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The Agrofuels Project at Large

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Abstract
This essay addresses the contradictory consequences of expanding agrofuels production on crop land (inflating food prices) and forestland (increasing carbon emissions). Whereas the energy crisis has strong roots in industrial agriculture's fossil-fuel dependence, responses to the energy crisis follow a typical capital accumulation script – that is, attempting to overcome barriers to profitability by extending the realm of value creation, even as this intensifies capitalism's contradictions. The 'agrofuels project' is central to this attempt to maintain profit, and to legitimize the state/capital nexus. The rush to agrofuels, under the guise of policies geared to alternative energy and reducing carbon emissions, opens up new profit frontiers for agribusiness, energy and biotechnology corporations.

Keywords
agribusiness, carbon emissions, energy crisis, food crisis, metabolic rift

Introduction: Fueling the Crisis of Capitalism

This essay recognizes and complements the contributions of James Petras in the critical sociology of crisis in general, and in the political sociology of agrarian change and agro-imperialism in particular (Petras, 1997, 2008; Petras and Veltmeyer, 2001, 2003). In this respect, I argue that the crisis of petro-capitalism implicates agro-imperialism as both cause and consequence. Whereas the energy crisis has strong roots in industrial agriculture's fossil-fuel dependence, responses to the energy crisis follow a typical capital accumulation script – that is, attempting to overcome barriers to profitability by extending the realm of value creation, even as this intensifies capitalism's contradictions. Importantly, 'capital's need to convert natural processes into value relations is realized politically, and in each case this generates specific new social and ecological barriers to further development' (McMichael, 2007: 171). The 'agrofuels project' is central to this attempt to maintain

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profit, and to legitimize the state/capital nexus. The rush to agrofuels, under the guise of policies geared to alternative energy and reducing carbon emissions, opens up new profit frontiers for agribusiness, energy and biotechnology corporations.

This essay addresses the contradictory consequences of expanding agrofuels production on crop land (inflating food prices) and forestland (increasing carbon emissions). What I term the 'agrofuels project' represents a politically orchestrated attempt to address the combined energy and climate crises stemming from fossil-fuel dependence, but with methods geared to sustaining the profitability of capital and therefore fundamentally at odds with social and ecological sustainability in the long run.

The Crisis of Global Production and the Dynamics of Agrofuels and Agflation

The agrofuels project follows the green revolution's misleading attempt to 'feed the world' via chemicals and biotechnologies, further subordinating agriculture to fuel a world minority's energy-intensive consumption patterns. The so-called 'agrofuels transition' has discarded 'feeding the world' to deepen industrial agriculture's contribution to climate change and ecological degradation by undermining proposed energy savings with new emissions.[1] In a perverse corporate-driven substitution of fuel crops for food crops, the conversion of agriculture to a branch of the energy-industrial complex deepens the fetishization of agriculture as a source of profit, rather than recognizing it as a life source.

The twin crises of peak oil and peak soil legitimize an agrofuels project, supplementing Northern fuel needs with cheaper (Southern) forms of ethanol and biodiesel, with little effect on the total amount of emissions. The conversion of rainforests, peatlands, savannas, or grasslands to produce agrofuels in Brazil, Southeast Asia and the USA 'creates a "biofuel carbon debt" by releasing 17 to 420 times more CO_2 than the annual greenhouse gas (GHG) reductions these biofuels provide by displacing fossil fuels' (Fargione et al., 2008). Rainforest Action Network (2007) notes that a ton of palm oil produces 33 tons of CO_2 (10 times more per ton than petroleum). As Greenpeace puts it, mildly, 'this trade amounts to emissions transfer, not emissions reduction' (2007: 8).

Currently Brazil plans to replace 10% of the world's fossil fuels by 2025 with sugar ethanol, Malaysia and Indonesia are developing oil palm plantations to supply 20% of EU biodiesel needs, India plans 14m hectares of land for jatropha plantations, and Africa another 400m (Holt-Giménez, 2007; Vidal, 2007: 3).

