Espacio y Desarrollo N° 41, 2024, pp. 126-139 (e-ISSN 2311-5734)
https://doi.org/10.18800/espacioydesarrollo.2024.005

Saving *Sachamama* Through BioTrade: Peru's Export of Native Biodiversity-Based Products[1]

Jens Rudbeck
https://orcid.org/0009-0008-4430-0853
New York University
jr2723@nyu.edu

Yovita Ivanova
https://orcid.org/0000-0003-2079-6117
Pontifical Catholic University of Peru (PUCP)
yivanova@pucp.pe

Sylvia Maier
https://orcid.org/0009-0002-2040-8268
New York University
sm173@nyu.edu

Recibido: mayo, 2023.
Aceptado: junio, 2024.

Abstract

Two decades ago, the Peruvian government introduced the National BioTrade Promotion Program to support the production and export of agricultural commodities that comply with UNCTAD's principles and criteria for BioTrade. This article takes stock of some of the program's achievements over the past 20 years and discusses the challenges that remain to scaling up biodiversity-friendly approaches to agriculture in Peru. We find that the rapid increase in export during the first ten years of the program, which drove the initial optimism about BioTrade's potential for economic development and biodiversity conservation, has given way to a more cautious assessment as the second decade has seen the expansion of markets for Peruvian biodiversity-based products slow down considerably.

Keywords: BioTrade, Biodiversity, Peruvian Amazon, Agricultural Export, Dependency Theory.

Salvar la *Sachamamama* a través del Biocomercio: las exportaciones de productos basados en la biodiversidad nativa en el Perú

Resumen

Hace dos décadas, el gobierno peruano introdujo el Programa Nacional de Promoción del Biocomercio para apoyar la producción y exportación de productos agrarios que cumplan con los principios y criterios de la UNCTAD para el Biocomercio. Este artículo presenta un balance de algunos de los logros del programa en los últimos 20 años y analiza los desafíos que aún quedan para promover una agricultura que conserva y da un uso sostenible de la biodiversidad en el Perú. Constatamos que el rápido aumento de las exportaciones durante los primeros diez años del programa, que impulsó el optimismo inicial sobre el potencial del Biocomercio para el desarrollo económico y la conservación de la biodiversidad, ha dado paso a una evaluación más cautelosa a medida que, en la segunda década, los mercados de productos peruanos basados en la biodiversidad nativa se han desacelerado considerablemente.

Palabras clave: Biocomercio, biodiversidad, Amazonía peruana, exportación agrícola, teoría de la dependencia.

A new approach to biodiversity conservation

Over the past fifty years, biodiversity has declined at a pace and on a scale not seen since the end of the Cretaceous period 65 million years ago. At a rate 1,000 times above the normal background frequency, the Earth is facing a potential mass extinction that could see more than 75 % of all species disappear (Barnosky et al. 2011; Pimm et al. 2014). The loss of biodiversity has been particularly disconcerting in the Amazon rainforest where current estimates suggest that as many as 10,000 of the about 50,000 plant and animal species will go extinct by 2050 (Nobre & Encalada 2021). While there are many complex reasons behind the decline, a main driving force is land-use and land-use changes, especially deforestation for agriculture and lumber, which has degraded or completely deforested more than 35 % of the region thereby destroying a significant number of natural habitats (Vergara et al. 2022).

It was against this background that the United Nations Conference on Trade and Development (UNCTAD) launched its BioTrade initiative in 1996 with the aim to foster trade and investment in biodiversity by outlining a set of principles and criteria for how businesses, especially in the agricultural sector, could promote the conservation of native ecosystems through the sustainable use of products and services.[2] In support of the initiative, the Peruvian government created the Peru National BioTrade Promotion Program (NBPP) in 2004, a program designed to help farmers and private enterprises produce, market, and export their biodiversity-friendly products and ingredients to consumers in high-income countries (UNEP 2012).

Encompassing over 12 % of the total area of Amazonia, and as one of only 17 countries categorized as megadiverse, Peru's commitment was crucial if BioTrade was to have a real effect on biodiversity in the rainforest. Aside from its importance in the struggle against environmental degradation, the BioTrade initiative also offered the Peruvian government a new tool in the fight against poverty in rural communities. As the vast majority of farms in the country are less than ten hectares, BioTrade has the potential for reducing poverty by integrating smallholders into high-value supply chains that ensure better prices than traditional produced export crops (FAO 2022; Zinngrebe 2016). Implementing environmental protection programs that elevate the income among poor farmers is particularly important in the Peruvian Amazon where poverty rates are almost 50 % higher than the national average (Morley 2017).[3] The same is true for malnutrition (Santos et al. 2021). Given the human consequences of poverty, it is not uncommon for farmers to turn to the production of coca or illegal gold mining as coping strategies (Grisaffi & Farthing 2021; Olson 2023). In fact, coca production has become a major source of deforestation in Peru as only about 10 % of the farmers who grow coca have access to other sustainable livelihood activities (UNODC 2005). So has artisanal and small-scale gold mining, which was responsible for nearly 100,000 hectares of deforestation in the period between 1984 and 2017 (Espejo et al. 2018). In this perspective, the promotion of BioTrade to protect biodiversity may offer farmers the opportunity to move away from such illegal practices by offering them a way out of poverty.

