The Food-Fuel Crisis

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Recent studies indicate that we face a looming global peak in oil extraction. Peak oil is the point at which further expansion of oil production becomes impossible because new production flows are fully offset by production declines. While the Association for the Study of Peak Oil and Gas (ASPO) predicts that it will occur in the next ten years, there is some debate as to whether it has already occurred. According to Deffeyes[1] and Simmons[2] it happened in 2005, while Skrebowski[3] states it will occur in 2010. Much of these figures, however, do not take into account the fact that as the halfway point of a reserve is reached, extraction and refinement of the remaining oil becomes increasingly expensive and requires more energy. Acknowledging these conditions, British Petroleum announced in 2004 that just over forty years of oil remains.[4]

Due to industrialised societies' heavy reliance on oil, peak oil will have major implications for their future. Today's global economic system is effectively based on the availability, abundance and, more importantly, cheapness of oil. According to Rob Hopkins[5], fifty years ago the world was consuming 4bn barrels a year and the average discovery was around 30bn a year. Today the opposite is true: consumption is over 30bn barrels a year and the discovery rate is around 4bn a year. In the age of oil, some 47,500 oil fields have been found, yet the forty largest ones have yielded 75% of all oil discovered. Discoveries have declined in size and number since 1965, while consumption has continued to increase. The average size of field discovered in the 1940s was 1.5bn barrels of oil. By 2004 this figure was just 45 million, and it continues to fall. For Hopkins, the nature of new discoveries that the market gets excited about, for example the Alberta tar sands in Canada, indicates that we are nearing peak production. "Prospecting on Wall Street" he sees as a final indicator that we are approaching peak: an oil company's share price is tied to its amount of reserves, i.e. the potential future production it has secured. As the size of new discoveries has gone down, companies have increasingly found it difficult to sustain their reserves level. Larger oil companies buy smaller ones to acquire their reserves, thereby securing more potential production. While this has always been the case, Hopkins points to the fact that these takeovers in recent years have become huge, with there even being speculation that BP and Shell may merge. Another development is that oil companies, with record earnings due to the high price of oil, are awash with money with seemingly nowhere to reinvest it, believing they are spending all they need on current extraction and exploration.[6] Increasingly, this has led to companies buying back their own shares, deploying unprecedented profit levels in market dealings that boost their own share price. Chevron

plans to spend $15bn in the next three years on buying back its own shares, while Exxon is similarly spending $30bn each year.

Peak oil theory, it is suggested by Hopkins, may well now be a factor in the decisions oil companies are making. The 2007 Global Upstream Performance Review states:

"We believe that the issue has become part of the industry's long-term planning. If peak oil theory is correct, and a decline in world production is imminent, a company must choose among four alternatives – try to become a dominant participant, find a niche operational talent, harvest assets, or liquidate quickly."[7]

There are some who would rubbish peak oil theory, such as economist Ismael Hossein Zadeh.[8] He claims that energy-saving technologies will improve efficiency and so reduce consumption, that new technologies utilised by the oil industry will improve oil exploration and allow oil to be extracted from previously inaccessible regions such as deep water, and that there is plenty of "non-conventional" oil left, such as the Alberta tar sands in Canada. He further claims that peak oil theory discounts alternatives such as gas or alternative-fueled cars. Peak oil theory is also argued against by suggesting that the increased world demand for oil, due to the booming economies of China and India, has been offset by economic downturn in Europe and the US. While it is true that the production of much that the west consumes has moved to the east, Zadeh does not take into account the actual scale of global growth, such as China's investment in Africa. Zadeh also points to increased market speculation, suggesting that, "As much as 60% of today's crude oil price is pure speculation driven by large trader banks and hedge funds." Finally, he suggests recent price spikes in oil are due to geopolitical insecurity in the Middle East, not a shortage of oil.

