientific investigations considered paramount to development.³⁹ However, the government felt the program failed to achieve the changes needed to adapt agricultural research to the new agriculture policy, whose prime aim was the modernization of Brazil's technical base.

With this in mind, the Ministry of Agriculture created a work group in 1972, tasked with drafting a concrete proposal for transforming the country's research structure.⁴⁰ The resultant report stated that Brazilian agriculture remained fundamental to the national economy and an active participant in the country's development, regardless of its significant industrial growth. From this perspective, agricultural and technological research were vital to increasing productivity, exports,

³⁶ Cyro M. Rodrigues, "A pesquisa agropecuária no período do pós-guerra", *Caderno de Difusão de Tecnologia* 4, 3 (1987): 219.

³⁷ *Idem.*

³⁸ Sônia R. de Mendonça, "Agronegocio, corporaciones agrárias y políticas estatales de investigación agropecuária em Brasil (1950-2002)" in *Corporaciones agrárias y políticas públicas em América Latina*, eds. Noemi M. Gilbal Blacha, Sônia R. de Mendonça (Rosario: Prohistoria Ediciones, 2013), 117-119.

³⁹ Rodrigues, "A pesquisa agropecuária no período do pós-guerra", 232-233.

⁴⁰ Assessoria de Comunicação Social, *Pesquisa Agropecuária e Qualidade de Vida: A história da Embrapa* (Brasília: Embrapa, 2002), 15.

and farmer income.⁴¹ Moreover, the work group recommended that Brazil design a new national agricultural research system, which would foster the Green Revolution model; the group also offered suggestions for creating a national agricultural research agency.⁴²

Based on this report, a draft law was submitted in October 1972 as the first step in establishing the Brazilian Agricultural Research Corporation (Empresa Brasileira de Pesquisa Agropecuária, or Embrapa).⁴³ Pursuant to its original bylaws, which took effect on March 28, 1973, the agency would be attached to the Ministry of Agriculture, its main offices would be located in Brasília, and its chief duty would be to “promote, stimulate, coordinate, and execute research activities, with the goal of producing knowledge and technology to be used in national agricultural development.”⁴⁴

When Embrapa opened its doors on April 26, 1973, it took over the country’s existing government agricultural research institutes and experimental stations.⁴⁵ This meant the new agency would be responsible for coordinating the entire federal-level agricultural research system and its various units across the country. In later years, one of its assignments would be the economic exploration of the Amazon region, as we will see ahead.

AGRICULTURAL MODERNIZATION IN THE AMAZON

Lying in the South American continent, the Amazon covers one-twentieth of the Earth’s surface. Sixty percent of the biome is located inside Brazil’s borders, encompassing the states of Pará, Amazonas, Amapá, Acre, Rondônia, and Roraima and parts of Maranhão, Tocantins, and Mato Grosso. It should not be confused with the

⁴¹ José I. Cabral, *Livro Preto*: Sugestões para formação de um Sistema Nacional de Pesquisa Agropecuária (Brasília: Embrapa Informação Tecnológica, 2006), 2

⁴² Idem.

⁴³ Definida empresa de pesquisa agropecuária. *O Estado de S. Paulo*, 10 de Novembro de 1972, 24.

⁴⁴ Governo do Brasil, Decreto n° 72.020, de 28 de março de 1973. Aprova os Estatutos da Empresa Brasileira de Pesquisas Agropecuária e dá outras providências (Brasília, 1973). Disponível em: http://www.planalto.gov.br/ccivil_03/decreto/1970-1979/D72020impresao.htm. Acesso em 20 de março de 2016.

⁴⁵ Disponível em: <http://hotsites.sct.embrapa.br/pme/historia-da-embrapa>. Acesso em: 20 de março de 2016.

North, a political-administrative⁴⁶ region that currently comprises the states of Rondônia, Acre, Amazonas, Roraima, Pará, Amapá, and Tocantins.⁴⁷

The Brazilian Amazon has been the target of government programs and projects since the 1940s, particularly under the second Getúlio Vargas administration (1937-1945). The region was deemed strategic to the State because, as then defined, the Amazon represented more than half of Brazil's territory, accounted for more than two-thirds of its borders, and held more than four-fifths of its forests. During those years, it was also considered the country's most "underdeveloped" area.⁴⁸

Planning the "occupation" of the Amazon was likewise a priority for the civilian-military dictatorship.⁴⁹ The belief that international envy might prompt foreign powers to take over the Amazon gained traction in the 1960s under the military regime. The region was also considered vital for geopolitical reasons, since the government believed the area was so isolated that it was easy for revolutionary foci to form there and for migrants to flow in from neighboring countries. The government also wanted to ensure that Brazil could exploit the region's resources, which meant the State had to "defend" the borders of the Amazon, preserve its "wealth," and achieve national integration. Domestically, it was thought that the region could play a role in responding to the social tension triggered by drought in the Northeast, while also lending continuity to growth in the Southeast by generating new opportunities for investments, markets, and resources.⁵⁰

Under the civilian-military dictatorship, the Amazon also came to be considered important to expansion of the agricultural frontier. Underpinning all of these strategies was the historically constructed image of the Amazon as an "empty space" that served as an "escape valve for social conflicts in densely settled areas and an open field for investments."⁵¹ For some authors, the fact that local populations

⁴⁶ Bertha K. Becker, *Amazônia* (São Paulo: Editora Ática, 1990), 8-9.

⁴⁷Disponível em: <http://www.ibge.gov.br/home/presidencia/noticias/imprensa/ppts/0000000243.pdf>. Acesso em 15 de agosto de 2016.

⁴⁸ Andrade, *A Amazônia na Era do Desenvolvimento*.

⁴⁹ Bertha K. Beker, "Amazônia sustentável: desenvolvimento sustentável entre políticas públicas, estratégias inovadoras e experiências locais", in *Amazônia sustentável: desenvolvimento sustentável entre políticas públicas, estratégias inovadoras e experiências locais*, orgs. Gerd Kohlhepp e Martin Coy (Rio de Janeiro: Garamond, 2005), 24.

⁵⁰ Bertha K. Becker, *Amazônia*, 11.

⁵¹ Idem, 10.

were “invisible” in the government’s plans and programs for the region had to do with the image of the Amazon’s lush nature, so magnificent that the biome was perceived as nothing more than a “physical environment.”⁵²

The military believed the region should be integrated into the rest of the country through such measures as the expansion of agricultural activities and settlement projects. The State formulated basic strategies that would enable technical and political control of the area in order to encourage settlement there. One of these was spatial integration, which they thought could be accomplished by installing a satellite telecommunications network, creating an urban network and establishing government and private agencies there, laying a hydroelectric network to provide energy for regional development, and building east-west and interregional highways that would allow for communication.⁵³

Another plan was to superimpose federal territories on top of states, through federal decrees that created “territories where [the government] exercised absolute jurisdiction and/or property rights.”⁵⁴ One such example was the Legal Amazon, established in 1966 to facilitate regional settlement plans. This administrative unit encompassed the areas lying north of the 16th parallel south in the state of Mato Grosso and the 13th parallel south in the state of Goiás, along with part of the state of Maranhão. Two similar areas were later created with this same idea: Western Amazon, established in 1967 and comprising the states of Amazonas and Acre and the territories of Rondônia and Roraima (the latter two earned statehood in 1988), and Eastern Amazon, covering the states of Pará, Maranhão, and Mato Grosso, the territory of Amapá (a state since 1968), and what is now Tocantins (a state since 1988).⁵⁵

⁵² Alfredo W. B. de Almeida, *Antropologia dos Archivos da Amazônia* (Rio de Janeiro: Casa 8/Fundação Universidade do Amazonas, 2008), 31-32.

⁵³ Becker, *Amazônia*, 14.

⁵⁴ Idem.

⁵⁵ The Western Amazon was established under a Decree-Law published in 1967. A new decree was issued the following year that extended certain fiscal advantages offered in the text of 1967 to other areas within the Western Amazon. The bibliography on the topic points to this 1968 decree as the origin of the delimitation of the Eastern Amazon. However, neither of the two decrees mentions the Eastern Amazon. We also failed to find any specific law or document on the establishment of the Eastern Amazon. We concluded that the existence of the Eastern Amazon simply followed from the creation of the Western Amazon and that the former came to comprise the territories not included in the latter. On this topic, see: Arlete A. Monteiro. “A Amazônia: conceitos históricos, movimentos migratórios e conflitos socioambientais”. *Cadernos CERU* 29, 2 (2018): 8; <https://www.gov.br/sudam/pt-br/aceso-a-informacoes/institucional/legislacao-da-amazonia>. Acesso em: 11 de jul. 2022.

