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Dangerous Liaison: Industrial Agriculture and the Reductionist Mindset

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Food and agriculture across the world is in crisis. Food is becoming denutrified and unhealthy and diets less diverse. There is a loss of biodiversity, which threatens food security, soils are being degraded, water sources polluted and depleted and smallholder farmers, so vital to global food production, are being squeezed off their land and out of farming.

A minority of the global population has access to so much food than it can afford to waste much of it, while food insecurity has become a fact of life for hundreds of millions. This crisis stems from food and agriculture being wedded to power structures that serve the interests of the powerful global agribusiness corporations.

Over the last 60 years, agriculture has become increasingly industrialised, globalised and tied to an international system of trade based on export-oriented mono-cropping, commodity production for the international market, indebtedness to international financial institutions (IMF/World Bank).

This has resulted in food surplus and food deficit areas, of which the latter have become dependent on (US) agricultural imports and strings-attached aid. Food deficits in the Global South mirror food surpluses in the North, based on a 'stuffed and starved' strategy.

Whether through IMF-World Bank structural adjustment programmes related to debt repayment as occurred in Africa (as a continent Africa has been transformed from a net exporter to a net importer of food), bilateral trade agreements like NAFTA and its impact on Mexico or, more generally, deregulated global trade rules, the outcome has been similar: the devastation of traditional, indigenous agriculture.

Integral to all of this has been the imposition of the 'Green Revolution'. Farmers were encouraged to purchase hybrid seeds from corporations that were dependent on chemical fertilisers and pesticides to boost yields. They required loans to purchase these corporate inputs and governments borrowed to finance irrigation and dam building projects for what was a water-intensive model.

While the Green Revolution was sold to governments and farmers on the basis it would increase productivity and earnings and would be more efficient, we now have nations and farmers incorporated into a system of international capitalism based on dependency, deregulated and manipulated commodity markets, unfair subsidies and inherent food insecurity.

As part of a wider 'development' plan for the Global South, millions of farmers have been forced out of agriculture to become cheap factory labour (for outsourced units from the

West) or, as is increasingly the case, unemployed or underemployed slum dwellers.

In India, under the banner of a bogus notion of 'development', farmers are being whipped into subservience on behalf of global capital: they find themselves steadily squeezed out as farming due to falling incomes, the impact of cheap imports and policies deliberately designed to run down smallholder agriculture for the benefit of global agribusiness corporations.

Aside from the geopolitical shift in favour of the Western nations resulting from the programmed destruction of traditional agriculture across the world, the Green Revolution has adversely impacted the nature of food, soil, human health and the environment.

Sold on the premise of increased yields, improved food security and better farm incomes, the benefits of the Green Revolution have been overstated. And the often stated 'humanitarian' intent and outcome ('millions of lives saved') has had more to do with PR and cold commercial interest.

However, even when the Green Revolution did increase yields (or similarly, if claims about GMO agriculture – the second coming of the Green Revolution – improving output are to be accepted at face value), Canadian environmentalist Jodi Koberinski says pertinent questions need to be asked: what has been the cost of any increased yield of commodities in terms of local food security and local caloric production, nutrition per acre, water tables, soil structure and new pests and disease pressures?

We may also ask what the effects on rural communities and economies have been; on birds, insects and biodiversity in general; on the climate as a result of new technologies, inputs or changes to farming practices; and what have been the effects of shifting towards globalised production chains, not least in terms of transportation and fossil fuel consumption.

Moreover, if the Green Revolution found farmers in the Global South increasingly at the mercy of a US-centric system of trade and agriculture, at home they were also having to fit in with development policies that pushed for urbanisation and had to cater to the needs of a distant and expanding urban population whose food requirements were different to local rural-based communities. In addition to a focus on export-oriented farming, crops were also being grown for the urban market, regardless of farmers' needs or the dietary requirements of local rural markets.