But, as David Strahan[9] argues, those who point to energy efficiency have not thought it through. The House of Lords Science and Technology Committee has shown that although the UK's energy efficiency has allegedly doubled since 1970, overall energy consumption still continues to increase. It doesn't matter if your latest electrical gadget is more efficient when there are many more of them in use. It doesn't matter if a modern car does more to the gallon, if the number of journeys continues to increase. As Strahan points out, this is known as the "boomerang effect", or more exotically, "The Khazzoom-Brookes postulate". Strahan also looks into the effect of technologies upon the petroleum industry, and the argument that technological advance enables the industry to exploit previously inaccessible regions, such as deep water. It is not uncommon for the new class of drill ship to be operating in depths ranging from 5,000 to 10,000 feet. Venturing out into ever-increasing depths requires larger equipment with extra hoisting capacity, and more capacity in pumping systems. In addition to increased water depths, you also have to contend with the fact that the geologic target area is quite a bit deeper. You can be in 8,000 or 9,000 feet of water looking for a target 20,000 feet below the seabed. All this adds up to increasing energy demands in order to explore for and extract oil. Here Strahan quotes Jim Henry, a Texas oil man:

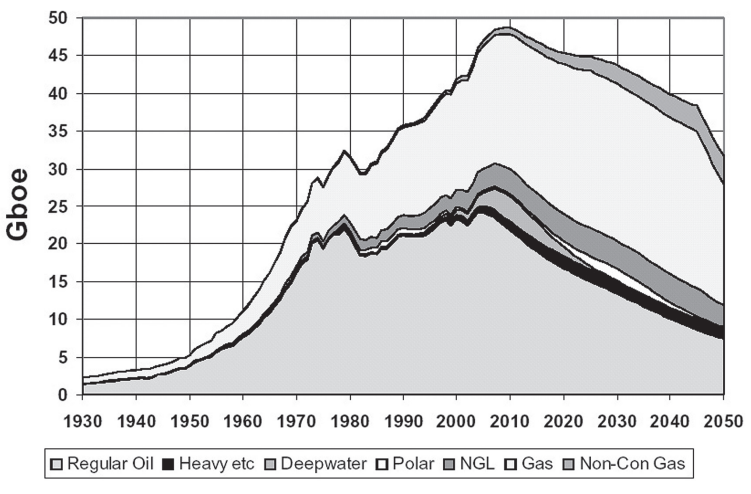
"A lot of people think this new technology is going to save us, but it doesn't work that way ... In the natural course of events we find the huge reservoirs first. In the US we found lots of the biggest in the 30s and 40s. And when they start declining, because production rates are huge, we can't make up the difference with all the little fields we're finding today ... Technology can kind of mitigate the decline, keep the decline from being so steep, but it won't stop the decline."

As for Zadeh's point concerning non-conventional oil, although there is estimated as much as 175bn barrels of oil in Alberta's tar sands[10], it is hugely expensive, energy intensive, and damaging to the environment to produce. It takes huge amounts of natural gas and water to extract the tar, the gas being used to make steam that is then injected to make the tar easier to extract. The tar then needs cleaned up, which again takes huge amounts of energy. According to Greenpeace[11], by 2011 the whole process will produce the equivalent of 80m tons of carbon dioxide per year – more than all the cars currently on Canadian roads.

Natural gas has also been hailed as a possible savior to future energy demands. Two types of fuel can be obtained here, Liquefied Natural Gas (LNG) and Gas to Liquids (GTL). The latter was used as town gas before widespread electrification. These fuels can be obtained from coal as well as gas, however, the emissions in the case of coal to liquid fuel are twice as high as from conventional diesel.[12] The Fischer-Tropsch conversion process involved is also highly energy intensive. According to the International Energy Agency[13], gas to liquids production is only 55% efficient, meaning the process itself uses up 45% of the gas. LNG, on the other hand, could be conceived as an interim fuel while we attempt transition, even if it has to be cooled to –160˚c to be transported.

