Photo by Corey Raffel, Macaw Recovery Network

Pineapples, Parrots, and People: Challenges and Opportunities for the Great Green Macaw in Costa Rica

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Abstract

This report, requested by the Macaw Recovery Network (MRN), details the ways in which the rapidly growing pineapple industry in Costa Rica threatens the survival of the Great Green Macaw, an already endangered species. It specifically examines the impacts of the pineapple industry on the environment, labor rights, and public health. It also provides overviews of several initiatives aimed at amending the pineapple industry and offers suggestions for enhancing Great Green Macaw conservation efforts. Finally, the report outlines potential next steps for continued research that may be helpful to MRN's conservation efforts.

Introduction and Roadmap

In December 2020, the International Union for Conservation of Nature (IUCN) classified the Great Green Macaw, a parrot species known for its "beauty, intelligence, and charisma,"[1] as critically endangered, meaning that it faces an extremely high risk of extinction in the wild. Over the past 15 years, the numbers of wild Great Green Macaws have "fallen from about 1,500 to 3,000 birds worldwide in 2005, to 500 to 1,000 in 2020."[2]

The range of the Great Green Macaw is fairly small. Of its two subspecies, *A. a. guayaquilensis*, inhabits a small range in Ecuador and possibly south-western Colombia, while *Ara ambiguus*, the subject of this report, inhabits Columbia, Costa Rica, Ecuador, Honduras, Nicaragua, and Panama.[3] The map below depicts the range of both subspecies.[4]

Map by Ara Manzanilla

Within these range nations, Great Green Macaws typically inhabit "humid lowland deciduous forests and forest edges, where they rely on mountain almond trees both as a source of food and also as nesting sites."[5] Great Green Macaws lay up to three eggs a year,[6] although often only one chick reaches adulthood.[7] Pairs also may mate unsuccessfully, and many lose all chicks before they can successfully fledge.[8]

Great Green Macaws face rampant poaching in parts of their native territory, including Honduras and Guatemala, primarily in the form of stealing

[1] *Threatened Species*, Macaw Recovery Network, https://macawrecoverynetwork.org/the-network/threatened-species/ (last visited, April 29, 2021).
[2] *Great Green Macaws Officially Listed as Critically Endangered by IUCN*, Macaw Recovery Network (Dec. 14, 2020), https://macawrecoverynetwork.org/great-green-macaws-officially-listed-as-critically-endangered-by-iucn/
[3] *Great Green Macaw*, World Land Trust, https://www.worldlandtrust.org/species/birds/great-green-macaw/#:~:text=One%20inhabits%20Central%20America%20and,and%20possibly%20south%2Dwestern%20Colombia (last visited, April 29, 2021).
[4] Map of "Great Green Macaw Population Distribution" taken from: Ara Manzanillo, *Meet the Great Green Macaw*, Ara Manzanillo, https://aramanzanillo.org/about/meet-the-great-green/ (last visited April 24, 2021).
[5] *Great Green Macaw*, World Land Trust, https://www.worldlandtrust.org/species/birds/great-green-macaw/#:~:text=One%20inhabits%20Central%20America%20and,and%20possibly%20south%2Dwestern%20Colombia (last visited, April 29, 2021).
[6] *Threatened Species*, Macaw Recovery Network, https://macawrecoverynetwork.org/the-network/threatened-species/ (last visited, April 29, 2021).
[7] *Recovery Program: 4 Pillars of Our Recovery Program*, Macaw Recovery Network, https://macawrecoverynetwork.org/the-network/recovery-program/ (last visited Dec. 23, 2020).
[8] *Id.*

chicks and eggs to sell in illegal wildlife trade.[9] Although less information exists on illegal poaching in Costa Rica, recent reports provide evidence of the practice, detailing incidents of "people asking community members for Great Green Macaw eggs."[10] Researchers have found that "although poaching is a threat to the GGM [Great Green Macaw] population in the country historical deforestation and the consequent habitat fragmentation have been to blame for the dramatic decline of Green Macaws, specifically during the 1980s and 1990s when habitat loss was estimated at around 90%."[11]

In Costa Rica, the rapidly growing pineapple industry has dire implications for the Great Green Macaw population's long-term viability. While the pineapple industry offers tremendous economic opportunities for individuals, communities, and the nation, it also has negative environmental and social impacts that threaten macaws, communities, and the ecosystems they share.

This report responds to a request from the Macaw Recovery Network (MRN), a conservation and advocacy organization based in Costa Rica, to identify challenges with and opportunities for conserving the Great Green Macaw in the nation. Specifically, MRN notes that while Costa Rica is, in many respects, a beacon of hope for global conservation efforts, the nation as whole, as well as its Great Green Macaw population specifically, face considerable challenges. In line with its mission to "recover endangered neotropical parrot populations,"[12] MRN seeks opportunities to address challenges and develop solutions to the negative social and environmental externalities of the pineapple industry on the macaws.

The report begins with a diagnostic section that details the economic, social, and ecological impacts of the pineapple industry in Costa Rica. It then explores various government, NGO, and private sector initiatives and opportunities for change. Finally, the report discusses possibilities for future research, with a focus on meaningful opportunities that could help MRN further its mission and represent the interests of the Great Green Macaw.

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[9] *See* Joyner & Portillo-Reyes, *Seven Years of Parrot Conservation in La Moskitia, Honduras*, 32:2 J. Avian Med. 144, Surg. (June 2018), https://www.academia.edu/36897628/Seven_Years_of_Parrot_Conservation_in_La_Moskitia_Honduras.

[10] Mario Jiménez Segura, *Notes on the 2019-2020 Great Green Macaw Breeding Season*, Macaw Recovery Network (Aug. 1, 2020), https://macawrecoverynetwork.org/notes-on-the-19-20-great-green-macaw-breeding-season/.

[11] *Id.*

[12] *About us*, The Macaw Recovery Network, https://macawrecoverynetwork.org/the-network/ (last visited, April 29, 2021).

Exploring the Pineapple Industry: Economic, Social, and Ecological Impacts

To grasp fully the current plight of Costa Rica's Great Green Macaws, one must understand the complex economic, social, and ecological impacts of the nation's pineapple industry. This section begins with an examination of the Costa Rican economy and the economic impacts of the pineapple industry. It then turns to the social impacts of the pineapple industry, with a particular focus on labor issues. Finally, the section addresses the ecological impacts of the pineapple industry.

Overview of Costa Rica's Economy

Costa Rica is classified by the World Bank[13] as an upper-middle-income country, "showing steady economic growth over the past 25 years."[14] The World Bank attributes this uptick in economic development to "an outward-oriented strategy, based on the openness to foreign investment and gradual trade liberalization."[15] Despite these advances, structural inequalities, and particularly income inequality, remain significant challenges in the nation.[16]

As of 2019, Costa Rica's population totaled 5.1 million,[17] with just over 80% living in urban centers.[18] That year, the country's GDP was 61.8 billion USD.[19] The majority of the GDP is generated through the service sector (69.6%), followed by industry (18.47%) and agriculture (4.25%).[20] Historically, Costa Rica's main exports were coffee and bananas, but in 1998, technology exports overtook them.[21] In recent years, Costa Rica has seen rapid growth of a number

[13] For more information on the World Bank, its institutions, and its functioning, *See, Who We Are*, The World Bank, https://www.worldbank.org/en/who-we are#:~:text=The%20World%20Bank%20Group%20is%20one%20of%20the%20world's%20largest,prosperity%2C%20and%20promoting%20sustainable%20development(last visited, April 29, 2021).
[14] *The World Bank in Costa Rica: Overview*, World Bank (last updated April. 6, 2021), https://www.worldbank.org/en/country/costarica/overview.
[15] *Id.*
[16] OECD, *Costa Rica Policy Brief: Inequality* (Feb. 2016), https://www.oecd.org/policy-briefs/costa-rica-towards-a-more-inclusive-society.pdf.
[17] *Countries: Costa Rica*, FocusEconomics (Nov. 10, 2020), https://www.focus-economics.com/countries/costa-rica.
[18] H. Plecher, *Urbanization in Costa Rica 2009-2019*, Statista (Nov. 17, 2020), https://www.statista.com/statistics/443981/urbanization-in-costa-rica/#:~:text=In%202019%2C%2080.08%20percent%20of,was%20living%20in%20urban%20areas.
[19] *Countries: Costa Rica*, FocusEconomics (Nov. 10, 2020), https://www.focus-economics.com/countries/costa-rica.
[20] Aaron O'Neill, *Distribution of Gross Domestic Product (GDP) across economic sectors Costa Rica 2019*, Statista (last updated April 1, 2021), https://www.statista.com/statistics/443233/costa-rica-gdp-distribution-across-economic-sectors/.
[21] *Costa Rican Economy*, CostaRica.com (last updated July 11, 2016), https://www.costarica.com/business/costa-rican-economy.

of export-driven industries including medical instruments, orthopedic appliances, and pharmaceuticals.[22]

In 2019, Costa Rica was awarded the United Nations Environment Programme's Champions of the Earth Award for policy leadership "in recognition of its decades-long commitment to ambitious policies to combat climate change and protect the planet's natural resources," including its comprehensive plan to decarbonize its economy by 2050.[23] Although Costa Rica long has been celebrated for pioneering programs related to deforestation and eco-tourism,[24] and even as green programs gain traction in Costa Rica, large-scale agriculture, livestock, and logging operations continue to have widespread impacts in the country. This is especially true for the pineapple industry, which has seen exponential growth in the 21st century, "with exports increasing by more than 200 percent from 2000 to 2013."[25]

The Economics of Pineapples

In 2019, Costa Rica exported 43.8% of the world's total exported pineapples,[26] making it the largest exporter of the tropical fruit in the world. Major importers of Costa Rican pineapples include the United States, Netherlands, Japan, Canada, and the United Kingdom.[27] To accommodate the global demand, the pineapple industry in Costa Rica annually employs 32,000 workers.[28] Approximately 70% of these workers are Nicaraguan immigrants.[29]

Major multinational corporations control most of Costa Rica's pineapple industry, and gain most of the profits. For example, of the profits from pineapples exported to Germany, retailers get 42.6%, producers get 24.8%, and workers get only 9.7%.[30] Major companies operating in Costa

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[22] *Costa Rica*, The Observatory of Economic Complexity, https://oec.world/en/profile/country/cri#:~:text=Exports%3A%20The%20top%20exports%20of,%2C%20and%20Guatemala%20(%24571M) (last visited, April 29, 2021).
[23] *Costa Rica: the 'living Eden' designing a template for a cleaner, carbon-free world*, UN Environment Programme (Sept. 20, 2019), https://www.unenvironment.org/news-and-stories/story/costa-rica-living-eden-designing-template-cleaner-carbon-free-world.
[24] *See* LaMay, Jessica, et al., *The Politics of Pineapple: Examining the Inequitable Impacts of Southern Costa Rica's Pineapple Industry*, Journal of Public and International Affairs, Princeton University (2020), https://jpia.princeton.edu/news/politics-pineapple-examining-inequitable-impacts-southern-costa-ricas-pineapple-industry.
[25] *Id.* (citing, Maglianesi-Sandoz, María Alejandra, *Desarrollo de las piñeras en Costa Rica y sus impactos sobre ecosistemas naturales y agro-urbano*, Biocenosis 27, no. 1-2 (2013)).
[26] Daniel Workman, *Pineapple Exports by Country*, World's Top Exports, Nd. http://www.worldstopexports.com/pineapples-exports-by-country/ (last visited, April 29, 2021).
[27] UNCTAD Trust Fund on Market Information on Agricultural Commodities, *Pineapple: An INFOCOMM Commodity Profile* (2016), https://unctad.org/en/PublicationsLibrary/INFOCOMM_cp09_Pineapple_en.pdf
[28] *Our Work in Costa Rica with SITRAP*, BananaLink, https://www.bananalink.org.uk/partners/costa-rica/ (last visited April 29, 2021).
[29] Kim Thelwell, *Costa Rica's Pineapple Industry*, The Borgen Project (Nov. 14 2019), https://borgenproject.org/costa-ricas-pineapple-industry/.
[30] Oxfam, *Sweet Fruit, Bitter Truth*, page 13 (May 2016), https://www.oxfam.de/system/files/20160531-oxfam-sweet-fruit-bitter-truth-en.pdf.

