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"Unity in diversity": Employing conservation easements and environmental justice to eradicate the Indonesian agricultural-industrial complex

In Indonesia, life has 279 million different meanings for 279 million people. No country in the world parallels Indonesia in its diversity and span of geography, climate, and culture. One of the world's largest archipelagos, Indonesia consists of 17,500 islands, and is the fourth most populous country in the world. (Encyclopædia Britannica) In recent years, the country has made large strides in eradicating extreme poverty, and, in the midst of widespread industrialization, Indonesia is now considered an upper-middle-income country. (UN World Food Programme) However, the level of prosperity that the people of Indonesia are afforded varies much more widely than a single statistic can reveal.

1. Context

Any two Indonesians may live vastly different lifestyles than one another – from the food they eat, to the customs they practice, and their way of life, each of the thousands of islands that make up the country is home to people with unique conditions to adapt to. Indonesians are composed of more than 300 distinct ethnic groups, all practicing variations of their own belief systems, and with unique societal hierarchies. But, for a country with people from all walks of life, Indonesia's government is a remarkable exemplar of uniting diverse populations – even those with conflicting values. The country's motto is "Bhinneka Tunggal Ika," which translates to "unity in diversity," and is a cornerstone of national identity. The country's residents are unified through a common language, Bahasa Indonesia, although regional variations and other languages are also spoken. The country's three-branch government represents 38 provinces and interprets the Constitution of Indonesia to pass legislation and maintain national affairs. (Encyclopædia Britannica)

Indonesia's status as a newly industrialized country, along with the fact that over 50% of the population lives in urban areas, has led to a shift from diets centered around traditional Indonesian cuisines to a rise in modern appetites acclimated to more international tastes. Despite the popularity of international cuisine, for an overwhelming majority of Indonesians not living in cities, food comes from local markets or street-side sellers and is prepared in biomass-fueled stoves. The gas-powered revolution has yet to reach the remote communities that reside on smaller islands, but most regional cuisines tend to rely on rice for carbohydrates and seafood for protein. (Wijaya)

The distance from the chaos and globalization of urban Indonesia presents unique challenges in rural regions. Although high school education is required, post-secondary education in Indonesia is among the lowest of OECD countries. Education barriers prevent women, low-income, and rural residents in particular from increasing their socioeconomic status. (Encyclopædia Britannica) Most people in the country are employed in agriculture, retail, or manufacturing, and the country's relative wealth is held in the iron-fisted grasp of few affluent members of society. (OECD)

2. Climate Change and the Agricultural-Industrial Complex

A key change driving the country's poor response to climate change is its unbalanced industrialization, which is overwhelmingly occurring in New Guinea, the country's largest island. Beyond the country's expanding concrete metropolises, Indonesia's islands are dotted with the remnants of volcanoes – some still active; rich and dense rainforest paradises; ecologically invaluable mangrove forests; and millions of hectares of patchy tropical peatlands. The climates of these regions vary widely, too. While typhoons and monsoons are a consistent weather fixture of nearly any Indonesian island, some regions also find themselves ravaged by droughts, floods, or inconsistently oscillating conditions exacerbated by climate change. (Encyclopædia Britannica)



Figure 1: Climate change indicators in Indonesia. (World Bank Open Data)

However, to understand the country's emerging struggle against its climate crisis and the infrastructural gaps that allow such failures to happen, it is critical to know Indonesia's long, convoluted battle against European colonization. Beginning in the Age of Exploration, Dutch colonial powers seized control of these so-called "Spice Islands" and established plantations that produced massive amounts of nutmeg and cloves to satisfy foreign market demands. Hard-fought wars waged by indigenous peoples such as the Infidel War weakened colonial rule on the country but failed to permanently remove settlers until after the end of Japanese occupation during World War II. (Encyclopædia Britannica)

Indonesia now celebrates its monumental independence on August 17, but colonial influence lingers: its largest export is palm oil, rather than staple crops to feed its people, and, to this day, the country continues to exhaust its farmland and forests to create commodities for international trade in an industrial-agricultural complex that is so deeply ingrained into the country's economy. (United States Department of Agriculture) While large farms are complacent in this issue, an overwhelming majority of farms in Indonesia actually belong to small farmers. (United Nations) Many of them practice slash-and-burn agriculture, where tropical rainforests or other existing natural ecosystems are torn down in place of a monocultural plantation that works the land until its nutrients are depleted. It's a vicious cycle that poor, rural farmers have no way of escaping. Few efforts have been made by the government to assist farmers in shifting to more sustainable practices or accessing modern technologies that have the potential to do so. (Goh)