In its endeavor to devise a new planning policy, the government also modernized existing institutions and opened new agencies that would be responsible for formulating and coordinating new State initiatives in the area. With this goal in mind, in 1966, the government transformed the Banco de Crédito da Borracha into the Banco da Amazônia (BASA)⁵⁶ and founded both the Manaus Free Trade Zone Authority (Superintendência da Zona Franca de Manaus, or SUFRAMA),⁵⁷ assigned to coordinating activities in Eastern Amazon, and SUDAM.⁵⁸ Settlement efforts would be the purview of the National Institute for Settlement and Agrarian Reform (Instituto Nacional de Colonização e Reforma Agrária, or INCRA),⁵⁹ established in July 1970 and charged with advancing and overseeing agrarian reform and defining the entire settlement system for the Amazon.⁶⁰

Settlement projects and some of the occupation plans for the Amazon were summarized in the National Integration Program (Programa de Integração Nacional, or PIN), drawn up under the Médici government in 1970 to serve as a guideline for government initiatives in the region. The program's prime concern was the economic integration of Brazil's various regions.⁶¹ According to the First National Development Plan, road construction was essential, so one of the goals of the National Integration Program was to build the Transamazonian⁶² and Cuiabá-Santarém highways.

In the early 1970s, government agency documents also underscored the role of S&T in the process of integrating the Amazon into the rest of the nation. Accordingly, in order to address deficiencies in S&T fields relevant to the Amazon and fundamental to national integration and regional development, the federal government established

⁵⁶ Bertha K. Becker, "Revisão das políticas de ocupação da Amazônia: é possível identificar modelos para projetar cenários?", *Parcerias Estratégicas* 12 (2001): 137.

⁵⁷ The Manaus Free Trade Zone Authority (Superintendência da Zona Franca de Manaus, or SUFRAMA) was established in 1967, during the Castello Branco administration, with the purpose of drafting and executing the Manaus Free Trade Zone Pluri-Annual Plan (Plano Plurianual da Zona Franca de Manaus, or ZFM). Thomas H. de T. Stella, "A integração econômica da Amazônia 1930-1980," (Dissertação de Mestrado, Universidade Estadual de Campinas, 2009), 90.

⁵⁸ Andrade, "A Amazônia na Era do Desenvolvimento".

⁵⁹ On INCRA, see: Kátia H. S. C. Schweickardt, "Um olhar sobre a produção do espaço na Amazônia: os encontros e desencontros entre políticas de reforma agrária e a política ambiental no estado do Amazonas," (Dissertação de Mestrado, Universidade Federal do Amazonas, 2001).

⁶⁰ Becker, *Amazônia*, 32.

⁶¹ Filipe M. Soares, "O governo Médici e o Programa de Integração Nacional (Norte e Nordeste): discursos e políticas governamentais 1969-1974", (Dissertação de Mestrado, Universidade Federal de Pernambuco, 2015), 10.

⁶² Construction works on the Transamazonian Highway were officially inaugurated at a ceremony held on October 10, 1970. The road was intended to occupy and integrate the country by joining up with the end points of the main navigable stretches of the Amazon River. Guilherme Velho, *Frentes de Expansão e Estrutura agrária* (Rio de Janeiro: Centro Edelstein de Pesquisas Sociais, 2009), 139.

the Humid Tropics Program (Programa do Trópico Úmido) in 1972. Instituted under Decree No. 70.999, the program was “aimed at coordinating the contribution of Science and Technology to the advancement of knowledge on how the human being can adapt to the peculiarities of the Humid Tropics.”⁶³

It is worth noting that research institutions in the humid tropics were already conducting scientific research on agricultural practices in the Amazon region. In Belém, for example, the Agronomic Institute of the North (Instituto Agrônômico do Norte, or IAN) had been established in 1939 and assigned to conducting scientific studies on the Amazon for application to agricultural production.⁶⁴ In 1962, the Ministry of Agriculture underwent a reform that gave birth to the Department of Agricultural Research and Experimentation (Departamento de Pesquisa e Experimentação Agropecuária) and transformed the former IAN into the IPEAN, or Agricultural Research and Experimental Institute of the Northeast (Instituto de Pesquisa e Experimentação Agropecuária do Norte). The new institute made changes in research goals and agency structure; in addition to phytotechnology studies, IPEAN also became responsible for animal science research. In 1971, the Ministry of Agriculture was restructured once again and the institute was renamed the Agricultural Research Institute of the North (Instituto de Pesquisas Instituto de Pesquisas Agropecuárias do Norte); its goals and acronym remained the same, while its activities were to encompass the entire Eastern Amazon.⁶⁵

In 1975, IPEAN was replaced by the Humid Tropics Agricultural Research Center (CPATU), with offices in Belém. We believe the State wanted to take advantage of Brazil’s existing research structure, like laboratories and research staff, to foster research that would yield short-term findings and thus contribute to the civilian-

⁶³ Governo do Brasil, Decreto nº 70.999, de 17 de agosto de 1972. Institui o Programa do Trópico Úmido e dá outras providências (Brasília, 1972). Disponível em: <https://www.diariodasleis.com.br/legislacao/federal/63657-institui-o-programa-dotropico-umido-e-da-outras-providencias.html>. Acesso em 16 de novembro de 2016

⁶⁴ Dominichi M. de Sá; André F. C. Silva, “Amazônia brasileira, celeiro do mundo: ciência, agricultura e ecologia no Instituto Agrônômico do Norte nos anos 1940 e 1950”, *Revista USP* (Outubro, 2019).

⁶⁵ Rubens R. Lima, Batista B. G. Calzavar, Paulo Ch. Kitamura, Nazira L. Nassar, “Histórico das atividades exercidas pelo IAN, IPEAN e Embrapa-CPATU no desenvolvimento da agropecuária na Amazônia”, *Anais do Simpósio sobre a História da Ciência e Tecnologia no Pará* 2, (1985): 425-440.

military dictatorship's national integration project for the Amazon, with Embrapa as a driving force.

THE ESTABLISHMENT OF THE HUMID TROPICS AGRICULTURAL RESEARCH CENTER (CENTRO DE PESQUISA AGROPECUÁRIA DO TRÓPICO ÚMIDO, OR CPATU)

The Humid Tropics Agricultural Research Center (CPATU) was established as an Embrapa resource center. In 1973, in the early days of the agency's activities, its board of directors decided that its programming would be based on scientific investigations by product, without, however, excluding research by discipline or special projects as deemed necessary.⁶⁶ Priority research would be aimed at boosting the production of Brazilian food staples and increasing exports, notably to “develop little-known resources, especially in humid tropics zones, the Central-West frontier, semiarid zones, and large scrubland areas.”⁶⁷

Research followed a national system model with two lines of action: direct and coordinating. Direct action fell to national units that conducted research, such as national centers by product and resource centers.⁶⁸ The goal of the national centers was to develop knowledge and technology applicable to products considered essential for both domestic consumption and export, like rice, beans, and corn. Resource centers, on the other hand, would be responsible for surveying natural resources, assessing their agricultural potential, and defining production systems compatible with each region's specific characteristics.⁶⁹

Embrapa was tasked with coordinating the work carried out by state-level agricultural research agencies.⁷⁰ Where such agencies did not yet exist, the government opened State-Level Research Units (Unidades de Execução de Pesquisa de Âmbito Estadual, or UEPAE)⁷¹ or Territorial-Level Research Units (Unidades de

⁶⁶ Idem.

⁶⁷ Ibidem.

⁶⁸ EMBRAPA. *Relatório de atividades de 1973* (Brasília: Embrapa, 1974), 4.

⁶⁹ EMBRAPA, *Embrapa 6 anos* (Brasília: Embrapa, 1979), 6.

⁷⁰ EMBRAPA. *Modelo Institucional de Execução da pesquisa agropecuária* (Brasília: Embrapa, 1974), p.4.

⁷¹ A number of new research centers were opened from 1974 to 1980. By 1980, Embrapa was coordinating fifty agencies, classified as National Action Agencies (Órgão de Ação Nacional), which were divided into Research Centers by Product (Centros de Pesquisa por Produto, or CNP, which included: CNP Cotton, in Campina Grande, Paraíba; CNP Rice & Beans, in Goiânia, Goiás; CNP Goats & Sheep, in Sobral, Ceará; CNP

Execução de Pesquisa em Âmbito Territorial, or UEPAT). State-level agricultural resource systems also included universities and institutes of higher education, whose central role was to provide human resource training and consultancy services in the selection of existing basic technology.

