

Ecological Economics: Seeking a Sustainable Society

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On Friday, November 21st, 2009, Jacques Diouf, chief of the UN Food and Agriculture Organization, conducted a 24-hour strike cum fast in the lobby of the Rome-based United Nations FAO office to protest and draw attention to the plight of the world's millions of hungry people.¹ He did this just prior to the United Nations Food Summit, and said that global food output will have to increase by 70 percent to feed 9.1 billion by 2050. Negotiations that took place over the next two days which showed a singular reluctant and noncommittal stance by wealthy nations to feed the world's poor by the proposed deadline of 2025. In fact, very few heads of state even bothered to attend the summit. Perhaps they see hunger as an unsolvable problem and up to a billion human beings as expendable on this populated planet. However, it is not unsolvable. With proper economic and ecological steps, the problem of hunger can certainly be relegated to the history museum. Let us explore the steps required to reach this noble goal, beginning with a perusal of what ecological economics is all about.

Ecological economics is an interdisciplinary field involving neoclassical economics, environmentalism, ecology, sociology, anthropology and other fields, including ethics and philosophy, in a search for establishing ecological and economic equilibrium in any given society. A few of its original founders, including researchers on sustainability, were Kenneth E. Boulding, world-renowned economist Nicholas Georgescu-Roegen, Robert Costanza, Herman Daly, Ann-Mari Jansson, William Kapp, Karl Polanyi and many others. The ideas of Nicholas Georgescu-Roegen in his book, *The Entropy Law and the Economic Process* (1971) had a profound influence on the budding ecologists of the time, particularly Herman Daly, who attended his classes at Vanderbilt University.² The ideas of E.F. Schumacher as expressed in his classic book, *Small is Beautiful – A Study of Economics as if People Mattered* (1973), also contributed to the core principles of ecological economics.³ A few years later in 1977 Herman Daly's classic text, *Steady-State Economics*. was published.⁴

In many cases, such as that of Herman Daly, it was a struggle to move away from pure neoclassical economics, which revolves around cost-benefit analysis, comparative advantage and diminishing returns, and move towards an ethical *weltanschauung*, which by its very nature injects ecological ideas into economics; hence, the development of this very new interdisciplinary field. Economists such as Malte Faber define it by its focus on nature and justice.⁵ These are the two essential characteristics of ecological economics, according to him, as well as on issues such as time, sustainability, environment and economic development, as they provide the means for ecological economists to advise both governments and societies.

Faber further explains that the field of ecological economics is a fragile field because it is embryonic in nature. At the same time, this gives scope for infinite freedom, conceptualizing and research on the part of its members, which more established fields do not have. An ecological economist, Faber says, requires *Urteilkraft*, or power of judgment, when dealing with economic issues which, according to him, cannot be separated from environmentalism and ecosystems.⁶

In 1997 ecological economist Robert Costanza wrote an article for *Nature* in which he put the value of the global ecosystem at \$33 trillion. (In that same year the global GDP was \$27 trillion.) Half this amount went to nutrient cycling, with the oceans, continental shelves, wetlands and estuaries having the highest total value. The highest per hectare value were swamps, flood plains and seagrass beds. Thus for the first time an economic analysis was conducted of the global ecosystem.⁷

The difference between ecological economics and neoclassical economics is that ecological economics is embedded in the biological ecosystem, in the environment. In contrast, mainstream economics considers nature as simply a subsystem of the economy, a subsystem to be controlled by man. Faber supports the present age of market triumphalism, but acknowledges the failure to see the problems that accompanied the successes of a market economy. Environmental problems loom large on the horizon. Inequality of income distribution increases by leaps and bounds along with the spiralling gap between minimum and maximum income. And finally, Faber points out that mainstream economists are unable to conceptualize nature and justice in relation to economic situations.⁸ They are unable to visualize beyond cost-benefit analysis, comparative advantage, economies of scale and diminishing returns.

Nature refers to that part of the world not made by human beings; it is something independent, and even the basis of all life, as substantiated in the writings of romantics such as Goethe, Wordsworth and Thoreau.⁹ It is tragic that western neoclassical economists view nature only as something to meet their own ends, something to satisfy their material wants. Both Adam Smith and Karl Marx believed that infinite material growth is possible, that material wealth would go on increasing. They never considered that nature itself may object to this *weltanschauung*, that the role of nature is not as a provider of goods and services for humans but rather nature has a far greater role, which is to maintain biological and ecological equilibrium on the earth.