Preserving biodiversity through export-led economic development

At the core of the six principles and criteria upon which the BioTrade initiative is based (see endnote 2) lies the belief that it is possible to transcend the antagonistic relationship between economic growth and the preservation of the environment that exists within the current development paradigm. Rather than a tradeoff where rising wealth and prosperity come at the expense of climate change, loss of biodiversity, and the pollution and destruction of ecosystems, BioTrade offers a win-win situation where sustainable agricultural practices have the potential to alleviate poverty and promote a more equitable sharing of the benefits derived from the use of biodiversity. This was by no means a novel idea when the BioTrade initiative was introduced in 1996 as similar eco-friendly labeling programs such as Fair Trade and Rainforest Alliance were already in existence, but what set the BioTrade initiative apart was the lack of a costly certification process that has often kept smallholders from adopting a more biodiversity-friendly approaches to agriculture. Furthermore, whereas certification by Fair Trade and Rainforest Alliance is issued by civil society organizations, BioTrade has the support of the state apparatus in the nearly 100 countries that have chosen

to take part in the initiative thereby providing it with significant economic weight and political clout (UNCTAD 2023).

However, while BioTrade offers farmers lower entry costs into high-value supply chains than alternative labeling programs, it taps into the same underlying neo-liberal strategy for economic development. This strategy aims to integrate smallholders into the global economy through the export of agricultural commodities to markets in high-income countries. With 90 % of Peru's BioTrade production destined for export, the success of the BioTrade initiative is intrinsically linked to the consumption patterns of citizens living in the Global North. While this provides biodiversity-based businesses with the potential of economy-of-scale, Latin America has a long and rich tradition critical of export-led development, not just within academia but in the political arena too. Under the umbrella of dependency theory, critics have seen the integration of poor countries into the global economy as the root cause of the economic disparity between the Global North and the Global South (Prebisch 1959; Frank 1967; Cardoso & Faletto 1979). As suppliers of primary products such as grains and other food products, lumber, oil, and minerals to the industrial nations in the Global North while importing manufactured goods from the same countries, Latin American has been locked in a production structure that has offered workers unskilled and low-paying jobs. To break free from the poverty trap, dependistas have advocated for industrialization policies relying on import substitution where trade barriers and other protectionist policies would create the conditions for the construction of a domestic manufacturing sector (Irwin 2021).

Although the criticism of export-led development policies has been challenged by the economic success of South Korea, Taiwan, Singapore, and later China and India –countries that based their development process on a carefully crafted integration into the global economy– dependency theory has survived in some academic circles, albeit in a revised form (Amsden 1992; Kim 1998; Meredith 2007). It has morphed into a critique of the extractive and mining industries in Latin America and the impact that the extraction of natural resources has on the lives of local, indigenous communities, and on the corruption of political institutions (Acosta 2013; Ellner 2021; Zárate 2021). Whether or not dependency theory still has merit as an explanatory framework of poverty, environmental degradation, and social injustice, it has and continues to highlight the dangers of an uncritical embrace of export-led strategies to tackle the exploitation of poor people and of ecosystems. While biodiversity-based agriculture is certainly less harmful to the environment than current monocrop farming practices, it locks smallholders in the Amazon into production patterns that put their fate in the hands of eco-conscious consumers in the rich countries. It also puts the burden of saving the planet on the shoulders of the poor all while high-income countries continue

their own industrialized agriculture that involved the use of fossil fuel-based fertilizers, pesticides, fungicides, and other toxic chemicals.

From this perspective, the BioTrade initiative could be seen as yet another example of the double standards that the wealthy nations so often apply when it comes to environmental policies. On the other hand, the importance of preventing further degradation of the Amazon rainforest can hardly be overstated, not just for the people living in the region, but for the entire global ecosystem. As poignantly observed by Ricardo Galvão, former head of Brazil's space agency, INPE, that monitors the rate of deforestation in Latin America, "if the Amazon is destroyed, it will be impossible to control global warming" (Sandy 2022). Not only is the rainforest storing the equivalent of 15-20 years of global carbon emissions in its biomass, the cooling effect of evapotranspiration plays a central role in stabilizing the Earth's climate (Flores et al. 2024). Any attempt to slow the speed of climate change must accordingly include measures for preserving the Amazon's biodiversity.