Projections of global energy needs suggest that the ecological and social catastrophe of agrofuels is irredeemably unable to address the energy crisis of peak oil. While the UN estimates agrofuels supplying 25% of energy needs over the next 15–20 years, ExxonMobil 'projects that biofuels, together with wind and solar, will contribute about 2% of the world's total energy supply in 2030' (Padilla, 2007: 3). Whether ExxonMobil underestimates or not, the International Energy Agency estimates that by 2030 agrofuels will 'barely offset the yearly increase in global oil demand' (Holt-Giménez, 2007), and all renewables, including agrofuels, will amount to only 9% of global energy consumption (GRAIN, 2007: 6).

Meanwhile, agflation was expressed in the doubling of maize prices, wheat prices rising by 50% and rice by as much as 70%, bringing the world to a 'post-food-surplus era' (Vidal, 2007). By the end of 2007, in a report, *The End of Cheap Food*, the *Economist*'s food-price index reached its apex since originating in 1845, food prices had risen 75% since 2005, and world grain reserves hit their lowest volume, at 54 days (Holt-Giménez and Kenfield, 2008: 3). The FAO argues agrofuels account for 10% of food price rise, while the IMF and IFPRI claim 30%, and the World Bank estimated a contribution of between 65% and 75% (Chakraborrty, 2008; Phillips, 2008). Agrofuels produce a so-called 'knock-on' effect, where expanding US corn production for ethanol (itself raising corn prices) reduced oilseed acreage, such that 'oilseed prices then also increased as a result of tightening supplies and this price strength was enhanced by rising demand for meals as a cereal feed substitute and increasing demand for vegetable oils for bio-diesel production' (Geenfield, 2007: 4).

The agrofuels project, claiming a solution to the energy and climate crises, will likely deepen these crises as well as the food crisis. The paradox deepens where 'while it is big business that is primarily behind the problems that biofuels are supposed to be addressing, it is also the one steering the global initiative for large-scale biofuels production and trade' (Padilla, 2007: 1). Arguably, the causality is more complex, where politicians with short-term horizons, driven by the needs of states to stabilize national currencies, consumer/energy prices and employment, reference 'green accumulation' as they mandate the emissions targets, and subsidies, that empower the agrofuel industry. Furthermore, the corporate/state nexus is rooted in a fuel-food complex that underlies agflation, compounding the conjunction of the three crises. Palm oil, 'now used widely in food products ranging from instant noodles to biscuits and ice cream, has become so integrated into energy markets that its price moves in tandem with crude oil prices' (Greenfield, 2007: 4).

This essay argues that the growing synchrony of these markets (in oil, palm oil and food in general) expresses the twin crisis of industrial agriculture. One is the crisis of food security, now manifest in the so-called 'world food crisis' – signaled in agflation, and expressed in food riots cascading across the world. The other is an ecological crisis – signaled in global warming, and expressed in accelerating natural disasters and human displacement (McMichael, 2009). Ironically, the agrofuels project not only exacerbates the former crisis in seeking to address the latter crisis, but also it combines them in a deepening of the 'metabolic rift' – separating agriculture from its biological base. Disruption of natural cycles of regeneration of soil and water is accompanied by dispossession of small-farming cultures responsible for local ecological and social reproduction.

Metabolic Rift: Social Interruption of Nature

The 'metabolic rift' divides agronomic methods from agriculture's natural biological base, disturbing the recycling of nutrients in and through the soil and water. On a broader scale, the subordination of agriculture to capitalist production relations establishes a metabolic rift between countryside and city (Moore, 2000: 123). Fossil fuels are central

to widening this rift, through the industrialization of agriculture and serving as a major input for the production of inorganic fertilizer, pesticides, herbicides and seed varnishes, as capital tries to sustain productivity on a degraded ecological base. The subordination of agriculture to capital reinforces the abstraction of agriculture 'as an input-output process that has a beginning and an end' (Duncan, 1996: 123) rather than as embedded in local biological cycles that replenish the soil through the maintenance of biotic diversity. Energy-intensity is accordingly high, where the industrial food system expends 10–15 energy calories to produce 1 calorie of food (GRAIN, 2007: 7). At the same time, industrial agriculture contributes significantly to global warming through its responsibility for greenhouse gas (GHG) emissions, representing about 22% of total emissions – more than the transport sector (McMichael et al., 2007).

