

An International Worker-Farmer Alliance (IWFA) to save the planet.

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Introduction:

The paper argues for an international alliance between the small farmers of the world and marginalised sections of workers in advanced capitalist economies. The former are under attack by corporate Capital in the form of agribusiness, and the latter are increasingly marginalised by the movement of capital to cheap labour countries such as China, India, Vietnam, etc. Many workers, who used to have skilled or semi-skilled but relatively well-paid and secure jobs, have joined the so-called 'precariat' working in service industries such as fast food or for security firms on temporary, even zero-hours contracts. Another contributing factor to worker marginalisation is the increasing computer-automation of work processes whose significance is discussed later. The widespread under-employment of graduates, often working in insecure jobs requiring a much lower education level, and the presence of migrant workers, and ethnic minority communities with low levels of employment, all contribute to the make-up of the precariat.

The end of the post-Second World War social contract

As Guy Standing has pointed out [Standing (2015) p3] "In the middle decades of the 20th century, capital, the trades unions and labour and social democratic parties all agreed to create a society and a welfare state oriented to labourism, based on a proletarianised majority, oriented to stable labour, with benefits linked to labour. For the proletariat, the main objective was better, "decent" labour, not escape from labour. The class structure corresponding to that system was relatively easy to describe, with a bourgeoisie – employers, managers and salaried professional employees – confronting a proletariat that between them formed the spine of society."

The Capital System ran into serious difficulties in the early 1970s partly due to problems of the chief imperialist hegemon, the US, in financing the Vietnam War as well as the usual crisis due to over-production. It was necessary to break the link between gold and the dollar established at Bretton Woods. This led to floating currencies and increase in speculation in commodities and even the value of money itself. It was, therefore, necessary to confront the working class with the new realities of an emerging neo-liberal market economy, in place of the social democratic 'Keynesian' settlement. This process was politically-fronted by Thatcher and Reagan who engaged in open class warfare on behalf of Capital, for example, the miner's strike in the UK, and the air-traffic controllers strike in the US. This period from late 1970s to the present also coincide with the emergence of powerful new technologies that threatened to replace many traditional working class skills.

As a consequence of these and other developments the traditional proletariat is now a rapidly diminishing sector of the work force, between 10-20%, and their social security benefits are also

diminishing to help to maintain profits, and ensure there are sufficient funds to bail out the banks when the next crash comes.

The agricultural sector

About 40% of the global workforce is employed in agriculture, that is, 1.3 billion people, the overwhelming majority of whom are small-scale or subsistent farmers. In Africa this figure is about 50% of the work force. [The global figure is, in fact, close to the figure of those in waged work, 1.4 Billion]. These small farmers are being preyed upon by the agribusiness corporations as illustrated by the 'Alliance for Africa' program of promoting such corporations to 'solve' the food security problems. These companies are not only those involved in agribusiness directly, which grow the food, but also those that supply the chemical inputs such as fertilisers, herbicides, pesticides and so on. If the small farmers are driven off their land by agribusiness than two catastrophes will result: a social catastrophe since these farmers and their families will end up in urban slums; an ecological catastrophe since small farmers tend to use ecological methods that protect biodiversity.

A central issue is whether the small-scale farmers, by banding together can resist this onslaught. They are already becoming organised in La Via Campesina with 200 hundred million members. It is also possible to show (see later) that they can produce enough food to feed the world, that is, especially if appropriate solar-powered technology can be made available and their best ecological practices can be enhanced by modern scientific understanding.

The 'Precariat' - marginalised workers in a Globalised economy

In advanced economies there is already a tendency for some sectors of marginalised, insecurely employed workers, the 'precariat', to listen to the siren voices of nationalism, and even, in some cases, of racism, as providing a possible solution to their situation. This is reflected in the popularity of such figures as Trump in the US, Farage in the UK, and Le Pen in France. They tend to see their economic situation as exacerbated by the large scale movement of people, the refugees, from imperialist wars of intervention in the Middle East and North Africa (MENA) as well as farther afield such as in Afghanistan. The free movement of labour principle of the EU, and so-called free-trade policies such as NAFTA have also contributed to this tendency to find solutions through reactionary appeals to nationalism. So the victims of imperialist wars and neoliberal economics are being blamed by some of its other victims, that is, another sector of the precariat.

The structure of the Precariat

According Guy Standing, one of the originators of the concept of the precariat, it can be divided into three categories: [Standing (2015) p7-9]

1. **Ex-proletariat** "The first consists of those dropping out of old working-class communities and families; mostly under-educated, they tend to relate their sense of deprivation and frustration to a lost *past*, real or imagined. They thus listen to reactionary populist voices of the far right and blame the second and even third variety of precariat for their problems.....it is this part of the precariat that is being led to the right and even far-right [Goodwin and Ford (2014)], due in part to

the absence of a progressive agenda that reaches out to it, one that would play on their aspirations rather than on their fears and insecurity.”

2. **Migrants and minorities** “The second variety consists of migrants and minorities, who have a strong sense of relative deprivation by virtue of having no *present*, no home. Politically, they tend to be relatively passive or disengaged, except for occasional days of rage when something that appears to be a direct threat to them sparks collective anger. This is what happened in the slums around Stockholm in early 2013 and in Tottenham in London in August 2011, and in other surges of violence.”
3. **The Higher Educated:** “The third variety consists of the higher educated, who experience in their irregular labour and in the lack of opportunity to construct a narrative for their lives a sense of relative deprivation and status frustration, because they have no sense of *future*. One might call them bohemians, but, as they are the potentially transformative part of the precariat, the new vanguard, they are open to becoming the *progressives*.” This sector of under-employed ex-students has been attracted to Bernie Sanders in the US and the Jeremy Corbyn campaign in UK, as well as Podemos in Spain and SYRIZA in Greece. Many these ex-students are heavily in debt from their student days. For instance, the total indebtedness of students and former students in the US is about \$1.3 trillion.

However, according to Standing [Standing (2015) page 9): “To become a class-for-itself, the precariat must be transformative”. This should, at least, mean that it must develop a radical program for redistribution of wealth created by wage labour.

But [Standing (2015) page 10] “In the global neo-liberal market economy, there is only one winner in that old model of distribution. In every part of the world, the wage share of national income has dropped sharply, and it is most unlikely to rise. While most attention has been given to the drop in the USA and Europe, labour’s share has dropped most in the emerging market giants of China and India.”

As Standing also points out [Standing (2015) page7]

“But in terms of consciousness, we can see why the precariat is the new dangerous class, because it rejects the old mainstream political traditions, rejecting labourism as much as neoliberalism, social democracy as much as Christian democracy. But it is also dangerous in another sense. A short way of saying this is that it is not currently a class-for-itself, because it is at war with itself in having three forms of relative deprivation, each of which characterises the three varieties of precariat that are currently in tension.”

To obtain a more comprehensive account of the precariat and its historical significance one should read Standing’s book “The Precariat: the new dangerous class” [Standing (2014)]

How many workers are in the precariat?

It is very difficult to answer this question with any degree of precision. For instance, many of the precariat work in the ‘shadow’ or ‘black’ economy, especially if they are undocumented immigrants. It will also vary from country to country. For instance in South Korea, an advanced emerging economy, it is estimated that the precariat may be as much as 50% of the workforce, and in Japan a third of workers are in

temporary jobs. In China there are over 200 million internal migrants who have limited rights and often have temporary jobs. According to Standing [Standing (2014) page 41] in many countries “ at least a quarter of the adult population is in the precariat”. Even taking this figure we can note that the precariat is at least double the number of workers in manufacturing in many countries.