Methodologically obstacles to assessing the economic and environmental impact of BioTrade

Between 2010 and 2023, the UNCTAD TraBio database, which contains data on bilateral and multilateral BioTrade, recorded the export of 1,814 different types of biodiversity-based products divided into 13 groups –including but not limited to pharmaceuticals, live animals and plants, food and beverages, perfumery and cosmetics, wood, hides and skins, natural fibers, and agricultural inputs– totaling a value exceeding US$ 5 billion in 2018 alone (UNCTAD 2023; UNCTAD 2018b).[4] Despite global sales in the billions of U.S. dollars and the continued efforts by governments to certify an increasing number of BioTrade products over the past decade, there have been relatively few assessments of the impact that BioTrade's has had on rural farming communities, or on biodiversity loss in the countries that supports the initiative. So far, the studies of biodiversity-friendly enterprises in the Peruvian Amazon have predominantly focused on the aspect of profitability and growth opportunities (Vollaard & Verweij 2013; Jezeer & Verweij 2015; Sasaki & Castro 2018). As traditional capital markets have been reluctant to engage in impact investment due to the perceived precariousness of eco-friendly business approaches, a reluctance that has made the economic support from international aid agencies vital to the getting BioTrade of the ground, academic research has been pessimistic about scaling-up the model and hesitant about assessing the effects on local communities (UNEP 2012).

Another reason for the lack of impact studies is to be found in the limited use of verification programs to distinguish farmers and agri-businesses that comply with the principles and criteria for BioTrade from those that don't. While the organization

the Union for Ethical BioTrade offers certification to companies that seek to position themselves within the BioTrade market, it is costly and only a small number of producers and distributors have opted for this solution. Instead, BioTrade labeling is in most cases done by national governments or donor organizations such as the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and the Swiss State Secretariat for Economic Affairs that undertake development projects to promote the conservation and sustainable use of biodiversity-based products and services through BioTrade. In some instances, farmers and agri-businesses who have obtained "organic" certification have been considered in compliance with the BioTrade principles and criteria, in other cases governments have created their own set of standards. In Peru, for example, the government-led Biocomercio Perú program has generated a list of products that are deemed biodiversity-friendly and provided exporters a labeling option for products on the list if they have been produced in accordance with the BioTrade principles and criteria (PromPerú 2008).

The lack of universally recognized measurable standards for BioTrade has meant that most evaluations of the impact of BioTrade on socio-economic development and environmental sustainability have been done at the project level. One example is the Perúbiodiverso project, a six-year collaboration between Perú and the Swiss and German international development organizations, initiated in 2007 (SECO 2011). This project involved 120 producer organizations and 3,021 producers and saw producers increase their profit margin by 106 % between 2010 and 2012, especially in the sacha inchi (*Plukenetia volubilis*) and aguaymanto (*Physalis peruviana*) value chains, while businesses saw a 73 % increase in export earnings (Peter 2014). Another important program, Biocomercio Andino, financed by the Andean Community, saw Peru enter into an agreement with Colombia and Ecuador to expand BioTrade within the region by creating a set of common regulations. This program involved 33 Peruvian companies operating in 15 different value chains. During the period from 2011 to 2014, the Andean BioTrade Project invested US$2 million in farms covering 31,273 hectares and benefitting 10,794 growers while exports reached US$ 78 million (CAF 2014). Even if the return on investment under these programs has been substantial, thereby demonstrating the potential that BioTrade has for reducing poverty among smallholders, they covered only a limited segment of Peru's BioTrade farmers and do not necessarily represent the larger community, especially the part that didn't receive economic support to integrate into BioTrade value chains.

To get a broader perspective on the impact that BioTrade has had on the Peruvian economy over the entirety of the period that the National BioTrade Promotion Program has been in place, the total export earnings provide a more complete picture. However, as much of the loss of biodiversity in the Amazon is taking the form of "dark extinction", meaning that species that have not yet been documented are being

decimated, it is methodologically difficult to determine the effects that BioTrade has on biodiversity (Boehm & Cronk 2012). Globally, it is estimated that 80 % of all existing species remain undiscovered, and for some areas in the Amazon as little as 10 % of the biodiversity has been mapped out (Sweetlove 2011). For trees alone, more than 9,000 species are still unknown of which 40 % are believed to grow in South America, most of them in the Amazon (McFall-Johnson 2022). Even for those species that have been catalogued, the number of individual members of a particular species is at best a guestimate, at worst unknown, making it impossible to track an increase or decline over time. Given that land-use for agriculture and lumber is the main driver of biodiversity loss, tracking changes in the data on the deforestation that has occurred during the period of the National BioTrade Promotion Program therefore provides that second best option in light of the difficulties involved in the direct observation of biodiversity loss.