There are many estimates of the amount of gas left worldwide, and Strahan[14] gives an average estimate of 11,700 trillion cubic feet – equivalent to 1.9 trillion barrels of oil. However, the production infrastructure needed is not in place. The whole process of building an infrastructure has been plagued by engineering problems and budget overruns. In a report by Deutche Bank Securities[15], LNG supply is assessed as having persistently failed to meet forecasts and will continue to do so. According to Paul Sankey[16], "LNG was seen as the cavalry coming to save the day. In reality we are still waiting. Our conclusion is that LNG supply will stay tight for the foreseeable future, being 2015 and beyond." Also hailed by opponents of peak oil theory is the invention of alternative fuels such as hydrogen cells. As Stahan points out, the technology, at $1m a car, is currently too expensive. There are other problems too: fuel cell cars are very inefficient. According to Massachusetts Institute of

OIL & GAS DEPLETION PROFILES
2004 Base Case



"The idea that developing countries should feed themselves is an anachronism from a bygone era. They could better ensure their food security by relying on US agricultural products, which are available in most cases at lower cost."

John Block, US Agricultural Secretary, 1986

Technology[17] there is little difference in emissions between fuel-cell vehicles and their closest petrol competitors.

While Zadeh's reasoning regarding peak oil may be skewed, he does however point to a fundamental truth: that much of the price rises we have seen over the past two years is due to speculation:

"Wall Street financial giants that created the Third World debt crisis in the late 1970s and early 1980s, the tech bubble in the 1990s, and the housing bubble in the 2000s are now hard at work creating the oil bubble."[18]

The food industry: its dependence on cheap oil.

The food industry is expected to be one of the hardest hit by the decline of cheap oil.[19] Modern agricultural practice is hugely oil-dependent, as is the surrounding post-harvest processing and distribution systems. From the field to the plate, oil fuels machinery, gets livestock fed, provides the base for agrochemicals, and fuels processing, packaging, and the long supply chain. The food we eat is not only inherently unsustainable, increasingly it is also damaging the environment. The food system itself is under serious risk from global warming caused by the greenhouse gases it emits. Predictable climate cycles, on which the system depends, are increasingly being disrupted. Additional environmental degradation is also taking place; irrigation systems use up huge amounts of water, soil erosion due to nitrogen depletion is evident across the globe, and deforestation continues apace to make way for agribusiness.

In March 2008 *The Times* reported that the UN Food and Agricultural Organization (FAO) monitored outbreaks of food riots in Mexico, Morocco, Uzbekistan, Guinea, Mauritania and Senegal, as well as the Indonesian capital Jakarta. The riots have multiple causes, however, the fact that oil has almost doubled in price in a year may well be the largest single contributor to pushing up the price of fertilizer as well as the cost of transport. Climate change has seen harvests seriously disrupted by freak weather conditions, including prolonged droughts in Australia and southern Africa, floods in west Africa, an extreme deep freeze in China, and record temperatures in northern Europe. The push for bio-fuels as an alternative to oil has further placed strain on the food system, especially in the US where these crops have been heavily subsidised. Global stockpiles of basic grains have dwindled to their lowest point in decades and rice has soared to its highest price in over twenty years, with supplies at their lowest since the 1980s.

The global wheat supply is even worse. Stockpiles are now lower than they have been in the last fifty years, according to the FAO, with just five weeks of world consumption available. Global wheat prices jumped by 25% in one day in February, prompted by Kazakhstan placing restrictions on exports through fear that its own population may go hungry. Likewise, India and Egypt have followed suite, with soybean oil shooting up by as much as 60% in one year. According to *The Independent* reporting in June, 37 countries now confirm they are in the grip of a food crisis, and that the price of food is at the centre of attention of financial speculators looking for new profit avenues following the credit crunch. Popham suggests speculative trading in food commodities has increased by as much as 1000% in the past four years and now exceeds $150bn, while *The Guardian* points out that Wall Street investors own 40% of US wheat futures and over 20% of corn futures.