Rica include PINDECO, a subsidiary of Del Monte, and Dole, both of which are U.S.-owned. Del Monte and its subsidiaries produce over 50% of Costa Rica's pineapples.[31] While most production occurs on large plantations, smaller pineapple farms do exist, but are less present in major markets. Medium-sized Costa Rican owned pineapple farms also exist, such as Grupo Acón and Chestnut Hill Farms. However, companies such as Del Monte frequently rent or buy land from small producers, who often are ridden with debt and unable to compete in the global market. Many retailers now skip the middlemen, buying directly from producers.[32]

Photo of a Pineapple Plantation in Costa Rica, courtesy of Del Monte Europe

The pineapple industry saw rapid growth in 2002 with the introduction of the "golden" hybrid pineapple variety.[33] This, along with increasing demand for tropical fruit products (including fresh fruit, canned products, and fruit juices),[34] has driven a decrease in the coffee and banana industry, which historically had been the main agricultural products of the Costa Rican economy.[35] The rapid growth of the pineapple industry has contributed to increased economic development in the country, making up about around 10% of the country's exports,[36] as well as to improvements in

[31] *All About Pineapples*, Banana Link, www.bananalink.org.uk/why-pineapples-matter/ (last visited April 29, 2021).
[32] Oxfam, *Sweet Fruit, Bitter Truth*, page 14 (May 2016), https://www.oxfam.de/system/files/20160531-oxfam-sweet-fruit-bitter-truth-en.pdf.
[33] *CR's Pineapple Production: High Quality Standards*, CANAPEP, https://canapep.com/c-rs-pineapple-production-high-quality-standards/ (last visited April 29, 2021).
[34] Food and Agriculture Organization of the United Nations, *The successes and shortcoming of Costa Rica exports diversification policies*, page 14 (2018) http://www.fao.org/3/I8308EN/i8308en.pdf.
[35] *Id.* at vii.
[36] "The National Institute of Statistics and Censuses (INEC) released a preliminary report showing that bananas and pineapples together represented 16.2 percent of the total value exported by Cost Rica during 2020, according to Nacion, a Costa Rican reporting agency. The country exported $1.118 billion in bananas, which represented 8.93 percent of the value exports, while pineapples totaled $910 million, representing 7.27 percent of the value exports." *Bananas and pineapples top Costa Rica's exports in 2020*, Blue Book Services (April 9, 2021),

local infrastructure.[37] The pineapple industry now contributes over $800 million USD to the country's GDP each year.[38] With increased availability and demand for pineapples worldwide, prices have dropped. [39] While this benefits consumers, it harms workers.

Even with the industry's growing economic success, poverty rates suggest that local economies are not benefiting as much as expected from hosting the industry.[40] This is due, in part, to the fact that while unskilled labor is sourced locally, managerial positions often are given to Costa Ricans in other parts of the country or otherwise outsourced.[41] In addition to economic inequities, widespread concern persists about the many social and ecological imbalances and abuses inherent in the mainstream production of the fruit. The sections below detail these negative externalities and their impacts.

The Social Impacts of the Pineapple Industry

Although the pineapple industry has a largely positive, albeit unequally distributed, economic impact on the nation, it also creates several negative social impacts, particularly in terms of labor issues. Widespread subcontracting practices, coupled with union repression, exacerbate the labor issues, including low wages, gender discrimination, and hazardous work conditions, which in turn have cascading effects in communities. These social issues inextricably are tied to the fate of the macaws. In the hierarchy of needs, attending to the ecology of wildlife invariably takes a back seat to human health and socio-economic struggles. Moreover, efforts to correct negative social impacts could lead to actions that also benefit the environment. Put simply, one cannot fix the macaws' problems without addressing social challenges and addressing these social challenges can help the macaws.

With the scale of pineapple production ranging from small family farms to large corporate plantations, the widespread use of subcontracting is not surprising. It is, however, problematic on several fronts. Specifically, subcontracting may mute workers' ability to levy complaints about

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https://www.producebluebook.com/2021/04/09/bananas-and-pineapples-top-costa-ricas-exports-in-2020/#:~:text=The%20country%20exported%20%241.118%20billion,percent%20of%20the%20value%20exports.

[37] Robert B. Richardson, et al., *Using Choice Experiments to Understand Household Tradeoffs Regarding Pineapple Production and Environmental Management in Costa Rica*, J. Envtl. Mgmt., Academic Press (June 24, 2013), www.sciencedirect.com/science/article/pii/S0301479713003721.

[38] *UNDP supports Costa Rica's pineapple sector to take critical steps towards sustainability*, UNDP (March 3, 2016), https://www.undp.org/content/undp/en/home/presscenter/pressreleases/2016/03/03/undp-supports-costa-rica-s-pineapple-sector-to-take-critical-steps-towards-sustainability.html.

[39] Anna Hommel, *Global Market Update: Pineapple*, Tridge (March 4, 2020), https://www.tridge.com/stories/global-market-update-pineapple

[40] LaMay, Jessica, et al., *The Politics of Pineapple: Examining the Inequitable Impacts of Southern Costa Rica's Pineapple Industry*, Journal of Public and International Affairs, Princeton University (2020), https://jpia.princeton.edu/news/politics-pineapple-examining-inequitable-impacts-southern-costa-ricas-pineapple-industry.

[41] *Id.*

conditions, create financial instability for workers' families, and enable plantations to both increase the number of violations and avoid responsibility.[42]

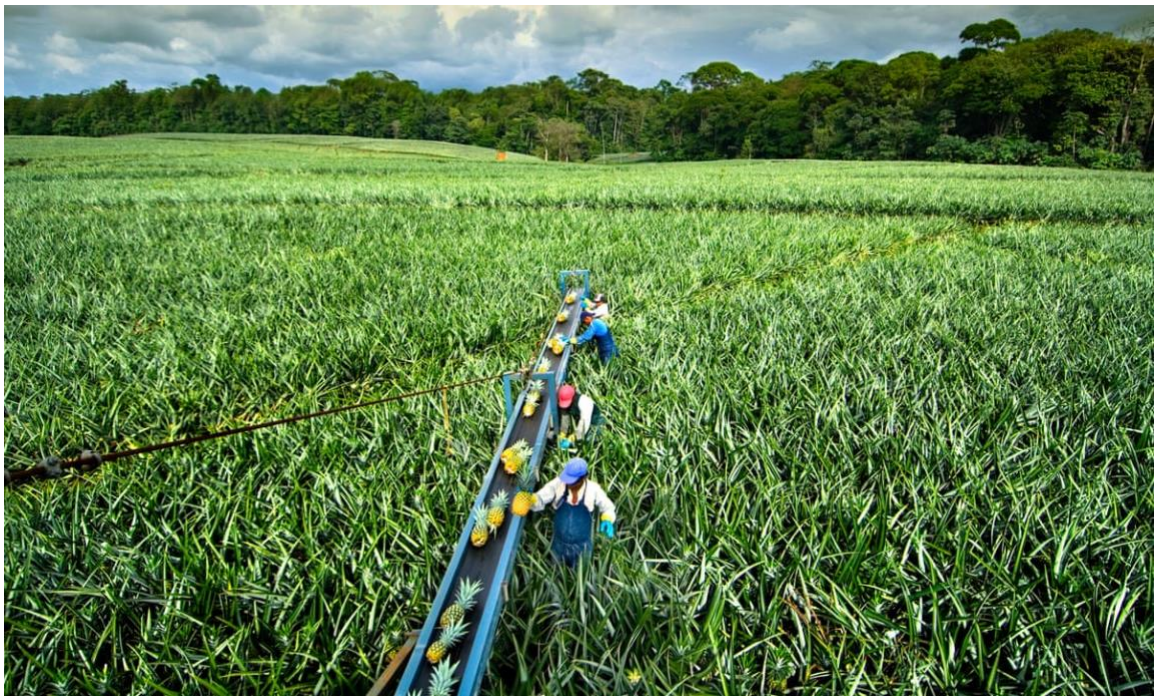

Photo by Anthony John Coletti, *The Guardian*

Subcontracting also helps enable union repression. Currently, less than 2% of pineapple workers are part of a union.[43] Most fear joining a union due to blacklisting, a practice in which unionized workers are barred from employment.[44] Farms also use "anti-union tactics," such as massive layoffs, prohibiting union representatives from entering farms, and not acknowledging unions.[45] About 70% of pineapple workers are migrants from Nicaragua, and many fear deportation if they speak out about working conditions.[46]

Together, subcontracting and union repression reinforce other labor challenges in the pineapple industry, including low pay, gender discrimination, and hazardous working conditions. Workers

[42] International Labor Rights Forum, *The Sour Taste of Pineapple: How an Expanding Export Industry Undermines Workers and Their Communities*, (Oct. 20, 2008), https://laborrights.org/sites/default/files/publications-and-resources/ILRF_pineapplereport.pdf.
[43] *Id.* at 4.
[44] *Id.* at 24.
[45] *Id.* at 23-25.
[46] Kim Thelwell, *Costa Rica's Pineapple Industry*, The Borgen Project (Nov. 14 2019), https://borgenproject.org/costa-ricas-pineapple-industry/.

in the pineapple industry typically receive low wages. Many pineapple farm laborers work 10 to12 hours a day, 6 days a week, for an average of $1 to $2 per hour without benefits.[47]

Women in the pineapple industry face additional challenges, including gender discrimination in terms of the kinds of jobs, wages, and benefits available to them.[48] On most farms, women are barred from laborious work in the fields, which pays much higher wages. Instead, most women work in packaging, where productivity measures determine income and make it harder to earn a decent wage.[49] Moreover, women typically are not provided childcare or maternity leave.[50]

Pineapple farms also have hazardous working conditions resulting from open, unshaded fields, dangerous machinery, pesticide usage, and ineffective protective clothing.[51] Pineapples are typically planted as a monoculture, or the only crop on a farm, which means there are no trees to provide shade and relief from consistent heat.[52] Workers also experience joint and back pain from lifting heavy loads for many hours. Further, operating heavy machinery under a tight schedule and in extreme heat often results in user error and consequent injury.[53]

Monoculture practices also result in the heavy and frequent use of pesticides. According to Costa Rican national law, workers can only work with chemicals up to 6 hours a day, but some report working up to 16 hours per day with pesticides.[54] While most plantations provide protective equipment from pesticide sprays, they do not provide replacements or a way to wash them. This forces workers to use damaged, insufficient, and unclean gear. Many workers have reported developing skin conditions, stomach issues, and cancers.[55]

Deleterious health effects are not limited to workers, but also impact communities near pineapple farms, due to contamination of air and drinking sources by pesticides.[56] In cultivating areas where

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[47] International Labor Rights Forum, *The Sour Taste of Pineapple: How an Expanding Export Industry Undermines Workers and Their Communities*, page 3 (Oct. 20, 2008), https://laborrights.org/sites/default/files/publications-and-resources/ILRF_pineapplereport.pdf.
[48] *Id.*
[49] *Id.* at 19.
[50] Georgia Orenstein, *Costa Rica's Pineapple Industry*, (Dec. 16, 2018), https://borgenproject.org/costa-ricas-pineapple-industry/.
[51] LaMay, Jessica, et al., *The Politics of Pineapple: Examining the Inequitable Impacts of Southern Costa Rica's Pineapple Industry*, Journal of Public and International Affairs, Princeton University (2020), https://jpia.princeton.edu/news/politics-pineapple-examining-inequitable-impacts-southern-costa-ricas-pineapple-industry.
[52] *All About Pineapples*, Banana Link, www.bananalink.org.uk/why-pineapples-matter/ (last visited April 29, 2021).
[53] Michael J. Miller, *Persistent Illegal Logging in Costa Rica: The Role of Corruption Among Forestry Regulators*, 20:1 J. Environ. Dev. 50 (Mar. 2011).
[54] Kim Thelwell, *Costa Rica's Pineapple Industry*, The Borgen Project (Nov. 14, 2019), https://borgenproject.org/costa-ricas-pineapple-industry/.
[55] Oxfam, *Sweet Fruit, Bitter Truth*, page 3 *(*May 2016), https://www.oxfam.de/system/files/20160531-oxfam-sweet-fruit-bitter-truth-en.pdf.
[56] *Id.* at 2, 27.