The export of biodiversity-based products from Peru

From an economic point of view, the first decade of the National BioTrade Promotion Program was an undeniable success story (Reinoso 2010). BioTrade exports grew almost five-fold to reach US$ 433 million with a combined export of US$1.1 billion between 2006-2011 (MINCETUR 2014). More than 75 % of the earnings was linked to the agricultural sector's export of aguaje (*Mauritia flexuosa*), Brazil nut (*Bertholletia excelsa*), conchinilla (*Dactylopius coccus*), camu camu (*Myrciaria dubia*), chestnut (*Castanea sativa*), quinoa (*Chenopodium quinoa*), sacha inchi (*Plukenetia volubilis*), and maca (*Lepidium meyenii*), while the remaining 25 % stemmed from ecotourism and the textile industry (alpaca and pima cotton) (PromPerú 2013). In the Ucayali region, for example, the export of camu camu (*Myrciaria dubia*), a berry exceptional high in vitamin-C, increased from US$ 4,400 to US$ 329,000 in just two years, and by 2014 Peru was exporting 94 tons of camu camu (*Myrciaria dubia*) valued at more than US$ 2 million (Munguia 2018).

In the initial years, the biggest market for Peruvian BioTrade export was the USA followed by China and Japan, and not only was the market for biodiversity-friendly products growing fast, most of the 248 companies involved in BioTrade exported for less than US$ 100,000 per year suggesting that it was predominantly small businesses that saw an opportunity in complying with principles and criteria for BioTrade. Only one of the companies exceeded US$ 10 million in export earnings. A status report prepared by the United Nations Environmental Program in 2012 was so optimistic about the prospect for the future of BioTrade that it predicted Peru's export would reach US$ 2.7 billion by 2020 and create 250,000 new jobs in the poorest areas of

the country if the trends from 2009-2011 continued. Furthermore, BioTrade would generate up to US$ 750 million in revenue from carbon sequestration (UNEP 2012).

In the years immediately following this forecast, BioTrade export continued on its positive trajectory peaking at US$ 476 million in 2014. However, by 2015, as the number of companies using the Biocomercio Perú labeling mechanism continued to rise, BioTrade experienced its first major export setback. More than US$ 40 million, equivalent to an almost 10 % drop, was lost when US customs authorities decided to return a large shipment of quinoa that had failed phytosanitary inspection (Palomino & Uenk-Barten 2019). Even though exports picked up after 2015, it had not reached its 2014 peak when another setback in 2019 saw exports fall to its lowest level in six years, and by 2020 the export was less than 20 % of the US$ 2.7 billion predicted by UNEP's forecast in 2012 (Maldonado 2021). Having adjusted to the COVID pandemic's disruption of supply chains, BioTrade rebounded somewhat in 2021 reaching US$ 490 million in export sales, only to decline by more than 10 % in 2022, and looked at as a whole the second decade of BioTrade was a disappointment. In contrast to the five-fold increase in export earnings over the first decade, exports declined between 2014 and 2022 by 12 % and BioTrade accounted for just 5 % of Peru's US$ 9.2 billion agricultural export and about 0.1 % of the GDP.

In the same period as the increase in BioTrade export stalled, the Peruvian Amazon saw a significant expansion in the illegal growing of coca. From 2010-20, the size of farmland used for coca production grew by almost 70 % while the potential for cocaine production more than doubled. In the Ucayali region alone, 47,000 hectares of rainforest were illegally cut down, and a satellite analysis of the deforestation patterns suggested that most clearings were less than five hectares, which is characteristic for deforestation intended for coca cultivation (Farman 2021). The rise in the production of the coca crop was accompanied by a significant rise in monocultures, especially of palm oil. In the two decades from 2000 to 2020, monocropping grew more than seven-fold in the Peruvian Amazon, from 15,000 hectares to around 110,000 hectares, challenging the idea that BioTrade has the potential for making a significant contribution to biodiversity conservation (Grandez 2021). Artisanal and small-scale gold mining operations and the deforestation associated with this form of mining, also increased over the past two decades. Reflecting the sharp increase in international gold prices since 2000, the loss of forest to gold mining has gone from almost neglectable 20 years ago to account for 7,000-10,000 hectares per year over the past decade, and even when gold prices began to stabilize around US$ 1,200-1,400 per ounce in 2014, gold mining activities continued to expand (Espejo et al. 2018). The economic fallout of the COVID-19 lockdown only intensified the small-scale gold mining operations as rising poverty saw people attempt to find new income sources (Smith-Roberts et al. 2021).