Destroying indigenous systems

In an open letter written in 2006 to policy makers in India, farmer and campaigner Bhaskar

Save (image on the right) offered answers to some of these questions. He argued that the actual reason for pushing the Green Revolution was the much narrower goal of increasing marketable surplus of a few relatively less perishable cereals to fuel the urban-industrial expansion favoured by the government and a few industries at the expense of a more diverse and nutrient-sufficient agriculture, which rural folk – who make up the bulk of India's population – had long benefited from.

Before, Indian farmers had been largely self-sufficient and even produced surpluses, though generally smaller quantities of many more items. These, particularly perishables, were tougher to supply urban markets. And so, the nation's farmers were steered to grow chemically cultivated monocultures of a few cash-crops like wheat, rice, or sugar, rather than their traditional polycultures that needed no purchased inputs.

Tall, indigenous varieties of grain provided more biomass, shaded the soil from the sun and protected against its erosion under heavy monsoon rains, but these very replaced with dwarf varieties, which led to more vigorous growth of weeds and were able to compete successfully with the new stunted crops for sunlight.

As a result, the farmer had to spend more labour and money in weeding, or spraying herbicides. Furthermore, straw growth with the dwarf grain crops fell and much less organic matter was locally available to recycle the fertility of the soil, leading to an artificial need for externally procured inputs. Inevitably, the farmers resorted to use more chemicals and soil degradation and erosion set in.

The exotic varieties, grown with chemical fertilisers, were more susceptible to 'pests and diseases', leading to yet more chemicals being poured. But the attacked insect species developed resistance and reproduced prolifically. Their predators – spiders, frogs, etc. – that fed on these insects and controlled their populations were exterminated. So were many beneficial species like the earthworms and bees.

Save noted that India, next to South America, receives the highest rainfall in the world. Where thick vegetation covers the ground, the soil is alive and porous and at least half of the rain is soaked and stored in the soil and sub-soil strata.

A good amount then percolates deeper to recharge aquifers or groundwater tables. The living soil and its underlying aquifers thus serve as gigantic, ready-made reservoirs. Half a century ago, most parts of India had enough fresh water all year round, long after the rains had stopped and gone. But clear the forests, and the capacity of the earth to soak the rain, drops drastically. Streams and wells run dry.

While the recharge of groundwater has greatly reduced, its extraction has been mounting. India is presently mining over 20 times more groundwater each day than it did in 1950. But most of India's people – living on hand-drawn or hand-pumped water in villages and practising only rain-fed farming – continue to use the same amount of ground water per person, as they did generations ago.

More than 80% of India's water consumption is for irrigation, with the largest share hogged by chemically cultivated cash crops. For example, one acre of chemically grown sugarcane requires as much water as would suffice 25 acres of jowar, bajra or maize. The sugar factories too consume huge quantities.

From cultivation to processing, each kilo of refined sugar needs two to three tonnes of water. Save argued this could be used to grow, by the traditional, organic way, about 150 to 200 kg of nutritious jowar or bajra (native millets).

If Bhaskar Save helped open people's eyes to what has happened on the farm, to farmers and to ecology in India, a 2015 report by GRAIN provides an overview of how US agribusiness has hijacked an entire nation's food and agriculture under the banner of 'free trade' to the detriment of the environment, health and farmers.

In 2012, Mexico's National Institute for Public Health released the results of a national survey of food security and nutrition. Between 1988 and 2012, the proportion of overweight women between the ages of 20 and 49 increased from 25% to 35% and the number of obese women in this age group increased from 9% to 37%.

Some 29% of Mexican children between the ages of 5 and 11 were found to be overweight, as were 35% of youngsters between 11 and 19, while one in 10 school age children suffered from anemia. The Mexican Diabetes Federation says that more than 7% of the Mexican population has diabetes. Diabetes is now the third most common cause of death in Mexico, directly or indirectly.

The various free trade agreements that Mexico has signed over the past two decades have had a profound impact on the country's food system and people's health. After his mission to Mexico in 2012, the then Special Rapporteur on the Right to Food, Olivier De Schutter, concluded that the trade policies in place favour greater reliance on heavily processed and refined foods with a long shelf life rather than on the consumption of fresh and more perishable foods, particularly fruit and vegetables.