Box 1: Community Members as a Stakeholder

Local news articles suggest that certain areas of Costa Rica are actively working against expanding the pineapple industry. Currently, 16 out of 82 cantons have plantations. As a result, areas such as Pococí and Guácimo have created moratoriums to prevent expansion. However, a study conducted in Límon shows that many Costa Ricans, such as in Pococí where there has been lesser conflict concerning plantations, are willing to support tradeoffs to continue pineapple production. The study shows that most Costa Ricans see pineapple production as both beneficial and problematic, and most are also willing to make tradeoffs to amend the sector. For example, many people support restricting the farm size, regulating the number of pesticides used, requiring soil conservation, and implementing government monitoring. Most are willing to accept use of a moderate number of pesticides if environmental protections are not too costly and allow Costa Rican pineapples to remain competitive in the international market.

[*] For more information, see Robert B. Richardson, et al., *Using Choice Experiments to Understand Household Tradeoffs Regarding Pineapple Production and Environmental Management in Costa Rica*.

potable water is contaminated, communities must purchase expensive water tankers for drinking, but there is typically not enough for bathing or washing clothes.[57] Further, as pesticide usage depletes soil quality, it also impacts ecosystems.[58] Soil erosion can increase susceptibility to drought, turn into runoff and leak into waterways, and impact crop and plant growth.[59]

In sum, the pineapple industry in Costa Rica creates several negative social impacts, including numerous labor issues. Specifically, subcontracting and union repression reinforce challenges with low wages, gender discrimination, and hazardous work conditions, which in turn create problems for communities. Arguably, people will not attend to macaws and the conservation of other species until these social issues are addressed and human needs are met. Thus, tackling these and other social and labor issues – particularly through engagement with a wide range of stakeholders including community members (see Box 1) – could go a long way toward creating effective and sustainable solutions for protecting the Great Green Macaw and its habitat.

The Ecological Impacts of the Pineapple Industry

In addition to its many social implications, the pineapple industry has deleterious impacts on the ecosystems that host plantations. In this section, we first examine the driving forces of ecological degradation and their impacts on ecosystems. We then discuss the specific impacts on Costa Rica's macaw populations.

[57] *Id.* at 23.
[58] A. Marais, et. al, *Effects of Monoculture, Crop Rotation, and Soil Moisture Content on Selected Soil Physicochemical and Microbial Parameters in Wheat Fields*, J. Appl. Envtl. Soil Sci. (March 2012), https://www.hindawi.com/journals/aess/2012/593623/.
[59] *How Industrial Agriculture Affects Our Soil*, FoodPrint, https://foodprint.org/issues/how-industrial-agriculture-affects-our soil/#:~:text=Fumigants%20kill%20nearly%20all%20soil,into%20the%20environment%20after%20application (last visited April 29, 2021).

Forces and Impacts of Ecological Degradation

Within the pineapple industry in Costa Rica, at least two interrelated forces drive ecological degradation: (1) the use of mainstream industrial agricultural practices, including monoculture and the use of agrochemicals, and (2) deforestation.

First, industrial agriculture models involving genetic modification of crops, the mechanization of farms, large-scale monoculture, and systemic pesticide use, rose to prominence on the global stage during the so-called Green Revolution of the 1960s.[60] Scientists orchestrating this revolution were lauded for increased food yields through the systemization of these practices.[61] In the years since, increased attention has been given to the many negative externalities inherent in the use of industrial agriculture practices.

Monoculture, a form of farming in which a single crop variety (in this case pineapples) is cultivated usually over extensive acreage and for several years at a time, has come under fire. Without a diversity of plant life to enrich the soil and support a healthy ecosystem of insects and microorganisms, monoculture leads to the depletion of soil nutrients and ultimately leaves the crops vulnerable to disease and without the proper nutrients to produce healthy fruit. To address these vulnerabilities, industrial agriculture turns to biotechnology, including pesticides and genetic modification, which help continue the expansion of monocultures,[62] ultimately creating a vicious, self-reinforcing cycle.[63]

Second, deforestation is propelled by monoculture practices, which create the constant need to enlarge plantations in search of fresh soil. Currently, the pineapple industry is the single greatest driver of deforestation in Costa Rica with more than 5,000 hectares of forest cover lost to pineapple plantations from 2000 to 2015, "amount[ing] to over 3,000 football fields of land."[64]

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[60] Shawn McKenzie, *A Brief History of Agriculture and Food Production: The Rise of "Industrial Agriculture,"* Johns Hopkins Center for a Livable Future (2007), https://resources.saylor.org/wwwresources/archived/site/wp-content/uploads/2015/07/ENVS203-7.3.1-ShawnMackenzie-ABriefHistoryOfAgricultureandFoodProduction-CCBYNCSA.pdf.

[61] Ray Offenheiser, *The Green Revolution: Norman Borlaug and the Race to Fight Global Hunger*, PBS (April 3, 2020), https://www.pbs.org/wgbh/americanexperience/features/green-revolution-norman-borlaug-race-to-fight-global-hunger/.

[62] Sarah Besky, *Monoculture*, Society for Cultural Anthropology (June 28, 2017), https://culanth.org/fieldsights/monoculture.

[63] Felicity A. Edwards et al., *Sustainable Management in Crop Monocultures: The Impact of Retaining Forest on Oil Palm Yield*, PLoS ONE 9(3): e91695 (March 17, 2014), https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0091695.

[64] UNDP Green Commodities Program, *Costa Rican Pineapples Guaranteed Deforestation-Free*, Mother Earth News (March 22, 2018), https://www.motherearthnews.com/organic-gardening/fruits/costa-rican-pineapples-deforestation-free-zb0z1803zmos#:~:text=MOCUPP%20has%20already%20shown%20the,3%2C000%20football%20fields%20of%20land.

Forest cover in Costa Rica was at an all-time low in 1987, with only 21% of natural forest cover remaining.[65] In the decades since, Costa Rica has made huge strides in increasing forest cover, doubling the forested acreage to over 50% in just under 30 years. This was achieved through the use of a number of incentives and disincentives, including tracking changes in forest cover to aid in enforcement, offering subsidies for landowners who maintain at least partial forest cover, and investing in public education related to the importance of forest ecosystems. Even with this promising progress, however, deforestation continues to pose a serious threat to the rainforest, its ecosystems, and its animals, including the Great Green Macaw,[66] in part because of challenges with forest regulators (see Box 2).

Box 2: Sistema Nacional de Áreas de Conservación (SINAC, National System of Conservation Areas)

SINAC located in the Ministry of Environment and Energy, is the main authority regulating forestry in the nation. However, studies indicate its forest regulators, who distribute permits for logging and monitor compliance, are underpaid, and provided with few supplies and benefits. This leaves regulators more open to bribes and corruption, which decreases their regulatory efficacy and their ability to prevent deforestation. As a result, logging more than is permitted, logging in protected areas, and logging in areas too soon (i.e., logging before permitted after a predetermined number of years) is common.

[*] For more information, see Michael J. Miller, Persistent Illegal Logging in Costa Rica: The Role of Corruption Among Forestry Regulators. *The Journal of Environment & Development*, 20(1): 50-68.

The current system of industrial agriculture and deforestation has several detrimental effects on the surrounding ecosystems, including a loss of biodiversity, depletion of soil quality, increased soil erosion, and the contamination of water sources.

First, these practices result in the loss of biodiversity, as natural habitats – including native plants and trees – are cleared and species are killed, displaced, or made more vulnerable due to lack of food, shelter, and cover from predators.

Second, once lands are cleared for plantations, remaining fragments of the native ecosystems face soil depletion and exposure to pesticides and other chemicals. Soil quality is "essential for plant and animal health, maintenance of the environment, and sustained biological productivity," as "[s]oil microbes play a pivotal role in maintaining soil quality."[67] Scientific studies of other crops have established "a clear relationship between soil microbial diversity, soil and plant quality, as well as ecosystem sustainability and it is known that crop rotation benefits [crop] yield."[68]

[65] Kaitlyn Asdigian, *Deforestation in Costa Rica: A Story Map*, Environmental Research Systems Institute, https://www.arcgis.com/apps/MapJournal/index.html?appid=250d5560fb62483b92dbf94b8db4c689 (last visited Dec. 6, 2020).
[66] *Id.*
[67] A. Marais, *Effects of Monoculture, Crop Rotation, and Soil Moisture Content on Selected Soil Physicochemical and Microbial Parameters in Wheat Field*s, J. Appl. Envtl. Soil Sci. (March 2012), https://www.hindawi.com/journals/aess/2012/593623/.
[68] *Id.*

Pineapple cultivation may benefit from greater attention to soil health and these related farming practices.

Third, the loss of forest and plant cover directly translates into increased soil erosion – without the plants' root systems to hold the land in place, rain or other disturbances sweep soil into water bodies and push it downhill. Increased soil erosion not only reduces the soil quality, but also can lead to dangerous situations including landslides, land instability, and mudslides.

Finally, deforestation removes the natural water reservoirs provided by the root systems of trees and plants within naturally occurring ecosystems. The loss of the protective canopy can also lead to devastating results. A report from US National Aeronautics and Space Administration (NASA) explains:

> Tropical deforestation also affects the local climate of an area by reducing the evaporative cooling that takes place from both soil and plant life. As trees and plants are cleared away, the moist canopy of the tropical rainforest quickly diminishes. Recent research suggests that about half of the precipitation that falls in a tropical rainforest is a result of its moist, green canopy. Evaporation and evapotranspiration processes from the trees and plants return large quantities of water to the local atmosphere, promoting the formation of clouds and precipitation. Less evaporation means that more of the Sun's energy is able to warm the surface and, consequently, the air above, leading to a rise in temperatures.[69]

These phenomena not only contribute to water scarcity within a region, but also can contribute to additional agricultural runoff, as a loss of forest cover equates to a loss of many of nature's natural filters for water on which human and animal communities rely.[70] Moreover, in this depleted landscape, pesticides, fertilizers, and other agrochemicals have a clear path to the surface waters and groundwater sources on which human, plant, and animal communities rely.

Impacts on Macaw Populations in Costa Rica

The environmental impacts of monoculture and deforestation have several negative consequences for macaw populations in Costa Rica. Most obviously, macaws rely on the dense forest cover and rich canopy provided by a healthy rainforest ecosystem. Researchers have found that, in addition to decreased food sources and nesting sites and increased exposure to predators, the loss of trees

[69] NASA, *NASA Facts: Tropical Deforestation*, page 3 (November 1998), https://www.researchgate.net/publication/272943918_Tropical_Deforestation.