To turn these trends around, the USAID has recently thrown its political support and economic weight behind the idea of entrepreneurship for sustainability when it launched "Catalyze Peru" and allocated US$ 15 million over three years towards the program. Recognizing that a lack of investment and employment opportunities in the Peruvian Amazon is a significant impediment on the ability to curb carbon emissions, the "Catalyze Peru" program seeks to mobilize private investment that can make an economic impact while protecting the ecosystems in the Amazon. The goal from the start of the project was to raise US$ 106 million of private financing to strengthen the licit economy and improve linkages between large-scale companies and smallholders with the aim to increase access to markets and finance (USAID 2022). The German government's aid agency (GIZ) has launched a similar program. This project intends to improve public incentive systems to encourage the private sector to invest in biodiversity-friendly companies. The long-term goal is to be able to identify scalable biodiversity-friendly business models and supported new companies (Treidel 2021).

The Peruvian government has also taken steps to revamp the Biocomercio Perú program. At the regional level, Ucayali is leading the efforts by creating of a first of a kind Regional Plan for the promotion of BioTrade. The plan focuses on local BioTrade products prioritizing ten crops -including aji (*Capsicum baccatum*), camu camu (*Myrciaria dubia*), cocona (*Solanum sessiliflorum*), and paiche (*Arapaima gigas*)- based on their economic profitability, demand, quantity, and quality of supply. It is expected that the plan will provide key incentives for small- and medium sized enterprises and entrepreneurs from the region by providing a legal mandate for the creation of local and regional markets for BioTrade products. The push to increase domestic sales could potentially curb some of the effects of the decline in demand from export markets.

Conclusion

Perhaps it was to be expected that the rapid expansion of BioTrade export, which took place during the first decade, would be difficult to sustain over time. Once low-hanging fruits had been picked and markets had been saturated, the continuing growth in sales would depend upon creating new products and developing new markets. What is conceivably more disconcerting for the future prospect for BioTrade is the acknowledgement by PromPerú that international development projects played a central role in the initial success of the program (PromPerú 2018). Even if the renewed commitment to BioTrade from the USAID, GIZ, and, recently, the EU has secured additional funding, the long-term viability of BioTrade is questionable if it depends on the continuous infusion of capital from aid donors (COEECI 2023).

While there is no easy solution to stopping farming practices that undermine biodiversity in the Peruvian Amazon, a first necessary step involves making BioTrade

a profitable business that has the potential to gain larger market shares. Otherwise, it may share a fate similar like that of other labeling programs such as Fair Trade and Rainforest Alliance. These programs are certainly not without merit, but they have yet to prove that they can radically alter the dynamics that are responsible for deforestation and the subsequent loss of biodiversity in the Amazon region. The growing number of registered BioTrade companies, more than 1,300 companies in 2021, is a positive sign that farmers still believe that agriculture, the protection of biodiversity, and profits can go hand-in-hand, and the fact that more than 75 % of the existing companies are either micro or small-scale reflects the socio-economic potential that BioTrade has for poor farmers (MINAM 2021). With the adoption of the Kunming-Montreal Global Biodiversity Framework in 2022, which aims to halt and reverse biodiversity loss by 2030, the political will to find quick and durable solutions to the degradation of the Amazon exists among global leaders. This could provide another impetus that injects new vigor into Biocomercio Perú.

Funding

The research for this article was funded by a grant from the Dean of the School of Professional Studies, New York University.

Notas

[1] *Sachamama* means "mother of the forest" in Quechua, a language spoken in the Amazon and in the South American Andes.

[2] The six principles and criteria included (1) sustainable use of biodiversity, (2) equitable sharing of benefits derived from the use of biodiversity, (3) socio-economic sustainability, (4) compliance with national and international legislation and agreements, (5) respect for the rights of actors involved in BioTrade activities, and (6) clarity about land tenure, use, and access to natural resources and knowledge (UNCTAD 2018a).

[3] According to the National Statistics and Informatics Institute (INEI), poverty in rural areas stood at 39.8 % in 2023. The Peruvian poverty line is set at 446 soles (US$ 120) per month for one person (Instituto Nacional de Estadística e Informática 2024).