The labour movement and the Precariat

It is essential that the traditional organisations of the working class, that is, the trade unions and social democratic parties, do not abandon the precariat to the nationalist and even neo-fascist movements that seek to prey upon them. They must find innovative ways to reach out to them, linking with social movements such as those that deal with hunger (food banks) and poverty, including fuel poverty by promoting, in the latter case, democratic community energy ownership. Most-of-all, they should reject the neo-liberal model and its demand for ‘austerity’ and use public funds to create secure worthwhile jobs as proposed in the UK Green New Deal. The latter document also proposed that technologies for sustainable development should be created and, in the first instance, given freely to developing countries as part of the conversion of the global economy away from a Death Economy to a Life Economy[Perkins (2016)].

By such means the Labour movement can overcome the understandable antagonism of the precariat to the traditional practices of social democratic labourism. These practices overwhelmingly favour those workers who are already in secure employment.

However the emergence of the precariat as a new social formation and the attack on the small farmers by corporate agribusiness must be understood as part of a more general crisis of the Capital system.

The Systemic Crisis of Capital

As Capital attempts to establish a global system of production and trade persisting with its (failed) economic philosophy of neo-liberalism and the increasing domination of finance capital, it has also entered a period of intense multi-faceted socio-economic, political, and environmental crises of which the above problems of small farmers and the ‘precariat’ are a part.

This systemic crisis, which was predicted by Marx, has its origin in the fundamental contradiction between the forces (or means) of production and the social relations of production. The leading edge of the revolutionary developments in the means of production is the binary Digital Systems (bDS) technology. It can revolutionise control of production, distribution and exchange of goods and services. But these technologies also have a dramatic, revolutionary effect on all aspects of human interaction and communication, that is, in the cultural and social spheres. The latter application of bDS is also known as ICT (Information and Communications Technology) but one should also, most importantly, include the digital instrumentation and control of the production processes themselves, hence the choice of the term ‘bDS’ as a more general descriptor for both aspects of this technology.

We will now give a brief account of significance of bDS within the history of the capital system.

Stages in the development of the Capital System

Mercantile stage

During the first stage of capital system, mercantilism, based on slave labour on plantations, the key technologies were in the field of communication, that is, printing and navigation, and new monetary (value information) systems. Navigation, especially, required Newton's mechanics and his theory of gravity to understand and predict the motion of planets. Newton was also in charge of the Royal Mint for producing coinage. [see "The social and economic roots of Newton's Principia" - by Boris Hessen (1930)]. But the key technology was printing, which allowed the rapid dissemination of information about markets, improvements in methods of production, and new scientific discoveries. The latter helped to undermine the grip of religion on the minds of the masses. The mass production of commodities by slave labour meant that they could not be processed by cottage industries and so, therefore, it acted as a driver for the emergence of the industrial phase of capitalism. [Inikori (1987)]

The Industrial stage

This phase was dominated by control technologies, that is, the controlled release of energy from nature so as, in the first instance, to vastly increase the productivity of labour. That meant initially the use of water power and then, most importantly, steam power. This latter source of energy allowed factories to be built in any location and operated at any time of the day. The new steam power also helped to increase the speed of circulation of goods, for example, using railways and steam ships.

The mechanical steam era was followed by the era of electromagnetic energy systems that was developed in the 19th Century after the advent of steam. It should be noted, however, that even to this day most electrical energy, except for renewable solar energy, is generated using steam or gas turbines driven by nuclear or fossil fuel sources of energy. Electromagnetism had implications for both the distribution of energy for production and transport as well as communication (telegraph, telephone radio and television). It was also important for understanding the forces that held matter together and thus led to possibility of transforming matter into more useful forms, that is, the science of industrial chemistry and related disciplines.

The arrival of binary Digital Systems (bDS) technologies - a synthesis of communications and control technology

It was electromagnetism that developed into electronics, which then developed into micro-and now nano-scale electronic devices in the past few decades. These devices produced a quantitative-to-qualitative shift in information and data processing power due to creation of massively integrated electronic systems with billions of transistors on a single piece of silicon. The latter made possible the present powerful multi-core microprocessors that are in most personal computers - the bDS technology in all its applications had arrived. We can also view bDS technology as the final synthesis of the communication and control technologies associated with the two stages of the development of the Capital system. It revolutionises both human communications and also the control of production systems.

The role of bDS technology under the Capital System

There are a number of negative or potentially negative applications of bDS technology under Capital

Displacement of jobs due to increased automation

Under the rule of capital bDS has been used to displace jobs in manufacturing into service jobs, especially, into information processing, which, in turn, is, itself, being increasingly automated with the growth of artificial intelligence software. Hence, we have another contribution to the emergence of a 'precariat'.

Increase in financialisation and speculation

It has also led to 'financialisation' of the world economy, that is, a break between finance capital and productive capital. The price of useful commodities such as houses, foodstuffs, energy, and money itself become the object of speculative gambling with the creation of so-called derivatives - kind of betting slips on future prices, which are traded as commodities in themselves, commodifying the future, as it were. The total value of the derivatives market is now said to be \$1000 trillion, which is threatening the stability of large banks such as RBS and Deutsche Bank. Automatic trading computer algorithms 'play' the market making fortunes in a few milliseconds. Thus, under the Capital System its revolutionary technology can be used for wholly parasitic activities.

Use for propaganda, computer games, and promoting the spectacle

The capitalist media monopolies also take advantage of the ICT branch of bDS to increase their rate of output of a steady diet of lies and misinformation, about the state of the world and spread propaganda that 'there is no alternative' (TINA) to the present sick and decaying system of Capital [McMurtry (2015)]. A whole subculture of computer games has been developed which condition youth in the pathologies of war, and infantile, nonsensical 'adventure' fantasies. According to the Situationist, Guy Debord, a characteristic feature of late capitalism is its promotion of the spectacle [Debord (1995)]. Thus bDS, in its ICT form, increases the possibility of the generation and promotion of spectacle, no longer in an arena, but on TV in the living room, which diverts the attention of the masses from solving their real problems, an example of course being the recent Olympic Games. In the latter case the comradeship of supposed rivals on occasions can be seen to shine through despite attempts by the promoters to encourage nationalist triumphalism

The bDS technology and the social relations of Capital

But the Capital system brings with it the social relations of capital such as the class system, vast inequalities of wealth, competitive individualism, the various forms of alienation of the worker from her/his product, alienation of atomised individual relationships and the alienation from nature itself. All militate against the realisation the power of these technologies to transform the world, to link together the producers of the necessities of life and of culture in bonds of mutuality, cooperation, and equality in, say, a cooperative, pluralist commonwealth [Alperovitz (2007)]. They also prevent the development of a more harmonious relationship with the rest of nature since that will interfere with profit maximisation

A key issue for the survival of our species is the need to develop renewable, non-polluting energy. The issue of energy is a fundamental part of the systemic crisis of Capital.

The present energy system under Capital, and future energy systems

One aspect of the environmental crisis is that the capital production and circulation system is heavily dependent on the use of energy derived from fossil fuels which, with its emission of greenhouse gases such as carbon dioxide, threatens to completely destabilise the climate system leading to a real possibility of runaway global warming. Such are the vast amounts of capital invested in, and profits made from fossil fuel (coal, oil, and gas) that the Capital system resists the abandonment this dangerous source of energy for clean renewable energy largely from the Sun, directly or indirectly. But solar technologies are also part of the revolutionary developments of the means of production mentioned above. The same material that dominates bDS technology, silicon, is also that used to fabricate solar cells, at present. They are capable within a few decades of replacing the fossil fuel system (FFS) and stabilising the planetary atmosphere. It is worth noting that at least 10,000 times more energy falls on the earth from the Sun everyday than we need. Thus we need only capture 0.01 % of this solar energy. The FFS also contributes to other aspects of the environmental crisis produced by the Capital system namely the poisoning of the land, air and water with pesticide and herbicides derived from FFS. The acidification of oceans leading to dead zones is also a consequence of the carbon dioxide emitted from the burning of fossil Fuel.

