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INVESTMENT IN SUSTAINABLE AGRICULTURE AS A MEANS TO AVOID DEFORESTATION: THE IMPORTANCE OF GOVERNANCE

PHOTO: SMALLHOLDER MIXED AGRICULTURE AND AGROFORESTRY, NORTHERN FOOTHILLS OF MOUNT KENYA.
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This brief is based on ProLand research on sustainable intensification, including case studies on certification, PES and the restoration of abandoned degraded land.

Agricultural intensification is not sustainable if it drives deforestation. Governments and their international development partners rarely explicitly recognize the relationship between agricultural investment and the expansion of fields and pastures into forests when investing in agriculture. As a result, the assumption that agricultural intensification will diminish agriculture-driven deforestation too often remains just that – an assumption that holds up poorly.

Two prominent publications, The Royal Society (2009) and Montpellier Panel (2013), make the case that to be "sustainable," agriculture must not expand into natural lands.

PART I: GOVERNMENTS PLAY A NECESSARY ROLE IN CONSTRAINING AGRICULTURE'S IMPACT ON FORESTS.

Programs to sustainably intensify agriculture focus on technical solutions and production strategies. Forest protection is often seen as the problem of another sector, a separate silo, someone else's funding stream. However, because successful investment in agricultural intensification increases the risk of expansion into forests, the use of land must be managed to protect forests. Agricultural intensification requires external constraints and incentives to prevent the extension of farms, pastures, and plantations into forests.

Governments create the larger context, and it often favors deforestation. Existing government policy strongly influences the risks new agricultural investment creates for forests. Policies unrelated to forestry or land-use often produce agricultural expansion that is unconstrained by policies intended to protect forests.

Policies beyond the scope of project design may have big impacts. Governmental policies in a broad range of sectors produce indirect, unintended, unrecognized, and poorly understood impacts on forests. These "unrelated" policies may nevertheless substantially increase the risk to forests. Governmental decisions that influence population growth and migration affect deforestation rates, as do fiscal policy, trade policy, and transportation investments.

Fiscal policy: Government fiscal policies influence agricultural expansion into forests most directly by increasing the availability of capital to invest. Economic modeling suggests that, in the developing countries with extensive forest cover, increased government spending speeds deforestation. Greater access to credit has the same impact. In a well-studied example, restrictions on agricultural credits in Brazil contributed to reductions in deforestation rates (Nepstad et al, 2014).

Trade policy: Trade liberalization -- removing or reducing barriers on trade with other countries, such as duties, licensing requirements and quotas – sets the groundwork for the expansion of the capital-intensive production of export commodities. The trade liberalization in the 1980s unleashed the rapid expansion of beef and soybean production in Brazil and Bolivia (Pacheco, 2006; Schmitz et al., 2012). Governments foster this growth by subsidizing inputs, levying value-added taxes, and promoting competitive exchange rates and low inflation (Akiyama & Nishio, 1999; Witjaksono, 2016; Leblois et al., 2017; Combes et al., 2018).

Transportation policy: The siting and quality of a country's transportation network influences the rate and location of agricultural expansion into forests. In the Amazon, roads planned and constructed by government, as well as unofficial private roads mediate the location of settlements, agriculture, and deforestation. From 1997 to 2006, nearly 95% of all deforestation in the country occurred within 5.5 kilometers of roads and rivers (Barber, Cochrane, Souza, and Laurance 2014). In the Congo Basin,

tropical deforestation patterns mirror the location and quality of roads and river transport. When governments build new roads and improve waterways, they enable settlement on the forest fringe. They also connect settled farmers to markets, thus facilitating the sale of food, the purchase of inputs, and increased investment in (and expansion of) agriculture. Forest conservation policy cannot be considered complete without guidelines for transportation investments (Angelsen, 2010).

Targeted policies may do little to constrain agricultural expansion. The policies governments develop and implement that target the use and management of forested lands are not always successful in limiting the pressure on forests created by population growth, agricultural investment, and the policies described above.