[4] The 1,1814 government-certified biodiversity-based products does not include goods produced from the extraction of minerals, ores, or metals, such as sands, oil and gas, as they are not directly derived from living plants and animals and hence not part of the biodiversity of ecosystems (UNCTAD 2023).

References

Acosta, A. 2013. Extractivism and Neoextractivism: Two Sides of the Same Curse. In *Beyond Development: Alternative Visions from Latin America*, M. Lang & D. Mokrani, eds., pp. 61-86. Quito: Rosa Luxemburg Foundation.

Amsden, A. H. 1992. *Asia's next giant: South Korea and Late Industrialization*. Oxford: Oxford University Press.

Boehm, M. M. E. & Q. C. B. Cronk 2021. Dark Extinction: The Problem of Unknown Historical Extinctions. *Royal Society Publishing* 17: 1-8.

Barnosky, A. D., N. Matzke, S. Tomiya, G. Wogan, B. Swartz, T. B. Quental, C. Marshall, J. L. McGuire, E. L. Lindsey, K. C. Maguire, B. Mersey & Elizabeth A. Ferrer 2011. Has the Earth's Sixth Mass Extinction Already Arrived? *Nature* 471: 51-57.

CAF 2014. *Andean Biotrade Project Promoted More than 20 Export Chains in Peru*. CAF: Development Bank of Latin America and the Caribbean. <https://www.caf.com/en/currently/news/2014/12/andean-biotrade-project-promoted-more-than-20-export-chains-in-peru> [consultado: 12-09-2024].

Cardoso, F. H. & E. Faletto 1979. *Dependency and Development in Latin America*. Berkeley: University of California Press.

COEECI 2023. Venimos avanzando con nuestra iniciativa Circulando en la Amazonía en Ucayali y San Martín. Entrevista a Shallinny Ramírez, coordinadora del Proyecto. *Coordinadora de Entidades Extranjeras de Cooperación Internacional*. <https://coeeci.org.pe/venimos-avanzando-con-nuestra-iniciativa-circulando-en-la-amazonia-en-ucayali-y-san-martin-entrevista-a-shallinny-ramirez-coordinadora-del-proyecto/> [consultado: 12-09-2024].

Ellner, S. 2021. *Latin American Extractivism: Dependency, Resource Nationalism, and Resistance in Broad Perspective.* Lanham: Rowman & Littlefield.

Espejo, J. C., M. Messinger, F. Román-Dañobeytia, C. Ascorra, L. E. Fernandez & M. Silman 2018. Deforestation and Forest Degradation Due to Gold Mining in the Peruvian Amazon: A 34-year perspective. *Remote Sensing* 10 (12): 1-17.

FAO 2022. *Agricultural Transformation: Trends in Farm Size, Crop Diversification and Mechanization in Nicaragua and Peru*. <https://www.fao.org/3/cc1723en/cc1723en.pdf> [consultado: 16-09-2024].

Farman, A. 2021. Coca Farming is Destroying Peru's Amazon. Is it Time for a Radical Solution? *Open Democracy*. <https://www.opendemocracy.net/en/democraciaabierta/coca-farming-is-destroying-perus-amazon-is-it-time-for-a-radical-solution/> [consultado: 12-09-2024].

Flores, B. M., E. Montoya, B. Sakschewski, N. Nascimento, A. Staal, R. A. Betts, C. Levis, D. M. Lapola, A. Esquível-Muelbert, C. Jakovac, C. A. Nobre, R. S. Oliveira, L. S. Borma, D. Nian, N. Boers, S. B. Hecht, H. ter Steege, Ju. Arieira, I. L. Lucas, E.

Berenguer, J. A. Marengo, L. V. Gatti, C. R. C. Mattos & M. Hirota 2024. Critical Transitions in the Amazon Forest System. *Nature* 625: 555-564.

Frank, A. G. 1967. *Capitalism and Underdevelopment in Latin America. Historical Studies of Chile and Brazil*. New York: Monthly Review Press.

Grandez, A. E. 2021. *Agribusiness Fueling the Climate Crisis in Peru*. Lima: Oxfam.

Grisaffi, T. & L. Farthing 2021. Cocaine: Falling Coffee Prices Force Peru's Farmers to Cultivate Coca. *The Conversation*. <https://theconversation.com/cocaine-falling-coffee-prices-force-perus-farmers-to-cultivate-coca-154754> [consultado: 12-09-2024].

Instituto Nacional de Estadística e Informática 2024. *Pobreza monetaria afectó al 29,0% de la población el año 2023.* Gobierno de Perú. <https://www.gob.pe/institucion/inei/noticias/951234-pobreza-monetaria-afecto-al-29-0-de-la-poblacion-el-ano-2023> [consultado: 12-09-2024].