The Military-Industrial-Security Complexes

Another aspect of the systemic crisis of Capital is the vast waste of resources on its military-Industrial-Security Complexes [MISC]. For instance, in the US about a million people are employed in the Homeland Security business. The so-called threat of terrorism is used justify this grotesque waste of resources. This is especially ironic when one realises the same US government has armed and financed, through its proxy regimes, the same Al Qaeda jihadi terrorists to help illegally overthrow the internationally accepted governments in Afghanistan, Libya, and now Syria. The threat of annihilation by nuclear war remains even today, after the end of the Cold War, an increasing threat. The US Government will spend more than \$trillion upgrading its nuclear weapons system and, in the UK, an upgrade of its Trident missile system will cost £200+Bn during its lifetime. The recent provocation of Russian and China by imperialism, such as the NATO exercises in the Baltic States, the fascist-led coup d'état in Ukraine, reflect the interests of the MISC section of Capital. There is also the US so-called pivot to Asia challenging, inter alia, China's right to guard its coastal waters and surrounding it with military bases.

We need to recognise that a fraction of the skilled working class support MISC since their jobs and thus pensions depend on it. But it can be argued, convincingly, that many more jobs will be created if the economy is switched from the Death Economy to the Life Economy [John Perkins (2016)] that is, to make products that help create a healthy humanity and a stable environment.

The Food and water system under Capital

We live in a world where over 1 billion people go to bed hungry every night and nearly half the world population live on \$2 dollar's day or less. In recent years, erratic weather behaviour patterns means that the work done by agencies to improve the lot of the poor in some regions has been undone due to extremes of either drought or flooding. The people in the regions of Africa and South East Asia hardest hit are the least able to defend themselves against these occurrences because of the poor conditions in which they find themselves with few possessions. At the same time, up to a third of the food used by the well-fed and, often, obese and diseased population in the 'North' is thrown away and wasted. Clearly in

view of such immediate chaos there is need for a food security plan to be implemented. There is also a need to stabilize these extremes of weather – which, 97% of climate scientists claim, is being driven by the emissions from burning fossil fuels. Policy makers must cultivate a model for food security that will eradicate this poverty and build a sustainable low or, preferably, zero fossil fuel future that reduces CO₂ emissions, stabilise the climate and meet the nutritional needs of all sisters and brothers, the animal kingdom and of the earth which is our common home.

The food and water system on the planet is also part of the systemic crisis of Capital. The organic food produced by small farmer agro-ecology is being replaced by processed food produced by companies closely linked to agribusiness. This mass-produced food also contains poisons derived from the use of herbicides and pesticides that cause many health issues. One example is the continued and increasing use of the herbicide Glyphosate (also known as 'Roundup') which is probably a carcinogen according to WHO. Agribusiness also contributes to climate destabilisation through its use of heavy machinery fuelled by the FSS, the emission of other potent greenhouse gases such as methane and nitrous oxide. It is estimated that Agribusiness is responsible for about 20-30% of Greenhouse Gas emissions. It also causes and the large-scale loss of biodiversity that would otherwise be protected by the agroecological methods of small farmers. In fact we are living through a period of the sixth species mass extinction comparable to some of the most destructive mass extinction of the past. But, uniquely this mass extinction has been caused by one of nature's species itself, namely, Homo sapiens.

The Capital system's abuse of planetary water is now reaching a critical state: Beijing has sucked so much water out of the ground so that the city is sinking 11 centimetres a year whereas parts of California's Central Valley are sinking at an alarming 5 centimetres per month. In Connecticut the nuclear power plants have had to close down through lack of cooling water and in India coal-powered plants have closed due to drought. Some water experts predict that in the not-too-distant future one could see entire cities abandoned as casualties of drought. The root of this water apocalypse is the "use once and throw away" which maximises profits for water companies.

It is therefore necessary to replace the food and water system promoted by corporate agribusiness for profit by one based on a sustainable methods of agriculture and water management, that protect biodiversity, and do not poison the earth and its inhabitants. In short, agroecological methods must replace agribusiness. But it will also mean that these methods must also use sustainable energy inputs, that is, the clean renewable energy of solar power, to increase their productivity in order to feed the world.

Agroecology versus Agribusiness

Using Global Justice Now [GJN] report '**From the roots up**' [GJN (2015)] and other sources, we will explore whether agroecology is capable of delivering the robust system required to transform to a sustainable low carbon food economy and away from the present dominant fossil fuel-led agribusiness that has caused so much uncertainty for food security.

What is 'Agribusiness and is it the answer to the food security problem?

It is the approach to farming that uses industrial methods both for crop and animal husbandry. It was developed initially in US but has spread to most of the developed world. There is now an active program to bring such techniques to Africa, allegedly as the way to deliver food security. This is part of the program called 'Alliance for Africa' and is supported by the Bill and Melinda Gates Foundation and many corporations associated with agribusiness such as Monsanto and Syngenta. [Econexus (2013), Feed the Future (2014)]

Allegedly to satisfy increased demand of the last half century, farming has evolved from family farms into an industrial operation business that is characterized by high external inputs of finance, technology and synthetic non-organic chemicals. Animals are corralled into close density areas and their feeding requires vast acreages to grow crops. These crops in turn require industrial scale inputs of fertilizers, herbicides and pesticides to produce vast monocultures usually of maize, rice or soy. The necessity for yearly inputs, such as seeds that are genetically modified hybrids (GM), herbicides and pesticides, high fossil fuel-based mechanization and water, need systems that are now supplied by a few giant transnational corporations like Monsanto, Dow, Bayer, Dupont [Figure 4 Appendix B]. The purpose was said to be able to provide abundant, cheaper food on the shelves to citizens in the US and elsewhere.

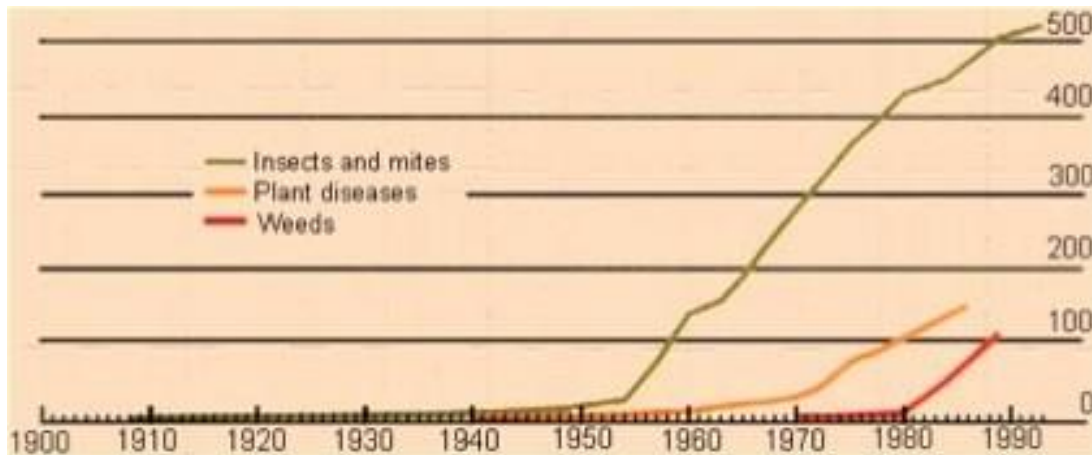
As a result of this industrial production of food for profit by 2050, crop demand for human consumption and animal feed will increase by at least 100 percent. At the same time, more resource constraints will emerge: for example, 40 percent of water demand in 2030 is unlikely to be met. Already, more than 20 percent of arable land is degraded- because of this industrial farming and its reliance on synthetic fertilisers and pesticides. Food and bioenergy production are competing with each other, as corn and sugar are increasingly important for both. [reference2] According to McKinsey analysis [McKinsey (2015)] since 2004, global investments in the food-and-agribusiness sector have grown threefold, to more than \$100 billion in 2013.