Private enterprise would also figure into the system through opportunities to purchase new or adapted technology or collaborate with research units in technology production.⁷² The overriding aim of this state-level system was to develop research that generated technology applicable to the solution of local problems.⁷³

The notion that the Amazon region was strategic to national development remained in place under the Ernesto Geisel administration, thereby justifying continued investment in a resource center on the humid tropics. Moreover, because petroleum was the world's main nonrenewable energy source, climbing oil prices sparked an international crisis in late 1973. The so-called oil shock⁷⁴ slowed Brazil's strong national economic growth, since the country was extremely oil-dependent;

Beef Cattle, in Campo Grande, Mato Grosso do Sul; CNP Dairy Cattle, in Coronel Pacheco, Minas Gerais; CNP Cassava and Fruits, in Cruz das Almas, Bahia; CNP Maize and Sorghum, in Sete Lagoas, Minas Gerais; CNP Rubber, in Manaus; CNP Soybean, in Londrina, Paraná; CNP Swine & Poultry, in Concórdia, Rio Grande do Sul; and CNP Wheat, in Passo Fundo, Rio Grande do Sul) and Special Services (Serviços Especiais, which included: the Centro Nacional de Recursos Genéticos, CENARGEN, in Brasília, Distrito Federal; Centro de Tecnologia Agrícola e Alimentar, CTAA, in Rio de Janeiro; Serviço Nacional de Levantamento e Conservação dos Solos, SNLCS, in Rio de Janeiro; and Serviço de Produção de Sementes Básicas, SPSB, in Brasília, Distrito Federal). There were also Regional Action Agencies (Órgãos de Ação Regional), which comprised Agricultural Research Centers in Natural Resources (Centros de Pesquisa Agropecuária de Recursos Naturais), which included the Centro de Pesquisa Agropecuária dos Cerrados (CPAC), Brasília, Distrito Federal; Centro de Pesquisa Agropecuária do Trópico Semi-Árido (CPATSA), in Petrolina, Pernambuco, and Juazeiro, Bahia; and Centro de Pesquisa Agropecuária do Trópico Úmido (CPATU), in Belém, Pará; and the Central-South Regional Forestry Research Unit (Unidade Regional de Pesquisa Florestal Centro-Sul, URPFCS), in Colombo, Paraná. There were also State Systems (Sistemas Estaduais), encompassing State Corporations (Empresas Estaduais, which included: Empresa de Pesquisa Agropecuária de Minas Gerais [EPAMIG]; Empresa Goiana de Pesquisa Agropecuária [EMGOPA]; Empresa Capixaba de Pesquisa Agropecuária [EMCAPA]; Empresa Catarinense de Pesquisa Agropecuária [EMPASC]; Empresa Agropecuária do Estado do Rio de Janeiro [PESAGRO]; Empresa de Pesquisa Agropecuária do Ceará [EPACE]; Empresa Pernambucana de Pesquisa Agropecuária [IPA]; Empresa de Pesquisa Agropecuária da Bahia [EPABA]; Empresa Maranhense de Pesquisa Agropecuária [EMAPA]; Empresa Estadual de Pesquisa Agropecuária da Paraíba [EMEPA]; Empresa de Pesquisa, Assistência Técnica e Extensão Rural de Mato Grosso do Sul [EMPAER]; Empresa de Pesquisa Agropecuária do Rio Grande do Norte [EMPARN]; Empresa de Pesquisa Agropecuária de Alagoas [EPEAL]; and Empresa de Pesquisa Agropecuária do Mato Grosso [EMPA]); Integrated Programs (Programas Integrados) in São Paulo, Paraná, and Rio Grande do Sul; and State and/or Territorial Research Units (Unidades de Execução de Pesquisa de Âmbito Estadual e/ou Territorial), which included: UEPAE de Corumbá, MS; UEPAE de Pelotas, RS; UEPAE de Cascata, RS; UEPAE de Manaus, AM; UEPAE de Altamira, PA; UEPAE de Teresina, PI; UEPAE de Aracaju, CE; UEPAE de Bagé, RS; UEPAE de Dourados, MS; UEPAE de Rio Branco, AC; UEPAE de São Carlos, SP; UEPAE de Bento Gonçalves, RS; UEPAE de Brasília, DF; UEPAE de Porto Velho, RO. These agencies underwent reorganization over the years; some names were changed, while others were merged to form new research centers. Cf.: Eliseu Roberto de Andrade Alves, *A importância do investimento na pesquisa agropecuária* (Brasília: Embrapa, 1980); EMBRAPA, *Relatório Ambiental* (Brasília: Embrapa, 2002).

⁷² EMBRAPA, *Modelo Institucional de Execução da pesquisa agropecuária*, 8.

⁷³ EMBRAPA, *Embrapa 6 anos*, 6.

⁷⁴ Elenita Pereira Malta, "O ouro negro – Petróleo e suas crises políticas, econômicas, sociais e ambientais na 2ª metade do século XX", *Outros Tempos* 5, 6 (2008): 54-72.

moreover, export earnings fell when Brazil's chief customers were hit by recession.⁷⁵ The Second National Development Plan (II Plano Nacional de Desenvolvimento, or II PND), published in 1974, hoped to respond to these challenges and ensure economic growth; its top priority was to enable increased productivity in the agroindustrial, mining, and livestock sectors.

This was the government's path to the "productive occupation" of the Central Plateau, Central-West, and Amazon, viewed as crucial not only for Brazil but also—as so often proclaimed—for the world's population overall, since resources from these newly occupied areas were expected to help decrease food insecurity while increasing the planet's access to raw materials and minerals, according to the era's thinking.⁷⁶

In engineering the CPATU's operational model and its main lines of action and research, Embrapa published a document entitled "Minuta do projeto de implantação do Centro de Pesquisa Agropecuária do Trópico Úmido" (Draft project for the implementation of a Humid Tropics Agricultural Research Center). According to this publication, the new Embrapa center would have a two-pronged focus: the identification of products that could be exploited economically, either by generating new technology or by relying on existing knowledge, and the creation of production systems tailored to the region.⁷⁷

Research in agricultural technology was tied in with rural extension work and the adaptation of technology from developed nations.⁷⁸ As we have seen, this was at the heart of the Green Revolution's technology package. However, these technologies had been developed in regions whose climate conditions and other characteristics differed greatly from those of a tropical environment, where rainfall is elevated, temperatures high, and soil deeper and more exposed to erosion. The technology

⁷⁵ Gustavo Machado Cavarzan; José Caio Racy. "II PND: As peculiaridades da estratégia brasileira durante a crise internacional dos anos 1970". *Revista de Economia Mackenzie* 8, 3 (2011): 53-66, 56-57.

⁷⁶ *Idem.*, 41.

⁷⁷ EMBRAPA, Centro de Pesquisa Agropecuária do Trópico Úmido. *Minuta do projeto de implantação do Centro de Pesquisa Agropecuária do Trópico Úmido-CPATU*.(197-), 5, 23.

⁷⁸ Eduardo J. Trigo; Davi Kaimowitz. "Investigación agrícola y transferencia de tecnología en América Latina em los años noventa". *Cadernos de Ciência & Tecnologia* 11, 1 (1994): 99-126.

package had therefore failed to take into account the world's diversity of climates, soils, topographies, and the like.⁷⁹

According to Embrapa heads, in areas of agricultural frontier, agriculture was based on natural soil fertility or the cutting and burning of forests; neither scientific knowledge nor any of the precepts of the Green Revolution's technological package were employed in these regions. Embrapa documents nevertheless affirmed that "the principles formulated therein are valid. It is, however, necessary to design research models that adequately incorporate [these principles], considering the abundance of natural resources."⁸⁰ In other words, while the assumptions underlying the technology package came from a different context, they should still be implemented in the humid tropics. It was all about generating technology that would make it possible for modern practices, designed in developed nations, to be adapted to local characteristics, thereby replacing an agricultural model based on the clear-cutting and burning of forests.

The publication on the project to open the CPATU stipulated that its researchers should carry out scientific investigations along three lines: (1) the survey of natural and socioeconomic resources; (2) the use of soil-climate-plant and/or soil-climate-animal resources; and (3) the development of new production systems and the improvement of existing. The first line of research would entail surveys in pedology, climate, and flora and studies of botany and wildlife, which would yield greater knowledge of regional ecology, that is, of the Amazon's soil, climate, and plant life. This would provide a better idea of the potential of unoccupied areas, while also helping develop technologies to foster higher productivity in settled areas. While the document did not specify the type of technology in question, we can infer that it would involve improved seeds, machinery, fertilizers, and chemical substances appropriate to regional characteristics. Studies could be conducted by the center itself or in partnership with other agencies in the Amazon and regions beyond. Flora surveys and botany studies could, for example, be conducted under agreements with

⁷⁹ Maria Ângela Fagnani, "A questão ecológica na formação do engenheiro agrícola" (Tese de Doutorado, Universidade Estadual de Campinas – Unicamp, Campinas, 1997), 9-20.