Beyond its significant role in GHG emissions – ignored by Al Gore (2006) and Jeffrey Sachs (2008) – industrial agriculture now includes conversion of the global South into a 'world energy farm'. Arguably, global warming is evidence of an intensified 'planetary metabolic rift', in the interruption of natural processes of sequestration of carbon – thus, 'when the impacts of forestation of land is compared to the impact of growing and using agrofuels, the forested lands were capable of sequestering anywhere from two to nine times more carbon over a 30-year period' (Smolker et al., 2008: 12). Mitigation of global warming with agrofuels has the opposite effect. It is widely acknowledged now that deforestation and draining peatlands for agrofuels increases emissions, and/or removes land from agricultural production, raising food prices and invading pristine habitats with croplands (Monbiot, 2007).

Sugar cane expansion for biodiesel in Brazil leads to deforestation – by 'usurping agricultural lands previously used for other purposes, cane expansion has pushed those other uses, especially cattleraising, into forest frontier areas' (Smolker et al., 2008: 19). Soy, a new source of biodiesel, depletes soils and nutrients, generating 'climate-damaging emissions of nitrous oxide' (2008: 19). This outcome is intensified by the food-fuel nexus – during 2007 Amazonian forests were razed by ranchers and settlers to clear land in Brazil, Paraguay and Bolivia. Thus, 'rising prices for both cattle and soy for animal feed appear to be the major factor driving the demand for more land' (2008: 23), following the US shift from soy into corn production for ethanol. The Brazilian *cerrado* (a biodiverse woodland/grassland, 20% of Brazil) is disappearing faster than the Amazon: 'more than half of this biome has already been turned over to cattle grazing and soy production, and it is now being considered as a promising area for sugar cane as well' (2008: 24). Across the world in Southeast Asia, the largest palm oil producers, Malaysia and Indonesia, supply roughly 85% of the world market (chiefly in Europe and China). Palm oil plantations are encouraged by tax breaks, subsidies and huge investments by the China National Offshore Oil Corporation and by oil and agribusiness firms like Shell, Neste Oil, Greenergy International, BioX, Cargill and Archer Daniels Midland. Destruction of peatland forests, concentrated in Indonesia, contributes about 8% of annual GHG, exceeded only by the USA and China (2008: 29).

Note that forests are habitats for indigenous people who practice low-carbon lifestyles, and whose displacement doubly endangers the planet and its cooling mechanisms. A recent UN report noted:

> Experience with existing and extensive oil palm plantations in other parts of Indonesia conclusively demonstrates that indigenous peoples' property and other rights are disregarded, their right to consent is not respected, some are displaced, and they are left with no alternative but to become de facto bonded laborers gathering oil palm fruit for the companies that manage the plantations. (quoted in Smolker et al., 2008: 30)

Ethnographic research on oil palm plantations in Kalimantan, Indonesia confirms the combined social and ecological effect of agrofuel expansion:

> Forest and land availability have been greatly reduced, making it more difficult for the local communities to obtain NTFPs (Non-Timber Forest Products) and leading to a lack of farming lands. As there are not enough farming lands, farming has become more intensive. The same lands are used continuously, so that the soil does not have enough time to regain fertility. As there is not enough arable land, many people have given up rice farming and a linear regression can be seen in the diversity of crops cultivated in relation to the proximity of the plantation … Availability of, and access to foods such as meat, vegetables and fruits has declined, so that more food has to be bought, leading to higher food expenses. (Orth, 2007: 51)