According to the Environmental Protection Agency (EPA), "Animal Feeding Operations" (AFO) "congregate animals, feed, manure, dead animals, and production operations on a small land area." AFOs confine animals for at least 45 days in a 12-month period with no grass or other vegetation in the area during normal growing season. Animals in AFOs are fed unnatural diets on-site, instead of allowing them to roam and graze. (U.S. Environmental Protection Agency). Monocultures of corn maize, wheat and soy, require intensive use of fertilizers to provide nutrients and pesticides to keep insects and disease under control, since through planting only one species over a large area, pests are naturally attracted. These fields are mechanically planted, weeded, and harvested. [NASA (2002)]

It is estimated that 80% of the world's 1500million hectares of arable land is now covered with monoculture crops which account for over a 25-30% of greenhouse gas (GHG) emissions and is highly dependent on dwindling fossil fuels and water. Additionally, the erratic weather patterns means a near constant crisis to get to save the harvest [Altieri (2011)]. Globally, according to the UN Food and Agricultural Organisation of UN (FAO), 181.5 million hectares was planted with GM crops in 2014, as stated by the ISAAA (International Service for the Acquisition of Agri-Biotech Applications), only make up roughly 3.7% of the total agricultural area and 12.9% of arable land. Half of the global GM crop area is located in developing countries, (www.ncbi.nlm.nih.gov)

The monopolisation of the global agribusiness industry is shown in the figure 4 [Howard (2013)]. A very few giant corporations dominate the seed, chemical inputs, making very large profits (Monsanto- \$2.5bn; Syngenta- \$1.6bn)

Luxury crops for export take over from sustainable local farming with the necessity of ploughing 2.6 million tons of pesticides into the soil worldwide yearly. US alone consumed 324million Kg of 600 different types of pesticides are used annually impacting negatively the flora and fauna of the region. Now the social costs of human poisoning is added 540 species of arthropods that have developed resistance to 1000 different types of pesticides. as shown below [Altieri,(2011)]:

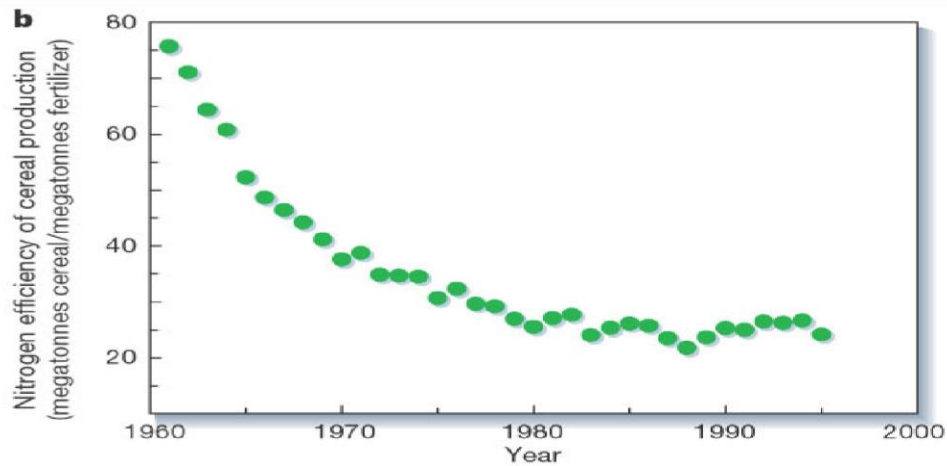


The above diagram shows the growth in resistance to the chemical pest controllers with the vertical axis showing the number of species that have become resistant.

Agribusiness, contrary to the neoliberal economic philosophy, is heavily subsidised. In the US this amounts to \$US 1 billion per day. This figure is six times the annual development assistance from Northern countries to the global South. In the European Union over the 40% of the value of agricultural production comes from subsidies. Despite the US being a pioneer of agribusiness methods one in six children and 12% of the US population go hungry each month. Often people are too poor to buy the food that is available. “We’re seeing more people hungry and at greater numbers than before,” said World Hunger Program’s executive director Josette Sheeran. “There is food on the shelves but people are priced out of the market.” This food crisis has produced popular rebellions that quickly spread across the globe and took place not in areas where war or displacement made food unavailable, but where available food was too expensive for the poor.

Global commodification of food production by big agribusinesses has a direct negative hit on small holding farmers throughout the world. It leads to their destruction, pushed off their land and increase of hungry mouths to feed according to ‘Hungry for Profit’ [Madoff et al(2001)] At the same time an opportunistic land grab is created for the relatively few agri-corporations, controlling global food production growing the monocultures. These monocultures replace the biodiversity offered by the local people.

Rather than solving the food security problem the corporate agribusiness has made it worse. As Altieri shows convincingly [Altieri (2011)] as the intense fertilizer cocktail is applied year after year the yield from the crop diminishes, as shown in the diagram below:

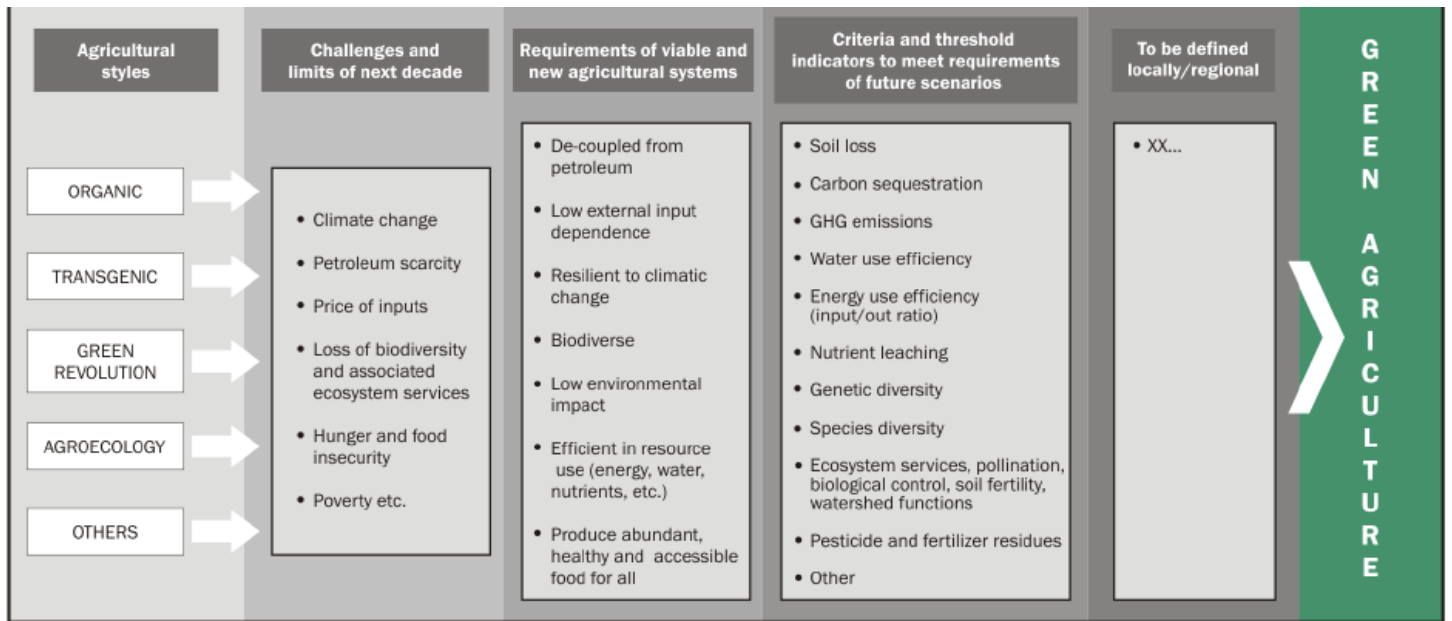


What is agroecology and is it the answer?

Agroecology is the system that encourages a community to work in a holistic way using all the local resources like knowledge, soil, seeds, water, labour, appropriate technology mechanisms and energy inputs that are sourced from within the community by working with natural processes. It builds on reducing dependency on external inputs or influences. This results in the small farm/ holding becoming more resilient to external shock like floods or droughts. It encourages self-reliance and food sovereignty.