Irwin, D. A. 2021. The Rise and Fall of Import Substitution. *World Development* 139. <https://www.sciencedirect.com/science/article/abs/pii/S0305750X20304332?via%3Dihub> [consultado: 12-09-2024].

Jezeer, R. E. & P. A. Verweij 2015. *Shade-grown Coffee: Double Dividend for Biodiversity and Small-scale Farmers in Peru.* The Hague: Hivos.

Kim, E. M. 1998. *The Four Asian Tigers: Economic Development and the Global Political Economy*. United Kingdom: Emerald Publishing.

Maldonado, C. 2021. BioComercio como oportunidad de un modelo de negocios basado en la biodiversidad peruana. In *Seminarios Virtuales Especializados*. Lima: PromPerú. <https://repositorio.promperu.gob.pe/server/api/core/bitstreams/34215bdc-d8c1-441e-82c6-6cb31206023e/content> [consultado: 12-09-2024].

McFall-Johnson, M. 2022. Scientists Estimate 9,000 Tree Species Are Still Unknown to Them. *Business Insider.* <https://www.businessinsider.com/scientists-estimate-9000-tree-species-are-still-unknown-to-them-2022-1> [consultado: 12-09-2024].

Meredith, R. 2007. *The Elephant and the Dragon: The Rise of India and China and what It Means for the Rest of Us.* New York: W. W. Norton & Company.

MINAM 2021. Más de 1000 bionegocios formales operan exitosamente en el Perú. *Gobierno de Perú.* <https://www.gob.pe/institucion/minam/noticias/569222-mas-de-1000-bionegocios-formales-operan-exitosamente-en-el-peru> [consultado: 12-09-2024].

MINCETUR 2014. *Biocomercio: modelo de negocio sostenible.* Commission for the Promotion of Peruvian Exports and Tourism. <https://www.siicex.gob.pe/siicex/resources/exportaciones/166661321rad78925.pdf> [consultado: 15-09-2024].

Morley, S. 2017. Changes in Rural Poverty in Perú 2004-2012. *Latin American Economic Review*. 26 (1): 1-20.

Munguia, D. M. 2018. *Exportación y capacidad de produccción del camu camu en el período 2008-2017*. Lima: Universidad César Vallejo.

Nobre, C. & A. Encalada 2021. *Science Panel for the Amazon: Amazon Assessment Report 2021*. New York: United Nations Sustainable Development Solutions Network.

Olson, A. 2023. 'Operation Mercury' Curbed Illegal Gold Mining in Peru. *Dartmouth*. <https://home.dartmouth.edu/news/2023/09/operation-mercury-curbed-illegal-gold-mining-peru#:~:text=A%20Mining%20Boom%20Across%20the%20Tropics%20Is%20Degrading%20Rivers&text=Artisanal%20and%20small%2Dscale%20gold,high%20and%20jobs%20are%20scarce> [consultado: 12-09-2024].

Palomino, J. & C. Uenk-Barten 2019. *Bio Trade in Peru. Sustainable Development of Exportable Native Fruit*. Thesis submitted to Aeres University Science Applied in fulfilment of the certificate of Supply Chain Programme. <https://hbo-kennisbank.nl/details/aereshogeschool:oai:www.greeni.nl:VBS:2:147801> [consultado: 15-09-2024].

Peter, M. 2014. SECO's Commitment to Biotrade. In *UN Trade and Development*. <https://repositorio.promperu.gob.pe/items/b70685e7-f506-4a99-9354-0189f1771d75> [consultado: 12-09-2024].

Pimm, S. L., C. N. Jenkins, R. Abell, T. M. Brooks, J. L. Gittleman, L. N. Joppa, P. H. Raven, C. M. Roberts & J. O. Sexton 2014. The Biodiversity of Species and Their Rates of Extinction, Distribution, and Protection. *Science* 344, 1246752. https://www.science.org/doi/10.1126/science.1246752

Prebisch, R. 1959. Commercial Policy in the Underdeveloped Countries. *The American Economic Review* 49 (2): 251-273.

PromPerú 2008. *Catálogo de productos de biocomercio.* <https://repositorio.promperu.gob.pe/items/b70685e7-f506-4a99-9354-0189f1771d75> [consultado: 12-09-2024].

PromPerú 2013. *Las empresas de Biocomercio en el Perú.* <https://repositorio.promperu.gob.pe/bitstream/handle/20.500.14152/1033/Kit_capacitacion_biocomercio_3_lectura_1_2_2013_keyword_principal.pdf?sequence=1> [consultado: 12-09-2024].