Southeast Asia promises to become an offshore export platform of agrofuels for China, 'already importing feedstocks from other countries, including Nigeria, Malaysia, Indonesia, and the Philippines, and investing in refineries in Indonesia and Malaysia'. Japan, an investor in agrofuel supplies in Brazil, 'has plans for a jatropha biodiesel plant in South Africa, a coconut biodiesel plant in the Philippines and cassava ethanol plants in Indonesia, Thailand and Vietnam' (Smolker et al., 2008: 31). And, Africa and its extensive land reserves (the 'Green OPEC'), is a frontier for Brazil, Saudi Arabia and China, the World Bank, USAID, the European Commission, and private corporations to develop agrofuels primarily for export. Of most concern are plans to open up the Central African Republic, and the Democratic Republic of Congo, to agrofuel development. The Congo Basin Rainforest represents 18% of the world's rainforest, contains about 70% of Africa's vegetation with 25–30 billion tons of carbon, and regulates rainfall and weather patterns in West Africa and the world as a whole (2008: 35).

In short, Northern energy needs and emission reduction targets are constructing a global agrofuels project. The EU, responsible for about 18% of global GHG, and a Kyoto Protocol signatory, has set targets that depend on agrofuels. As Smolker and colleagues note, 'the EU is reducing its own emissions by raising emissions in developing countries that produce the feedstock oils (through increased deforestation and land use change, for example) and are not bound by emissions reduction targets, especially Indonesia and countries in Latin America' (2008: 38). This relationship registers the Northern ecological crisis, as 'peak soil' in the USA and Europe undermines productivity increases. Northern fuel needs could be met now with the conversion of 70% of European farmland to fuel crops, and the entire US corn and soy harvest (Holt-Giménez, 2007). However, this target is unlikely especially given access to Southern resources, which underlines the general crisis of the agroindustrial model.

Offshore access to cheaper resources to address peak oil and soil in the North capitalizes on Southern dependencies as a solution to Northern needs, facilitating the 'export of sustainability' from South to North. To indebted states carbon offset, and agrofuel, projects are attractive foreign-exchange sources for debt repayment. New oil/energy, auto, food, biotech industrial alliances are driving new investment in Southern land and agrofuel infrastructures, including crop development. The overriding premise is that agrofuels are critical alternative energy supplies – thus a DuPont official claimed, 'the demand for corn [for ethanol] could be so dramatic that it could change farming practices' – substituting crop rotation with monoculture, which depletes soil and produces insect and disease build-up (Padilla, 2007: 7), and, of course, provides opportunity for GM crops. As Silvia Ribeiro, from the Action group on Erosion, Technology and Concentration (ETC) reports:

> All the companies which produce transgenic crops – Syngenta, Monsanto, Dupont, Dow, Bayer, BASF – have investments in crops designed specifically for the production of biofuels such as ethanol and biodiesel. They also have collaboration agreements in a similar vein with Cargill, Archer Daniel Midland, Bunge, transnational companies that dominate the global trade in grains. All this is creating new alliances. For example, Monsanto and Dow have just signed an agreement to create GM seeds that will combine in the same plant both resistance to eight herbicides as well as making them insecticides. This in part reflects the recognition that GM seeds create resistance to herbicides and therefore require more and more. And if the seeds are not for human use it will be possible to use more toxic herbicides in greater quantities. (quoted in Padilla, 2007: 6)

Agrofuel corporations organize their own feedstock supply chains: 'most agrofuel factories are being built with simultaneous investments in crop production. The clear trend is towards the formation of fully integrated transnational agrofuel networks, bringing together everything from seeds to shipping' (GRAIN, 2007: 12). Agrofuel profits not absorbed by agribusinesses already producing potential feedstocks (soya, maize, palm oil and sugar) are financing 'a wave of new alliances and business groupings, bringing together financial companies, shippers, traders, and producers. In some cases major investment funds, such as the Carlyle Group, are even setting up their own fully integrated agribusiness/energy networks' (GRAIN, 2007: 13). And beyond the agribusiness complex, 'BP and ConocoPhillips have struck deals with major meat processors for the supply of animal fats to produce biodiesel. BP, along with several other companies, is also developing jatropha as a feedstock, while Chinese and South Korean corporations are busy making deals in Nigeria and Indonesia for the large-scale production of cassava' (GRAIN, 2007: 13).