Can the agroecology system meet the requirement of a robust new system required for a future sustainable food system for the planet with its demands? This question must be answered in the affirmative if the precariat worker-small farmer alliance proposed in this paper is to have any significance and a future. As we shall see below there is plenty of evidence that supports this affirmative answer.

But a key question for a future agroecology is the issue of sovereignty and resiliency- that the agroecological food production is completely under control of the community of the producers . Kookhanfkan [Kookhanfkan (2014)] has summarised the requirements of viable and durable agricultural system for the challenges of the 21st century in the following table:



The basic requirements of a viable and durable agricultural system capable of confronting the challenges of the 21st century while carrying out its productive goals within certain thresholds established locally or regionally (Koohafkan et al 2011)

It is easy to show that of all the agricultural 'styles' shown in the left-hand column only solar-powered agroecology meets the requirements for a viable new agricultural system to replace the failing and unsustainable agribusiness system (centre column).

Agroecology greatly reduces the requirement for fossil fuel usage on the small farms. It depends on low external inputs because seeds, fertilizers and pesticides are not required to be purchased as a package on a yearly basis. It has a beneficial impact on the environment as it works with nature and does not destroy species as happens when agribusiness uses pesticides that destroy flora and fauna and contaminate the soil. There is no need for artificial nitrogen or other fertiliser as either an appropriate legume, tree or shrub, or organic compost can be applied as necessary. It is not 'One Size Fits All' approach as with the industrial agribusiness. It is very water efficient and composting, mulching, compost pot holing or even edge-tilling is chosen according to the soil/ environment requirement, so that it takes into consideration the soil, the environment, the altitude, and the wind cover.

From the present usage in diverse environments the yields are comparable if not better than the conventional production (see table below). Agroecology outstrips the conventional delivery of a locally diverse crop, in many cases bred- nearly tailor-made by the user and the agroecologist to meet the micro environment in which it will be planted. The result is a greater variety of cereals, other staples, vegetables, trees, shrubs and fruit that will improve the diet of the locals and lead to improved health of the community.

What makes agroecology an appropriate twenty first sustainable global system for delivering suitable nourishing food no matter the location on the earth is that it is that inputs to it are in the control of local, diverse, communities who are best suited to share local knowledge with applied food scientists that ensures delivery of local food firstly to meet local needs. The surpluses can then be marketed. Agroecology has the huge variety of techniques that are all based on a low-input sustainable approach to farming. Despite the lack of resources and funding for research into agroecology, the evidence that is

available shows unequivocally that agroecology must be taken seriously. This evidence shows that agroecology leads to not only food sovereignty but also energy and technological sovereignty [Altieri (2011)] as an all-encompassing system of community control and efficiently using all local resources as behind it lies the democratic political will of the whole community it is serving.

We can see from the following table agroecology produces greater yields than conventional production methods [Altieri (2011)]

Global comparison of yields of organic versus conventional production using an average yield ratio (organic: non-organic). **1,0**: org.=conventional < **1,0**: conventional higher than organic. >**1,0**: organic higher than

Food category	(A) World			(B) Developed countries			(C) Developing countries		
	N	Av.	S.E.	N	Av.	S.E.	N	Av.	S.E.
Grain products	171	1.312	0.06	69	0.928	0.02	102	1.573	0.09
Starchy roots	25	1.686	0.27	14	0.891	0.04	11	2.697	0.46
Sugars and sweeteners	2	1.005	0.02	2	1.005	0.02			
Legumes (pulses)	9	1.522	0.55	7	0.816	0.07	2	3.995	1.68
Oil crops and veg. oils	15	1.078	0.07	13	0.991	0.05	2	1.645	0.00
Vegetables	37	1.064	0.10	31	0.876	0.03	6	2.038	0.44
Fruits, excl. wine	7	2.080	0.43	2	0.955	0.04	5	2.530	0.46
All plant foods	266	1.325	0.05	138	0.914	0.02	128	1.736	0.09
Meat and offal	8	0.988	0.03	8	0.988	0.03			
Milk, excl. butter	18	1.434	0.24	13	0.949	0.04	5	2.694	0.57
Eggs	1	1.060		1	1.060				
All animal foods	27	1.288	0.16	22	0.968	0.02	5	2.694	0.57
All plant and animal foods	293	1.321	0.05	160	0.922	0.01	133	1.802	0.09

The scaling up of agroecology: spreading the hope for food sovereignty and resiliency

For the world as a whole organic agroecology always, with one exception, produces more yield than conventional methods (left-hand shaded column). In developing countries the yield ratios always favour organic agroecology over conventional farming methods. Only in developed countries are the yields approximately equal.

Altieri's evidence presented above indicates the extent that the organic (agroecological) production is every bit as, and most often, even more efficient than the agribusiness production— but without the strain on earth resources. The Food Sovereignty movement is already engaging with a food production model of living sustainably, changing lives and giving new life to rural communities

Agroecology also leads to better opportunities for women, increased income, employment, agricultural biodiversity, health and nutrition, as well as helping to mitigate the impacts of climate change. (See Appendix for several examples from Africa)

Around the world agroecological techniques, ranging from community seed banks, water harvesting and applying compost, are helping small-scale farmers across Africa, Latin America and Asia resources sustainably and reduce the need for expensive and unsustainable inputs.

Presently, those controlled through inequality and thus poverty, through the existing conventional commercial industrial farm system of food production and delivery, have awoken from their pain and are fighting back in such organisations such as La Via Campesina [Via Campesina(2013)] with over 200 million members from the marginalized rural workers and peasant organisations, pastoralists, fisher folk, indigenous peoples, women and civil society groups have formed a growing movement for food sovereignty which allows communities control over the way food is produced, traded and consumed.

The HE (Hyper-Expansionist) agri-capitalist system, acts like a death/debt row system – delivering death and debt to people, death to bio-diversity, death to soil, death to water-systems, death of clean air, death of the commons -the common resources, on which nature has placed no price.

In place of this HE system we can support a SHE (Sane, Humane, Ecological) [Robertson (1990)] system for planetary food production, that is, through Agroecology. We can now summarise its benefits:

- **Better ways of growing food:** The adoption of sustainable crop-growing systems, ranging from agroforestry, conservation agriculture, home gardens and the ‘system of crop intensification’, are helping farmers increase their yields and reduce their impact on the environment
- **Reducing the gender gap:** Agroecology helps to put women in a stronger economic and social position through, for example, Farmer Managed Natural Regeneration.
- **Addressing climate change:** The Intergovernmental Panel on Climate Change has said that agroecological practices can help with the impacts of climate change and reduce the 25-30% greenhouse gas emissions that agribusiness contributes.
- **Increasing employment and income:**
Many case studies show that agroecology provides decent jobs and a way out of poverty. For example, farmers in Kenya using push-pull technology were able to earn three times more income than farmers using chemical pesticides.
- **Increasing agricultural biodiversity:** Organic farming systems can have up to 30 times more species on them than conventional farms and crop diversity can help farmers adapt to changes in heat, drought, pests and low soil fertility.
- **Improving health and nutrition:** For example, the Soils, Food and Healthy Communities Project, a participatory agriculture and nutrition program in northern Malawi, was able to improve child health, crop diversity and food security by using sustainable agriculture techniques combined with education.

Many inspiring examples of agroecology programs can be found in Africa. These are discussed in my organisation, Global Justice Now Report “From the Roots Up” [GJN (2015)]. A summary of some of these case studies can be found in Appendix A. South Africa is also playing a leading role in the African agroecology movement through the work, inter alia, of the African Centre for Biosafety, for example, in their discussion document: “Agroecology in South Africa: policy and practice”

We close this section with a remark of Olivier de Schutter, **United Nations Special Rapporteur on the right to food, 2008– 2014:** “As a way to improve the resilience and sustainability of food systems, agroecology is now supported by an increasingly wide range of experts within the scientific community, and by international agencies and organizations, such as the United Nations Food and Agriculture Organization (FAO), UNEP and Bioversity International.” [UN(2010)]

Agroecology and Solar Power.