⁸⁰ EMBRAPA. *Relatório de atividades de 1973*, 10.

researchers from the National Institute of Research on the Amazon (Instituto Nacional de Pesquisas da Amazônia, or INPA), while regional climate studies could make use of surveys done by the Ministry of Agriculture's Meteorology Department.⁸¹

Based on these studies, the goals would be to: ascertain the agricultural suitability of lands so production systems could be introduced there, based on evaluations of soil fertility and the nutrients needed to increase productivity and on the zoning of areas for agriculture, grazing, and reforestation; arrive at methods for combatting and controlling diseases, pests, and invasive plants; analyze potentially promising products, both native and exotic, but always compatible with the region; and define floodplains in the Lower Amazon that could serve agricultural and livestock purposes, among others.⁸²

Notable emphasis was also placed on studies to establish pasturelands and other areas for livestock production. Beef was then fetching top price on the international market, and the federal government stepped up sector investments in hopes that the country would soon be a major meat exporter. This is one reason agriculture was expected to play a new role in raising GDP, as stated in the Second National Development Plan (II Plano Nacional de Desenvolvimento, or II PND).⁸³ Consonant with this goal, the Second National Development Plan for the Amazon (II Plano Nacional de Desenvolvimento da Amazônia), which ran from 1975 to 1979, defined the transformation of the Legal Amazon into a beef export area as one of the guidelines for developing the region; this effort would count on funds from SUDAM itself and from international bodies.

The second line of research would explore better use of natural resources for agricultural purposes, with investigations focused on the issues then hampering regional development of agricultural and livestock activities. One of these was the low soil fertility in *terra firme* forests, where, according to the document, soils were deficient in nitrogen, micronutrients, and phosphorus and contained elevated levels

⁸¹ Idem, 11-12.

⁸² Ibidem, 12-14.

⁸³ Iane Maria da Silva Batista. "A natureza nos planos de desenvolvimento da Amazônia (1955-1985)," (Tese de Doutorado, Universidade Federal do Pará, 2016), 196-197.

of aluminum.⁸⁴ The draft CPATU project explained that soil fertility could be improved by investigating the most efficient methods for applying soluble fertilizers and by identifying the best species for plant cover and green manure.⁸⁵

Soil erosion was another fixed target for this line of research into the regional use of natural resources. Again according to the document, tropical climates facilitated erosion. Moreover, the removal of plant cover in more uneven terrain damaged the biological equilibrium and eroded the soil. This process was underway in areas of the Transamazonian and Belém-Brasília highways, where improper soil management was exacerbating erosion.⁸⁶ In other words, the document noted that the government's own projects to integrate and settle the area were contributing to erosion; it also pointed out that the problem could be solved through scientific and technological investigations to determine the most efficacious practices for soil preparation and management, cropping systems that could improve the soil physically and chemically, and the most suitable production systems for each soil type.⁸⁷

This line of research would also emphasize studies of crop pests and diseases. The document stated that this problem stemmed from ecological conditions in the Amazon environment, which favored the emergence and proliferation of pests and disease. Further according to the document, the problem could be mitigated through scientific investigations to survey the principal crop pests, assess damages caused by the main diseases, and promote genetic improvement to create more resistant plants, along with other research.⁸⁸ While the document attributed these pests and diseases solely to ecological conditions in the Amazon, some scientists were then discussing other factors that contributed to the propagation of pests, such as the introduction of new crops to the region.

It is also worth noting that the document emphasized species improvement over greater application of chemical substances as an alternative for boosting

⁸⁴ EMBRAPA, *Minuta do projeto de implantação*, 14-15.

⁸⁵ *Ibid.*, 15.

⁸⁶ *Ibidem.*, 17.

⁸⁷ *Ibid.*, 18.

⁸⁸ *Ibid.*, 19.

productivity, since the supply of pesticides, fertilizers, and other chemical products was low and prices therefore high at the time. The oil shock, mentioned earlier, pushed up prices not only on oil but also on raw materials, intermediary goods, and capital goods.⁸⁹ In 1975, the federal government launched the National Pesticide Program (Programa Nacional de Defensivos Agrícolas), which offered fiscal and financial incentives for new companies operating in the manufacture of products like insecticides, fungicides, and herbicides; the same programs also provided tariff benefits on machinery and equipment imports.⁹⁰

The need to decrease the use of chemical products was likewise mentioned in the third line of research, aimed at developing new production systems and refining existing ones. According to the CPATU publication, Brazil needed production systems that would use chemical fertilizers more efficiently and require less pesticide application. This line of research would be responsible for adapting the knowledge and technology needed to implement the Green Revolution agricultural model in the humid tropics. It also encompassed studies to introduce fast-growing perennial crops, define production systems specific to each soil type, identify the best production systems for buffalo and bovine milk and meat, improve buffalo genetically for milk and meat production, and develop feed systems for critical forage production periods, among other studies.⁹¹ Many of the studies addressed livestock production systems, which, as mentioned earlier, were part of the federal government plan for the development of the Amazon.

According to the CPATU draft plan, it would fall to the agency to produce knowledge and devise production systems to guide government programs in the Amazon, like the Amazon Pastureland Improvement Project (Projeto de Melhoramento de Pastagens da Amazônia, or PROPASTO) and the Program for Agricultural and Agromineral Hubs in the Amazon (Programa de Polos Agropecuários e Agrominerais da Amazônia, or Polamazônia).

⁸⁹ Guido Mantega, O Governo Geisel, o II PND e os economistas, *Relatório de Pesquisa EAESP/FGV 3* (1997): 32.

⁹⁰ José M. F. Silveira; Ana Maria Futino, "O Plano Nacional de Defensivos Agrícolas e a Indústria Brasileira de Defensivos", *Agricultura em São Paulo* 37, 3 (1990): 129-146.

⁹¹ Idem.

PROPASTO was a program to produce technology based on experimental field research conducted on private farms in the Amazon, with a view to better pastureland use and consequent promotion of beef cattle production systems. Initiated in 1976, the program was conducted by Embrapa units in the Amazon under the coordination of the CPATU and with financial support from BASA and Polamazônia. During this period, experimental fields were set up in Paragominas, Marabá, São João do Araguaia, Santana do Araguaia, and Cachoeira do Ariri, state of Pará; along the Manaus-Itacoatira highway, state of Amazonas; in the municipality of Rio Branco, state of Acre; in Amapá and Macapá, Federal Territory of Amapá; in Porto Velho and Rondônia, Federal Territory of Rondônia; and in the cities of Boa Vista and Caracaraí, Federal Territory of Roraima.⁹²

The Second National Development Plan included provisions for the Polamazônia Program, one of the State's key planning strategies during this period.⁹³ Designed to create "development hubs" centered on selected production activities, the program had a particular concern with increasing bovine numbers and introducing selected crops, like rubber, cacao, sugarcane, dendê palm, fruits, black pepper, and rice.⁹⁴ The idea of developing growth hubs in the Amazon had been a topic of discussion in Latin America since the 1960s. The hubs would center on certain investment sectors, such as mining, agriculture, and cattle production, whose output would feed into industrial processing.⁹⁵

The Polamazônia Program was intended to replace the settlement approaches adopted in projects like the National Integration Program and First National Development Plan, which had been based on small-scale production; efforts would now focus on laying the ground for private investments.⁹⁶ The opening of private businesses thus became the new strategy for Amazon development.⁹⁷ As a result,

⁹² *Ibidem*, p.172-173.

⁹³ Iane Maria da Silva Batista, "A natureza nos planos de desenvolvimento da Amazônia", 199.

⁹⁴ *Idem*, p.200.

⁹⁵ Gerd Kohlhepp, Conflitos de interesse no ordenamento territorial da Amazônia brasileira *Estudos Avançados*, 16, 45 (Agosto 2002): 39.

⁹⁶ *Idem*.

⁹⁷ Pedro Henrique Pedreira Campos, *Estranhas Catedrais: As empreiteiras brasileiras e a ditadura civil-militar, 1964-1988* (Niterói: EdUFF, 2014), 382.

major companies set up shop there in diverse sectors, including construction, mining, and agriculture.