Justice, as defined by Faber, refers to the idea of being able to lead a good life in a just society that is also in harmony with nature. Neoclassical economists limit their definition of justice to income distribution, saying that if the majority of humans have their material needs met, then the issue of justice is no longer an issue. However, they are again assuming, as David Hume and Marx, and even John Maynard Keynes before them, that indefinite growth is a given, that material wealth will always go on increasing. Many mainstream economists, however, believe that eternal non-satisfaction is an essential human trait, hence they operate freely with the term 'scarcity', which refers to demand being greater than supply. Scarcity is not the problem for neoclassical economists that Marx considered it to be. Inequalities in income are also ultimately irrelevant and hence are not a problem, because economic growth will always be manifested. An ecological consideration of justice, however, will not accept this *Weltanschauung* of mainstream economists.

Economic development must lead to improvement in the human condition, hence the emphasis of ecological economics not on growth but on sustainable societies.¹⁰ Ecological economics is not just theoretical research. It is action oriented and intended for application in the real world. In his book *Development Betrayed*, Richard Norgaard states that development terminology has been hijacked by economists for the greater good of corporations and not for the public good.¹¹ While neoclassical economists claim that infinite growth is possible, ecological economists talk instead about ecological and economic sustainability and equilibrium. A deeper study of Third World communities supports the latter concept.

Neoclassical economics ignores the contribution of Nature to economic systems, whereas ecological economists put maximum importance on natural systems and the need to work within those systems rather than attempt to control them from the outside. Neoclassical economists focus on growth and efficient allocation of resources, while ecological economists focus on distribution, on Kirkpatrick Sale's human scale as opposed to economic scale.¹² The incorporation of ecology into economics leads to making a clear distinction between quantitative growth as expressed in percentages and qualitative development as reflected in the lives of the common people and steadily increasing standard of living.

Ecological economics also incorporates the study of energy within economic systems, as initially propounded by Nobel Prize winner Frederick Soddy,¹³ who argued that real wealth was the transformation of energy into real goods and services. In other words, ecosystems were considered as goods and services, an idea that was rejected during Soddy's lifetime but today is accepted as a natural part of ecological economics.¹⁴ Ecological economists also proclaim that environmental and community costs are not mutually cancelling externalities, and that goods produced unsustainably are not cheaper than goods produced sustainably if one takes into account those environmental and community costs.

According to Peet and Watts, there is no one definition of liberation ecology, development, environment and sustainability. All terms have multiple meanings. The term liberation ecology was coined by Peet and Watts in the early 1990s; however, it appears over the following decade to have been replaced by the term political ecology, which describes the nexus between socio-political movements and ecological / environmental issues. Development can mean one thing to the World Bank and International Monetary Fund and something quite different to the indigenous farmers struggling to eke out a living with subsistence farming in an era that rewards only cash crops. As Eduardo Galeano once said, who is being developed by so-called development? Sustainability is a word that has been greatly misused and abused, as even politicians use it regularly today in their speeches and think of it loosely as putting solar power and wind power in a region and obtaining some electricity. Beyond that, knowledge will be extremely limited, because the field of sustainability has become so vast. Again, the same problem arises in the field of environmentalism, which then causes philosophy to enter into the discussion to help define what exactly a particular field of environmentalism means, what are its basic tenets, what is its base. Academics become so specialized in one particular area of sustainability or environmentalism, for example, that the larger picture becomes lost. This author would like to keep the term sustainability to a very simplistic level, as meaning the ability to maintain a particular, positive, economic-cultural-political

situation for the longest period of time with minimal short or long-term spill-over effects on the ecosystem.

In this paper we will learn that the most critical factor in creating a sustainable society today is water. All other agricultural strategies, all societal, cultural, moral and spiritual strategies, all political and economic strategies, cannot work without water. Water is the fundament of life. At present there is acute water shortage on every continent of the earth. Unfortunately, governments are indifferent (because the politicians have water in their homes) or ignorant and do not know how to solve the problem of water shortage even if they want to, though the methods are not difficult to implement. Hence, in any discussion of sustainability, water must predominate.

