Learning from the Indirect Land Use Change Debate

For the last few years, environmental advocates and ethanol producers have been mired in a debate over something known as indirect land use change (ILUC), a measure of greenhouse gas (GHG) emissions caused by, but not directly associated with, biofuel production. The controversy centers on these questions: Does ethanol demand in the U.S. and other countries lead to destruction of forests and other carbon-sequestering ecosystems in countries other than where the ethanol or the crops used to make it are produced? And if it does, can the GHG emissions associated with those land use changes be accurately quantified and used for regulatory carbon footprint assessments?

For the moment, the debate has cooled. In 2010, the Environmental Protection Agency (EPA) released a final rule stating that it would utilize ILUC estimates as part of the carbon footprints it calculates to determine whether biofuels like corn ethanol can meet federal mandates, which are now tied to GHG emissions performance. Similarly, California decided in 2009 to include ILUC impacts as part of its low-carbon fuel standard (LCFS).

But the debate is not over. In the EU, the European Commission is currently studying policy options to deal with ILUC. And opponents of ILUC in the U.S. have demonstrated that they will continue to try to get those estimates taken out of federal and state energy policies—ILUC was featured prominently in a lawsuit the ethanol industry brought against California's LCFS that recently derailed that regulation's implementation (Rocky Mountain Farmers Union et al v. Goldstene, 2011).

One outcome of the ILUC debate is that it has deepened the already growing divide between environmental advocates and many U.S. farmers and agricultural organizations. Without some resolution, ILUC will continue to be a barrier to the coming together of U.S. farmers and environmentalists around on-farm GHG reductions and improved carbon sequestration—a crucial step toward climate mitigation success.

Perhaps the reason the ILUC debate has become so contentious is because at its core lie two questions that are not easy for either biofuel proponents or environmental advocates to answer: How do we stem agriculture's negative effects on the environment while still meeting food, energy and materials demand from the land? And, who—or what—is to blame when pressure to expand agricultural land destroys carbon-sequestering ecosystems?

The urgency of these questions and the fraught relationships between environmentalists and farm groups around ILUC drove IATP to delve into the debate. We weren't satisfied with sterile quantitative discussions, however, and instead decided to take a group of stakeholders from the U.S., including corn farmers, environmental policy advocates, ethanol producers and researchers, to Brazil to investigate firsthand the changes in Brazilian land use for agriculture and the relationship of those changes to U.S. ethanol production. We followed that trip with a one-day conference on Indirect Land

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Use Change in Saint Paul, Minnesota, with speakers and participants from the U.S. and Brazil, representing a diverse set of stakeholders.

What is indirect land use change?

ILUC refers to changes in agricultural land use not directly associated with biofuel production, but rather caused by that production. For example, demand for corn ethanol (and consequent high corn prices) has driven some farmers in the Midwest to plant more corn and fewer soybeans. The resulting decrease in soybean supply causes an increase in the price of that crop, signaling farmers in other parts of the world to plant more soybeans, so the theory goes, and clearing grasslands or forests to do so. These conversions of land in places like Brazil—indirectly caused by demand for biofuels elsewhere—release substantial amounts of greenhouse gases (GHGs) through the burning and plowing of land.

Many environmentalists believe ethanol production is ultimately responsible for those GHG emissions, and think those emissions should be included in the overall carbon footprint accounting for ethanol. This idea has induced serious rancor within the ethanol industry and among many corn farmers, who either deny the existence of ILUC or see it as an unfair apportioning of blame.

Until about 2008, attempts to quantify the GHG emissions associated with ethanol and biodiesel focused exclusively on emissions resulting directly from a biofuel's production cycle. A lifecycle assessment for corn ethanol, for example, included emissions from growing and harvesting the corn (including the emissions from fertilizer and pesticide use and production, from tractors, etc.), transporting it to a plant, producing and blending the ethanol, and getting it to the point of sale. But in a 2008 paper, Princeton researcher Timothy Searchinger and colleagues turned GHG accounting for biofuels on its head.[1] Previous studies, they said, had counted the carbon benefits of growing crops on the land, but omitted the carbon costs of land-use changes that may have occurred when land or its product was diverted from existing uses—indirect land use changes.