In May, while releasing its annual outlook report, the FAO predicted that by 2017 wheat could be up 60% and the cost of vegetable oils may rise by 80% – this after prices of wheat, maize and oilseed crops already doubled between 2005 and 2007. It is also reported that although food prices are expected to drop in the future, they will plateau at a far higher level. *The Guardian* also reported in May that global inflation of food prices, as measured by the international food price index, increased by 40% in 2007. This dramatic rise continued during the first seven months of 2008. Any increase in food prices hits the poorest the hardest, as it is them who spend a larger proportion of their income on food. In industrialised nations, the average household expenditure on food is about 10% of income, while for the poorest nations the proportion is as much as 50-80%, so any increase can easily translate into hunger for the poorest fifth of the world's population.

According to Norman Church[20] the situation the food industry is in is totally against common sense. To illustrate his point, he uses the "crazy case" of Swedish tomato ketchup, which undergoes more than fifty-two transport and process stages, further arguing that in many cases countries import and export massive quantities of the same food product. For example, UK imports of milk have doubled over the last twenty years while there has been a four-fold increase in exports. This sounds not only utterly illogical, it is also unsustainable in the long run.

Church looks to the organic sector for possible solutions to this situation, arguing that organic is more energy efficient due to lower fossil fuel consumption and lower emissions than in conventional farming. Drawing from a UK study, this improved energy efficiency stems from lower – or zero – fertilizer and pesticide use, which otherwise accounts for up to half the energy input in conventional potato and winter wheat production, and as much as 80% of the energy consumed in some vegetable crops. Concentrated cereal feeds are the largest energy input in conventional livestock farming; when reared organically a larger proportion of feed for livestock comes from grass. In the case of dairy farming it was found that organic systems were almost five times more energy efficient in terms of unit

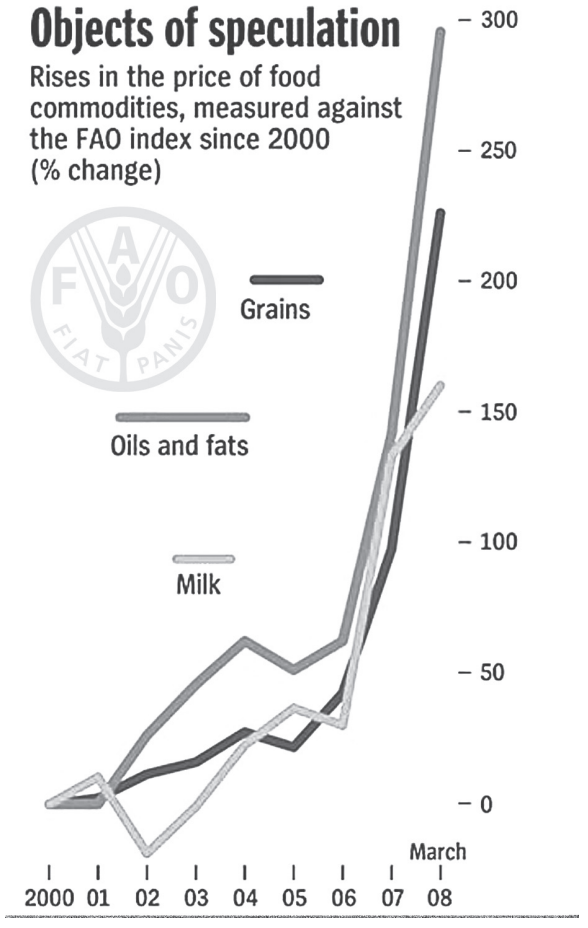
output, in this case a litre of milk. However, Church quickly points to problems with this system too, as once produce passes the farm gate it enters the world food system like conventional produce. Britain imports over three quarters of its organic produce, while only 2% of land is organically farmed, which means food miles, energy consumption and emissions savings are quickly lost. According to Church, one shopping basket containing twenty-six imported organic products could have traveled as much as 241,000km.