[70] Tapia M.M., Némiga X.A., Pérez J.I.J. (2011) *The Environmental Calculator: A Tool for the Efficient Assessment of Environmental Services Loss due to Deforestation*, page 164. In: Thakur J.K., Singh S.K., Ramanathan A., Prasad M.B.K., Gossel W. (eds) Geospatial Techniques for Managing Environmental Resources. Springer, Dordrecht. https://doi.org/10.1007/978-94-007-1858-6_11.

poses particular challenges for young macaws as they fledge the nest. Without the close-knit forest canopy, young macaws are at risk of being injured during their first attempts to fly.[71]

Deforestation also poses several risks specific to the Great Green Macaw as a species. For example, Great Green Macaws nest almost exclusively in Mountain Almond Trees, which serve as important sources of food and water, as the birds eat their nuts and drink from cavities in the wood. The trees themselves became endangered after special carbon steel blades, which are necessary to make logging dense wood commercially viable, were introduced in Costa Rica.[72] In 2008, the Costa Rican Constitutional Court ruled it was illegal to harvest the Mountain Almond Trees and would remain so until both the tree and the Great Green Macaw are no longer endangered.[73] While this ban aided in efforts to protect the trees and the macaws, due to inadequate enforcement of the law, the illegal logging of Mountain Almond Trees still poses a significant threat to Macaw populations.[74]

The Great Green Macaw relies on other plant life beyond the Mountain Almond Tree. In fact, around 35 species of trees and plants serve as supplementary food sources for the birds.[75] For example, the Titor Tree, found in forest remnants, pastures, and on the outskirts of patches of forests in Costa Rica's Caribbean slope, "plays a very important role in the cycle of the Great Green Macaw in northern Costa Rica; when the production of food from the Mountain Almond Tree decreases, the Titor appears as the second most important source of nutrients for these emblematic birds."[76] In the years since the Mountain Almond Tree received legal protection from logging, the Titor Tree and other species have faced increased harvesting. According to their field observations, the Macaw Recovery Network notes that "in the nesting area of the Great Green Macaw in northern Costa Rica there is one Titor for every 10 Mountain Almond trees."[77]

In sum, current agriculture practices associated with the pineapple industry create several negative environmental impacts. Specifically, monoculture and the resultant deforestation decrease biodiversity, increase soil erosion, and degrade natural water reservoirs. In turn, these environmental impacts not only adversely affect ecosystems, but have deleterious effects on Great

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[71] Macaw Recovery Network, *Observations of a wild Great Green Macaw nest: Time to fledge the nest!* (May 21, 2020), https://www.youtube.com/watch?v=-O2JkQHhrS4.
[72] Andrew Rothman, *Costa Rica protects green macaw by banning logging of mountain almond tree*, Mongabay News (Oct. 27, 2008), https://news.mongabay.com/2008/10/costa-rica-protects-green-macaw-by-banning-logging-of-mountain-almond-tree/.
[73] *Judgment No. 13426 of the Constitutional Chamber of the Supreme Court of Justice* (Sept. 2, 2008), https://vlex.co.cr/vid/-499306090.
[74] Thomas Sheridan, *A Day in the Field: WCN's Visit to Macaw Recovery Network*, Wildlife Conservation Network (June 18, 2019), https://wildnet.org/a-day-in-the-field-wcns-visit-to-macaw-recovery-network/.
[75] Mario Jiménez Segura, *The Titor tree: an unknown food source for the Great Green Macaw*, The Macaw Recovery Network, (Aug. 7, 2020), https://macawrecoverynetwork.org/titor-tree-an-unknown-food-source-for-the-great-green-macaw/.
[76] *Id.*
[77] *Id.*

Green Macaws, particularly in terms of loss of habitat, food, and water. Addressing these and other environmental issues generated by the pineapple industry implicitly requires collaborative engagement with a wide range of stakeholders. Through collaboration, government officials, industry executives, and unions could increase shared responsibility and accountability, improve issues around subcontracting and labor conditions, and reduce the use of harmful pesticides, which in turn could improve ecological conditions for both macaws and communities. More directly, collaborations can provide immediate benefits, such as identifying priority forests for the macaws on which to focus enforcement efforts on illegal logging and deforestation. While challenging, such engagements could make significant strides toward protecting the Great Green Macaw and its habitat. Potential inroads for greater collaboration are discussed in the next section, which explores current, ongoing efforts and potential opportunities in Costa Rica to address issues in the pineapple industry and mitigate its most severe impacts.

Initiatives and Opportunities for Change

Several initiatives already exist in Costa Rica to improve the agricultural sector generally, and the pineapple industry more specifically. Two are particularly relevant for this report. First, launched by the government, the National Platform for the Responsible Production and Trade of Pineapple in Costa Rica united stakeholders to mitigate the negative externalities of the pineapple sector in the nation. The Platform spurred the creation of the National Initiative for Sustainable Pineapple Production (INSP) and the Monitoring Land Use Change with Production Landscapes Program (MOCUPP). Although the National Platform, and the more recent efforts of INSP and MOCUPP, have made considerable progress, improvements likely could be made to include a wider range of stakeholders and ultimately better protect wildlife. Second, the Rainforest Alliance, an international nonprofit, promotes sustainable agriculture throughout the world and attempts to hold farms accountable for their environmental practices through various certification processes. However, the Rainforest Alliance shifts much responsibility to host countries and farms, and often falls short of affecting actual change. Additional opportunities for positive change exist in the private sector. Private sector market forces exert tremendous influence on the pineapple-macaw dynamic. The private sector presents additional opportunities for positive change.

Although we review initiatives and opportunities by sector – government, NGO, private – these should not be viewed as completely independent. Efforts to change one program in one sector may have spillover effects, positive or negative, in other sectors. Instead, a comprehensive understanding of the interplay between various sectors and efforts should inform the strategic actions of all stakeholders, though this interplay is often neglected by even the most genuine actors. Ultimately, the objective of this report is to identify areas where the Macaw Recovery Network can focus attention and attempt influence.

Government Sector Initiatives

National Platform for the Responsible Production and Trade of Pineapple in Costa Rica

Launched in 2011 and dissolved in 2018, La Plataforma Nacional para la Producción y Comercio Responsable de Piña en Costa Rica, or the National Platform for the Responsible Production and Trade of Pineapple in Costa Rica, was created as a multi-stakeholder effort, spearheaded by the Ministry of Environment and Energy (MINAE) and the Ministry of Agriculture and Livestock (MAG) with the support of the United Nations Sustainable Development Programme (UNDP).[78] The Platform sought to address the negative externalities of the pineapple industry through collaborative efforts involving national and subnational government officials, non-profit advocacy groups, multinational corporations, workers, supermarkets, and the local communities most impacted by the industry.[79]

The National Platform established "a neutral multi-stakeholder and inter-institutional dialogue between government, the private sector, and civil society that brought together over 900 technical experts from over 50 organizations and institutions in the pineapple sector."[80] The participants were organized into six thematic working groups: (1) Compliance and Enforcement of National Legislation, (2) Economic Incentives for the Application of Agricultural Best Practices, (3) Use and Control of Agrochemicals, (4) Use and Conservation of Soil, (5) Small and Medium-Sized Enterprises, and (6) Institutional Coordination.[81]

The participating parties created and agreed to *La Plan de Acción para el Fortalecimiento de la Producción y Comercio Responsable de Piña en Costa Rica*, or the *National Action Plan for the Strengthening of Responsible Production and Trade of Pineapple in Costa Rica*. The Action Plan set out twelve action steps for addressing concerns identified by the National Platform, to be implemented over a five-year period spanning from 2012 to 2017. Each action step identified specific tasks to be completed, the government bodies responsible for each of the tasks, organizations to provide support in these efforts, and their respective deadlines.[82]

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[78] *Plataforma Nacional de producción y comercio responsable de piña en Costa Rica*, UNDP Costa Rica https://www.cr.undp.org/content/costarica/es/home/operations/projects/environment_and_energy/plataforma-pina-costa-rica.html (last visited April 29, 2021).

[79] *Antecedentes: Plataforma Nacional para la producción y comercio responsable de piña en Costa Rica*, Iniciativa Nacional para la Sostenibilidad Piñera, http://www.pnp.cr/antecedentes-plataforma-nacional-para-la-produccion-y-comercio-responsable-de-pina-en-costa-rica (last visited Nov. 1, 2020; link inactive as of April 29, 2021).

[80] UNDP Green Commodities Program: Costa Rica, The Need for Sustainable Pineapple Production: Supporting environmental safeguards and productivity (March 2015), https://www.undp.org/content/dam/undp/library/Environment%20and%20Energy/Green%20Commodities%20Programme/GCP%20Costa%20Rica.pdf.

[81] *Antecedentes: Plataforma Nacional para la producción y comercio responsable de piña en Costa Rica*, Iniciativa Nacional para la Sostenibilidad Piñera, http://www.pnp.cr/antecedentes-plataforma-nacional-para-la-produccion-y-comercio-responsable-de-pina-en-costa-rica (last visited Nov. 1, 2020, link inactive as of April 29, 2021).

[82] Plataforma Nacional de Producción y Comercio Responsable de Piña en Costa Rica. Plataforma Nacional de Producción y Comercio Responsable de Piña en Costa Rica, Plan de Acción para el Fortalecimiento de la Producción y Comercio Responsable de Piña en Costa Rica 2013-2017 (2015),

In 2016, an executive decree, *Decreto Ejecutivo 39462 MAG-MINAE-S-MTSS* (the Decree), adapted and formalized the Action Plan. It also established La Inciativa Nacional para la Sostenibilidad Piñera, or the National Initiative for the Sustainable Production of Pineapple (INSP), discussed below.[83]

The National Initiative for Sustainable Pineapple Production (INSP)

The Decree outlines three key elements of INSP: (1) a governance system composed of implementation and monitoring committees at the national and regional levels, (2) the formalization of the National Plan, and (3) a system for compliance monitoring and public accountability.[84] The Decree recognizes as constitutional mandates the State's duty to ensure both the rational exploitation of land and resources and safe working conditions for foreign and domestic workers.[85] The Decree appoints the Committee as the body responsible for the creation of a framework for the implementation and monitoring of the strategic actions and tasks in the Plan, as well as for informing local communities and the international public of the progress being made.[86] The Committee is required to update the Plan every five years, adapting it to reflect changes in knowledge, technology, or social and economic conditions.[87]

The Decree recognizes the role of the Costa Rican government in protecting the Costa Rican people's right to "a healthy and ecologically-balanced environment, identifying it as "a basic condition to ensure respect for different forms of life including human life."[88] But, the protection of wildlife or any particular species is not directly addressed in the Decree or in the original action plan.

The Decree formalized 11 action steps, the majority of which were presented in the original plan:

> (1) Adopt best practices in soil use and conservation; (2) Strengthen the PITTA-Piña[89] research program; (3) Promote adherence to industry standards and reinforce

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http://www.pnp.cr/sites/default/files/documentos/plan_accion_de_pina_en_costa_rica_impresion_07052014.compressed.pdf (link inactive as of April 29, 2021).

[83] *¿Qué es la iniciativa?*, Iniciativa Nacional para la Sostenibilidad Piñera, http://www.pnp.cr/que-es-la-iniciativa (last visited Nov. 1, 2020, link inactive as of April 29, 2021).

[84] *¿Qué es la iniciativa?*, Iniciativa Nacional para la Sostenibilidad Piñera, http://www.pnp.cr/que-es-la-iniciativa (Last visited Nov. 1, 2020, link inactive as of April 29, 2021).

[85] Executive Decree 39462 MAG-MINAE-S-MTSS, Preamble, Paragraph 2 (March 4, 2016) http://extwprlegs1.fao.org/docs/pdf/cos163205.pdf.

[86] Decreto Ejecutivo N°39462 MAG-MINAE-S-MTSS, Iniciativa Nacional para la Sostenibilidad Piñera, Article 1, paragraph 4. (March 4, 2016), http://www.pnp.cr/es/decreto-ejecutivo-ndeg39462-mag-minae-s-mtss (link inactive as of April 29, 2021).

[87] *Id.* at Article 8, paragraph 1.

[88] *Monitoring Land Use Change within Production Landscapes*, MOCUPP, http://www.mocupp.org/en (last visited April 29, 2021).