The impact of Searchinger's paper (and the ensuing ILUC papers, along with advocacy from environmental groups) was huge—ILUC calculations are now part of lifecycle assessments for biofuels within the federal Renewable Fuel Standard (RFS) and the state of California's Low-Carbon Fuel Standard, and the European Commission is currently discussing the role ILUC will play in EU biofuel mandates. The debate has engendered serious political fallout, as well. For example, during the 2009 Congress, Rep. Collin Peterson (D-MN) used ILUC as a bartering tool, refusing to vote for climate legislation unless ILUC was removed from the RFS.

What's clear about ILUC is that the debate is far from over. As it moves forward, and as we consider other issues around agriculture's sustainability, we can learn from several lessons the ILUC debate has wrought.

Low prices for farmers do more harm than good

Demand for corn ethanol, driven largely by the RFS, has helped boost corn prices. Over time, the RFS mandates production increases of "advanced" and "cellulosic" biofuels, categories corn ethanol does not qualify for. If corn ethanol demand falls, corn prices could stagnate or decline, and perhaps lead farmers to plant more soybeans. An increase in the U.S. soybean crop would lead to lower soybean prices globally and, it's then hoped, a decrease in land conversion for soybeans outside the United States. Although the connection between price signals and reduced land conversion isn't often part of the ILUC conversation, the implicit assumption is that low prices will help stem land conversion.

If the goal is improved environmental outcomes (specifically, around climate change), it is important to recognize the fundamental discord between low prices and agricultural sustainability.

High prices stimulate agricultural expansion, but there is evidence that low commodity prices can do the same. Low prices can encourage producers to plant more to make up for lost volume, and have led many developing nations to decrease investments in agriculture that could lead to sustainability and food

IATP's ILUC delegation in the Pantanal, Brazil.

sovereignty improvements. Low prices have instead encouraged many countries to create food systems based on cheap imports, a pattern now being played out in China, which has created a hog production industry fueled by soybean imports from the U.S. and Brazil.[2]

The economic standing of farmers plays a crucial role in determining agriculture sustainability. Low commodity prices, in combination with free trade agreements, have been grossly debilitating to farmers around the world, frequently leading to concentration of agriculture in fewer geographic areas and among fewer farmers.[3,4] An illustration of these effects comes from the high-production, low-market-prices years of 1997 to 2005, when U.S. corn exports to Mexico were selling at 19 percent below the cost of production.[5] This cheap corn, dumped onto the Mexican market, undermined Mexican corn markets and squeezed many Mexican farmers (who did not have equivalent government support for production costs as do U.S. farmers) off their land, ultimately causing an increase in deforestation by poor and landless farmers turning to subsistence farming on previously uncultivated land.[6]

According to agricultural economists Daniel de la Torre Ugarte and Chad Hellwinckel, "cheap, industrially produced grains have done nothing to improve the lives, health or nutrition of the poorest one-third of humanity living in rural areas. Their lives will not be improved by policies aimed at continually lowering the relative price of the commodities."[7]

The role price signals play in determining land-use changes is unclear, so it is a mistake to make overly simple assumptions about how price changes will affect farm production.

Trip participants discuss ILUC over juice at Copacabana beach, Rio de Janiero.

We need clear end goals for agriculture

There is strong evidence that industrial agriculture as currently practiced is not sustainable.[8] Farmers will face increasing risks from climate change, soil degradation, water scarcity, declining fossil fuel availability and increased demand from a growing population. Industrial agriculture cannot provide the resiliency needed to meet these challenges; it is too dependent on fossil fuel–based inputs and susceptible to extreme weather. But before we can design effective alternatives, we must first define our goals for agriculture, including biofuels. The debate over ILUC is a clear indication of the importance of climate goals vis-à-vis agriculture. Clearly, GHG emissions reductions, as well as increased carbon sequestration, are priorities. Those goals, however, will be difficult to achieve without complementary aims to increase farmer incomes and to improve livelihoods globally, as well as to increase the abundance, quality and availability of foods in developing countries, to improve soil and water quality, and to increase agriculture's resilience to the effects of climate change and other environmental pressures.