Paul Roberts[21] sees many problems with the modern, industrialised food system, including a lack of biodiversity with the associated increased risk of widespread crop failure, and the spread of diseases such as foot and mouth. However, for Roberts the main threats are energy, climate change, and water. According to Roberts, ethanol refineries now consume nearly 30% of US corn crop annually – up 10% since 2002. This, he claims, has had the effect of pushing up the price of grain paid by cattle and dairy farmers. But the amount consumed by the biofuel industry is still dwarfed by the livestock industry, which uses up more corn than every other user combined. In 2006, more than one third of the 2bn tons of grain produced worldwide was used to feed animals. Forecasts predict that by 2017 global grain prices may increase by 50% above historic averages. By 2070 the world population is expected to peak at 9.5bn, from its current 6.7bn. The question, though, is not how are 9.5bn going to feed themselves by 2070, but how long can the demand of 6.5bn people today be sustained? Roberts' answer is that lowering meat consumption is a necessity. Not least as meat is a very inefficient form of food when you take into account that 20lb of feed equals just 1lb of meat. In other words, for every ton of beef, twenty tons of grain is consumed. Which is why as much as 90% of the grain consumed by Americans is consumed in meat or dairy production.

Corn is the most nitrogen-hungry of all commercial crops – 33,000 cubic feet of natural gas is needed to make one ton of nitrogen fertilizer. This amount of gas could be used instead to generate 9,671 kilowatts of electricity – enough to run an average UK home for ten-and-a-half months. This means that farmers (via the fertilizer companies) are now in direct competition with utility companies for natural gas. Estimates are that as much as 230lb of nitrogen is applied to the typical acre of US corn, with up to 50lb of this leaving the soil and entering the surrounding environment, causing soil depletion, which according to a World Bank study is now so severe that by 2050 the planet may be trying to feed twice as many people with half as much top soil. The story does not stop there. The nitrogen released into the surrounding environment essentially fertilizes everything it meets, such as various algaes. When these organisms die, they set off a chain reaction known as eutrophication, which sucks oxygen out of the surrounding water, leaving massive fish-killing zones. According to a 2003 report by the UN environmental programme, the number of dead zones worldwide is about 150 – more than twice 1990 levels. This is not the most lasting effect of Nitrogen. By binding with oxygen the migrating nitrogen becomes nitrous oxide, a major pollutant that depletes the ozone layer and is a greenhouse gas 300 times more potent than carbon dioxide. It is claimed by Roberts that as much as 70% of all human-generated nitrous oxide comes from farming.

As for climate change, high-yield crops are susceptible to climactic shifts. They have been designed for and been evolved under a particular climate regime, so even a modest shift in climate conditions or cycle can have massive consequences for yields. Higher temperatures boost pest populations and allow insects, fungi, and weeds to thrive and pests to migrate into regions historically unaffected by them. Higher temperatures also mean higher levels of bacteria, which accelerate the decay of soil organic matter and thus reduce the soil's capacity to store nutrients and transport water. Such soil will not only erode more easily, it also needs more fertilizer to maintain yields. However, as they have less organic matter to retain them, they will surrender more of those added fertilizers into groundwater.

On average, according to Roberts, every ton of grain requires 1,000 tons of water. Agriculture now accounts for roughly three quarters of all fresh water use across the globe. In California it sucks up as much as four-fifths of the state's water supply. The global yields of grain have only become possible through huge irrigation systems, with half of the developing world's grain crop grown industrially on irrigated land. To meet future population food demand the FAO predicts a 20% increase in irrigation by 2030. However, many studies indicate that not only is this increase impossible, but that even current water use is unsustainable. Roberts points to a 2001 report by the World Bank, which states that China now exceeds the sustainable flow of the Huang, Hai and Huai rivers by as much as 600m tons a year, to grow grain. In all, one trillion tons of additional water will be needed in order to produce the extra



grain the world is forecasted to need by 2050, a challenge Roberts suggests seems to be beyond our technical, political and physical capacities. So the question now becomes, what sort of agricultural system could produce the food and fibre we need in a world where oil could be as much as $250 a barrel, and where we have twice the severe weather, but only half the water that we have now?