Land-use planning and zoning: In theory, land-use planning determines the siting and management of protected areas, concessions, and zones for agriculture – and in the process clarifies and weighs the benefits and losses of specific decisions regarding deforestation in each zone. Properly executed, land-use planning can be part of a country's transition away from deforestation. In practice, land-use planning in the developing world resembles "organized anarchy" involving smallholders, international investors, government officials, civil society and representatives of the donor community (Rudel and Meyfroidt, 2014). In most instances, governments don't undertake the process holistically; they plan land use in an *ad hoc* manner, focusing on zoning specific high-priority areas (Lambin, et al., 2014). Often, after developing land-use plans, countries don't implement or update them. Many countries in Africa have done little to enforce their planned protected areas. In Indonesia and India, designated "forestland" areas have persisted with no tree cover for decades (Lambin, et al., 2014).

The siting and management of protected areas: There is no doubt that, on the global average, protected areas support greater biodiversity and experience less deforestation than comparable areas outside and around them, especially in the tropics (Gray et al., 2016; Joppa and Pfaff, 2009; Nelson and Chomitz, 2011). Yet governments create protected areas in locations with low population and economic pressures. The overall impact of governmental efforts may be minimal. Many countries do not have the capacity to effectively monitor forest use and enforce penalties, especially in remote areas. When, under pressure, some resort to forceful removal campaigns the brutal implementation generates unfavorable political ramifications. Given the alternatives, many governments have decided that protecting areas costs more in resources and political capital than other options, such as concessions. Between 1900 and 2010, 57 countries in Africa, Asia, Latin America, and the Caribbean downsized, degraded, or degazetted over more than 503 591 km2 of protected lands and waters (Mascia, et al., 2014).

The allotment and regulation of concessions: Governments manage forest by allocating large tracts of land for defined periods of time for commercial uses, such as plantation agriculture, timber, and mining. By definition, allotting forest concessions for tree crop plantations accelerates forest conversion to agriculture. The magnitude of the impact from logging concessions differs depending on the original status of the forest, the crop, and post-allocation management practices. Over time, logging creates the opportunity for other land uses, such as clearing for agriculture (Edwards, Tobias, Sheil, Meijaard, and Laurance, 2014). Concessionaires enable agriculture by constructing roads that connect uncleared forest to markets and urban centers and thus enable migration, settlement, and farming. Governments and concessionaires frequently fail at preventing such encroachment, as has been amply demonstrated in the Congo Basin (Nasi, Billand, and Van vliet, 2012; Megevand, 2013a).

Land tenure policy and its enforcement. Tenure regimes create opportunities and incentives for farmers to increase investment in agricultural lands and clear (or not clear) additional forest. Both secure rights in land and insecure rights in land may foster encroachment into forests, depending on the larger context. When secure tenure draws investment and agricultural success, farmers may expand fields into forests. When poor rights in land discourage investment in soils, farmers may clear forest to

cultivate the exposed richer soils. Investments to intensify agriculture must evaluate the threat that tenure in that situation will drive expansion into forests, the potential counter-balancing force of claims to resources in that forest, and the nature and effectiveness of forest management institutions.

Investment-specific policies: In recent decades, non-governmental actors have attempted to fill a perceived void in the governance of natural resources through payments for ecosystem services and certification schemes with elements designed specifically to target the conversion of forest lands to agriculture. Research increasingly reveals the importance of formal governments in the success of these efforts.

Payment for Ecosystem Services. The IPCC Special Report on Climate Change and Land presents PES as a "proven measure" that facilitates the implementation of practices that reduce deforestation (Shukla, et al., 2019). At the same time, the report also recognizes that PES is an emerging and sometimes contested approach that "needs to be carefully designed to be effective" (Hurlbert et al., 2019). PES can be a complicated and demanding policy tool requiring careful design and diligent implementation. Solid economic theory underpins the approach, yet, as with all social policy measures, the approach needs to be adapted to the context and must evolve over time. An assessment of the available research found that PES programs produce positive environmental outcomes slightly more than half of the time, and that they produce positive economic and social outcomes slightly less than half of the time (Burivalova, Miteva, Salafsky, Butler, and Wilcove, 2019b). PES programs that address deforestation, depend upon effective governmental regulation to succeed (Arneth et al., 2019). Without proper regulation, programs that increase land productivity can attract investment which in turn increases pressure on land resources and drives additional deforestation.