If agribusiness is to be replaced by agroecological production there will, eventually, be a need to increase the productivity of these agroecological producers. That will mean the need to develop solar-based appropriate scale technology, for instance, small tractors that run on solar-derived hydrogen, solar-powered water pumps for obtaining water from depth for irrigation and drinking. The rapid development of these technologies would be part of the Worker-Farmer Alliance. In the first instance the precariat workers can be employed in the mass production of such technologies which can be developed in

collaboration with universities and research centres. For instance, the North West of England has eight universities and several government-funded research labs, some associated with the nuclear industry. There were very large sums of money made available for the development of nuclear weapons and nuclear power shortly after the Second World War, that is, billions of pounds in today's money, when the UK was deeply in debt due to the cost of the war. It would require a fraction of such amounts of money to be made available to develop solar-based agricultural technology for small farmers to make a large difference to their productivity in a short time. Given the depth of the environmental crisis one must think in terms of such bold plans of an international nature.

For the educated sector of the precariat the possibility of obtaining meaningful secure employment by helping to solve the human and environmental problems must be very attractive. The educated sector, as they develop a transformative consciousness, can also share their understanding and influence with the other sectors of the precariat, helping then to understand the need for these green technologies to halt the death spiral to a dead planet. They can also explain the many possibilities of job creation in the production of the new green technologies for sustainable development. Thus, all sectors of the precariat can begin to act in a united way and become a class-for-itself. It can reach out to those who are tempted by backward nationalist so-called 'solutions' by pointing out that it is the international character of a worker-farmer alliance that is the source of its strength and significance.

Solar energy, bDS, and living systems

We can view the emergence of a production system based on solar energy combined with bDS as having similarities to living systems themselves. Living systems derive all their energy from the sun through the photosynthesis of plants. Photosynthesis, the method of trapping solar energy and storing it initially as carbohydrates, is based on subtle quantum processes similar to the quantum processes in solid state photo-cells. They, therefore, both depend on solar energy and both are controlled by digital coding systems. For living systems this is the quaternary digital system of the molecular genetic code (qDS). Both systems have digital-to-analogue converters (DACs) to convert digital information into analogue forms and functions. For instance the DVDs and MP3 players convert the binary digital data into analogue images and sounds respectively with such devices. For living systems the DACs are the many thousands of ribosomes in each cell that convert the RNA digital code into analogue proteins that create continuously variable shapes and functions in living systems.

Again a large number of solar-powered small producers sharing knowledge encoded in digital form is much closer to nature's own system. Living systems also can share knowledge or information through exchange of genes, hormones, using intermediaries such as fungi, although, of course, with a much smaller 'bandwidth'. Higher level species also communicate using sound and physical gestures.

The production of food through agro-ecology assisted by solar power and bDS, has to be based on intimate understanding of nature and be able to access that knowledge readily. The indigenous knowledge can also be enhanced by modern scientific understanding of plant breeding, soil science, etc. The Solar-bDS allows the food production to be sensitive to the ecological balance by transmitting data from digitised sensors about the condition of the air, water and soil and thus enhance indigenous knowledge. The same bDS sensor technologies can also monitor the effects of other aspects of the total global production system on the planetary living systems.

The use of bDS for Global Enlightenment and the socialisation of production under post-capitalism

But it is this two-fold character of these technological developments that also creates the possibility of the transformation of both the means of production and the social relations of production. On the one hand it allows a fine control of production processes and the elimination of much tedious work. But it also provides the possibility of overcoming the alienation of the worker under the Capital system. On the other hand it allows for a transformation of human culture making accessible all human knowledge and artistic achievements to everyone, anywhere on the planet. It also makes possible a science-based Global Enlightenment of the overwhelming majority rather a social elite as happened with the 18C Enlightenment [Hookes (2015)] They also allow us to monitor the effects of production systems on nature so that a new eco-equilibrium relationship can be established as part of the transformation of the socio-economic system. Fundamentally, these developments point to the need for the complete socialisation of the global production system, and its necessary corollary, the ending of the chaotic, thoughtless, never-ending profit-seeking, growth-for-growth's sake of the present system of private capital. The latter is the cause of the socio-economic and environmental crises. If the capital system continues its present trajectory then the possibility of becoming a dead planet through environmental and climate collapse and/or nuclear war is very real.

Solar-powered shipping containers for agroecological farmers

One possibility for making solar energy available to rural or even urban communities is the solar-powered shipping container. An example of this concept is shown in figure 1 (Appendix B). The shipping container not only acts as a secure storage for the solar panels in transit or in stormy weather it can also be used for multiple purposes: (1) A water-pumping station (2) a medical facility and cool-room (3) Internet-linked school room (4) An agroecology laboratory (5) an hydrogen production facility for driving farm machinery (6) A civilian drone charging station. There are several companies in Germany and one in the UK are beginning to manufacture such solar containers. The bDS technology also allows the construction of new educational equipment for spreading fundamental scientific understanding as part of a global enlightenment. Such computer-interactive equipment can help to overcome barriers to cognition and understanding as illustrated by the Physics-is-Fun workstation [Hookes (1997)]. Solar-container classrooms can be equipped with such technology.

Financing the International Worker-Farmer Alliance

Since one of the central purposes of this alliance is to combat or mitigate climate change it can expect to be supported by funds that have been set aside for such purposes by international climate meetings. For instance the Copenhagen Accord at the Conference of Parties to the *United Nations Framework Convention on Climate Change [UNFCCC]* in December 2009, agreed to make \$100Bn available per annum to mitigate and adapt to climate change for developing countries. This was confirmed at the subsequent Durban meeting (2011) and recently in Paris. Although most of this money is likely to end up in the pockets of large corporations it can be demanded that some be used to make solar energy available to small-farmer communities to increase their productivity and avoid the fossil fuel route taken by leading capitalist economies. As mentioned earlier there appears almost unlimited funds available to the various aspects of the Death economy such as nuclear technology and MISC, and massive subsidies for FFS. It can be argued convincingly that if a country has policy of converting part of its Death economy to a Life economy, that is, by investing the money instead in solar technology for sustainable development, then this can be considered as a form of defence. This will mean that a country will gain a large number of

friends who will come to its support if it were ever threatened by another country. This would avoid the need to resort to nuclear weapons that is, to 'defend' oneself by destroying oneself in a nuclear exchange. Ironically, the present leader of the UK Labour Party who said he would not press the nuclear button, was immediately labelled 'a threat to national security'.

Of course, one may expect that corporate elites will resist such a radical solution to the problems of the precariat and small farmers. In fact they actually would like to increase the number in the Precariat thus increasing the pool of cheap labour and thus driving down labour costs. There are also political gains for maintaining the precariat since some sections can be made to support reactionary nationalist politics thus preventing maximum unity of the working class in the struggle against the common enemy, that is the international system of Capital.

It is important to view the choice facing our species, Homo sapiens in the broadest possible terms. One approach is to pose it in terms of paradigm shift in philosophical and scientific outlook

The need for a Paradigm Shift: from the Cartesian- Newtonian Era of the Capital system to the Marx-Einstein (Quantum-Digital) Era.