He added that the overweight and obesity emergency that Mexico is facing could have been avoided, or largely mitigated, if the health concerns linked to shifting diets had been integrated into the design of those policies.

The North America Free Trade Agreement led to the direct investment in food processing and a change in the retail structure (notably the advent of supermarkets and convenience stores) as well as the emergence of global agribusiness and transnational food companies in Mexico.

The country has witnessed an explosive growth of chain supermarkets, discounters and convenience stores. Local small-scale vendors have been replaced by corporate retailers that offer the processed food companies greater opportunities for sales and profits. Oxxo (owned by Coca-cola subsidiary Femsa) tripled its stores to 3,500 between 1999 and 2004. It was scheduled to open its 14,000th store sometime during 2015.

In Mexico, the loss of food sovereignty has induced catastrophic changes in the nation's diet and has had dire consequences for agricultural workers who lost their jobs and for the nation in general. Those who have benefited include US food and agribusiness interests, drug cartels and US banks and arms manufacturers.

More of the same: a bogus 'solution'

Transnational agribusiness has lobbied for, directed and profited from the very policies that have caused much of the above. And what we now see is these corporations (and their

supporters) espousing cynical and fake concern for the plight of the poor and hungry.

GMO patented seeds represent the final stranglehold of transnational agribusiness over the control of agriculture and food. The misrepresentation of the plight of the indigenous edible oils sector in India indicates encapsulates the duplicity at work surrounding the GM project.

After trade rules and cheap imports conspired to destroy farmers and the jobs of people involved in local food processing activities for the benefit of global agribusiness, including commodity trading and food processor companies ADM and Cargill, there is now a campaign to force GM into India on the basis that Indian agriculture is unproductive and thus the country has to rely on imports. This conveniently ignores the fact that prior to neoliberal trade rules in the mid-1990s, India was almost self-sufficient in edible oils.

In collusion with the Gates Foundation, corporate interests are also seeking to secure full spectrum dominance throughout much of Africa as well. Western seed, fertiliser and pesticide manufacturers and dealers and food processing companies are in the process of securing changes to legislation and are building up logistics and infrastructure to allow them to recast food and farming in their own images.

Today, governments continue to collude with big agribusiness corporations. These companies are being allowed to shape government policy by being granted a strategic role in trade negotiations and are increasingly framing the policy/knowledge agenda by funding and determining the nature of research carried out in public universities and institutes.

As Bhaskar Save wrote about India:

> "This country has more than 150 agricultural universities. But every year, each churns out several hundred 'educated' unemployables, trained only in misguiding farmers and spreading ecological degradation. In all the six years a student spends for an M.Sc. in agriculture, the only goal is short-term – and narrowly perceived – 'productivity'. For this, the farmer is urged to do and buy a hundred things. But not a thought is spared to what a farmer must never do so that the land remains unharmed for future generations and other creatures. It is time our people and government wake up to the realisation that this industry-driven way of farming – promoted by our institutions – is inherently criminal and suicidal!"

Save is referring to the 300,000-plus farmer suicides that have taken place in India over the past two decades due to economic distress resulting from debt, a shift to (GM)cash crops and economic 'liberalisation' (see this report about a peer-reviewed study, which directly links suicides to GM cotton).

The current global system of chemical-industrial agriculture, World Trade Organisation rules and bilateral trade agreements that agritech companies helped draw up are a major cause of food insecurity and environmental destruction. The system is not set up to 'feed the world' despite the proclamations of its supporters.

However, this model has become central to the dominant notion of 'development' in the Global South: unnecessary urbanisation, the commercialisation and emptying out of the countryside at the behest of the World Bank, the displacement of existing systems of food and agricultural production with one dominated by Monsanto-Bayer, Cargill and the like and

a one-dimensional pursuit of GDP growth as a measure of 'progress' with little concern for the costs and implications – mirroring the narrow, reductionist 'output-yield' paradigm of industrial agriculture itself.