[89] PITTA-Piña is an interdisciplinary organization (composed of government officials, academics, scientists, and industry members) focused on research and technology development in the Costa Rican pineapple sector. For more

> capacity of the pineapple industry to comply with best practices for the use of agrochemicals; (4) Promote integrated pest management and eco-efficient use of pesticides in the pineapple industry; (5) Ensure that all pineapple farms in operation comply with relevant national laws; (6) Promote spaces for dialogue, transparency and accountability to ongoing efforts to improve the environmental and social impacts of pineapple production in the country; (7) Promote measures to enable the pineapple sector to address the impacts of climate change; (8) Identify, propose and establish financial incentives to promote the adoption of agricultural best practices and the strengthening of small and mid-sized producers; (9) Create a working group on the differentiation of pineapple in domestic and international markets; (10) Promote the identification of impacts of pineapple production on the water resources of communities located near plantations; and, (11) Stimulate organic pineapple production in the country.[90]

Interesting differences exist between the Action Plan agreed to by the original stakeholders participating in the National Platform and the altered plan, which was formalized through the Decree. Notably, two action steps included in the original plan are omitted in the latter Decree: (10) Promoting a national dialogue on labor rights, and (11) Identifying, compensating and remedying impacts of pineapple production. Alternatively, action step 10 addressing impacts on water resources was added to the Decree but was not included in the original Plan.

A number of the action steps align, at least broadly, with the Macaw Recovery Network's goals to protect the habitat and well-being of macaws in the country. The implementation of agricultural best practices, the controlled use of pesticides, the development of an organic pineapple sector, and efforts to address impacts of climate change, all contribute to the protection and revitalization of ecosystems threatened by the industry, and as a result the protection of the species that inhabit these ecosystems, including the Great Green Macaw.

In addition, the fifth action step, "Ensure that all pineapple farms in operation comply with relevant national laws," includes better enforcement of the National Forestry Law to address deforestation, the single greatest threat to the macaws. The specific tasks outlined under this action step include the proposal of mechanisms to improve complaint response time and effective follow-up to complaints, programs to raise awareness among farm owners on the relevant laws, environmental standards, impacts, and penalties related to deforestation, and the creation of a system for the registration and monitoring of protected conservation areas adjacent to active plantations.[91]

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information, *See* PITTA-Piña, Guía Práctica de diagnóstico de la mosca del establo Stomoxys calcitrans y otros dípteros asociados a rastrojos de piña (Dec. 2011), http://www.mag.go.cr/bibliotecavirtual/AV-1444.pdf.

[90] Decreto Ejecutivo N°39462 MAG-MINAE-S-MTSS, Iniciativa Nacional para la Sostenibilidad Piñera (March 4, 2016), http://www.pnp.cr/es/decreto-ejecutivo-ndeg39462-mag-minae-s-mtss (link inactive as of April 29, 2021).

[91] *Id.*

The effectiveness of the Initiative is unclear. The official website was last updated in 2018. Many of the Initiative's expressed values and mandates address root problems impacting the rainforest ecosystems (pesticides, deforestation, and so forth), but we were unable to locate research assessing the efficacy of these efforts. Nevertheless, the Initiative could likely be adapted to better serve the interests of wildlife. One possible first step towards this goal, if not already accomplished, would be for the Initiative to directly represent wildlife conservation, and perhaps specifically the preservation of Great Green Macaws (and other endangered species), in the Initiative's language, purposes, and related programming.

Article 6 of the Decree requires the creation of a National Monitoring Committee to ensure proper implementation of the identified action steps. The Committee is to be made up of the following twelve members:

> (1) the Minister or Vice-Minister of Agriculture; (2) the Minister of the Environment and Energy or a Deputy Minister; (3) the Minister of Health or a Deputy Minister; (4) the Minister of Labor and Social Security or a Deputy Minister; (5) a person representing the pineapple producers associations and an alternate (6) a representative of large-scale pineapple producers; (7) a representative of small-scale and medium-scale pineapple producers; and, (8) two representatives from community and non-profit organizations.[92]

As of 2018, in addition to the Ministry heads, the Committee included a representative from UNDP, the president of the Costa Rican Institute of Aqueducts and Sewers, two representatives from the office of the Ombudsman, and two leaders of community groups in production areas. The INSP website notes that other organizations not already represented on the Committee, such as universities and national and international non-governmental organizations, may also participate as observers or technical references.[93]

We were unable to locate a list of all of the organizations that participated in the Initiative, but these goals would likely be served in part by having conservation organizations like the Macaw Recovery Network participate in the collaborative elements of INSP programming and/or as observers or technical references to the National Monitoring Committee. The potential for getting MRN and/or other conservation organizations involved in this way, and the process for doing so, remains unclear and requires further research.

[92] *Id.*

[93] Comité Nacional de seguimiento, Iniciativa Nacional para la Sostenibilidad Piñera, http://www.pnp.cr/es/comite-nacional-de-seguimiento (last visited Nov. 1, 2020, link inactive as of April 29, 2021).

The Monitoring Land Use Change within Production Landscapes Program (MOCUPP)

INSP has spurred ongoing efforts to end illegal deforestation, primarily through the implementation of el Programa de Monitoreo de Cambio de Uso Paisajes Productivos, or the Program for the Monitoring of Change in the Use of Productive Lands (MOCUPP).[94] The program was created by MINAE, in collaboration with UNDP, the Forestry Financing Fund, UN-REDD[95] and others, with the hope of better protecting conservation areas and forested lands from deforestation driven by expanding agricultural plantations.

According to the program website:

> Monitoring of land use change within production landscapes linked with land tenure (MOCUPP) is a tool for sustainably managing landscapes where agricultural commodities are grown, [throughout] the Costa Rican territory. It generates annual publishing of total land cover maps of agricultural commodities that may be detected using remote sensors (pineapple, pasture, sugar cane, palm oil). It also generates maps of the deforestation detected within production landscapes. These maps are published through the Territorial Information System. This allows users to link these maps with land tenure information so they may serve to generate economic incentives for those who avoid deforestation or to process those who infringe [on] the Forestry Laws.[96]

MOCUPP is a part of MINAE's larger National Environmental Information System.[97] The program enables government officials and the public to identify and hold accountable actors threatening SINAC protected areas or otherwise illegally deforesting land.

In addition to the compilation and publication of the maps, MOCUPP is involved in initiatives to use the collected information to protect against further deforestation including a program focused on creating dialogues with supermarket chains on the creation of incentives to stop deforestation, such as selective purchasing policies.[98] A second related program works to educate public officials

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[94] *What is MOCUPP*, MOCUPP, http://www.mocupp.org/en (last visited April 29, 2021).

[95] According to its official website, "Reducing emissions from deforestation and forest degradation ([UN]REDD+) is a mechanism developed by Parties to the United Nations Framework Convention on Climate Change (UNFCCC). It creates a financial value for the carbon stored in forests by offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development. Developing countries would receive results-based payments for results-based actions. REDD+ goes beyond simply deforestation and forest degradation and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks." For more information, *See About REDD+*, UNREDD+ Programme, https://www.unredd.net/about/what-is-redd-plus.html (last visited, April 29, 2021).

[96] *Id.*

[97] MINAE, UNDP, et al., *Monitoring Land Use Changes within Production Landscapes (MOCUPP)*, http://mocupp.org/sites/default/files/documento-mocupp-en.pdf.

[98] *What is MOCUPP*, MOCUPP, http://www.mocupp.org/en (last visited April 29, 2021) (Information presented in embedded video).

on the monitoring system and how to use it to generate economic incentives or to prosecute farms engaged in illegal deforestation.[99]

MOCUPP is an impressive collaborative effort that has helped to advance[100] the protection of rainforests by modeling "a monitoring and land management strategy that is practical, low-cost and replicable."[101] Yet enforcement against violations of the country's forestry law is still lacking.[102] To fully mobilize the monitoring system and best protect the macaws and their rainforest ecosystems, enforcement measures must continue to improve. Issues of enforcement, along with other governmental-driven opportunities for positive change are discussed in Box 3.

NGO Sector Initiatives

The Rainforest Alliance

The Rainforest Alliance is an international nonprofit organization known for its green frog label on produce that consumers can identify in the grocery store.[103] This frog signals a "Sustainable Agriculture Standard" Certification that is consistent with the requirements of the Sustainable Agriculture Network (SAN),[104] which are based on biodiversity conservation, effective planning systems, natural resource conservation, and social standards, and which aim to protect forests, commit to sustainability, and adapt to climate change. The Rainforest Alliance was founded in 1986 to prevent deforestation and is a registered 501(c)(3) according to the US tax code. It has since expanded, with headquarters in multiple locations around the world and corresponding offices and audit agencies in over 70 countries.[105]

Although any farm can seek certification, only about 40% of Costa Rica's pineapple farms currently are certified by the Rainforest Alliance.[106] To be certified, farms must meet 45 "critical criteria" required by the Rainforest Alliance. Further, farms must also meet *80 percent* of over 100 general criteria outlined by the Rainforest Alliance. Examples of critical criteria include:

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[99] *Id.*
[100] Sebastian Rodriguez, *With drones and lasers, Costa Rica seeks to track its forests*, Reuters (Oct. 2, 2018), https://www.reuters.com/article/us-costa-rica-forest-carbon/with-drones-and-lasers-costa-rica-seeks-to-track-its-forests-idUSKCN1MC1DI.
[101] MINAE, UNDP, et al., Monitoring Land Use Changes within Production Landscapes (MOCUPP) 2, http://mocupp.org/sites/default/files/documento-mocupp-en.pdf (last visited April 29, 2021).
[102] Giles Crosse, Why satellite surveillance isn't enough to turn the tide on deforestation, Reuters (Oct. 30, 2018), https://www.reutersevents.com/sustainability/why-satellite-surveillance-isnt-enough-turn-tide-deforestation.
[103] *See* Rainforest Alliance, Using Our Logo and Seal (last updated April 1, 2020), https://www.rainforest-alliance.org/business/marketing-sustainability/using-our-logo-and-seal/.
[104] *What Does Rainforest Alliance Certified Mean?* Rainforest Alliance (Oct. 28, 2020), https://www.rainforest-alliance.org/faqs/what-does-rainforest-alliance-certified-mean.
[105] Our Impacts, *Rainforest Alliance*, https://www.rainforest-alliance.org/impact (last visited April 29, 2021).
[106] Reena Shah, *Rainforest Alliance Certifying Unethical Pineapple Farms, Activists Claim*, The Guardian, Guardian News and Media (May 29, 2020), www.theguardian.com/global-development/2020/may/29/rainforest-alliance-certifying-unethical-pineapple-farms-activists-claim.