PromPerú 2018. *Expo Amazonica 2018: Peruvian Rainforest Products Attract International Buyers.* <https://perutradeoffice.us/expo-amazonica-2018-peruvian-rainforest-products-attract-international-buyers/> [consultado: 12-09-2024].

Reinoso, A. 2010. Biocomercio en el Perú: experiencias y propuestas. <https://repositorio.promperu.gob.pe/server/api/core/bitstreams/9c6e4abb-864b-407e-a8d2-2bdb9953f54f/content> [consultado: 12-09-2024].

Sandy, M. 2022. The Amazon Rainforest Is Nearly Gone. We Went to the Frontlines to See of It Could Be Saved. *Time.* <https://time.com/amazon-rainforest-disappearing/> [consultado: 12-09-2024].

Santos, M. P., B. Turner & M. Pia Chaparro 2021. The Double Burden of Malnutrition in Peru: An Update with a Focus on Social Inequities. *The American Journal of Clinical Nutrition* 113 (4): 865-873.

Sasaki, L. & L. J. Castro 2018. Biodiversity Conservation is Necessary as Well as Profitable. *International Trade Forum* 3: 26-27.

SECO 2011. *Perúbiodiverso*. <https://www.cooperacionsuiza.pe/proyecto-finalizado/> [consultado: 12-09-2024].

Smith-Roberts, A., K. Disney, V. Morelli, H. Frías, M. Nayak, N. M. Smith & L. Jaramillo 2021. All that Glitters is not Gold: The Effects of the COVID-19 Pandemic on Artisanal and Small-scale Gold Mining and Supply Chains in Peru. *Journal of Energy & Natural Resources Law* 39 (4): 489-527.

Srinivasan S., M. Saborío & C. Morales 2022. Agricultural Transformation: Trends in Farm Size, Crop Diversification and Mechanization in Nicaragua and Peru. *Food and Agricultura Organization of the United Nations*. <https://www.fao.org/3/cc1723en/cc1723en.pdf> [consultado: 12-09-2024].

Sweetlove, L. 2011. Number of Species on Earth Tagged at 8.7 Million. *Nature* https://doi.org/10.1038/news.2011.498

Treidel, H. 2021. *Impact Investment for the Sustainable Use of Biodiversity in Peru*. Lima: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

UARM 2014. Biocomercio: modelo de negocio sostenible. *PromPerú*. <https://repositorio.promperu.gob.pe/server/api/core/bitstreams/67324c9b-c9d1-4e11-baec-6241ed63941b/content> [consultado: 12-09-2024].

UNCTAD 2018a. BioTrade Principles and Criteria. <https://repositorio.promperu.gob.pe/items/b70685e7-f506-4a99-9354-0189f1771d75> [consultado: 12-09-2024].

UNCTAD 2018b. *Peru's BioTrade Sales Reach New High but Challenges to Growth Remain*. <https://unctad.org/news/perus-biotrade-sales-reach-new-high-challenges-growth-remain> [consultado: 12-09-2024].

UNCTAD 2023. Trade in Biodiversity-based Products. <https://unctadstat.unctad.org/EN/Biotrade.html#:~:text=Relevant%20biotrade%20publications&text=The%20Principles%20and%20Criteria%20are%20today%20implemented%20in%20nearly%20100%20countries> [consultado: 12-09-2024].

UNEP 2012. BioTrade: A Catalyst for Transitioning to a Green Economy in Peru. <https://www.greengrowthknowledge.org/research/biotrade-–-catalyst-transitioning-green-economy-peru> [consultado: 12-09-2024].

UNODC 2005. Coca Cultivation in the Andean Region. <https://www.unodc.org/pdf/andean/Part1_excutive_summary.pdf> [consultado: 12-09-2024].

USAID 2022. Launch of Catalyze Peru. <https://www.usaid.gov/peru/news/launch-catalyze-peru> [consultado: 12-09-2024].

Vergara, A., M. Arias, B. Gachet, L. Naranjo, L. Román, J. Surkin & V. Tamayo 2022. *Living Amazon report 2022*. Ecuador: World Wildlife Fund.

Vollaard, B. & P. Verweij 2013. *Biodiversity Business from India to Peru.* The Hague: Hivos.

Zárate, J. 2021. *War of the Interior*. Great Britain: Granta Books.

Zinngrebe, Y. 2016. Learning from Local Knowledge in Peru. Ideas for More Effective Biodiversity Conservation. *Nature Conservation.* 32: 10-21.