International finance: how neoliberal policies ended agricultural self-sufficiency in developing countries

The neoliberal policies of the IMF and World Bank play a causal role in this unsustainable system, in the form of the free trade policies, as they are known, promoted by international financial institutions. A classic example, given by Roberts,[22] is Mexico. In 1982, it threatened to default on $80bn of foreign debt, a third of which was owed to US banks. The World Bank and the IMF agreed to restructure Mexico's repayments, as they did for many other debtor nations. However, this was only agreed on the condition of debtor nations restructuring their "dysfunctional" economies according to free-market principles. A main target for restructuring was the agricultural sector. A less restricted, more liberalised food trading system was imposed – the Washington Consensus, as it came to be known – which changed the shape of the global food system. Many nations, Mexico included, had to move away from small peasant holdings to a high-volume, intensive, industrialised model, which was expected to produce surplus for export and the earnings used to pay off debts.

To bring this about, debtor nations were required to liberalise state-run farming – for example, eliminating farm subsidies that, according to the Washington Consensus, distorted trade by protecting small, inefficient farmers. They were also to devalue currencies to make their produce cheaper for foreign buyers. Not only were they expected to export more, by opening up their markets, they were expected to import more as well; not only imports of fertilizer, for example, but more commodities such as grain if it could (apparently) be grown more cheaply elsewhere. Most importantly here, they were also directed to open up their borders to foreign capital, known as Foreign Directed Investment (FDI), the excuse being that many of these nations lacked the infrastructure needed for modern industrialised agriculture. This inevitably led to developing-world farmers with smallholdings being in direct competition with large-scale, multinational, agribusiness operators who still benefited from the very subsidies now prohibited in the developing world. According to Roberts, this was to have a huge effect upon these regions, where farming can account for as much as half of a developing country's economy, in contrast to being a small part of the economy in a developed country, where it may be only 2% of all jobs and only 1% of GDP. Many of these previously food self-sufficient nations now found themselves relying more and more on imports as their farmers increasingly could not compete with their subsidised foreign counterparts. In Mexico this had a devastating effect on peasant farming, which was followed by an even bigger blow in the shape of the North American Free Trade Agreement (NAFTA), as further phasing out of tariff protection for these countries took place. This led to huge amounts of US subsidised corn flooding the market and plunging many farmers into crisis and in many cases driving them out of business. Big business in the form of multinationals, like US companies Cargill, quickly moved in and monopolised the sector. According to Walden Bello[23], as many as 1.3m farmers were put out of business in Mexico, and this trend continues as neoliberals in the Mexican government dismantle the peasant support system, a key legacy of the Mexican Revolution. A country which was once self-sufficient in corn is now heavily reliant upon imports, a situation which had such dire consequences as to force tens of thousands of people to take to the streets in 2007 to demonstrate against a 60% increase in the price of tortillas.

For Bello, the global food crisis stems mainly from free-market restructuring of farming. A clear example for him is the case of rice. There has been no transfer of rice consumption to biofuels, as in the case of corn, and only 10% of the world's rice production is traded. However, rice, like wheat and corn, has seen a huge rise in price, nearly tripling from $380 a ton in January to more than $1000 a ton in April 2008. Again, as with corn, the rise in price is closely linked to market speculation, and again the question remains as to why countries like the Philippines, once self-sufficient, are now heavily reliant upon imports, and again the answer is seen in the shape of neoliberal economic restructuring. As Bello points out, between 1986 and 1993 debt repayment accounted for 8% to 10% of GDP in the Philippines. Interest payments as a percentage of total government expenditure rose from 7% in 1980 to 28% in 1994, as a result debt servicing became a national budgetary priority and spending on agriculture fell by more than half. As with Mexico, peasants in the Philippines had to contend with a full-scale rolling back of state support. This was compounded in 1995 with the nation entering the World Trade Organisation, and its associated trade liberalisation. The agriculture sector in the Philippines essentially collapsed and

the country, which had had 900,000 metric tonnes of rice in government warehouses in 1986, and which had been self sufficient, began to import rice for the first time. The amount rose from 263,000 metric tonnes in 1995 to 2.1m in 1998.