Advent of GM and Terminator Seeds

In April 2008 the Soil Association published a report providing the latest research on GM crop yields covering the period 1998-2008. According to their statistics, the yields of GM crops were either equivalent or in most cases lower than non-GM crops.¹⁵ Yet, as Soil Association policy director Peter Melchett said, GM companies are constantly claiming that their products give higher yields and are hence the answer to world hunger. In some cases there was not only decreased production but complete crop failure. As further substantiation of GM crop failure, in April 2006 the US Department of Agriculture (USDA) reported that GM crops do not increase the yield potential of a hybrid variety; rather it may decrease production. In 2004, the United Nations Food and Agriculture Organization issued a report also stating that GM crops can have lower yields than non-GM crops.¹⁶

Lakshman Yapa has explained in detail the answer to the question, what are improved seeds, and how development can create constructed scarcity. He questions the neoclassical “axiom of economic development”¹⁷ which says that poverty is caused by economic underdevelopment and can be eradicated by economic development. On the contrary, Yapa argues that poverty is an unavoidable by-product of so-called economic development, a development originating in the minds of western scientists and agriculturalists on the basis of their particular weltanschauung or way of knowing the world. The development as envisioned from the very limited worldview of western scientists invariably does not solve the problems of hunger, malnutrition and poverty.

Poverty can be defined as missing one or more of the five necessities of life: food, clothing, shelter, health care and education. Yapa posits three theories of development as being (1) neoclassical theory of development based on such issues as overpopulation, technology transfer, etc.; (2) Marxian theory of development as defined by preoccupation with imperialism, dependency and world systems; and (3) an environmental concept of sustainable development. According to Yapa, neoclassical economic development leads to scarcity, which compels a rethinking of the issue of poverty. He cites as an example the phrase, “Bangladesh is a basket-case of poverty.”¹⁸

Yapa uses the example of seeds, which invariably come in a package from western agri-corporations to include fertilizers, pesticides, fuel and pump-sets for irrigation. Wealthy Third World farmers further invest in imported tractors. He says

they are far too costly for small farmers, while in contrast their indigenous seeds were free, natural organic fertilizers such as cow and buffalo dung were free, and their indigenous varieties of seeds for wheat, rice and maize had inborn resistance to many pests developed over generations, which the new seeds of the Green Revolution did not have. The Green Revolution that was touted as the final answer to poverty in India did not work because it ignored the social classes or sociological aspect of implementation, and consequently the wealthy farmers and landlords alone benefited. Rather, subsequent studies have shown that the Green Revolution increased the wealth divide in rural India.¹⁹

In India over the millennia the farmers have created thousands of varieties of rice. It was the basis of the food supply. Today it is under threat from American agri-corporations such as Monsanto and Novartis who are banning the production of indigenous seeds and ensuring that their genetically modified and terminator seeds alone are sold to the farmers. It is plunging from the heights of biological diversity to the depths of monocultures and monopolies. Thousands of indigenous varieties of rice that could withstand pests have been abandoned and now exist only in research laboratories controlled by western agencies and agri-corporations.²⁰ Corporations need monocultures because it enables them to control all production and distribution of food. Three processes are intensifying monopoly control of seeds: (1) economic concentration, such as Monsanto buying up scores of smaller seed companies; (2) patents and intellectual property rights, with the prime example being RiceTec in Texas obtaining a patent on basmati rice, and (3) genetic engineering, marked by the dreaded terminator seeds which become sterile after one growing season.²¹

In March 1998 the US Department of Agriculture along with the Delta and Pine Land Company announced the patent of a new biotechnology called "Control of Plant Gene Expression." It permits the license owner to create sterile seeds by programming the DNA of the plant to kill its own embryos. The patent covers all plant and seed species. The USDA receives five percent profit of all sales of these terminator seeds. Over millennia, farmers always saved their seeds for the next year's harvest. And now, they will save terminator seeds only to find that next year's crop will fail. As Dr. Vandana Shiva says, the pea pods, tomatoes, heads of wheat and ears of corn will all become seed morgues, compelling even the poorest farmers to purchase new seeds every year.²² The terminator seeds along with costly fertilizers and pesticides are directly responsible for the 150,000 suicides of farmers across the Indian landscape over the past five years. They are destroying Indian agriculture, which at least maintained ecological equilibrium until the Green Revolution.