Agroecology offers a genuine solution

Across the world, we are seeing farmers and communities pushing back and resisting the corporate takeover of seeds, soils, land, water and food. And we are also witnessing inspiring stories about the successes of agroecology.

Reflecting what Bhaskar Save achieved on his farm in Gujarat, agroecology combines sound ecological management, including minimising the use of toxic inputs, by using on-farm renewable resources and privileging natural solutions to manage pests and disease, with an approach that upholds and secures farmers' livelihoods.

Agroecology is based on scientific research grounded in the natural sciences but marries this with farmer-generated knowledge and grassroots participation that challenges top-down approaches to research and policy making. However, it can also involve moving beyond the dynamics of the farm itself to become part of a wider agenda, which addresses the broader political and economic issues that impact farmers and agriculture (see this description of the various modes of thought that underpin agroecolgy).

Jodi Koberisnki's nod to 'systems thinking' lends credence to agroecology, which recognises the potential of agriculture to properly address concerns about local food security and sovereignty as well as social, ecological and health issues. In this respect, agroecology is a refreshing point of departure from the reductionist approach to farming which emphasises securing maximum yield and corporate profit to the detriment of all else.

Wei Zhang – an economist focusing on ecosystem services, agriculture and the environment – says that

> 'worldview' is important "to how you conceptualise issues and develop or choose tools to address those issues. Using systems thinking requires a shift in fundamental beliefs and assumptions that constitute our worldviews. These are the intellectual and moral foundations for the way we view and interpret reality, as well as our beliefs about the nature of knowledge and the processes of knowing. Systems thinking can help by changing the dominant mindset and by addressing resistance to more integrated approaches."

Agroecology requires that shift in fundamental beliefs.

A few years ago, the Oakland Institute released a report on 33 case studies which highlighted the success of agroecological agriculture across Africa in the face of climate change, hunger and poverty. The studies provide facts and figures on how agricultural transformation can yield immense economic, social, and food security benefits while ensuring climate justice and restoring soils and the environment.

The research highlights the multiple benefits of agroecology, including affordable and sustainable ways to boost agricultural yields while increasing farmers' incomes, food security and crop resilience.

The report described how agroecology uses a wide variety of techniques and practices,

including plant diversification, intercropping, the application of mulch, manure or compost for soil fertility, the natural management of pests and diseases, agroforestry and the construction of water management structures.

There are many other examples of successful agroecology and of farmers abandoning Green Revolution thought and practices to embrace it (see this report about El Salvador and this interview from South India).

In a recent interview appearing on the Farming Matters website, Million Belay sheds light on how agroecological agriculture is the best model of agriculture for Africa. Belay explains that one of the greatest agroecological initiatives started in 1995 in Tigray, Northern Ethiopia, and continues today. It began with four villages and after good results, it was scaled up to 83 villages and finally to the whole Tigray Region. It was recommended to the Ministry of Agriculture to be scaled up at the national level. The project has now expanded to six regions of Ethiopia.

The fact that it was supported with research by the Ethiopian University at Mekele has proved to be critical in convincing decision makers that these practices work and are better for both the farmers and the land.

Bellay describes another agroecological practice that spread widely across East Africa – 'push-pull'. This method manages pests through selective intercropping with important fodder species and wild grass relatives, in which pests are simultaneously repelled – or pushed – from the system by one or more plants and are attracted to – or pulled – toward 'decoy' plants, thereby protecting the crop from infestation. Push-pull has proved to be very effective at biologically controlling pest populations in fields, reducing significantly the need for pesticides, increasing production, especially for maize, increasing income to farmers, increasing fodder for animals and, due to that, increasing milk production, and improving soil fertility.

By 2015, the number of farmers using this practice increased to 95,000. One of the bedrocks of success is the incorporation of cutting edge science through the collaboration of the International Center of Insect Physiology and Ecology (ICIPE) and the Rothamsted Research Station (UK) who have worked in East Africa for the last 15 years on an effective ecologically-based pest management solution for stem borers and striga.