As Bello indicates, this experience was replicated in many different countries that were subjected to the policies of the IMF and WTO. He points to a study conducted by the UN's Food and Agricultural Organisation, which looked at fourteen different nations and found that food imports had increased in every one: not surprising when the goal of the WTO's policy on agriculture was to open up markets in developing countries so that they would absorb the surpluses produced by the EU and US, surpluses that were only made possible by huge subsidies. In the US, these subsidies increased from $367bn in 1995 to $388bn in 2004, giving US farmers a distinct advantage over their developing counterparts. Even though under WTO guidelines subsidies were meant to be phased out, since the late '90s subsidies have accounted for 40% of agricultural production in the EU and 25% in the US. This, along with the fact that due to liberalisation multinational companies have increased their share of the market, has meant that there is now very little room in the market left for the hundreds of millions of peasant farmers throughout the world, further eroding national food self-sufficiency and food security.

The situation is repeated in Africa. In the 1960s, during decolonisation, Africa was a net food exporter, but today it imports as much as a quarter of its food, almost every country being a net importer. For Bello, African agriculture now finds itself in a deep crisis, which has multiple causes, from the spread of AIDS and HIV, war and bad governance, to lack of agricultural technology. However, as with Mexico and the Philippines, lack of government support mechanisms due to neoliberal economics and its associated restructuring of the food sector is a major contributing factor. Liberalisation has enabled subsidised EU beef to drive many west and south African cattle farms out of business, while US subsidised cotton has been unloaded on to markets at as low as 20% of production cost, again bankrupting African farmers. Oxfam estimates that between 1981 and 2001 the number of sub-Saharan Africans living on less than a dollar a day doubled, pointing to structural adjustment as the main source of creating such poverty. This is best shown by Bello in the example of Malawi. In 1999 the government started a programme in which small family farms were given a seed and fertilizer starter-pack, resulting in a national surplus of corn. World Bank directives and aid donors forced this to be abandoned. Without the starter packs output collapsed while the IMF insisted that the government sell off a large portion of its grain reserves to settle debt. Corn surplus and self-sufficiency soon turned to famine in 2002, a situation which worsened by 2005, when the Malawi government had had enough and reintroduced the programme, enabling over two million households access to discounted seeds and fertilizer once more. The result was a bumper harvest for two consecutive years and a million-ton maize surplus, which then became a national export to South Africa.

Local production must supplant global structures

Rob Hopkins sees climate change and peak oil[24] as two issues that are totally interwoven. According to Hopkins, peak oil is problematic for climate-change activists. He suggests that George Monbiot has expressed caution about placing any emphasis on peak oil theory, fearing that this will strengthen the case for alternatives, like bio-fuels, increased coal consumption, tar-sand extraction and other processes dangerous for the environment and climate – and, we might add, the market for nuclear. This has led to many climate activists arguing that we must keep peak oil and climate-change issues entirely separate. However, for Hopkins, they are both symptoms of societies addicted to fossil fuel lifestyles the planet cannot sustain.

For Church, the solution lies in organic localisation, in which food production and consumption becomes local and regional as opposed to globalised and transnational. With problems such as food security, greenhouse emissions, food miles, erosion of biodiversity and environmental as well as economic degradation, Church points to a process of exchanging "near for far" in production and distribution systems, with production placed as close to the consumer as possible. Local food systems would take the form of local farmers' markets and shops selling local produce, replacing imported and centrally distributed food. Leaving aside foodstuffs such as bananas, coffee, tea and sugar, products such as meat, cereals, dairy and cooking oils, as well as local fruit and vegetables, could be available throughout the year and imports of these suspended. This, Church argues, would increase self-sufficiency and food security, and help regenerate local and rural economies.

Notes

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