We cannot consider any of agriculture's functions in a vacuum. To do so risks unintended negative consequences. An example of this is the current carbon myopia around agriculture: the push to turn farms around the world into carbon offset sources for trading on carbon markets. Increasing carbon sequestration on-farm is a laudable goal, but if ensuring farmers' incomes and rural food security aren't equal priorities, carbon farming schemes can put entire communities—and potentially food systems—at risk. Similarly for biofuels, if we design policies with only GHG-reduction goals, we're unlikely to improve agriculture's environmental footprint overall.

Agriculture's negative impacts cannot be fixed by way of the very system that has helped create them. We must find policies that help make farmers and societies better able to cope with the food and energy needs of a growing planet, as well as with the uncertainty that goes along with agriculture. Unregulated markets have failed to adequately balance the many social, economic and environmental functions of agriculture. Instead, the prioritization of maximized production of commodities for international trade (with no regard to agriculture's other functions) has brought heightened pressures on finite land resources that do get transmitted from one part of the global economy to another. And with this recipe for market failure, Wall Street

Participants survey what remains of Brazil's cerrado ecosystem.

has convinced policymakers to further financialize agricultural commodities (creating massive index funds that treat commodity futures contracts like a Vegas casino), which divorces prices on global markets from any relevance to actual fundamentals of supply and demand. This system creates artificial scarcity in some places and waste in others, and pits different values, such as fuel and food production, against each other instead of seeking to optimize agriculture's multiple functions.

What we need instead is a political mechanism that allows countries to decide on how they want to balance priorities—such as food, fuel, employment and the environment—and then a set of farm policies and programs that supplement (or regulate) markets in order to ensure that those priorities are met.

To begin, we could reconsider grain reserve systems, wherein a portion of the national harvest in abundant years is purchased and set-aside by the federal government, helping to guard against steep price decreases, and then released to the market when harvests are weak. Grain reserve systems (which were a part of U.S. federal agriculture policy until 1996) help provide price stability to farmers and, done right, could ensure that we have sufficient grain to meet our short- and medium-term food needs, helping to diminish the risk of a food-versus-fuel conflict.[9,10]

Farmers and environmental advocates can only succeed by working together

Among many striking moments on IATP's trip to Brazil in March, 2011, two stand out. The first happened while driving across the state of Mato Grosso, home to most of Brazil's soybean production and also to a remarkable ecosystem known as the Cerrado, a densely vegetated, biodiversity-rich tropical grassland. All of us on the trip—IATP staff, Minnesota corn farmers, environmental advocates, academics and bioenergy producers—knew the agricultural expansion in that region was extensive, but I think none of us was prepared for the enormity of changes that have been brought to that landscape. We saw unfathomably wide fields of soybeans, corn and cotton stretching as far as the eye could see, punctuated only by occasional islands of native vegetation. It's clear that demand for soybeans and other crops has radically and permanently changed that landscape.

The second moment occurred in a conference room in the plush São Paulo headquarters of UNICA, the Brazilian sugarcane growers' association. UNICA very effectively markets the idea that Brazilian sugarcane ethanol and environmental sustainability go hand-in-hand. Whether it's mostly a veneer or something more meaningful is debatable, but it's clear that UNICA recognizes that embracing environmental sustainability and positioning itself as a sustainability leader confer substantial public relations benefits as well as market access (including to the U.S.). We were all struck by how strongly UNICA's "sustainable" identity contrasts with the adversarial position—exemplified by the ILUC debate—the U.S. corn ethanol industry takes vis-à-vis environmentalism (despite real efforts by many in the industry to become more efficient and to reduce GHG emissions).

These experiences seemed to create a collective sense—within a group that was far from on the same page about ILUC and biofuels in general—that 1.) biofuels or not, agricultural expansion is causing irreversible changes to Brazil's native ecosystems, and 2.) it might be possible for biofuels to be a positive force for environmental sustainability, if we could ever figure out a way to get there.