But agroecology should not just be regarded something for the Global South. Food First Executive Director Eric Holtz-Gimenez argues that it offers concrete, practical solutions to many of the world's problems that move beyond (but which are linked to) agriculture. In doing so, it challenges – and offers alternatives to – prevailing moribund doctrinaire economics and the outright plunder of neoliberalism.

The scaling up of agroecology can tackle hunger, malnutrition, environmental degradation and climate change. By creating securely paid labour-intensive agricultural work, it can also address the interrelated links between labour offshoring by rich countries and the removal of rural populations elsewhere who end up in sweat shops to carry out the outsourced jobs.

Thick legitimacy

Various official reports have argued that to feed the hungry and secure food security in low income regions we need to support small farms and diverse, sustainable agroecological

methods of farming and strengthen local food economies (see this report on the right to food and this (IAASTD) peer-reviewed report).

Olivier De Schutter says:

> "To feed 9 billion people in 2050, we urgently need to adopt the most efficient farming techniques available. Today's scientific evidence demonstrates that agroecological methods outperform the use of chemical fertilizers in boosting food production where the hungry live, especially in unfavorable environments."

De Schutter indicates that small-scale farmers can double food production within 10 years in critical regions by using ecological methods. Based on an extensive review of scientific literature, the study he was involved in calls for a fundamental shift towards agroecology as a way to boost food production and improve the situation of the poorest. The report calls on states to implement a fundamental shift towards agroecology.

The success stories of agroecology indicate what can be achieved when development is placed firmly in the hands of farmers themselves. The expansion of agroecological practices can generate a rapid, fair and inclusive development that can be sustained for future generations. This model entails policies and activities that come from the bottom-up and which the state can then invest in and facilitate.

A decentralised system of food production with access to local markets supported by proper roads, storage and other infrastructure must take priority ahead of exploitative international markets dominated and designed to serve the needs of global capital.

It has long been established that Small farms are per area more productive than large-scale industrial farms and create a more resilient, diverse food system. If policy makers were to prioritise this sector and promote agroecology to the extent Green Revolution practices and technology have been pushed, many of the problems surrounding poverty, unemployment and urban migration could be solved.

However, the biggest challenge for upscaling agroecology lies in the push by big business for commercial agriculture and attempts to marginalise agroecology. Unfortunately, global agribusiness concerns have secured the status of 'thick legitimacy' based on an intricate web of processes successfully spun in the scientific, policy and political arenas. This allows its model to persist and appear normal and necessary. This perceived legitimacy derives from the lobbying, financial clout and political power of agribusiness conglomerates which set out to capture or shape government departments, public institutions, the agricultural research paradigm, international trade and the cultural narrative concerning food and agriculture.

Critics of this system are immediately attacked for being anti-science, for forwarding unrealistic alternatives, for endangering the lives of billions who would starve to death and for being driven by ideology and emotion. Strategically placed industry mouthpieces like Jon Entine, Owen Paterson and Henry Miller perpetuate such messages in the media and influential industry-backed bodies like the Science Media Centre feed journalists with agribusiness spin.

When some people hurl such accusations, it might not just simply be spin: it may be the

case that some actually believe critics are guilty of such things. If that is so, it is a result of their failure to think along the lines Zhang outlines: they are limited by their own reductionist logic and worldview.

The worrying thing is that too many policy makers may also be blinded by such a view because so many governments are working hand-in-glove with the industry to promote its technology over the heads of the public. A network of scientific bodies and regulatory agencies that supposedly serve the public interest have been subverted by the presence of key figures with industry links, while the powerful industry lobby hold sway over bureaucrats and politicians.

The World Bank is pushing a corporate-led industrial model of agriculture via its 'enabling the business of agriculture' strategy and corporations are given free rein to write policies. Monsanto played a key part in drafting the WTO Agreement on Trade-Related Aspects of Intellectual Property Rights to create seed monopolies and the global food processing industry had a leading role in shaping the WTO Agreement on the Application of Sanitary and Phytosanitary Measures (see this). From Codex, the Knowledge Initiative on Agriculture aimed at restructuring Indian agriculture to the currently on-hold US-EU trade deal (TTIP), the powerful agribusiness lobby has secured privileged access to policy makers to ensure its model of agriculture prevails.