The core philosophical and scientific outlook of bourgeois society is based on the dualist philosophy of Rene Descartes combined with the science of Newtonian mechanics. According to Descartes conscious thought was completely separate from material world which obeyed its own mechanical laws. Individuals in society can be treated as Newtonian particles interacting with each other in a mechanistic way. Although many philosophers refined this dualist philosophy it is to Marx we owe a decisive break from this view. He showed that conscious thought is a social product, arising out of the need for our species to act together in increasingly complex social organisations. He used the dialectical method of Hegel's logic to analyse the true character of the capital economic system showing that labour and value have both a local character (concrete labour and use value) and a non-local character (abstract labour and universal exchange value)

Einstein, in many ways the true originator of quantum physics, showed that the latter implied that there are local and non-local aspects to quantum interactions, as opposed to Newtonian purely local mechanistic interactions. Although Einstein eventually refused to accept this aspect of quantum physics that he had himself discovered, non-local quantum effects, called quantum entanglement, have been shown experimentally to exist. It may well be the basis of future computers very much more powerful than present ones. Einstein was also the first to show that quantum theory was necessary to explain the photoelectric effect and thus can be considered the father of solar electricity and the coming solar revolution.

The two 'paradigms' can be illustrated by simple graphs shown in figure 2 and figure 3 (Appendix B). The Cartesian-Newtonian paradigm is shown as a rooted tree graph in figure 2 and the Marx-Einstein 'Quantum- digital' paradigm as a nested cyclic graph in figure 3. In the latter all nodes are connected to each other since the graph is a topological folding of a circle, that is, they are non-locally connected, but at the same time they are locally connected within sub-cycles. The graph in figure 3 is borrowed from a graphical representation of the structure of Hegel's logic by the Polish mathematician, Sinowiecki. [Sinowiecki (1973)]. For a more detailed discussion of the significance of these graphical representations see Hooke (2007).

Conclusions:

In this present epoch of the globalising of the system of Capital it is possible to form an alliance between two groups of the oppressed and exploited, the workers in advanced and emerging capitalist countries that constitute the Precariat and the small farmers of the developing world. Both have an insecure present and an uncertain future. This alliance can be inspired by a desire for stable, secure employment for both groups with maximum amount of leisure to pursue cultural and educational activities. The key technologies that can effectuate this alliance are solar energy and binary Digital Systems. Already the small farmers are organising, using the internet in a global alliance called Via Campesina with several hundred million members.

The task now is to start a parallel movement within the precariat. This is a task of the International Labour Movement, through its trade unions and the political parties allied to it. This will establish, in practice, not in propaganda leaflets, the universal character of labour. This international alliance can be an important component of a radical transformation of the global socio-economic system, into one that is non-

exploitive of human-kind and which works in maximum possible harmony with all other natural species. It will also make possible the spread of a scientific understanding of nature and human society, leading to the possible development of a science-based global enlightenment

Precariat workers and small farmers of all lands unite! You have
nothing to lose but your insecurity!
You have a planet to save!

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APPENDIX A

Agroecology in action in Africa

Some case studies used in ‘From the roots up’ report by Global Justice Now[GJN(2015)]

(The references are from in the original report and numbered as such)

Ghana: “For years, the government provided free chemicals and fertilizers to farmers as part of the Green Revolution strategy. Now, we see that this has led to serious land degradation. The farm lands are in a terrible state and do not produce enough food to feed the families. This has led me and fellow women farmers to begin to sensitise other women about the effects of pesticides..... We see the promotion of healthy, traditional crops as a step towards food sovereignty for rural women in northern Ghana ”. Patricia Dianon [59]

ETHIOPIA: a great example of using agroecological methods to increase crop yields and restore soil quality is the work carried out by the Ethiopian Institute for Sustainable Development (ISD) in the Tigray Region of northern Ethiopia. In 1995, the ISD, in collaboration with a group of farming communities, trained farmers to produce compost and apply it to their crops instead of using chemical fertilisers. The results were immediately positive. Yields from composted crops were higher than crops which had received chemical fertiliser..... [61]

Malawi, Gliricidia trees, which improve soil fertility, have increased maize yields five-fold in good years, and almost four-fold in average years. This has led farmers to describe these trees as a “fertilizer factory on the farm” [69]**
Ethiopia,....Growing with agroecological methods rather than chemical fertilisers can also be more profitable. In the Ejere locality of the Addaa region, a study carried out during the 1998–99 production season showed that growing low-input varieties of wheat with crop rotation (using legumes) was actually more cost- effective and profitable than growing modern varieties which required chemical fertilisers. [72]

Burkina Faso, Mali and Niger,: Integrated pest management (IPM) is an agroecological technique with a long history which involves using a combination of biological controls (natural predators for pests), modified farming techniques (modifying irrigation practices), and mechanical controls (using physical traps or barriers for pests), to help manage pests and reduce the use of pesticides – which are only used as a last resort. In a number of farming projects across Burkina Faso, Mali and Niger, a parasitic wasp has been successfully used to help control a pest that damages millet.

[78]

Senegal: farmers using IPM produced 25% more rice than conventional farmers with an increase in income of almost US\$400 per hectare. A survey of 80 vegetable growers who had received IPM training showed that 92% of them had reduced their use of pesticides by an average of 3.2 litres per hectare helping them to save US\$60 per hectare in production costs. [80]

** [69] Missing from the indices in original report : Evergreen Agriculture: The use of fertilizer trees in maize production in Malawi. <http://teca.fao.org/read/7847>

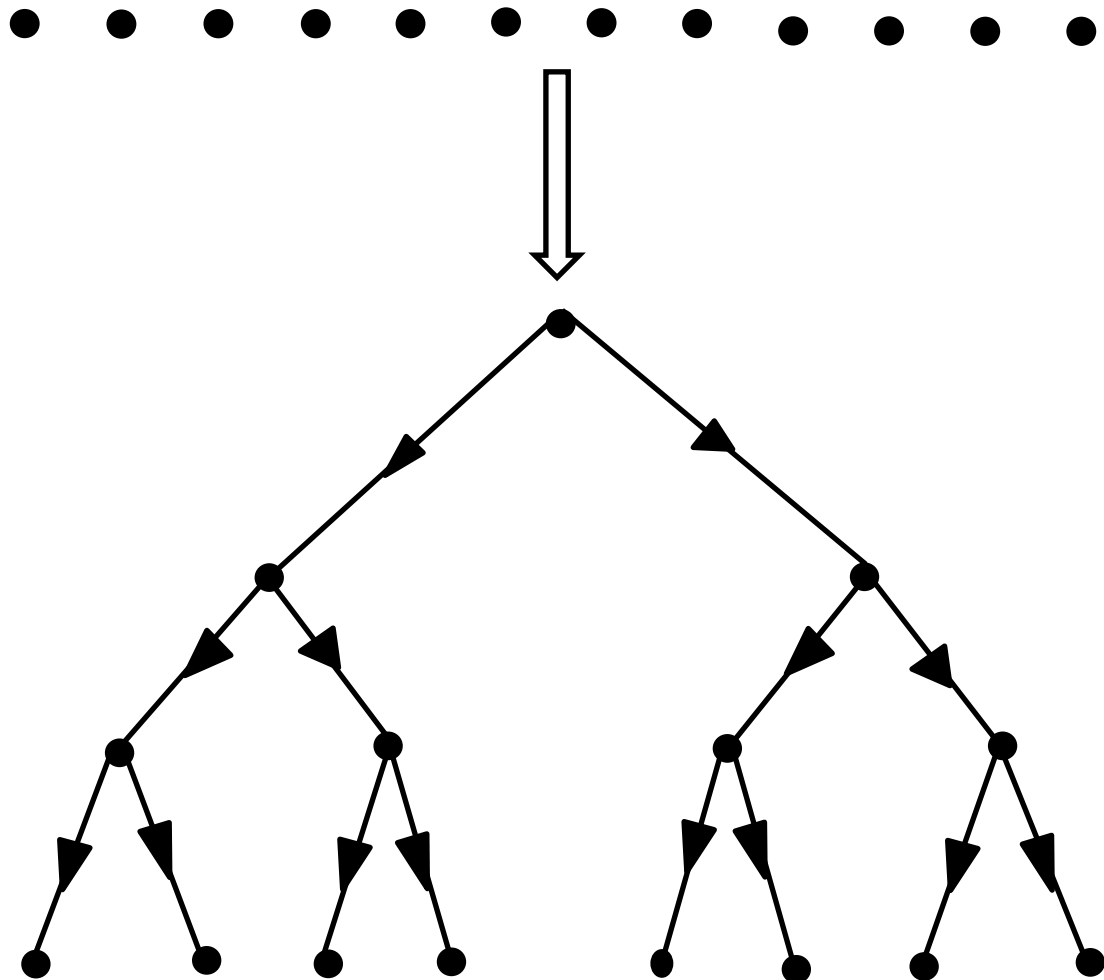
Appendix B - Figures



- *Water pumping for drinking and irrigation**
- *Internet- linked Classroom**
- * Medical cool-room and facility**
- * Field laboratory for agro-ecology**
- *Hydrogen generation**
- *Civilian drone re-charging**