The agrofuels project is anchored in new private-public partnerships (TNI, 2007). And these partnerships allow agrofuel corporations a captive market, under the proliferating mandates by governments to increase agrofuel content of transport fuels. US and EU agrofuel subsidies amount to $16–18bn a year, four times all agricultural aid to the South, which focuses on agroexports (Seager, 2008). Thus agrofuels universalize the corporate/state nexus nurtured by industrial agriculture. For the palm-oil complex, the

Indonesian palm oil trade is managed by a combination of Cargill (the world's largest private company), an ADM-Kuck-Wilmar alliance (the world's largest biofuels manufacturer), and Synergy Drive, while the Malaysian government firm is 'soon to become the world's biggest palm oil conglomerate' (Greenpeace, 2007).

Recent commissions and reports express misgivings about the ecological and human consequences of offshoring and outsourcing agrofuels in the South. The French ecology minister stated on 30 June, 2008 that developing a biofuels target was 'probably a mistake', and that environmental and social criteria should have been developed prior to setting a target (Phillips, 2008). This implicit admission that market forces trumped political considerations informed the European Parliament on 7 July, when its members voted for significantly reduced targets, given biofuel impacts on food prices, people and biodiversity, and their failure to reduce emissions. In the same week, the UK's Gallagher Report was released, the Executive Summary stating:

> Biofuels have been proposed as a solution to several pressing global concerns: energy security, climate change and rural development. This has led to generous subsidies in order to stimulate supply. In 2003 … the European Union agreed to the Biofuels Directive …
>
> Five years later, there is growing concern about the role of biofuels in rising food prices, accelerating deforestation and doubts about the climate benefits. This has led to serious questions about their sustainability …
>
> We have concluded that there is a future for a sustainable biofuels industry but that feedstock production must avoid agricultural land that would otherwise be used for food production. This is because the displacement of existing agricultural production, due to biofuel demand, is accelerating land-use change, and, if left unchecked, will reduce biodiversity and may even cause greenhouse gas emissions rather than savings. The introduction of biofuels should be significantly slowed until adequate controls to address displacement effects are implemented and are demonstrated to be effective. (Gallagher, 2008: 1)

Despite misgivings, the door to biofuels remains open, with the Gallagher Report arguing that 'it should be possible to establish a genuinely sustainable industry provided that robust, comprehensive and mandatory sustainability standards are developed and implemented' (2008: 9). The problem here is establishing such standards. As Biofuelwatch concluded: 'The majority of biofuel industry responses, however, reject any mandatory safeguards which would ensure that the biofuels sold in Europe will have lower greenhouse gas emissions than the petrol or diesel which they will replace … Many responses suggest that not enough is known about life-cycle greenhouse gas emissions from biofuels, but nonetheless demand government support for rapid market expansion' (quoted in Gilbertson et al., 2007: 15–16). For GHG balances, 'current margins of uncertainty, even at the micro-level, are currently too high for meaningful certification based on life-cycle emissions' (TNI, 2007: 31). That is, calculating and/or equating GHG emissions from land-use change, soil erosion and nitrous oxide release is now

impossible (2007: 10). According to Gilbertson et al. 'there are currently no peer reviewed life-cycle greenhouse gas studies for biodiesel from palm oil, jatropha or soya, and peer reviewed studies on sugarcane ethanol are limited to those looking at energy gains and fossil fuel displacement, rather than total greenhouse gas balances' (2007: 39). Further, the Malaysian state claimed 'words such as "environmentally harmful" systems [of agrofuel production] should be avoided as there are no internationally accepted standards' (Gilbertson et al., 2007: 15–16). Such a standard would be technically necessary, where biofuels represent an artificially created market to respond to environmental considerations via public incentives, incommensurate with WTO protocols. The UK's voluntary scheme, in lieu of a standard, claimed 'mandatory environmental criteria would greatly increase the risk of international legal challenge to the policy as a whole' on grounds of trade distortion (Padilla, 2007: 7).