The ultimate coup d'etat by the transnational agribusiness conglomerates is that government officials, scientists and journalists take as given that profit-driven Fortune 500 corporations have a legitimate claim to be custodians of natural assets. These corporations have convinced so many that they have the ultimate legitimacy to own and control what is essentially humanity's common wealth. There is the premise that water, food, soil, land and agriculture should be handed over to powerful transnational corporations to milk for profit, under the pretence these entities are somehow serving the needs of humanity.

Corporations which promote industrial agriculture have embedded themselves deeply within the policy-making machinery on both national and international levels. From the overall narrative that industrial agriculture is necessary to feed the world to providing lavish research grants and the capture of important policy-making institutions, global agribusiness has secured a perceived thick legitimacy within policymakers' mindsets and mainstream discourse.

It gets to the point whereby if you – as a key figure in a public body – believe that your institution and society's main institutions and the influence of corporations on them are basically sound, then you are probably not going to challenge or question the overall status quo. Once you have indicated an allegiance to these institutions and corporate power, it is 'irrational' to oppose their policies, the very ones you are there to promote. And it becomes quite 'natural' to oppose any research findings, analyses or questions which question the system and by implication your role in it.

But how long can the 'legitimacy' of a system persist given that it merely produces bad food, creates food deficit regions globally, destroys health, impoverishes small farms, leads to less diverse diets and less nutritious food, is less productive than small farms, creates water scarcity, destroys soil and fuels/benefits from World Bank/WTO policies that create dependency and debt.

The more that agroecology is seen to work, the more policy makers see the failings of the

current system and the more they become open to holistic approaches to agriculture – as practitioners and supporters of agroecology create their own thick legitimacy – they more willing officials might be to give space to a model that has great potential to help deal with some of the world's most pressing problems. It has happened to a certain extent in Ethiopia, for example. That is hopeful.

Of course, global agribusiness nor the system of capitalism it helps to uphold and benefits from are not going to disappear overnight and politicians (even governments) who oppose or challenge private capital tend to be replaced or subverted.

Powerful agribusiness corporations can only operate as they do because of a framework designed to allow them to capture governments and regulatory bodies, to use the WTO and bilateral trade deals to lever global influence, to profit on the back of US militarism (Iraq) and destabilisations (Ukraine), to exert undue influence over science and politics and to rake in enormous profits.

The World Bank's ongoing commitment to global agribusiness and a wholly corrupt and rigged model of globalisation is a further recipe for plunder. Whether it involves Monsanto, Cargill or the type of corporate power grab of African agriculture that Bill Gates is helping to spearhead, private capital will continue to ensure this happens while hiding behind platitudes about 'free trade' and 'development'.

Brazil and Indonesia are subsidising private corporations to effectively destroy the environment through their practices. Canada and the UK are working with the GMO biotech sector to facilitate its needs. And India is facilitating the destruction of its agrarian base according to World Bank directives for the benefit of the likes of Monsanto, Bayer and Cargill.

If myths about the necessity for perpetuating the stranglehold of capitalism go unchallenged and real alternatives are not supported by mass movements across continents, agroecology will remain on the periphery.

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This skilfully researched book focuses on how a small socio-political American elite seeks to establish control over the very basis of human survival: the provision of our daily bread. “Control the food and you control the people.”

This is no ordinary book about the perils of GMO. Engdahl takes the reader inside the corridors of power, into the backrooms of the science labs, behind closed doors in the corporate boardrooms.

The author cogently reveals a diabolical world of profit-driven political intrigue, government corruption and coercion, where genetic manipulation and the patenting of life forms are used to gain worldwide control over food production. If the book often reads as a crime story, that should come as no surprise. For that is what it is.

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