The CPATU was supposed to contribute to this new occupation project, as evident from the areas of activity defined in the draft. According to the latter document, the agency would make use of the physical structure of the former IPEAN, in Belém, Pará, moving into the existing facilities and building others as necessary for research work. Furthermore, it would carry out satellite activities in other places, initially at UEPAE Transamazon, in Altamira; Tracuateau Experimental Station, in Bragança, Pará; Marajó Experimental Station, in Porto Planton, Amapá; UEPAE Manaus-Amazonas; and the Lower Amazon, either in Belterra or the SUDAM logging center. According to the document, other satellite activities should be conducted, considering the studies programmed for the Polamazônia and PROPASTO areas, “which often coincide with the Development Hubs program.”⁹⁸ In other words, CPATU work should emphasize locations where these two state-level programs would be implemented.

Grounded in this initial proposal, the CPATU began its activities in 1976. From 1976 to 1979, experiments were conducted at CPATU facilities, which were located along the national integration roads that were site of settlement projects and also in the area of Polamazônia development hubs. In 1978 the CPATU began conducting experiments in the municipalities of Alenquer, Curuá-Una, and Belterra,⁹⁹ a region that was included in CPATU research because of the interest in encouraging agricultural development in places near Curuá-Una, where the Brazilian government wanted to take advantage of hydroelectric potential. Pursuant to the guidelines of the Second National Development Plan,¹⁰⁰ the Curuá-Una hydropower plant was inaugurated in 1977 on the homonymous river, in the state of Pará.¹⁰¹

⁹⁸ EMBRAPA, *Minuta do projeto de implantação*, 25.

⁹⁹ EMBRAPA, Centro de Pesquisa Agropecuária do Trópico Úmido, *Relatório Técnico Anual do Centro de Pesquisa Agropecuária do Trópico Úmido 1978* (Belém: CPATU, 1979), 5.

¹⁰⁰ Governo do Brasil, Lei n° 6.151, de 4 de dezembro de 1974 – Dispõe sobre o Segundo Plano Nacional de Desenvolvimento (PND), para o período de 1975 a 1979 (Brasília, 1974), 4. Disponível em: http://www.planalto.gov.br/ccivil_03/leis/1970-1979/L6151.htm. Acesso em 18 de maio de 2016.

¹⁰¹ Philip M. Fearnside, “As usinas hidrelétricas mitigam o efeito estufa? O caso da barragem de Curuá-Uma” in *Hidrelétricas na Amazônia: Impactos Ambientais e Sociais na Tomada de Decisões sobre Grandes Obras*, org. Philip M. Fearnside (Manaus: Editora do INPA, 2015), 194.

From 1980 to 1984, the CPATU continued its scientific investigations aimed at enabling agricultural modernization in the Amazon region and guiding the implementation of settlement projects and agricultural companies. At the same time, national research programs were established by product. We believe that the creation of national food crop programs was an outgrowth of the Third National Development Plan (III Plano Nacional de Desenvolvimento) (1980-1985), which named agriculture and supply as a priority sector.¹⁰² Published during the administration of João Baptista Figueiredo, the last president under Brazil's civilian-military dictatorship, the plan also stated that it was essential to take advantage of the Amazon's tremendous economic potential, "especially for energy generation and agromineral, agricultural, agroindustrial, and fishing activities."¹⁰³

It should be noted that research on the region moved into new topics from 1980 to 1984. Experiments were conducted in inventory and climate evaluation, some with the goal of assessing climate conditions in the humid tropics as pertinent to agricultural projects. Likewise, a number of experiments explored the edaphoclimatic suitability of the region lying between Serra de Carajás and Porto de Itaquí for the production of cassava, babassu, dendê palm, sugarcane, and rubber trees.¹⁰⁴ Meteorological surveys provided information on such variables as air and soil temperature, precipitation, evaporation, and humidity. These analyses were used to draw up climate maps for areas such as the Grande Carajás Program,¹⁰⁵ which encompassed both agricultural and logging activities.

However, concomitant with the government's promotion of intense exploration of the Amazon region, which counted on the help of research conducted by this Embrapa unit, the world began to engage in a debate over environmental

¹⁰² Governo do Brasil, *III Plano Nacional de Desenvolvimento 1980-1985* (Brasília, 1980).

¹⁰³ *Idem*, 90.

¹⁰⁴ EMBRAPA, Centro de Pesquisa Agropecuária do Trópico Úmido, *Relatório Técnico Anual do Centro de Pesquisa Agropecuária do Trópico Úmido 1980* (Belém: Embrapa/CPATU, 1981), 33.

¹⁰⁵ This program was created in November 1980, with the purpose of accelerating the commencement of mineral-metallurgical activities in municipalities of the states of Pará and Maranhão. See: Batista, "A natureza nos planos de desenvolvimento", 259; Governo do Brasil, Decreto-Lei nº 1.813, de 24 de novembro de 1980. Institui regime especial de incentivos para os empreendimentos integrantes do Programa Grande Carajás e dá outras providências (Brasília, 1980). Disponível em: http://www.planalto.gov.br/ccivil_03/Decreto-Lei/1965-1988/Del1813.htm. Acesso em 02 de outubro de 2017.

preservation, directed precisely at the planet's largest tropical rainforest, as we will now see.

THE EMERGENCE OF THE ENVIRONMENTAL AGENDA DURING THE CIVILIAN-MILITARY DICTATORSHIP

Modern unease about the destruction of nature surfaced in the eighteenth century.¹⁰⁶ However, it was only after World War II that greater attention was given to the effects of human action on the environment and to the need for environmental preservation.

Certain factors aid in explaining the emergence of environmental concerns during this more recent period; for example, the use of the atom bomb¹⁰⁷ drove home the fact that the Earth has limits and that ignoring them could endanger the human species itself.¹⁰⁸ In the late 1950s and early 1960s, a new protest movement took shape in the context of these debates, centered on growing environmental degradation and human attitudes towards the planet Earth. The movement focused not only on natural resources but also on issues like population growth, pollution, economic development, and capitalism itself.¹⁰⁹

This new environmental movement and the debate surrounding environmental degradation spawned several international conferences. The first of these, the Intergovernmental Conference for Rational Use and Conservation of the Biosphere (known as the Biosphere Conference) took place in Paris in September 1968 and was organized by UNESCO; its goal was to discuss the consequences of human action on the biosphere, such as the effects of air and water pollution and deforestation.¹¹⁰

¹⁰⁶ Keith Thomas, *O homem e o mundo natural: mudança de atitudes na Inglaterra 1500-1800* (São Paulo: Companhia das Letras, 1988); John McCormick, *Rumo ao Paraíso: A História do Movimento Ambientalista* (Rio de Janeiro: Editora Relume Dumará, 1992), 16.

¹⁰⁷ Donald Worster, *Healing the Planet*. In: *Nature's Economy – A History of Ecological Ideas* (New York: Cambridge University Press, 1994), 342-387.

¹⁰⁸ José E. Viola, "O movimento ecológico no Brasil (1974-1986): do ambientalismo à ecopolítica", *Revista Brasileira de Ciências Sociais* 3, 93 (1986): 5-26.

¹⁰⁹ McCormick, *Rumo ao Paraíso*, 61.

¹¹⁰ *Idem*, 98.

The United Nations Conference on the Human Environment was subsequently scheduled for 1972, in Stockholm, Sweden. The conference agenda, defined at preparatory meetings held in 1970 and 1971, listed such topics as human settlement, natural resource administration, pollution control, education, the environment, and development. These preparatory meetings also drafted a report entitled *Only One Earth*, which informed discussions at the Stockholm Conference, although the document was only published in 1973.¹¹¹

The conference also discussed the ideas presented in the book *The Limits to Growth*, published in 1972 by the Club of Rome.¹¹² Compiled by the Massachusetts Institute of Technology (MIT) under the direction of Dennis Meadows, this report presented the findings of a scientific study meant to inform future decisions.¹¹³ The authors reached the conclusion that the depletion of natural resources and high mortality rates caused by pollution and food insecurity would reach catastrophic levels within one hundred years.¹¹⁴ The report urged reliance on new scientific knowledge, socioeconomic change, and “zero growth” as strategies for avoiding tragedy—in other words, economic and population growth had to be halted to forestall future hunger and pollution.¹¹⁵ Despite the criticisms directed at it, *The Limits to Growth* put the topic of environmental issues “on the agenda of everyday matters.”¹¹⁶

Held on June 5-16, 1972, the Stockholm Conference was attended by 113 countries, including Brazil, and more than 400 governmental and nongovernmental organizations. The resultant Stockholm Declaration presented a list of Principles plus an Action Plan. The document was not intended to define mandatory clauses but

¹¹¹ *Ibidem*, 104.