Certification programs. Since the early 1990s, industry associations and NGOs have employed voluntary incentive programs to promote social and environmental objectives.[1] Such "certification schemes" take many forms, but all include offering benefits to producers and other value chain actors on the condition that they adhere to specific practices, or "standards." The approach has spread and is increasingly mainstreamed into agricultural commodity markets. Certified products that occupied niche markets prior to 2000 constituted reputable market segments by 2012. Governments create the economic environment for the market systems in which certification works, although with varying degrees of success. They establish and maintain transportation networks, markets, and export infrastructure on which certification programs rely. They may also facilitate the collection and dissemination of market and weather information and monitor environmental impacts. Some governments support certification schemes directly through extension services that enable producer compliance. One study found that 70 percent of certified producers in forestry and marine sectors benefited from government support (Lambin, and Thorlakson, 2018). The decades ahead may reveal that non-state certification has been a transitionary step towards forest protection by governments themselves. In the meantime, the effectiveness of standards programs will depend on their relationship with governments, and the effective collaboration of the many parties involved. Donors can work to strengthen the role of governments in providing an enabling environment; they can also support coordination between state and non-state systems. Non-state voluntary standards will strengthen public conservation policies by interacting with, rather than operating outside of, governmental efforts.

[1] This is not to say these are the sole reasons private sector actors collaborate in certification initiatives. They also use certification to strengthen brands, improve consumer loyalty, reduce reputational risk, and increase sales and profits.