Although the country's climate issues take place across various geographic regions with uneven and, at times, unexpected, consequences particularly for low-income and women, a worthy goal would be to eradicate slash-and-burn agriculture and replenish previously used farmland across the country's thousands of islands. This would, essentially, be hitting two birds with one stone. On one hand, you have the intuitive benefits of restoring the vitality of lands that were previously exhausted. It would also reintroduce natural flood protection and disaster resilience without draining government funds and using as many tax dollars to burden shorelines with miles of seawalls and levees. (Breuer et al.)

According to the Climate Policy Database, Indonesia's overall climate change policy rating is "Very Good," the best rating possible. Despite this recognition, Indonesia lacks policies in individual areas that hinder a more effective response to climate change and dismantling the agricultural-industrial complex. In particular, no policies exist at the time of this paper that reduce CO2 or N2O emissions in farming, indicating that policy in sustainable farming is still lacking. (Climate Policy Database, 2024) There are, however, 32 total policies, regulations, and standards that support agriculture more broadly or reforestation efforts. While there may be ample attention paid to these issues in Indonesia law, the majority of palm oil production still comes from the country, indicating that the true intention of reforms to democratize agriculture to Indonesian small farmholders has not yet been met. (USDA, 2023) However, progress has clearly been made and suggests that policymakers are attentive and willing to craft impactful, climate-centric policies for food justice.

4. Conservation Easements

Despite being equipped with these resources, scientists, and other personnel, palm-oil plantations and industrial agricultural farms still dominate Indonesia and forging truly sustainable practices on these lands poses a challenge. Putting land in the hands of Indonesians would be a form of paying reparations for the centuries of colonization that wreaked its islands, provide new jobs that can aid in elevating women's social status, and allow Indonesia to craft resilient food and natural systems that can sustain its population – and environment – for centuries to come.

For the purposes of this paper, a solution was sought that satisfied the following criteria: 1) be inherently sustainable in nature, meaning the implementation ensures the long-term success of the program, rather than a short-term action that is abandoned as soon as a certain quota is met, 2) positively benefit the socio-ecological systems of the country, from its farmers and the people who eat their food, to the biota and biodiversity housed within Indonesia's landscapes, and 3) be an effective solution to combating climate change by reducing the environmental impact of Indonesian agriculture.

As mentioned in the previous section, many current and previous solutions have been policy-centered programs, such as the "Master Strategy on Agricultural Development" proposal passed in 2013, but whose most recent update was over a year ago in February 2023. Without adequate and thorough documentation of its implementation and successes, it is extremely difficult to gauge the efficacy of such policies. Many of these actions tend to also be big-picture approaches, composed and led by leadership from high positions in government. For instance, one example is the Partnership for Indonesia's Sustainable Agriculture (PISAgro), a coordination network consisting solely of members of parliament and representatives from several private companies.

Among these companies are Syngenta and Bayer. Both were involved in lawsuits or investigations accusing them of keeping harmful substances in the market, paraquat and glyphosate respectively. These actions demonstrate that without ensuring a diverse range of voices on their board, with an emphasis on marginalized groups like women and rural residents, in the room where decisions are made, the work that organizations like PISAgro does will lack authenticity to the people who will be directly affected.

This paper proposes conservation easements as a promising solution and core framework for Indonesia's battle against climate change. Due to the complex and widespread nature of this issue, targeting the root cause of the issue can help stymie its effects, and conservation easements mesh with this goal. Conservation easements, or, the practice of purchasing land to repurpose it for sustainable applications. This technique is relatively well-known in biodiversity conservation, but using it in combination with sustainable agriculture is nearly unheard of, despite numerous potential benefits, including the ability to be integrated into already-existing regional practices. ("Conservation Easements")

Contrary to popular belief, using exhausted land doesn't diminish the efficacy of this strategy – it actually enhances it. A study conducted by University of Sheffield researchers found that land easement was most effective on already-exhausted lands as they were cheaper to purchase and obtain rights to. (Armsworth and Sanchirico) This means that flash-and-burn farmers whose land is already degraded can work with the land they already own and use.

What makes the proposed solution in this analysis unique is incorporating the tenets of digital agriculture, environmental justice, and open science collaborations into conservation easements, which hasn't seen such cross-interaction with other climate mitigation techniques before. The following schematic framework depicts the workflow and core components of the proposed solution.