¹¹² The association was founded in 1968 by Aurélio Peccei, an Italian industrialist and chair of NATO's Economics Committee, during a ceremony that took place at the Rockefeller family estate in Bellagio, Italy. Comprising journalists, scientists, industrialists, and educators, the Club of Rome was intended as a forum for discussions on the global system that could foster new attitudes, policies, and institutions, including the fight against environmental degradation. On the Club of Rome, see: Leandro D. de Oliveira, “A geopolítica do desenvolvimento sustentável: um estudo sobre a Conferência do Rio de Janeiro (Rio-1992)”, (Tese de Doutorado, Universidade Estadual de Campinas/Unicamp, 2011), 34; McCormick, *Rumo ao Paraíso*, 86.

¹¹³ Iris Borowy, “Global Health and Development: Conceptualizing Health between Economic Growth and Environmental Sustainability”, *History of Medicine and Allied Sciences* 68, 3 (2013): 463.

¹¹⁴ McCormick, *Rumo ao Paraíso*, 88.

¹¹⁵ *Idem*, 92-93.

¹¹⁶ Oliveira, “A geopolítica do desenvolvimento”, 37.

rather to outline essential arguments that might lead to action against environmental deterioration.

In the 1970s, the environmental damages caused by the pursuit of economic development came to be regarded as a global problem, in contrast with the view that had prevailed in the First World in earlier decades, when environmental issues were seen as specific to each country.¹¹⁷ From this perspective, joint solutions were needed, and the environment became an essential discussion topic for governments and a matter to be considered when drafting development policies. Environmental issues gained greater visibility worldwide, including in Brazil, where the degradation of natural resources was increasingly evident and emerging environmental groups were defending their preservation.

In this context, at the same time that Brazil's military government structured its agricultural modernization programs around Green Revolution ideas and implemented policies to encourage the use of agrochemicals, like the 1975 National Pesticide Plan, it also adopted a perfunctory policy that suggested the country was fulfilling the clauses of the Stockholm Declaration. In 1973, for example, Brazil opened its Special Office for the Environment (Secretaria Especial de Meio Ambiente, or SEMA).¹¹⁸ Similarly, a number of laws and decrees regulating the use of natural resources were enacted during the same period. Another government strategy was to take part in international agreements; from 1972 to 1984, Brazil signed fifteen such agreements addressing a variety of topics, like safeguarding the Atlantic Forest, promotion of climate change studies, and protection of the ozone layer. The Amazon region was the specific target of five of these fifteen agreements.

Starting in the 1970s, Brazil witnessed the greatest forest destruction ever recorded, a consequence of escalating environmental devastation, wrought by the civilian-military dictatorship and its projects in roadbuilding (e.g., the Transamazonian highway), mining, hydroelectric dams, and large-scale settlement

¹¹⁷ Viola, "O movimento ecológico no Brasil", 6.

¹¹⁸ Governo do Brasil, Decreto nº 73.030, de 30 de Outubro de 1973. Cria, no âmbito do Ministério do Interior, a Secretaria Especial do Meio Ambiente - SEMA, e dá outras providências (Brasília: 1973). Disponível em: http://www2.camara.leg.br/legin/fed/decret/1970-1979/decreto-73030-30-outubro-1973-421650_publicacaooriginal-1-pe.html. Acesso em 31 de janeiro de 2017.

and agrarian modernization. Environmentalists, scientists, nongovernmental organizations (NGOs), and multilateral institutions around the globe reacted.¹¹⁹ The Amazon became synonymous with “tropical rainforest” and a symbol of the contemporary environmental movement, which was also taking shape during these decades.¹²⁰

While government discourse held that environmental preservation was one of the State’s priorities, economic growth remained the overarching goal for the dictatorship as well as for the first administrations following redemocratization. As we will see ahead, at a time when environmental agendas were going international and the Amazon was attracting global interest, Embrapa played a relevant role in adjusting and bringing Brazil’s plans for agricultural modernization up to date.

BRAZIL: THE PLANET’S BAD GUY?

Brazil experienced major changes beginning in the mid-1980s. After twenty-one years of military dictatorship, the country was no longer controlled by the armed forces. João Figueiredo, the last general-president, left power in 1985 following indirect presidential elections, which was the first step in the country’s redemocratization. However, the newly elected president, Tancredo Neves, passed away before taking office; his vice president, José Sarney, was sworn in and held office until 1990.

The demise of the dictatorship lent civil society more space for mobilizing and taking part in the formation of strategic political alliances, like those between social and environmental movements.¹²¹ As part of this tendency, the rubber-tapper movement formed in the Amazon in the late 1970s; leaders like Francisco Mendes Filho, better known as Chico Mendes, moved into the spotlight. The group took a strong stand against agricultural projects in the Amazon region that sought to occupy

¹¹⁹ José Augusto Pádua, “A. Tropical Forests in Brazilian Political Culture: From Economic Hindrance to Endangered Treasure” in *Endangerment, Biodiversity and Culture*, eds. Fernando Vidal, Nélia Dias (London: Routledge, 2015), 148-171.

¹²⁰ Antoine Acker, “O maior incêndio do planeta”: como a Volkswagen e o regime militar brasileiro acidentalmente ajudaram a transformar a Amazônia em uma arena política global, *Revista Brasileira de História*, 34, 68 (2014): 13-33; Antoine Acker, *Volkswagen in the Amazon: The Tragedy of Global Development in Modern Brazil* (Cambridge: Cambridge University Press, 2017).

¹²¹ Juliana Santilli; Márcio Snatilli, “Desenvolvimento socioambiental: uma opção brasileira” in *Desenvolvimento, Justiça e Meio ambiente*, ed. José A. Pádua (Belo Horizonte: Editora UFMG, 2009), 216-241.

rubber tree areas and that often used violence to intimidate workers, burning homes and plantations. Under Chico Mendes's leadership, the rubber trappers called attention to the cause of forest harvester groups. In 1985, the First National Rubber Tappers Meeting (I Encontro Nacional dos Seringueiros) was held in Brasilia, where it was attended by union leaders from around the Amazon, as well as by students, members of Congress, teachers, and others. The meeting led to the formation of the National Rubber Tappers Council (Conselho Nacional dos Seringueiros, or CNS), which advocated the establishment of so-called extractive reserves, that is, areas reserved specifically for rubber tappers, an idea patterned after Indigenous reserves. The meeting also presented a new model for agrarian reform as an alternative approach for developing the Amazon region.¹²² Chico Mendes became leader of the CNS in 1988, a position that earned him fame both at home and abroad. Over the years, the CNS entered into alliances with Brazil's Green Party (Partido Verde), Brazilian and international NGOs, and the Union of Indigenous Nations (União das Nações Indígenas), in the latter case to form the Alliance of Forest Peoples (Aliança dos Povos da Floresta).

Chico Mendes was murdered by a rancher in Xapuri in December 1988, and his death reverberated around the world. In January 1989, for example, an ecumenical service was held in his memory in Washington DC.¹²³ The rubber-tapper movement became a transnational movement linking local, national, and global efforts.

The movement's success also had to do with events at the world level. In the 1980s, US environmental groups comprising both scientists and citizens launched a campaign to protect tropical rainforests, which were being destroyed by burn-offs.¹²⁴ It was during this same period that scientific investigation confirmed the theory that carbon atoms might thin the ozone layer.¹²⁵ In 1988, the World Meteorological Organization (WMO) and the United Nations Environmental Programme (UNEP)

¹²² Mauro W. B. Almeida, "Direitos à floresta e ambientalismo: seringueiros e suas lutas", *Revista Brasileira de Ciências Sociais* 19, 55 (Junho 2004): 43-44.

¹²³ Manoel F. Brito, "Congresso dos EUA presta homenagem a Chico Mendes", *Jornal do Brasil*, 26 de Janeiro de 1989, 12.

¹²⁴ Mary Allegretti, "A construção social de políticas públicas. Chico Mendes e o movimento dos seringueiros", *Desenvolvimento e Meio Ambiente* 18 (2008): 56.