Figure 1 A solar-powered shipping container

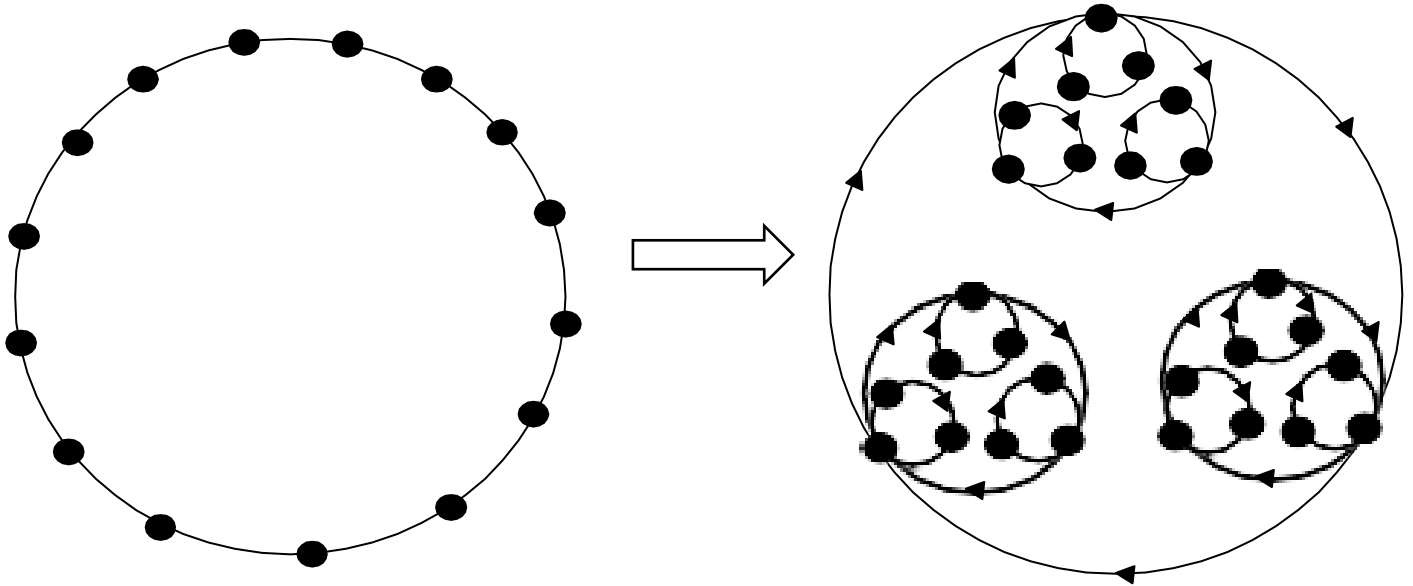
The Cartesian-Newtonian Paradigm



- Localised nodes
- Hierarchical
- Undemocratic
- Bureaucratic
- Alienating

Figure 2 The Paradigm for the 18th Century Enlightenment and a Capitalist or a State-bureaucratic system

The Marx-Einstein (Quantum–Digital) Paradigm

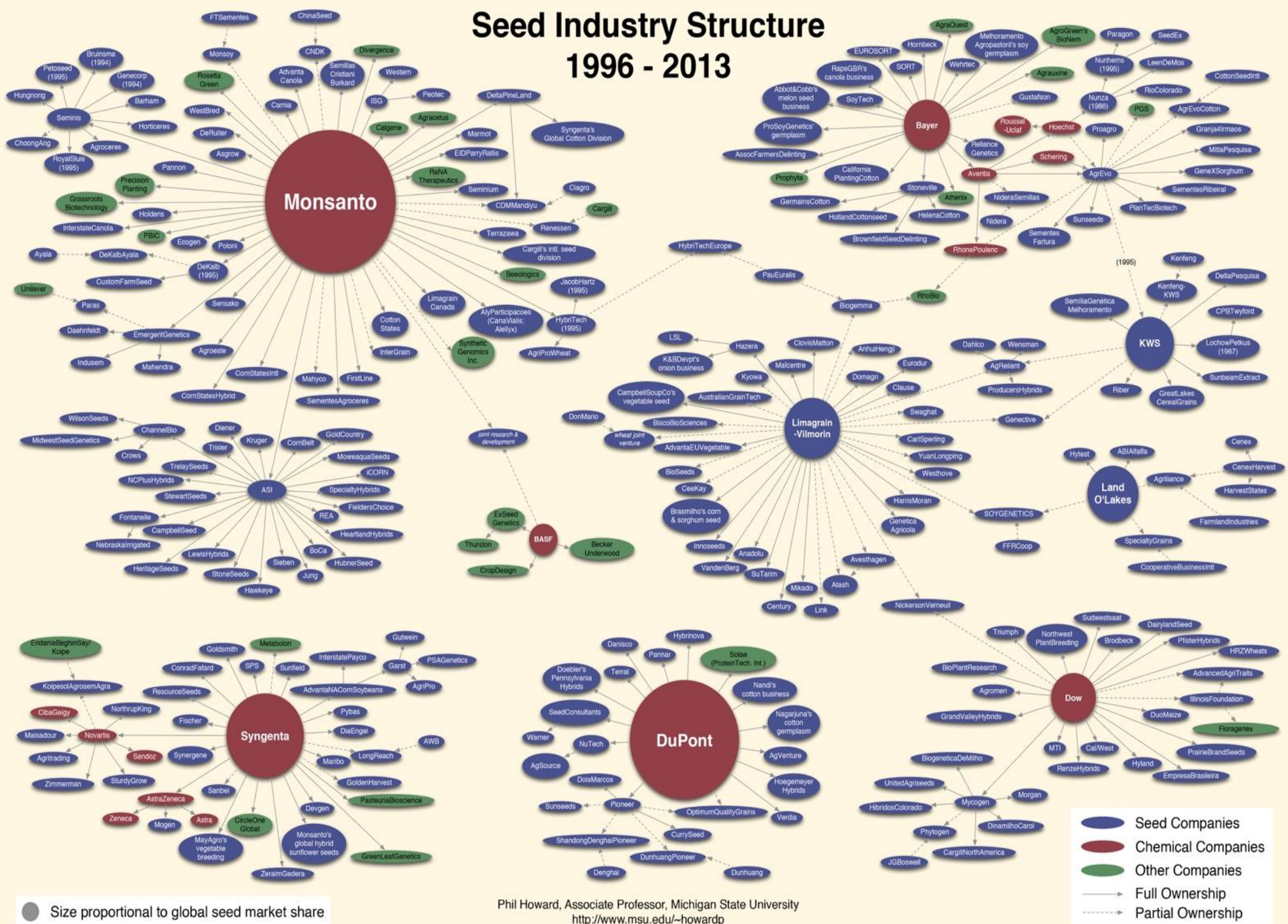


- ‘Quantum’ local/non-local dialectic
- Non-hierarchical
- Democratic
- Non-alienating
- Fractal

Figure 3 The Paradigm for a Global Enlightenment and Post-capitalism

Figure 4

Seed Industry Structure 1996 - 2013



Phil Howard, Associate Professor, Michigan State University
<http://www.msu.edu/~howardp>