Beyond obstacles to precautionary environmental standards in the global trade regime, the Kyoto Protocol's Clean Development Mechanism represents a structural momentum – through which Northern entities paying for projects reducing emissions in the South, are awarded carbon credits to meet their own emissions targets. Carbon market studies estimate 'that the output of bioethanol and biodiesel could rise up to 120 and 24 billion litres respectively in 2020 if instruments such as the CDM support the implementation of biofuel markets in developing countries' (Gilbertson et al., 2007: 41). So far agrofuels projects registered with CDM only extend to processing of waste products like bagasse (sugar cane or sorghum biomass) and used cooking oil, but crop production projects are pending (2007: 41). Meanwhile, the World Bank has inserted itself as a broker in the carbon market, recognizing (in a leaked 2005 memo) that with a 5%+ commission (now 13% – 2009) it could earn $100 million in one year. Using its institutional networks, the Bank is able to declare local carbon capture projects eligible for carbon credit exchanges with Northern governments and corporations. Establishing a Community Development Carbon Fund 'will link small-scale projects seeking carbon finance with companies, governments, foundations, and NGOs seeking to improve the livelihoods of local communities and obtain verified emission reductions' (Wysham, 2005). Thus the development paradigm, and its enforcers, are able to profit, and, in the case of the Bank, renew their legitimacy via the new virtual frontier of carbon crediting (Lohmann, 2006).

Agrofuels and Social Reproduction

Whether agrofuels account for up to 75% of food price inflation, as the World Bank reports, or somewhat less, the point is clear: that crop-derived fuels directly or indirectly contribute to rising prices. Either way, the corporate mediation of supply and demand conditions the inflation of prices. Between 2006 and 2007, US ethanol distillery corn demand increased twice as much as the increase in global demand for corn (Holt-Giménez and Kenfield, 2008: 3). The 2007 US Renewable Fuels Standards legislation empowers 'ADM, Bunge and Cargill to diversify their monopsonistic purchases to include corn for fuel as well as corn for food' (Holt-Giménez and Kenfield, 2008: 2). With corn prices rising over 50% in 2006, nevertheless, these grain traders profit from the

captive market created by ethanol targets (2008: 2). US corn diverted to fuel feedstock puts pressure on world grain markets, since the USA produces 40% of corn globally.

Diversified corporate portfolios deepen the consolidation of agribusiness power. For example, while corn prices fell continuously in Mexico following NAFTA's liberalization of corn imports from the USA, tortilla prices tripled during the 1990s (Philpott, 2007). Tortilla prices doubled again during 2006, such that 'low-income people found themselves priced out of the tortilla market, and forced into less nutritious alternatives like white bread and ramen noodles' (Philpott, 2007). Two food processors control 97% of the industrial corn flour market, and, with the state reducing food subsidies, tortilla riots now shape the political landscape – intensified by the displacement of peasants by corn imports leading to a 10% reduction in wages (Patel, 2007: 53).