- Training on pesticide risks for pesticide handlers.
- Use of personal protective equipment (PPE).
- Commitment to management requirements according to applicable law.
- No destruction of high conservation value areas[107] after November 2005, when the new criteria went into effect.
- No GMOs in Rainforest Alliance products.[108]

As more retailers aim to be environmentally conscious, the demand for the certification has grown.[109] However, many organizations and actors critique the Rainforest Alliance as being highly performative, ineffective, and misleading to consumers. For example, Oxfam and other NGOs have accused the Rainforest Alliance of "greenwashing," because although the Rainforest Alliance provides certification of environmentally friendly practices, it does not target Costa Rica's largest environmental issues, such as pesticide usage and local employment law violations.[110]

Others suggest that the Rainforest Alliance requirements for certification are insufficient and not enforced on many Costa Rican pineapple farms.[111] Specifically, many farms conceal poor working conditions and other misconduct to maintain their certification. Since most farms are large, managers can use cell phone messages to notify those in the fields or elsewhere to hide the undocumented workers, unauthorized chemicals, or other violations, even when the Rainforest Alliance conducts surprise audits.[112] Further, since few pineapple workers are part of a union, those interviewed by auditors lie about working conditions or risk getting fired.[113]

Farms also pay the Rainforest Alliance for audits and certifications.[114] This dynamic creates perverse incentives for the Rainforest Alliance to grant certification (and leniency) so farms will continue to hire the Alliance for audits. For example, during a regular audit in February 2020, Chiquita's certificate was suspended due to non-compliance with a required standard, which was

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[107] High conservation value areas are "are biological, ecological, social or cultural values which are considered outstandingly significant or critically important, at the national, regional or global level"; *See* Rainforest Alliance, Rainforest Alliance Sustainable Agriculture Standard For farms and producer groups involved in crop and cattle production, page 19 (Version 1.2, July 2017), https://www.rainforest-alliance.org/business/wp-content/uploads/2017/11/03_rainforest-alliance-sustainable-agriculture-standard_en.pdf.
[108] *Id.*
[109] In addition to the Rainforest Alliance, several other good-practice certification organizations exist, including the Sustainable Agriculture Network, Global Gap, Ethical Trading Initiative, Grasp Module, and Field to Fork.
[110] Oxfam, *Sweet Fruit, Bitter Truth*, page 4 (May 2016), https://www.oxfam.de/system/files/20160531-oxfam-sweet-fruit-bitter-truth-en.pdf.
[111] Reena Shah, *Rainforest Alliance Certifying Unethical Pineapple Farms, Activists Claim*, The Guardian, Guardian News and Media (May 29, 2020), www.theguardian.com/global-development/2020/may/29/rainforest-alliance-certifying-unethical-pineapple-farms-activists-claim.
[112] *Id.*
[113] *Id.*
[114] *How to Get Your Farm Certified*, Rainforest Alliance for Business *(Mar. 17, 2020), https://www.rainforest-alliance.org/business/sustainable-farming/farm-certification/how-to-get-Rainforest-alliance-certified-a-guide-for-farmers/.*

Box 3: Addressing Illegal Logging, Expanding PES Programs, and Promoting Eco-Tourism

Beyond INSP and MOCUPP, the Costa Rican government could take advantage of several other opportunities for promoting positive change.

First, the government could work, alone or in partnership with NGOs, to curb illegal logging due to corruption. Many forest regulators accept bribes due to insufficient salaries, while others become discouraged from lack of resources and equipment.[1] However, budget limitations prevent government from providing regulators with higher salaries and more resources, and compel government to use non-governmental actors, paid for by NGOs, to act as staff.[2] In the short term, forest protection might improve (and corruption might decrease) if NGOs could take on greater regulatory responsibility. Over the long term, the forest regulation conducted by the Sistema Nacional de Áreas de Conservación (SINAC; see Box 2)[3] must be strengthened by increasing access to equipment, resources, and benefits for employees.

Second, the government could expand Payment for Ecosystem Services (PES) programs, which are "relatively new schemes seeking to support positive environmental externalities through the transfer of financial resources from beneficiaries of certain environmental services to those who provide these services or are fiduciaries of environmental resources."[4] Costa Rica's 1996 Forestry Law provided the legal framework for the country's PES programming,[5] and according to a 2013 Report, "nearly one million hectares of forest in Costa Rica [had] been part of the PES programme at one time or another."[6] Payments to landowners have been funded by the Costa Rican government, the private sector, and international banks and bilateral agencies.[7] Payments made to landowners between 1997 and 2012 totaled over $340 million USD.[8] PES programs could be used to incentivize behavior that ultimately benefits the macaws.

Finally, the government could continue to support and strengthen eco-tourism. According to the Costa Rican Embassy, with over 1.7 million tourists per year, about 80% of whom do eco-related activities, tourism is the nation's main source of income and hard currency, generating more than $1.7 billion US dollars annually.[9] Programs that encourage an economy that derives its financial health from the country's natural health should continue to be supported.

[1] UNODC, Wildlife and Forest Crime Analytic Toolkit (revised edition) (2012), https://www.unodc.org/documents/Wildlife/Toolkit_e.pdf

[2] Giles Crosse, Why satellite surveillance isn't enough to turn the tide on deforestation, Reuters (Oct. 30, 2018), https://www.reutersevents.com/sustainability/why-satellite-surveillance-isnt-enough-turn-tide-deforestation.

[3] *See* Box 2 describing SINAC on Page 11.

[4] Karel Mayrand & Marc Paquin, *Payments for Environmental Services: A Survey and Assessment of Current Schemes*, Unisféra International Centre for the Commission for Environmental Cooperation of North America (2004), https://www.cbd.int/financial/doc/cec-pes.pdf.

[5] David Barton, *Payments for ecosystem services: Costa Rica's recipe*, International Institute for Environment and Development (Nov. 29, 2013), https://www.iied.org/payments-for-ecosystem-services-costa-rica-s-recipe.

[6] Ina Porras, et al., *Learning from 20 years of Payments for Ecosystem Services in Costa Rica* (2013), International Institute for Environment and Development, London, page 2 (2013), https://pubs.iied.org/16514IIED/.

[7] *Id.* at 12.

[8] *Id.* at 44.

[9] *About Costa Rica*, Embassy of Costa Rica in Washington, D.C., http://www.costarica-embassy.org/index.php?q=node/19, (last visited April 29, 2021).

not specified. However, the Rainforest Alliance agreed to allow Chiquita to continue to sell its products marked as "certified," due to the COVID-19 pandemic and the inability to perform a follow-up audit.[115] One could argue that an imperfect program is better than no program, and flexibility makes things work better. One also could argue that a program in which the regulators themselves benefit from lenient enforcement is akin to the fox guarding the henhouse.

Due to critiques from organizations concerned with the social impact of the agricultural industry, as well as the global pandemic and climate crisis, the Rainforest Alliance is creating an updated "2020 Sustainable Agriculture Standard." This standard has separate requirements for farms, supply chains, and data assurance.[116] Examples of new foci in the standard include climate-smart agriculture, living wages, risk-based assurance, gender equality, and biodiversity conservation. Part of the 2020 certification program shifts to an "assess-and-address" approach,[117] which focuses on prevention and improvement. It involves incentivizing farm owners to address issues on their farms, such as child labor, instead of working to hide them. The "assess-and-address" approach also requires farms to appoint a person or committee to act as an advocate or manager to oversee addressing issues associated with gender, such as discrimination, harassment, and sexual violence among others.[118]

The new 2020 requirements, however, push much of the responsibility to the host country. Many of the requirements require that farms adhere to national laws concerning low wages, overtime hours, or pesticides. For example, the new requirement states that hourly wages must meet applicable minimum wages or those decided on in a Collective Bargaining Agreement.[119] Specifically, the standard states, "Although the system aims to contribute to better wages for workers by requiring that the minimum wage is paid and that there is progress towards a living wage, the Rainforest Alliance recognizes the limitation of producers to unilaterally solve the problem of low wages."[120] Arguably, this statement underestimates the certification's influence on the retail market. Similarly, the Rainforest Alliance permits the use of pesticides that are legal in the host country. Therefore, certified Costa Rican farms can use dangerous pesticides banned in the US and UK. Currently, Oxamyl (classified as highly hazardous according to the WHO),[121] and Chlorothalonil, Mancozeb, and Glyphosate (considered possibly carcinogenic chemicals by the

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[115] *Rainforest Alliance suspends Chiquita certification in Costa Rica*, BananaLink (June 11, 2020), https://www.bananalink.org.uk/news/rainforest-alliance-suspends-chiquita-certification-in-costa-rica/.
[116] *2020 Certification Program*, Rainforest Alliance, https://www.rainforest-alliance.org/business/tag/2020-certification-program/ (last visited April 29, 2021).
[117] *See* https://www.rainforest-alliance.org/business/resource-item/assess-and-address-position-paper/.
[118] *Advancing the Human Rights of Rural People*, Rainforest Alliance (January 22, 2020), https://www.rainforest-alliance.org/articles/advancing-the-human-rights-of-rural-people.
[119] *Id.*
[120] Rainforest Alliance, *Rainforest Alliance Sustainable Agriculture Standard: Farm Requirements*, Page 55 (2020, Version 1.1), https://www.rainforest-alliance.org/business/wp-content/uploads/2020/06/2020-Sustainable-Agriculture-Standard_Farm-Requirements_Rainforest-Alliance.pdf
[121] Oxfam, *Sweet Fruit, Bitter Truth*, page 16 (May 2016), https://www.oxfam.de/system/files/20160531-oxfam-sweet-fruit-bitter-truth-en.pdf.

US environmental authority) are permitted according to Costa Rican law, and thus accepted by the Rainforest Alliance.[122] In these and other ways, the Rainforest Alliance diverts responsibility, and may not ensure environmentally and socially responsible practices.

Ultimately, the new requirements need substantial national laws and protections for the Rainforest Alliance to fulfill its goals. While Costa Rica has considerable environmental and social protections via national legislation, it often lacks the resources and political will necessary to ensure compliance. Further, since most farms usually only get a warning if they have violations during an audit, farms do not have a strong incentive to uphold the highest standards. To have a greater impact, the Rainforest Alliance may need to better engage retailers, which may have a greater ability to enact change on the environmental and social practices of their pineapple suppliers. The Rainforest Alliance also could be more exclusive when providing certifications, specifically to pineapple farms.

The Rainforest Alliance has the potential to better protect wildlife in particular. The new 2020 requirements largely shift to social responsibility, but still include a commitment to biodiversity.[123] Differences in the new requirement include developing a risk-based approach, conserving native vegetation on farmland, improving soil health, and related action.[124] However, it is too early to tell how effective these changes will be. Wildlife conservation groups (including MRN) and international stakeholders should pay close attention to how the Rainforest Alliance enforces these changes to discover potential opportunities for improvement.

Private Sector Opportunities and the Market

Multiple opportunities exist within the private sector to affect positive change in the pineapple-macaw dynamic. Some of these, however, are contingent upon changes and a level of support from the agricultural and retail sectors that may not be realistic, or they would shift problems from one place to another. Some of the private sector opportunities are discussed below, with an understanding that not all are created equal in terms of likelihood or net gain to the environment or macaws.

Encourage Geographical Diversification of the Pineapple Sector

In September 2020, Colombia exported pineapples to Canada, a major importer of Costa Rican pineapples, for the very first time.[125] The inability to improve production sustainability is a significant challenge with pineapples. With only 1-2 harvests per year, farmers are required to consistently strip land of vegetation to expand their production. If corporations stopped expansion

[122] *Id.*
[123] *See* Rainforest Alliance, *What's in our 2020 Certification Program? (June 2020)*, https://www.rainforest-alliance.org/business/wp-content/uploads/2020/06/2020-program_biodiversity.pdf.
[124] *Id.*
[125] *Colombia exports pineapples to Canada for the first time*, FreshPlaza (Sept. 16, 2020), https://www.freshplaza.com/article/9250064/colombia-exports-pineapples-to-canada-for-the-first-time/.

in Costa Rica, and responsibly expanded in other countries, it could lessen ecological impacts in Costa Rica. However, it would take strategic and well monitored action to ensure that production is done sustainably in new locations such as Colombia, which might have looser regulation and weaker enforcement capabilities. Thus, while geographic diversification could benefit Costa Rica's environment, it could harm its economy, and shift environmental and labor problems to other countries.

Increase Crop Variety on Plantations

Some studies suggest that pineapples do not need to be grown as a monoculture, but rather can be grown successfully as polycultures with other fruits.[126] In one instance, growing pineapple with maize, passion fruit, and cassava in Brazil resulted in higher yields of crops.[127] Another study shows that the forests surrounding agricultural land provide attractive homes for bird populations.[128] However, polyculture is known to require more intensive labor, [129] which could negatively impact the already poor working conditions of Costa Rican plantation workers. Still, a switch to polyculture, or possibly even crop-rotation, could reduce negative ecological impacts and encourage the return of endangered bird species to a habitat. More research and insight from Costa Rican pineapple farmers are needed in this area.