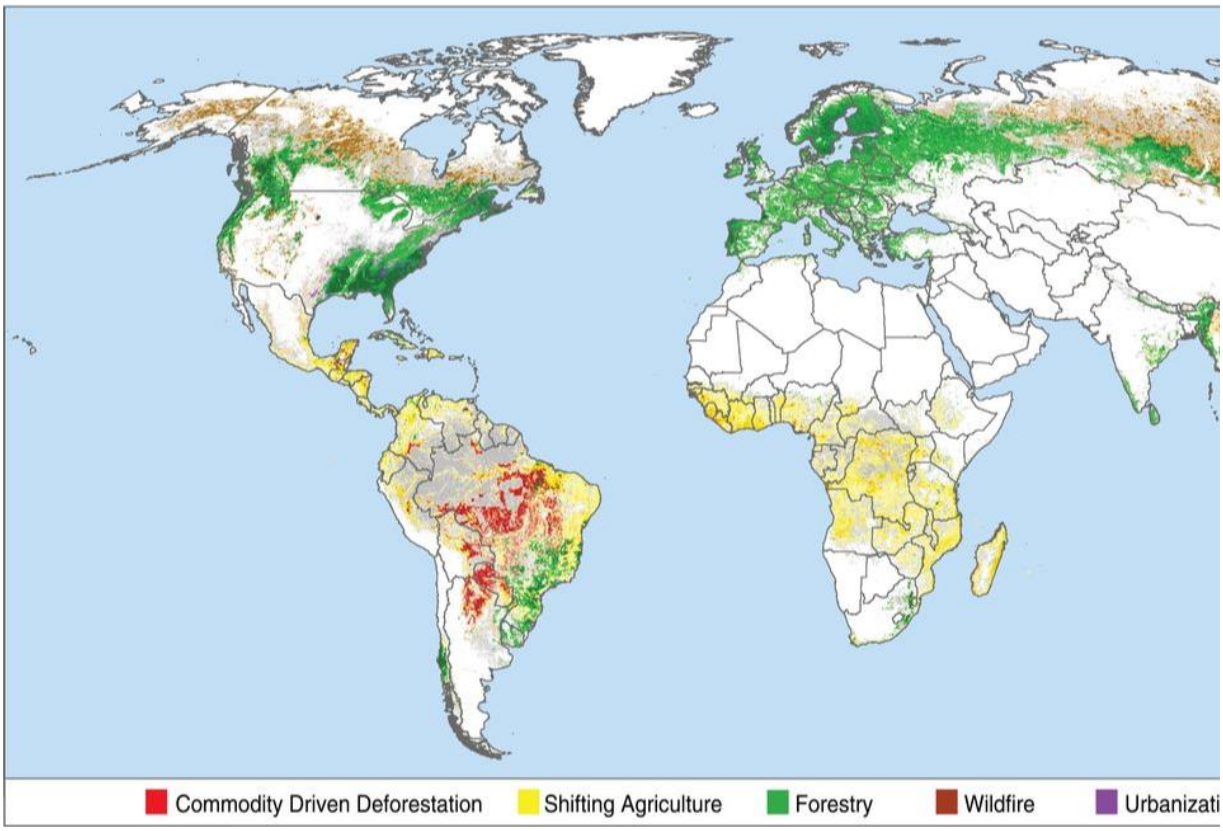
PART II: PRODUCTION STRATEGIES POSE DIFFERENT LEVELS OF RISK TO FORESTS

How agricultural intensification drives expansion. From the turn of last century, specialists have theorized that by increasing yields we may limit or even reverse global drivers of agricultural expansion. While it is true agricultural intensification has slowed total deforestation at the global scale, it also continues to be a cause of deforestation locally. Using land more efficiently often encourages farmers to expand to new lands. When farmers increase productivity through new practices and technologies, they increase profits. This success may keep farmers in place who would otherwise leave, retain investments that would otherwise be allocated elsewhere, or draw new farmers and investment from somewhere else. At the local scale, increased population or wealth reinforces demand, which in turn raises prices and spurs nearby farmers to cultivate more land.

The role of markets. At the global scale, markets allow commercial agriculture to invest selectively across the world's regions. International markets support the relocation of production, and thus deforestation, toward more land-available regions. When they create new fields, agricultural actors, whether smallholders or commercial firms, select lands of less value, which cost them less to clear and use, such as unprotected standing forests. Investments in sustainable production systems on the forest frontier may put local producers in contact with growing international markets, thereby motivating producers to clear forest in order to produce more goods demanded by these markets.

The rising threat of commodity driven deforestation in Africa. Since 2000, evidence has increasingly underscored the growing influence of distant markets on land-use change in Africa. Of particular concern is the possibility that the Congo Basin could become the next frontier for oil palm expansion: "*Large-scale oil palm investments are concentrated in tropical forest countries with little potentially available cropland outside forests, namely the Congo Basin, where expansion is accelerating*" (Ordway, Asner, and Lambin, 2017). In Sub-Saharan Africa, where the rates of deforestation have historically been lower than elsewhere in the tropics, deforestation has occurred faster in nations with predominantly dry forests. Smallholder commodity cultivation has been a principle driver of deforestation in some regions, such as much of Côte d'Ivoire (Somarriba et al., 2012; Ruf & Varlet, 2017). In Southwest Cameroon commodity crop expansion accounts for nearly half of all deforestation since 2000 (Ordway, Asner, and Lambin, 2017). In contrast to South East Asia and South America, thus far commodity agriculture has grown in response to domestic, not international, demand (Ordway, Asner, and Lambin, 2017). In the more humid countries of the Congo basin, oil and mineral wealth, cereal imports, and urban migration have limited commercial agricultural expansion (Rudel, 2013) as have infrastructure and tenure constraints (Ordway, Asner, and Lambin, 2017). Conflict and deterrents associated with governance have also stifled international investment. The stage is nevertheless set; greater security may bring an explosion of commercial agriculture, as has been the case in post-conflict Colombia (Weisse and Dow Goldman, 2018).

DRIVERS OF DEFORESTATION: COMMODITY AND SWIDDEN AGRICULTURE



Dominant drivers of deforestation, 2001-2015. Red: commodity-driven agriculture. Yellow: shifting agriculture. Source: Curtis, Slay, Harris, Tyukavina, Hansen, 2018.

Some production strategies may pose less risk to forests: Abundant evidence points to the need for multifaceted governance strategies to achieve forest protection and agricultural intensification simultaneously. Available evidence also points to some potentially promising solutions, but successful solutions identified to date fall far short of the need. Research has made a much stronger connection between conventional intensification (reliance on chemical inputs, monocultures, hybrid seeds, and economies of scale) and deforestation than it has between diversification and deforestation.

Diversification. Farmers diversify their agricultural systems in multiple ways and for multiple ends. They integrate trees, annuals and livestock in a variety of spatial and temporal patterns. These strategies may raise and maintain yields, and are often relied upon for other benefits, such as risk mitigation; improved soils, pollination and other ecosystem services; and supplementary products, such as fuel, nuts and fruit.