Food riots cascading across the world today (Italy, Uzbekistan, Morocco, Guinea, Mauritania, Senegal, West Bengal, Indonesia, Zimbabwe, Burkina Faso, Cameroon, Yemen, Jordan, Saudi Arabia, Egypt, Mexico, Argentina, Haiti…) protest rising basic food prices. An overriding cause is structural adjustment policies which dismantled public capacity (specifically food reserves) and deepened food dependency across much of the global South through liberalization of trade in foodstuffs. Thus African wheat imports increased 'by 35% between 1996 and 2000, while the total value of these ever cheaper imports actually fell by 13%, on average' (Rosset, 2006: 65) and in 2007, the 'food import bill of developing countries rose by 25% as food prices rose' (*New York Times* editorial, 10 April 2008). Such food dependency is legitimized via a perverse discourse of 'food security' – that is, a global (trade) relation privatized under neoliberalism on grounds of the superior efficiencies of 'comparative advantage', with TNCs organizing global trade in foodstuffs to meet (market) demand (McMichael, 2003). As Vía Campesina notes:

> National food reserves have been privatized and are now run like transnational companies. They act as speculators instead of protecting farmers and consumers. Likewise, guaranteed price mechanisms are being dismantled all over the world as part of the neo-liberal policies package, exposing farmers and consumers to extreme price volatility. (2008)

Under these circumstances, the food crisis is viewed as an 'opportunity' to incorporate small farmers into the market. The Food and Agricultural Organization (FAO) claims that: 'High prices promise not only to lift farmers out of years of debt, but also to revive the livelihoods rooted in agriculture of the world's poor. The crisis of high food prices presents the world with an opportunity to invest in agriculture and secure a sustainable future for world food supplies' (FAO, 2008). Meanwhile, the World Bank, following its 'agriculture-for-development' theme in its 2008 *World Development Report*, which advocates GM crops, argues for a green revolution in Africa 'by assisting countries to boost productivity throughout the agricultural value chain and help small-holder farmers to break the cycle of poverty' (Zoellick, 2008). This position informed the Memorandum of Understanding at the Rome Food Summit, June 2008, between the FAO and the Alliance for a Green Revolution in Africa (AGRA), the World Food Program (WFP) and the International Fund for Agricultural Development (IFAD), to develop opportunities

for smallholders. AGRA then formed a collaborative relationship with the Millennium Challenge Corporation, to combine MCC expertise in infrastructure development with AGRA's links with small farmers to 'turn many of the African countries into breadbaskets' and 'to improve the whole food chain and not just the farmer' (LaFranchi, 2008). Note that the MCC stipulates neoliberal governance as a financial condition.

The reality is that small farmers have not benefited from rising food prices, largely because of prior commitments of harvests at previous prices, higher input costs, and/or many small farmers self-consume (IFAD, 2008; McGregor, 2008; Macinnis, 2008). Furthermore, an investment consortium such as this threatens a 'final land grab' for export agriculture in the guise of developing small farming, and addressing the food crisis. We know that food security through the global market has been an illusion (McMichael, 2003), and we also know that corporate alliances are forming that profit from flexible portfolios in food and fuel crops. That is, however well intentioned, the renewed multilateral attention to small farmers portends further dispossession, in addition to speculative investments promoting flexible substitution between fuel and food crops, as decided by the 'market'. Under these conditions it is unsurprising to find declarations from Indonesian smallholders like: 'It's as if we were ghosts on our own land' (Forest Peoples Programme and Sawit Watch, 2006), and Amazonian indigenous peoples referring to agrofuel plantations as the 'devil's orchards'. As the food sovereignty movement claims, small farmers, and even smallholder agrofuel producers, need their own markets, not the (corporate) 'global market'.

With 'green accumulation' as the new game in town, 'idle' land is being identified by states and firms for expansion of commercial agrofuels. However, 'growing evidence raises doubts about the concept of *idle* land. In many cases, lands perceived to be *idle*, *underutilized, marginal* or *abandoned* by government and large private operators provide a vital basis for the livelihoods of poorer and vulnerable groups, including through crop farming, herding and gathering of wild products' (Cotula et al., 2008: 22–3). Jatropha production in India targets 'waste lands' which sustain millions of people, as 'commons' and pasturelands. Beyond pastoralists, GRAIN observes that 'refugees from development projects, displaced persons, jobless laborers and small farmers facing crop failure often rely on these lands as places where they can put their cattle during an emergency. If these lands are enclosed, the lifelines of many already disadvantaged people will be jeopardized' (2008: 8). And in Malaysia, where the government plans for 1 million hectares of oil palms by 2010, 'native land owners are expected to surrender their lands to the State for 60 years to be developed as joint ventures within private companies, in which the State acts as Trustee on behalf of the customary owners', with no clear plans for compensation (Colchester et al., 2007).