¹²⁵ John McNeill, *Something New Under the Sun: An Environmental History of the Twentieth-Century World* (New York: W. W. Norton, 2000).

formed the Intergovernmental Panel on Climate Change, or IPCC.¹²⁶ Despite persistent controversies surrounding the question of global warming, panel scientists urged governments to take measures to reduce the risk of raising the planet's temperature.¹²⁷ In their political positioning, industrial countries reacted to growing carbon dioxide concentrations in the atmosphere by reducing the issue to the matter of burn-offs in tropical rainforests, especially the Amazon forest, because this process released carbon dioxide.¹²⁸

With burn-offs in the Amazon blamed for atmospheric pollution, Brazil became the world's environmental bad guy. During this period, no other region of the planet attracted as much attention as the Amazon. According to some Brazilian periodicals, such as *Veja*, any project to make economic use of the area was accompanied by an "apocalyptic trumpet announcing the irreversible destruction of the Brazilian tropical jungle."¹²⁹ Worldwide public opinion, said the same issue of the magazine, believed that:

The Amazon's entrails were ablaze, setting off a fire whose flames could produce enough smoke to bring biblical retribution down on the Earth, as the irreversible heating of its surface [brought] an unending, sweltering summer. The global village has convinced itself that a green hell exists here and now in Brazil and that only an international campaign can save the world's lungs from its aggressors—burn-offs and deforestation. This image of a giant threatening to swallow up forests and spit out fire has traveled the world.¹³⁰

The dissemination of the image of Brazil as the chief culprit behind destruction of the ozone layer and the greenhouse effect, the campaigns by the Brazilian rubber-tapper and international environmentalist movements, and Chico Mendes's murder had such a great impact that the Brazilian government began encountering challenges abroad, including difficulties in sourcing loans from multilateral banks to settle its public accounts.¹³¹

¹²⁶ John R. McNeill; Peter Engelke, *The Great Acceleration: An Environmental History of the Anthropocene since 1945* (Cambridge, Massachusetts: Belknap Press of Harvard University, 2014), 77.

¹²⁷ Rosineide Bentes, "A intervenção do ambientalismo internacional na Amazônia", *Estudos Avançados* 19, 54 (2005): 228.

¹²⁸ Gerd Kohlhepp, "Desenvolvimento regional adaptado: o caso da Amazônia brasileira", *Estudos Avançados* 6, 11 (1992): 82.

¹²⁹ O choque do futuro na Amazônia real, *Veja*, ed. 1086, 5 de Julho de 1989, 59.

¹³⁰ Sinais de vida e morte no planeta verde: A ocupação da Amazônia tira o sono do mundo, mas é um desafio do qual os brasileiros não podem escapar, *Veja*, ed. 1086, 5 de Julho de 1989, 61.

¹³¹ "O cerco do verde: As queimadas da Amazônia e o assassinato de Chico Mendes criam uma inesperada dificuldade para o governo brasileiro negociar a dívida", *Veja*, ed. 1065, 1 de Fevereiro de 1989, 26.

This state of affairs also made itself felt at Embrapa because the government alleged it had to cut public agency funding. Moreover, agency work was aimed at executing mega-projects in the Amazon region that were then under attack by Brazilian and international environmental movements. In the context of debates about the need to protect the Amazon forest, the government tried to fine-tune the agency's role by introducing an agricultural model deemed "ecological," or sustainable; the agency announced that its priority would be to encourage research on biological control and reduce reliance on agrochemicals and chemical fertilizers in Brazilian agriculture.¹³²

Given this unstable state of affairs, agency heads published a number of documents aimed at revising and reorienting the agency's institutional tradition. Its institutional mission incorporated the need for more rational exploitation of natural resources and environmental preservation, realigning the agency with the new situation at home and abroad. The agency also produced documents redefining objectives in specific relation to the Amazon.¹³³

While Embrapa publications emphasized the alterations that were made to research guidelines, there were no major changes in lines of scientific investigation at the CPATU. From 1985 to 1989, research continued in areas related to the large agriculture, mining, and settlement projects designed during the civilian-military dictatorship. In terms of research that could be considered "ecological," some experiments were conducted on how to reduce the use of chemical products on crops. Along this line, researchers carried out four studies on green manure, one of which was aimed at improving soil fertility through the addition of organic matter, under the title "Avaliação de espécies nativas e introduzidas na Amazônia Oriental brasileira adequadas à adubação verde" (An evaluation of native species suitable for green manure, introduced in Brazil's Eastern Amazon).¹³⁴

¹³² "Embrapa quer uso menor de agrotóxico", *Folha de São Paulo*, 16 de Maio de 1985, 16.

¹³³ EMBRAPA, *O papel da Embrapa na Amazônia: pesquisa científica para o desenvolvimento com conservação ambiental* (Brasília: Departamento de Planejamento, 1989).

¹³⁴ EMBRAPA, Centro de Pesquisa Agropecuária do Trópico Úmido, *Relatório Técnico Anual do Centro de Pesquisa Agropecuária do Trópico Úmido 1985-1987* (Brasília: Embrapa-CPATU, 1989), 106-115.

This period also saw a significant increase in genetic research. Studies on the cloning of species were conducted as part of the effort to develop more productive, disease-resistant crops. Two experiments were done on black pepper, one of which sought to ascertain the most fungi-resistant cultivar, under the title “Inoculação de mudas cultivares, clones e espécies com os fungos *Fusarium solani f. sp. piperis* e *Phytophthora palmivora*” (The inoculation of cultivars, clones, and species with *Fusarium solani f. sp. piperis* and *Phytophthora palmivora* fungi).¹³⁵

Fernando Collor de Mello was sworn in as president of Brazil in 1990, following the first direct presidential elections since the end of the dictatorship.¹³⁶ A noted trait of the Collor administration was environmental rhetoric. During his inaugural speech, Collor insisted that his government would work to promote national development but with ecological considerations in mind.¹³⁷

This pro-environment rhetoric was one of the Collor administration’s political strategies for negotiating potential international investments and loans. This discourse also tied in with the more heated debates that followed the United Nations Conference on Environment and Development, or Earth Summit, held in Rio de Janeiro and known locally as Eco-92.¹³⁸ In 1990, to demonstrate his commitment to the matter, Collor invited the environmentalist José Lutzenberger¹³⁹ to assume the post of National Secretary of the Environment to the Presidency of the Republic (Secretário Nacional do Meio Ambiente da Presidência da República). Collor’s discourse, combined with José Lutzenberger’s appointment as environmental secretary, helped reshape the country’s image abroad, where Brazil was now seen as a country whose government was concerned with the preservation of the Amazon.¹⁴⁰

Collor embraced the precepts of economic neoliberalism, opening up trade and privatizing government-owned companies. The overall industrialization project,

¹³⁵ Idem, 442.

¹³⁶ Fausto, *História do Brasil*, 475-476.

¹³⁷ Governo do Brasil, *O Projeto de Reconstrução Nacional* (Brasília: 1990), 17.

¹³⁸ On the Rio de Janeiro Earth Summit, see: Oliveira, “A geopolítica do desenvolvimento sustentável”.

¹³⁹ On José Lutzenberger, see: Elenita M. Pereira, “Um protetor da natureza: trajetória e memória de Henrique Luiz Roessler,” (Dissertação de Mestrado, Universidade Federal do Rio Grande do Sul, 2011).

¹⁴⁰ Eurípedes Alcântara, “Os fuzileiros não vêm: O administrador da EPA, a agência ambiental dos Estados Unidos, diz que os brasileiros estão cuidando bem da Amazônia e falar em uso da força é ridículo”, *Veja*, ed. 1222, 19 de Fevereiro de 1992, 8.

which had entailed the modernization of agriculture and been characterized by heavy government intervention, was abandoned; development of the agricultural sector was no longer a priority political program on the administration's agenda. According to the Guidelines for Economic Policy in Agriculture (Diretrizes de Política Econômica para a Agricultura), drawn up under Collor, the government needed to have a smaller hand in agricultural production.¹⁴¹

These changes had a direct impact on Embrapa, generating institutional instability. Agency heads adopted the strategy of publishing documents indicating a re-orientation of Embrapa goals; they announced a restructuring that reflected a concern with enforcing new agricultural standards that would have a lower environmental impact. As part of this reformulation, the agency transformed all State-Level Research Units (UEPAEs) located in the Amazon region into Agroforestry Research Centers (Centros de Pesquisas Agroflorestais).

In 1991, the CPATU merged with the Belém State-Level Research Unit (Unidade de Execução de Pesquisa de Âmbito Estadual de Belém) to form the Eastern Amazon Agroforestry Research Center (Centro de Pesquisa Agroflorestal da Amazônia Oriental).¹⁴² That same year, cropping systems accounted for the absolute majority of research studies; in other words, instituting permanent, more profitable cropping systems remained a priority for this Embrapa unit. Echoing the late 1980s, researchers focused more attention on the area of genetic resources. For example, five activities were designed to collect genetic material on understudied Amazon plants with potential economic application, like patawa (*patauí*) and medicinal plants. Researchers also conducted six experiments to evaluate the progeny of cassava, *bacuri* (*Platonia insignis*), mallow, and guaraná, with a view to developing more productive cultivars. These progeny tests enable the genetic conservation of

¹⁴¹ Áureo E. M. Ribeiro, "A política agrícola do governo Collor", *Caderno de Economia* 4, 4 (Setembro 1991): 5-13.