Promote Organic Growing Practices and Limit Use of Harmful Pesticides

Limiting the use of harmful pesticides and other chemical inputs in pineapple production would alleviate some of the stress placed on waterways, the soil microbiome, and connected ecosystems. The volume of agrochemicals used in the country's pineapple industry is notable, as "Costa Rica ranks first in the world for both pineapple exports and the use of pesticides per hectare."[130] However, organic production practices are gaining traction in Costa Rica and on the global market.

Certified organic pineapple is "free from synthetic additives such as pesticides, chemical fertilizers, and dyes. Organic pineapples are not processed under industrial solvents, irradiation, or genetic engineering. [The fruit's] content [is generally required to be] 95% or more certified

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[126] Tanja Folnovic, *Polyculture Production for Sustainable Farming*, Agrivi, https://blog.agrivi.com/post/polyculture-production-system-for-sustainable-farming (last visited April 29, 2021).
[127] Sebastião Elviro de Araújo Neto, *Organic polyculture of passion fruit, pineapple, corn and cassava: the influence of green manure and distance between espaliers*, 38:3 Ciênc. Agrotec 247**(**June 2014).
[128] James Ebersole & Skye Greenler, *Bird communities in tropical agroforestry ecosystems: an underappreciated conservation resource*, Springer (July 27, 2014), https://www.researchgate.net/publication/274719278_Bird_communities_in_tropical_agroforestry_ecosystems_an_underappreciated_conservation_resource.
[129] Tanja Folnovic, *Polyculture Production for Sustainable Farming*, Agrivi. https://blog.agrivi.com/post/polyculture-production-system-for-sustainable-farming (last visited April 29, 2021).
[130] LaMay, Jessica, et al., *The Politics of Pineapple: Examining the Inequitable Impacts of Southern Costa Rica's Pineapple Industry*, Journal of Public and International Affairs, Princeton University (2020), https://jpia.princeton.edu/news/politics-pineapple-examining-inequitable-impacts-southern-costa-ricas-pineapple-industry.

organic. The remaining 5% can only be foods or . . . additives from an approved list."[131] Demand for organic pineapple has been growing as more people around the world are willing and able to pay higher prices for foods that are better for their health, the health and wellbeing of producers, and the environment.[132] That said, conventional methods (i.e., monoculture sustained by chemical inputs) still dominate the global market.[133]

While the organic pineapple market continues to grow, another potential line of action could be to advocate for more stringent pesticide regulations.[134] Advocating for stricter standards for pesticide use may incentivize the research and development of alternative growing and pest-control methods that could spur further growth and profits in the organic sector. This type of action is not unprecedented in the country. Costa Rican municipalities are taking action within their own jurisdictions, with Perez Zeldon making history as the first municipality to ban the use of agrochemicals in public spaces.[135] More research and insight from Costa Rican pineapple farmers, government officials, and other industry actors is needed to determine the potential for impactful change in this area.

Limit Farm Size

The Costa Rican government could limit the size of pineapple farms. Currently, the profit of Costa Rican pineapple production is centered in large corporations and farms.[136] Alternatively, the government and or supermarket chains could call upon pineapple corporations to limit the scale of production and overall plantation size. Many medium sized farms have already reduced their size in the Northern region of Costa Rica. Corporations could decrease pineapple production and diversify the export sector by engaging in polyculture cultivation. In one study, this solution was highly favored by community members, but opposed by multinational corporations (MNCs) such as Del Monte and Dole.[137]

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[131] *Organic Pineapples Market - Global Industry Analysis, Size, Share, Growth, Trends and Forecast 2017 - 2025*, Transparency Market Research, https://www.transparencymarketresearch.com/organic-pineapples-market.html (last visited April 29, 2021).

[132] *Id.*

[133] *Id.* ("Organic pineapples land under agriculture usage is relatively less and constitutes [sic] about 0.5-0.75% of total agriculture land. The land use and the total output might be considered low when compared to other subtropical [sic] fruits where the percentage represents a larger share of total organic produce").

[134] LaMay, Jessica, et al., *The Politics of Pineapple: Examining the Inequitable Impacts of Southern Costa Rica's Pineapple Industry*, Journal of Public and International Affairs, Princeton University (2020), https://jpia.princeton.edu/news/politics-pineapple-examining-inequitable-impacts-southern-costa-ricas-pineapple-industry.

[135] Abelardo Canelo, *First Municipality in Costa Rica to Ban the Use of Agrochemicals in Public Spaces*, The Costa Rica News, https://thecostaricanews.com/first-municipality-costa-rica-ban-use-agrochemicals-public-spaces/ (last visited April 29, 2021).

[136] Food and Agriculture Organization of the United Nations, *The successes and shortcomings of Costa Rica exports diversification policies* (2018), http://www.fao.org/3/I8308EN/i8308en.pdf.

[137] Robert B. Richardson, et al, *Using Choice Experiments to Understand Household Tradeoffs Regarding Pineapple Production and Environmental Management in Costa Rica*, J. Envtl. Mgmt., Academic Press (June 24, 2013), www.sciencedirect.com/science/article/pii/S0301479713003721.

Retail Influence

Perhaps the most promising private sector lever resides in power that consumers exert on retailers. Large supermarket chains have the potential to influence companies like Dole and Del Monte. Oxfam already has called upon European supermarket chains to create binding measures with the farms they receive products from.[138] Since retailers decide which pineapples they purchase, they also can buy from farms with more sustainable practices or persuade suppliers to adjust their practices. Relationships with representatives from retail trade organizations and national economic development agencies may advance efforts to push retailers towards environmentally responsible sourcing practices. Relatedly, efforts to educate and motivate consumers through media campaigns and outreach, particularly in the United States and Europe, may help influence buying practices, and thus help influence retail sourcing practices.[139] The power of retail influence can be seen in products ranging from shade-grown coffee to dolphin-safe or wild-caught tuna, from hormone free milk to pasture raised meat, as well as the rapid growth of the entire organic industry.[140]

Summary of Opportunities for MRN

None of the initiatives and opportunities for changing the dynamic between the pineapple industry and macaws are simple. Each requires time, resources, and relationships, and some simply may be impractical or unworkable. But each of the primary sectors influencing the dynamic—government, NGO, private—offer existing initiatives and additional opportunities that are worth considering. Areas in which progress seems possible and perhaps most likely include:

- Developing relationships with officials to influence INSP and MOCUPP standards.
- Improving enforcement of logging regulations through public funding or private philanthropy.
- Developing relationships with The Rainforest Alliance, or with stakeholders connected to The Rainforest Alliance, to exert influence on green certification standards.
- Promoting programs that encourage and/or incentivize crop diversification, polyculture, and organic farming, as well as programs that encourage smaller-scale farming.
- Developing relationships within the private sector, whether formal state-affiliated agencies or retailers themselves, to educate and affect sourcing habits.
- Educating the public in key countries to influence buying habits.

Most if not all of these opportunities will require additional research and resources. The following section addresses additional research opportunities that are designed with the Macaw Recovery Network in mind.

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[138] Oxfam, *Sweet Fruit, Bitter Truth*, page 4 (May 2016), https://www.oxfam.de/system/files/20160531-oxfam-sweet-fruit-bitter-truth-en.pdf.
[139] *Id.*
[140] USDA, Economic Research Service, *Organic Market Summary and Trends* (2021), https://www.ers.usda.gov/topics/natural-resources-environment/organic-agriculture/organic-market-summary-and-trends/.

Potential Next Steps for Research

Regardless of whether and how MRN pursues future opportunities, additional research may be necessary and helpful to fully take advantage of initiatives and opportunities for change. In this section, we identify and briefly explain four research projects that would be particularly advantageous to MRN efforts. The Conservation Law Clinic and the Program for the Advancement of Research on Conflict and Collaboration are well-positioned to conduct these (and potentially other) research projects should they be of interest and value to MRN. Most of these projects involve – to varying degrees – reaching out to and talking with various sets of stakeholders. In anticipation of this and other work, we identify, profile, and provide contact information for many of the major stakeholders in the appendices to this report. We also have some preliminary ideas about the kinds of interview questions we might ask various stakeholders were we to pursue any of these research opportunities.

First, as noted above, the National Platform for the Responsible Production and Trade of Pineapple in Costa Rica, a multi-stakeholder effort led by MINAE and MAG with support from UNDP, was active from 2011 to 2018. In 2011, the Platform convened the multi-stakeholder dialogue which led to the first Action Plan. The 2016 Executive Decree adapted and formalized the Action Plan and established the INSP. In implementing the Action Plan, INSP encouraged efforts to address deforestation through MOCUPP. Beyond these activities, however, we identified little information about the INSP, its activities, or the effectiveness of the ongoing implementation of the Action Plan. We also do not have a full list of organizations that participated, or continue to participate, in the collaborative processes under the INSP, or to what extent conservation and ecological interests have been represented. It would be useful to have more information about and better understand the current standing and future plans of the INSP, especially given that the National Action Plan is likely scheduled to be updated in the near future (possibly in 2021, if the 5 years is calculated from the passing of the Official Decree in 2016). The timing of this update is potentially fortuitous and could allow MRN to get macaw (and other species and habitat) conservation issues on the agenda. To gather such information, we recommend contacting and interviewing major stakeholder and participants about the Platform, Plan, and INSP, particularly in relation to current and planned activities, accomplishments to date, and opportunities and barriers to further progress.

Second, and relatedly, it would be useful to learn more about MOCUPP to understand the challenges of and opportunities for monitoring and land management strategies aimed at protecting rainforest. Likewise, it would be useful to learn more about Costa Rica's forestry laws and enforcement mechanisms. To gather this information, it would be useful to talk with actors and stakeholders involved in MOCUPP and other forestry or environmental initiatives, as well as to learn about the challenges faced by forest regulators and loggers.

Third, the agriculture sector is undoubtedly and inextricably intertwined with conserving wildlife. Thus, it could be helpful to better understand the auditing and enforcement processes of the Rainforest Alliance and/or of organizations with similar green certification standards such as the Sustainable Agriculture Network, Global Gap, Ethical Trading Initiative, Grasp Module, and Field to Fork. With a better understanding of their standards and processes, as well as the barriers and challenges such organizations face, MRN may be able to identify discover gaps in methods and/or exert meaningful influence to correct inconsistencies or improve practices. Beyond interviews with key actors, it also could be useful to examine the efficacy of similar certification practices for other agricultural or forest products in other places around the world.

Fourth, macaws do not bear the brunt of the pineapple industry alone. Thus, it would be useful to identify and map organizations that seek to address the negative externalities of the pineapple industry, including for example organizations, groups, and efforts that deal with environmental issues, labor, migrant rights, pesticides, health, farming and agricultural practices, and the like. Similarly, macaws are not the only threatened or endangered species in Costa Rica. Thus, it would be useful to identify and map organizations that address wildlife and conservation issues in Costa Rica (and perhaps the region). Know your allies.

Finally, MRN may wish to explore the possibilities for convening either a larger or narrower collaborative effort aimed at macaw conservation. To do so, it would be useful to conduct a conflict assessment (i.e., an analysis of the social and environmental conflicts with regard to pineapple production and conservation; the positions and interests of stakeholders; potential areas of common ground and potential levers for change), a collaborative assessment (i.e., an analysis of existing collaborative efforts, including who has and has not been involved, points of success and struggle, and opportunities for and barriers to more effective collaboration), and a convening assessment (i.e., an analysis of the likely efficacy of convening stakeholders in a new or revised collaborative effort, as well as who should be involved and who should convene).