Conclusion

The crisis of the agroindustrial model is in many ways the vortex of this crisis conjuncture, since agriculture (and associated deforestation) account for almost a third of GHG. Agribusiness is organized to systematically undermine peasant agriculture, decoupling urbanization from industrialization, and generating a planet of slums and global circuits

of migrant labor (Davis, 2006). Human redundancy combines with the elimination of biodiversity and vital food provisioning cultures, upon which the future of humanity depends. The ultimate problem is the assault on small farming implicit in the marshalling of 'climate investment funds' and agriculture-for-development funds by the World Bank and its corporate partners.

As the food sovereignty movement argues, and demonstrates (Lobe, 2007), small farming cools the earth and feeds the world, significantly. Agroecology represents a long-term corrective to the metabolic rift – Jules Pretty, for example, estimates industrial agriculture uses 6–10 times more energy than agroecological methods (Goldsmith, 2007); while agroecology restores soils, reducing emissions up to 15%, and restoring grasslands, wetlands can reduce emissions up to another 20% (Apfelbaum and Kimble, 2007). There is a wealth of research and practice that supports the claim that small farms are more productive than large mono-cultural factories in the fields (Pretty et al., 2006). In 1962 Amartya Sen claimed an inverse relationship between the size of farms and their crop yield per hectare – confirmed in farming studies in Turkey, India, Pakistan, Nepal, Malaysia, Thailand, Java, the Philippines, Brazil, Colombia and Paraguay, and yet the FAO argues, 'as a result of small landholdings, farm output … remains low' (Monbiot, 2008). Miguel Altieri (2008) summarizes the advantage of small diversified farming in the following terms:

> In polycultures developed by smallholders, productivity, in terms of harvestable products, per unit area is higher than under sole cropping with the same level of management. Yield advantages range from 20 to 60%, because polycultures reduce losses due to weeds, insects and diseases, and make more efficient use of the available resources of water, light and nutrients. In overall output, the diversified farm produces much more food.

Further, small farms 'cool the climate', using organic fertilizer that absorbs and sequesters carbon more effectively than industrial agriculture (Altieri, 2008). The serious conjuncture of food, energy and climate crises demands a reversal of the modernist rejection of small-holder farming, fishing and pastoralism, and assumptions of obsolescence (McMichael, 2008). There is mounting evidence of the adaptability of peasants to ecological changes under conditions of global warming, provided they are sufficiently valued, adequately heard and generously supported.[2] The latest attempt by the development industry to renew its legitimacy, and empower agribusiness alliances around agrofuels, at the expense of complex cultural and ecological relations, will only accelerate dispossession, and global warming, as it undermines the ecological knowledge the world needs to sustain food supplies and stabilize the climate.

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Notes

1 Agrofuels production consumes more fossil-fuels, fertilizer, pesticides and water, and degrades the soil, globally, as President Bush's mandate of 36 billion gallons of agrofuels per year by 2022 cannot be met without importing from Southeast Asia and Latin America, according to Eric Holt-Giménez (Leahy, 2008).

2 Surveys following the devastation of Hurricane Mitch in Central America show that 'many small farmers cope and even prepare for climate change, minimizing crop failure through increased use of drought tolerant local varieties, water harvesting, mixed cropping, opportunistic weeding, agro-forestry and a series of other traditional techniques' (Altieri, 2008). See also ActionAid (2007) and Community Media Trust (2008).

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