The figure below encapsulates the conceptual framework of the proposed solution. The core process driving forward a transition to grassroots and sustainable agriculture is placing farmland – exhausted or not – into the ownership of small Indonesian farmers by the government. This is a generational contract ensuring land is democratically kept from the reaches of corporations like Syngenta and Bayer. Then, the socio-ecological systems that reside on this land will undergo recovery from previous destructive processes, such as deforestation. This step will redirect slash-and-burn agricultural lands into farms that practice agroforestry, intercropping, and sustainable irrigation. Once the land is prepared for sustainable farming, then farmers are given full independence over their land, as long as they

adhere to the sustainable commitment agreement. Diversified funding streams will supply them with the necessary monetary support for materials in the short-term, but the long-term goal is to earn full economic independence while practicing sustainable agriculture.



Figure 2: Conceptual framework of the proposed solution in this paper. (Source)

To ensure that forestry goals are actively and continually met, civic organizations that specialize in conducting on-the-ground work with farmers themselves can gauge progress that the country is making, and adjust goals accordingly. (Breuer et al.) Open-science should pioneer research programs that allow graduate students, post-docs, professors, and government officials to share their findings with Indonesian farmers and facilitate work-study programs that provide academics with a fulfilling research experience and farmers with one-on-one time with an expert in reforestation.

5. Evaluating the Solution

In the coming sections, we outline a stakeholder analysis and evaluate the fit, anticipated effectiveness, and long-term feasibility of the proposed solution.

Stakeholder mapping is a helpful tool when understanding the populations or entities who stand to benefit or contribute to the proposal of sustainable agriculture conservation easements. The important players for our solution that we identified lie in four primary categories: government, citizens, private domestic organizations, and international organizations.



Figure 3: The umbrella categories of stakeholders of mitigating climate change in Indonesia. (Source)

Independent and small-time Indonesian farmers and the Indonesian National Ministry of Environment and Forestry are anticipated to be the foundation of this collaboration. At its core, the proposal is intended to transform the way that Indonesian farmers farm through government-issued land trust agreements.

Additional consideration and support will be given to women and rural residents from the most impoverished areas of the country. We envision that individual units or task forces within the governing body of this initiative can tackle the challenges that arise against these populations. For instance, cultural norms that prevent women from economic autonomy or access to higher education. While this is a larger societal issue of the lack of women's empowerment, conservation easements offer an opportunity for many of underresourced populations a chance to break cycles of generational poverty and sexism. (Niazi, 2006)

However, the work for this proposal will also rely on the collective efforts of communicators, nonprofits, and international collaborators to succeed. An organization that serves as a model to pilot this framework of land reclamation for sustainable agriculture is Tropenbos Indonesia. Tropenbos specializes in community forest schemes in tandem with restoring and repurposing land they save from further degradation.

One of the most important promising aspects that this nonprofit offers lies in its commitment to long-term land-use changes, rather than short-term changes that leave as sources of funding dry up. Such projects may span decades, and coordinating funding may be a challenge during economic recessions, but can be solved by using funding and resources from a plethora of sources. This prevents both a single source from possibly unethically influencing the results of forestry initiatives and creates a more sustainable economic base that ensures continual funding even if certain sources withdraw their support. (Breuer et al.) One attractive crowdsource funding is from microloans using popular sites like Go-Fund-Me or "Sponsor a Plantation" programs that allow farmers to garner support among international audiences and allow individuals to take collective action in supporting Indonesians. (Leiserowitz)

But what of the "ordinary people"? That is to say, what role do ordinary citizens, whether they be in Indonesia or the rest of the world, play when they have little or no connection to a nonprofit, agency, or farmer themselves? The role of this remaining population lies in supporting these farmers by buying their food, participating in science exchange programs, or acting as global citizens in this fight to sustainably modernize Indonesian agriculture.

7. Conclusion

Finding solutions doesn't have a single answer: in fact, it is the synergy between environmental justice, open science, digital agriculture, and conservation easements that makes it such powerful tools to prevent climate catastrophe. Under the guidance of Indonesia's natural resources management and conservation department, influence of international environmental organizations like Tropenbos Indonesia, and the passionate will of individual farmers and environmentalists, the fate of the climate crisis in this vulnerable country's future need not be the horror story that current research foresees. Rather, it could be one of hope and one that ignites a revolutionary movement that rewrites future narratives of the climate crisis.

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