¹⁴² EMBRAPA, Centro de Pesquisa Agropecuária do Trópico Úmido, *Proposta de estratégia para reestruturação do Centro de Pesquisa Agroflorestal da Amazônia Oriental* (Belém: Embrapa-CPATU/Embrapa UEPAE Belém, 1991).

populations, indicate the genetic structure and value of the genotype of the mother plants selected from the group, and lead to the production of improved seeds.¹⁴³

Similarly, from 1992 to 1993, researchers placed special emphasis on genetics. Some experiments, for example, involved species cloning. Along this line, genetic material was harvested from bacuri, which, according to the report, was an important fruit with tremendous economic potential that might vanish as land was taken over for agricultural purposes, making it essential to conserve this material for future genetic improvement.¹⁴⁴

Research continued on the use of fungicides, herbicides, and chemical fertilizers as part of the drive to foster agricultural productivity and forest exploitation. Although the activities report for 1991 stated that more attention would be paid to remote sensing, agroecology, and biotechnology, this did not translate into new research topics or any notable increase in studies in these fields.

FINAL CONSIDERATIONS

Embrapa is now Brazil's largest producer of agricultural technology and innovation. It was originally established to implement a modernization project in Brazil centered on the US agricultural model. Through its offices in the Eastern Amazon, studies and research were conducted to adapt the Green Revolution's technology package to this region and make agricultural activities possible within the agromineral exploitation hubs then being established there.

When environmentalism came on to the world stage and Brazil became the planet's bad guy at the same time that the country was undergoing redemocratization, the Brazilian government tried to show it had left the civilian-military dictatorship behind and introduced a "sustainable" agricultural model at Embrapa. To guarantee the agency's survival at a moment when environmental agendas were emerging and in the context of the day's political changes, agency heads released a series of

¹⁴³ EMBRAPA, Centro de Pesquisa Agropecuária do Trópico Úmido, *Relatório Técnico Anual do Centro de Pesquisa Agroflorestal da Amazônia Oriental 1991* (Belém: Embrapa/CPATU, 1992), 237.

¹⁴⁴ EMBRAPA, Centro de Pesquisa Agroflorestal da Amazônia Oriental, *Relatório Técnico Anual do Centro de Pesquisa Agroflorestal da Amazônia Oriental – CPATU 1992 a 1995* (Belém: Embrapa/CPATU, 1996), 114.

documents intended to realign institutional traditions with the new context. During the Collor administration, the CPATU was transformed into the Agroforestry Research Center for the Eastern Amazon.

While Embrapa documents state that the agency was shifting to a pro-environmental preservation stance, it did not abandon research aimed at greater agricultural productivity. The biggest change in CPATU activities during this period was greater emphasis on a topic already being explored, that is, genetic research. The aim was to develop genetically modified organisms (GMOs) to reduce the use of fungicides, herbicides, and chemical fertilizers, since agency researchers believed this technology would have a lower environmental impact. However, controversy still surrounds the impact of GMOs and transgenic organisms on human and environmental health.

The question of development programs and how to tailor them to environmental preservation remains a subject of controversy in Brazil and abroad. Internationally, there is continued debate about how to achieve so-called sustainable development, which supposedly links economic and environmental goals so that today's needs are met without jeopardizing future generations' ability to meet theirs. Sustainable development is not about ending economic growth but about finding new ways to reconcile economic and social growth with the rational use of natural resources.

Recent decades have seen a number of transnational agreements to define sustainable development goals. The latest of these was a United Nations resolution adopted in September 2015 under the title *Transforming Our World: the 2030 Agenda for Sustainable Development*. The document outlines seventeen sustainable development goals and 169 targets to be reached by participating countries from 2016 to 2030. Since its adoption, the agenda has been criticized for various reasons, including its failure to address the production and consumption patterns of current economic models.

Domestically, exploitation of the Amazon region has been a main target of controversies over development. Recently, the eyes of the world turned back to the

Amazon because of record deforestation in 2019. The Brazilian and foreign press have increased their coverage of the region, including not only fires but also the expansion of agricultural and livestock production frontiers, exploitation of the hydrological network for energy production, illegal mining, the actions of mining and logging companies in the region and their brutal violence against forest peoples, and the bloody conflicts between wildcat miners, squatters, landgrabbers, and traditional communities, especially the Indigenous. Journalists have also reported on the environmental and human impact of large modernization projects like the Belo Monte hydropower plant; joining with scientists from various fields, they have also warned that the forest is reaching the tipping point, after which its ecosystems will no longer be able to regenerate, eventually converting the rainforest into a tropical savannah.¹⁴⁵

These examples illustrate both how exploitation of the Amazon remains a topic of much international interest and how challenging it still is to define strategies aimed at sustainable development compatible with environmental preservation not just in this region but worldwide. As we witness the worsening of the climate crisis in the Anthropocene, many actually consider the notion of sustainable development oxymoronic. Proponents of this newly proposed geologic time period, which is still being discussed, argue that the Amazon is now “the center of the world.” Under this banner, scores of scholars, journalists, and activists in Brazil and abroad have warned about the accelerating pace of environmental degradation in this biome. In terms of the climate emergency, the transformation of the rainforest poses unprecedented risks, since the Amazon forest and basin, as a biophysical system, is key to regulating the world’s climate. According to these thinkers, the Amazon constitutes the number-one global concern today. Unfortunately, we have ignored these warnings, and current devastation of this biome seems to rival that of the 1970s.

This article has examined local applications of international projects for the exploitation of agricultural commodities, like the Green Revolution, and has shown that exploitation of the Amazon rainforest reached an unparalleled pace at the same time that the biome became a global symbol for the environmental movement. In

¹⁴⁵ T. Lovejoy; C. Nobre, “Amazon tipping point: Last chance for action 2019”. *Science Advances* 5, 12 (2019), DOI: 10.1126/sciadv.aba2.

exploring this process, we took Embrapa as a case study in an analysis of the active, contradictory role played by the sciences in agricultural modernization projects in this region and the reverberation of environmental discourse. Scholars and experts from various scientific disciplines had a hand in facilitating programs and projects in natural resource exploitation that aligned with the political and economic goals of Brazil's dictatorial State, while also seeking to lessen ensuing environmental impacts on the biome, in step with the burgeoning international environmental movement.

This research agenda will be further explored under the aegis of the research project "A Amazônia como microcosmo do Antropoceno: a história das pesquisas transnacionais em ecologia amazônica e os impactos ambientais da Grande Aceleração (1952-2002)" (The Amazon as a microcosm of the Anthropocene: the history of transnational research in Amazon ecology and the environmental impact of the Great Acceleration [1952-2002]).¹⁴⁶ As historians of science, we feel it is imperative, as suggested by the anthropologist Anna Tsing, to understand the effects of the modernization projects in which the sciences participated heavily starting in the mid-twentieth century and to grasp "what went wrong." The future of the rainforest and the planet in the Anthropocene, to cite Tsing, will depend on this "failure science."¹⁴⁷

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Ciência e Revolução Verde na Amazônia Brasileira: a Criação da Embrapa entre a Ditadura Militar e os Movimentos Ambientalistas (1972-1991)

RESUMO

A Empresa Brasileira de Pesquisa Agropecuária (Embrapa) foi criada em 1972 durante a ditadura civil-militar brasileira com o objetivo de fomentar a modernização agrícola no país por meio da incorporação do pacote tecnológico da Revolução Verde, como o uso de insumos químicos, sementes híbridas de alto rendimento e mecanização da produção. Nesse artigo, busca-se compreender o contexto de criação da empresa e sua agenda de pesquisa científica para a agricultura brasileira, assim como os impactos da emergência dos movimentos ambientalistas nos debates sobre o aproveitamento econômico da Amazônia e o próprio perfil da instituição no período da redemocratização no Brasil. O foco da análise será a unidade localizada em Belém e fundada como Centro de Pesquisa Agropecuária do Trópico Úmido (CPATU) em 1975. Acompanharemos a trajetória da instituição até 1991, quando o CPATU foi transformado em Centro de Pesquisa Agroflorestal da Amazônia Oriental, sendo atualmente conhecido como Embrapa Amazônia Oriental.

Palavras-chave: Embrapa; Revolução Verde; ditadura civil-militar; Amazônia brasileira; movimentos ambientalistas.

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