Conclusion

The pineapple industry in Costa Rica has severe economic, social, and environmental ramifications. Deforestation, driven by efforts to clear land for pineapple planting, is a major cause for the endangerment of the Great Green Macaw. Aside from harming wildlife, the pineapple sector also impacts public health and violates workers' rights. While these issues are distinct, they present the unique opportunity for stakeholders across sectors to collaborate. Current ongoing collaborative initiatives exist, including the Rainforest Alliance, the National Initiative for Sustainable Pineapple Production, and the Monitoring Land Use Change within Production Landscapes Program. While all have the potential to mitigate some negative externalities, they must be adapted to prioritize conserving wildlife.

Amending the pineapple sector presents both challenges and opportunities for protecting the Great Green Macaw. Overall, correcting logging corruption, sustainably outsourcing pineapple production, using smaller farms, increasing plant variety, and promoting organic growing practices could help limit the harm done by the pineapple sector. However, many of these initiatives require large-scale action by a variety of stakeholders and cannot be accomplished promptly. As a result, the Macaw Recovery Network could consider collaboration and research opportunities with new partners, to expand their influence and increase opportunities for effective advocacy.

Photo by Macaw Recovery Network

Appendix A: Potential Stakeholders

Government Actors

1. National Chamber of Pineapple Producers and Exporters (CANAPEP)
2. Forest Regulators: Sistema Nacional de Áreas de Conservación (SINAC)
3. Tribunal Ambiental
4. Ministry of Labor and Social Security (MTSS)
5. Ministry of Agriculture and Livestock (MAG)
6. Ministry of Health
7. Ministry of Environment and Energy (MINAE)
8. Chamber of Commerce of Costa Rica (Cámara de Comercio de Costa Rica, CCCR)

Private Actors

1. Costa Rican Pineapple Producers/ Farms
    a. Grupo Acón
    b. Chestnut Hill Farms
2. Major Multinational Corporations/ Farm Owners
    a. Del Monte: US owned (about 50% of Costa Rica's pineapples)
        i. Subsidiary: Pineapple Development Corporation (PINDECO)
    b. Dole: US owned
        i. Subsidiary: Calinda Farm
3. Good-Practice Certification Organizations
    a. Rainforest Alliance
    b. Sustainable Agriculture Network
    c. Global Gap
    d. Ethical Trading Initiative (ETI)
    e. Grasp Module
    f. Field to Fork Certificate
4. Multinational Supermarkets
    a. Kroger, Aldi, Walmart
5. Subcontractors

Non-Governmental Actors

1. Food and Agriculture Organization of the United Nations (FAO)
2. UN Development Programme (UNDP)
3. International Atomic Energy Agency (IAEA)
4. Consumers International + European Union (have expressed interest in improving working conditions/reducing pesticides)
5. Oxfam International

Unions

1. Sindicato de Trabajadores de Plantaciones Agrícolas (SITRAP)
2. National Association of Public and Private Employees in Costa Rica (ANEP)
3. Asociación de Trabajadores de Fertilizantes (ATFE)
4. Frente Nacional de Sectores Afectados por la Producción Piñera

Advocacy Organizations

1. Federation of Conservationists of Costa Rica
2. CoecoCeiba - Friends of the Earth Costa Rica
3. National Front of Sectors Affected by Pineapple Production (FENASAP)

Other Research Contacts

1. University of Costa Rica's Environmental Pollution Research Centre (CICA)

Appendix B: Profiles of Key Organizational Stakeholders

Dole

Dole employs more than 7,500 people annually in Costa Rica.[141] It prioritizes ensuring that pineapples meet international standards and are safe to eat but is critiqued for denying environmental responsibility for using pesticides and herbicides not permitted in the US. Dole hires about 77% of its workers through subcontractors to avoid legal responsibilities concerning benefits and accountability to its workers. This prevents workers from joining unions.[142] In 1990, Dole created an endowment for nutrition testing with the Mayo Clinic and on September 4, 2020, Dole Chairman of the Board, David Murdock, advised the Mayo Clinic to not use its funds to perform testing on animals. This may signal Dole's interest in animal rights and could be leveraged to engage them in the conservation of the Great Green Macaw. Dole has also responded to several allegations concerning its practices in Costa Rica, claiming several criticisms were untrue.[143]

Grupo Acón

A Costa Rican pineapple company, Grupo Acón is dedicated to both environmental and social responsibility.[144] It has the largest solar panel installation in the country and is certified by many groups including Rainforest Alliance, Global G.A.P., and the Grasp Module, although some critique these certifications. While Rainforest Alliance emphasizes long-term environmental, social, and economic sustainability, it fails to address pesticide usage and local employment violations, such as those discriminating against unionized workers or Nicaraguans. Global G.A.P. grants certifications based on good agriculture practices[145] and the Grasp Module provides a format to help assess social practices on the farm such as worker welfare.[146]

National Chamber of Pineapple Producers (CANAPEP)

CANAPEP helped implement the Socio-Environmental System for the Sustainable Production of Pineapple (SG-PSP). This helps guide producers towards environmentally friendly processes. It

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[141] *Dole closes facility at Costa Rican port*, FreshFruitPortal (Jan. 28, 2019), https://www.freshfruitportal.com/news/2019/01/28/dole-closes-facility-at-costa-rican-port/#:~:text=Dole%20employs%20more%20than%207%2C500,in%20increasing%20its%20pineapple%20operations.

[142] Anne Martin, *The Sour Side of Pineapple Production*, Exploring Green, 24 Oct. 2016, blogs.nicholas.duke.edu/exploring-green/the-sour-side-of-pineapple-production/.

[143] *See* http://www.fruitnet.com/americafruit/article/8373/dole-responds-to-costa-rica-allegations.

[144] *Social Responsibility*, Grupo Acón, https://www.grupoacon.com/social-responsibility/ (last visited April 29, 2021).

[145] *Welcome to Global G.A.P. –The Worldwide Standard for Good Agricultural Practices*, Global G.A.P., https://www.globalgap.org/uk_en/ (last visited April 29, 2021).

[146] *What is Grasp?* Global G.A.P., https://www.globalgap.org/uk_en/for-producers/globalg.a.p.-add-on/grasp/what-is-GRASP/# (last visited April 29, 2021).

also has created cooperation agreements, farming manuals, training sessions, and other resources for those involved in the sector to ensure environmental protections.[147]

PINDECO (Del Monte Subsidiary)

PINDECO is responsible for about 50% of pineapple production in Costa Rica. It often provides health insurance for its workers, but some workers suspect this is due to the desire to hide the health problems and damage they are causing.[148] PINDECO has been authorized to break the law by the Ministry of Agriculture and Livestock, such as through burning post-harvest biomass, even though this releases toxic pesticides into air and impacts surrounding communities.[149]

Sistema Nacional de Áreas de Conservación (SINAC)

The Costa Rica National System of Conservation Areas is in charge of protecting natural parks and environmentally protected areas. It is a part of the Ministry of Environment and Energy (MINAE) of Costa Rica. Traditionally underfunded, some researchers have found that forest regulators are not properly conserving animal habitats due to corruption and lack of incentive.[150]

Sindicato de Trabajadores de Plantaciones Agrícolas (SITRAP)

SITRAP, the most active and influential agricultural union in Costa Rica, represents all types of tropical fruit workers and has a presence in more than 50 fruit plantations, demonstrating its wide reach.[151] They currently are funded by UNISON, a United Kingdom based union group. SITRAP holds workshops, educates workers on their rights, and recruits members. Perhaps most importantly, it signed a significant Collective Bargaining Agreement with Bandeco, a major subsidiary of Del Monte.[152] Since the Cold War, there have been historically low levels of unionization. To change this, SITRAP has also worked with the Ministry of Labor and Social Security (MTSS) concerning unfair employee dismissals. It works to represent workers, promote gender equity in the workplace, and prevent discrimination and unfair dismissal.[153]

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[147] Fresh Plaza, *CANAPEP, 15 years of promoting pineapple production in Costa Rica*, 28 Mar 2018, https://www.freshplaza.com/article/2191861/canapep-15-years-of-promoting-pineapple-production-in-costa-rica/.
[148] *See* LaMay, Jessica, et al., *The Politics of Pineapple: Examining the Inequitable Impacts of Southern Costa Rica's Pineapple Industry*, Journal of Public and International Affairs, Princeton University (2020), https://jpia.princeton.edu/news/politics-pineapple-examining-inequitable-impacts-southern-costa-ricas-pineapple-industry.
[149] *Id.*
[150] Michael J. Miller, *Persistent Illegal Logging in Costa Rica: The Role of Corruption Among Forestry Regulators*, 20:1 J. Environ. Dev. 50 (Mar. 2011).
[151] Quienes Somos?, SITRAP, http://www.sitrap.net/quienesSomos.html (last viewed April 29, 2021).
[152] ITRAP & UNISON International Development Fund, *Supporting the Union of Agricultural Plantation Workers, SITRAP, in Costa Rica.* https://www.bananalink.org.uk/wp-content/uploads/2019/08/UNISON-Report-2019-FINAL-VERSION.pdf.
[153] BananaLink, *Our Work in Costa Rica with SITRAP*, https://www.bananalink.org.uk/partners/costa-rica/.

University of Costa Rica Environmental Pollution Research Centre, the Food and Agriculture Organization of the United Nations (FAO), and the International Atomic Energy Agency

Together, these three actors are working towards alternative methods for fertilization of soil and land. One solution is through biochar, a material made from leftover parts of the pineapple plant. The usage of biochar will reduce the need for fertilizer and reduce dangerous residue that can attract biting flies. Further, biochar reduces greenhouse gases, and can remove carbon from the atmosphere and increase soil productivity.[154]

[154] Laura Gil, *Costa Rica Paves the Way for Climate-Smart Agriculture*, IAEA, (Dec. 7, 2017), www.iaea.org/newscenter/news/costa-rica-paves-the-way-for-climate-smart-agriculture.

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The Conservation Law Center is a nonprofit public interest law firm. We are lawyers, advocates, and educators who care deeply about the natural world and people's relationship to it. We work to protect and improve the health, diversity, beauty, and resilience of the planet and defend our shared natural heritage. The Center provides legal support to other conservation nonprofits and works with clients on a wide range of transactional, policy, and litigation matters pertaining to regional, national, and international conservation issues. The Center has particular interest and expertise in several topics, including natural habitat protection, conservation easements, the Public Trust doctrine, endangered species protection, and the protection of freshwater ecosystems especially in the Great Lakes region. While we focus on land, water, and species, climate change is a factor in nearly all of the issues we address. Conservation Law Center was founded in 2005 by attorney W. William Weeks, former EVP and COO of The Nature Conservancy, who currently serves as the Center's board chair.

The Center also operates the Conservation Law Clinic in partnership with the Indiana University Maurer School of Law at Indiana University. In that capacity, the Center works with student interns on its active projects, advising clients, and researching legal and policy solutions on conservation issues. The Center is the only law clinic in the country dedicated solely to conservation issues.

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PARCC is an interdisciplinary program devoted to advancing the theory and practice of the analysis and resolution of conflict, collaborative problem solving, and collaborative governance. The primary goals of the program are to develop knowledge about the context and stages of different conflicts and, on that basis, to assess and teach alternate methods of conflict transformation. The diverse backgrounds of PARCC faculty associates and graduate students reflect the program's emphasis on interdisciplinary research and theory building. Program associates engage in studies that relate to advocacy and activism, collaborative governance, environmental conflict and collaboration, and international and intra-state conflict. Under these categories, associates examine myriad issues, such as foreign policy decision making during crises, cultural aspects of conflict, geo-political ideologies, ethnic conflicts, labor studies, nonviolent means of protest, gender and conflict, community organizing efforts, alternative dispute resolution methods, conflict transformation, interpersonal violence, prevention of disputes through increased public participation in environmental matters, and de-escalation initiatives and peacemaking.

Other activities of the program include a theory-building seminar, working groups organized around specific research topics, a conflict forum speaker series, and interdisciplinary conferences and publications focused on conflict-related topics. PARCC also offers a certificate of advanced studies in conflict and collaboration and provides skills workshops and trainings for students and community members.