Farmers diversify the types of field crops and animals they produce. A recent meta-analysis of research concludes that intercropping may substantially improve yields, with the productivity of "mixed" crops producing yields just short of a fifth higher than "solo" cropping (Yu, Stomph, Makowski, van der Wef, 2015). Few, if any, studies focuses on the forest impacts of this type of diversification.

Farmers integrate trees into the cultivation of annuals and raising livestock. This form of diversification through agroforestry can raise yields, reduce risks to production, and provide products

and services that forests also produce. On a practical level, cultivating trees may create incentives for producers to remain in one location; it is an investment in a specific location, and may strengthen rights in land. A few studies that focus on the forest impacts of this type of diversification have found that it may reduce encroachment into nearby forests.

Diversifying tree crops with other perennial and annual crops. Many specialty tropical products, such as coffee, cacao, fruit, and nut trees can be cultivated within standing forests, under forest remnants or in the shade of planted trees. Declines in the productivity of monocropped trees and loss of ecosystem health over time exacerbate deforestation, leading farmers to clear more forested areas and expand production for their short-term economic advantages in ways that do not benefit long-term production, income stability, or livelihood resilience. Compared to full-sun cocoa production, for example, diversified cocoa systems may slow deforestation as they vertically intensify growing space and strengthen smallholder resilience to market and climate variability and extremes. However, scaling cocoa agroforestry alone is not the solution to deforestation. Concerted efforts by governments and their partners are needed to implement integrated regulation and policy reform, stronger institutional and value chain accountability, infrastructure investments, and capacity building that considers farmers' tradeoffs and decision making. Increasing yields does not necessarily reduce deforestation, and profitability creates an incentive to expand cocoa production into uncultivated forest areas.

Other approaches to agricultural investment that may pose less risk to forests. Other strategies for agricultural intensification that hold promise for avoiding increased risk to forests include: .

Investment in agricultural systems unsuited to forests is less likely to drive deforestation. Intensifying rice cultivation in irrigated lowland areas will not enable the expansion of rice into higher lands where there is no irrigation. In some cases, intensification of rice cultivation has absorbed labor that would have been employed otherwise to clear and farm forest lands. Investing in horticulture in peri-urban areas distant from forests will probably not drive farmers to clear forest, especially if the forest is remote. This is in part because crops such as vegetables and fruits must be produced close to markets because they are perishable and transporting them is costly. This approach is far from foolproof, however. Investments in irrigation and horticulture have both been known to enable expansion into forested lowlands.

Revitalizing or restoring degraded lands. Overexploitation of soil, water, and biodiversity have caused close to one-quarter of the world's agricultural land to become degraded and unproductive. Such widespread degradation of agricultural land undermines efforts to protect forests in many developing countries because farmers and large agricultural firms frequently respond by simply abandoning degraded land and moving to more productive forestland, which they clear and use for agriculture. Degraded land occurs on currently-farmed fields as well as on abandoned fields, and restoration can be applied in both circumstances. On currently-farmed land, farmers employ a broad spectrum of techniques to stop or reverse degradation and increase yields. These include conservation tillage, improved slope management, mingling of perennial crops, integrated pest management, and improved water efficiency (Pretty and Hine, 2001; de Vries et al., 2008). Evidence suggests that restoring abandoned degraded land and using it for agriculture can also spare forests from agricultural conversion, but those benefits are limited by constraints and trade-offs. Potential high costs of restoration for agriculture may skew benefits to wealthy investors and potential opportunity costs, such as foregoing other potential uses for degraded land, may also be high. Restoration may create social conflict if decision-making is not inclusive and respectful of local people's interests and rights.

Conclusion: The scope, resources and timeline of agricultural programs rarely suffice to reform government policy and assure the implementation of new policy at scale. Few agricultural projects will be capable of transforming governments. However, all investments with the goal of sustainable agricultural intensification should assess these potential impacts, and support awareness, consideration,

and negotiation of the inherent trade-offs with stakeholders. The shortcomings of the governance and market systems in the countries in which USAID works means that no investments in agricultural systems can be considered sustainable in themselves. To mitigate deforestation decisively, investments in agricultural systems must be accompanied by investments in governance. Ideally these investments should be linked or at least tightly coordinated to achieve the joint objectives of avoided deforestation and agricultural intensification.

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