Whatever one's position on biofuel sustainability or ILUC, there is no debating that agriculture plays a dominant role in shaping landscapes worldwide. This means that agriculture and biofuels are powerful levers to either advance (by creating incentives for perennial crop establishment for example) or diminish global ecological sustainability. Environmentalists in the U.S. might find more opportunities to influence agriculture by identifying areas of common ground with the American agricultural community. Similarly, U.S. biofuel producers might be wise to take inspiration from UNICA and recognize that embracing sustainability would not only generate good PR, but could also increase their political reach, market access and the staying power of their products.

Despite the antipathy the ILUC debate has generated between U.S. biofuel producers and environmentalists, it doesn't take much probing (much less a trip to Brazil) to realize that both groups share a certain set of goals. Both would like to see reduced reliance on petroleum, both would like to see the growth of renewable energy use and production, and both would like to ensure that agriculture can meet all our needs over the long term. These goals will only be realized through collaboration.

A path forward for biofuels

The scale and production practices associated with the current corn ethanol system are unsustainable, yet biofuels have the potential to play a role in increasing agriculture's sustainability. To succeed, a radically new development path is needed. Bioenergy—which includes not just liquid fuels, but also heat and electricity generation from biomass sources—is one of few markets currently available for growers of perennial biomass. Although ethanol is still made almost exclusively from corn and the prospects for cellulosic ethanol will remain uncertain for at least the near future, a growing number of facilities are generating power from perennial biomass such as native grasses.

Smaller- and more appropriate-scale energy production from perennial biomass and sustainably produced crops has the potential to help farmers diversify their fields and provide locally produced energy to communities. The key is to ensure that state and federal biofuel policies promote transitions to those types of energy production systems. We need to incentivize more sustainable bioenergy production through mechanisms tied to a holistic measure of overall "performance," rather than volume mandates. One way of doing this, a concept originally proposed by policy consultant Loni Kemp and the Natural Resource Defense Council (NRDC), might be to create performance-based tax credits.[11] This policy proposal does not circumvent the

A meeting with small-scale farmers in Lucas do Rio Verde, Brazil.

ILUC debate—carbon reductions would play a large role in performance standards, and LCA would still be required—but it would incentivize better biofuel production through a mechanism not tied to volume mandates.

Such a mechanism could promote not only environmental, but also local economic and community goals. In bioenergy production and throughout the rest of agriculture as well, farmers and rural communities benefit much more when they own the means of production and can reap the profits. Concentration in agriculture has had steep costs for farmers and rural communities—when a small number of companies control the market, those communities are more often exploited than benefited. A performance-based biofuel policy could include criteria for local ownership, living-wage jobs, and other local economic and community benefits.

We also need to address negative *direct* land use changes outside the United States. European biodiesel demand, for example, has led to the conversion of rainforest and peatlands in subtropical countries such as Indonesia and Malaysia to oil palm plantations, a process that has had severe negative environmental consequences, both for the climate as well as wildlife habitat. And with the December 2011 expiration of the U.S. ethanol tariff, ethanol production will likely now expand further into Central America and across South America, much of which is intended for eventual export to the United States. Although some imported biofuels may perform better environmentally than U.S. biofuels, it is more difficult to verify production standards of these fuels. The biodiversity loss associated with ecosystem conversion in Brazil, Malaysia or elsewhere seems a poor tradeoff for efficiency and energy content gains.

In the end, what is needed is a more direct grappling with the drivers of ILUC, and an important part of the process will be expanded on-the-ground engagement with stakeholders in Brazil and other affected countries. In order to create effective policies, there is a critical need for a better understanding of the ways stakeholders make decisions about land uses. We also need strong policies to reduce deforestation, which should be enacted as part of a binding, comprehensive global climate treaty, something the U.S. must advance in conjunction with the passage of strong domestic climate legislation. A global treaty must set strong GHG reduction requirements, and must include adequate funding for climate-friendly practices both in agriculture and forestry production. Without strong national and international

policies prohibiting it, deforestation will continue to contribute significantly to climate change, whether from pressures brought on by biofuel demand, by increased feed grain demand or through subsistence farming pressures from landless peasants. We must decide land use policies based on environmental and social goals, not limit our efforts to indirect mechanisms.

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