The greatest tragedy of the so-called economic development brought on by the Green Revolution in the 1970s was the accompanying creation of scarcity of indigenous seeds and loss of the marvellous diversity they provided to the people. In addition, the Green Revolution created undevelopment not only of local indigenous seeds but also indigenous, time-tested agricultural methods, such as crop rotation, multiple cropping and companion planting. All these strategies served the people well and had no negative spill-over effects on the ecosystem. Today, due to excessive use of synthetic pesticides imported from western countries, the water in the paddy fields is contaminated. It is the same water the small farmers drink, wash and bathe in. As Yapa says, it is not enough to simply say that this is one of the "externalities" of the Green Revolution.²³ The poisoning of the crabs and fish that

lived in the water and the humans who drink and bathe in the paddy water, is not an externality. It is a human tragedy.

Yapa concludes by saying that poverty is a form of scarcity induced by economic development. This author, however, would clarify that the economic development referred to is based on neoclassical economics or the capitalist model; hence, every decision taken related to that development is based on cost-benefit analysis and not on the welfare of the indigenous people. Therefore it was destined to fail. This does not presume that economic development of Third World countries is impossible. We simply have to redefine development using the *weltanschauung* of the farmers themselves, and then add whatever knowledge we have, as Miguel Altieri points out, to supplement and expand upon the indigenous knowledge of the farmers.

Regarding compelling Third World farmers to use American pesticides, statistics do not support this step. As Miguel Altieri points out, as of 2001 farmers lost 33 percent of their crops to pests before harvesting despite the fact that one billion pounds of pesticides were used annually. Thirty-three percent losses are the same percentage reported in 1942 before pesticide use began on a large scale. In addition, he points out that biotechnology is bound to fail because plants will develop resistance. As of 2001 560 anthropoid species were resistant to American pesticides due to constant spraying.²⁴

Roundup Ready GM soya has likewise been touted by agri-corporations as the answer to world hunger. However, from the period 1999-2007 RR GM soya had 4-12 percent lower yields than non-GM soya varieties. In drought conditions GM soya have 25 percent higher losses than conventional crops due to stem splitting and water stress.²⁵ Between 1995 and 2003 the use of GM soya in the United States increased to 81 percent of total soya crop production. During that same period farmers lost \$1.29 billion in stagnating yields.

The story of how GM soya replaced mustard oil in India and other countries is tragic. Bengalis always fry their food in mustard oil, and so do people across West Bengal, Bihar, Orissa and East Uttar Pradesh.²⁶ In South India the seeds are used to flavour almost every single dish. In addition to being nutritious, edible oil, it is used as medicine in numerous ways, including massaging of aching joints and rheumatoid arthritis problems. It is also a mosquito repellent, thus keeping disease away in a natural, ecological manner. Traditional mustard oil lamps used at the time of Deepavali always kept away pests. The beautiful part of edible mustard oil, however, is that the oil was made by more than one million expellers and 20,000 processors, in small amounts which the poor could easily afford.

This all came to an end in August, 1998 when a mysterious contamination of mustard oil took place in New Delhi, causing 41 deaths and more than 2,300 reported illnesses ranging from mild to serious, in the form of liver and kidney shutdown. It was a massive adulteration of oil never seen before and for all purposes an intentional act, as it led to the banning of home-made, small-scale mustard oil production in Haryana, Madhya Pradesh, Orissa, Uttar Pradesh, West Bengal, Arunachal Pradesh, Sikkim, Tripura and Karnataka.²⁷ Simultaneously it opened the door to soybean oil imports, which one can surmise was the goal from the beginning. All home production of edible mustard oil in unpackaged form came to a screeching

halt by September 1998, and industrialized soybean oil began to take over the Indian market, Indian culture and Indian lives.

Again, the goal on the part of multinational companies was the monoculturation of India's edible-oil economy. Still today the production of small-scale oil with local processor is a criminal act as per the extant laws. The destruction has a domino effect, since if mustard oil cannot be processed and sold, then the mustard plant itself will not be purchased, and will become gradually extinct on the Indian landscape. As has already happened in other countries like Indonesia, this will lead to hopeless dependence on soybean oil, that too genetically modified soybean, which the agric-corporations are only too pleased to dump onto the Indian market since it is rejected by European buyers. Monsanto, the leading criminal in this affair, is pushing the Roundup Ready soybean since 1998, and also has a patent on the seeds; hence, their control over every aspect of soybean production is complete.

We should understand that the greatest crime by agri-corporations is taking place in the seeds; they are banning use of indigenous seeds and compelling poor farmers to purchase their genetically modified seeds, which produce for just one season, forcing the poorest of the poor to purchase seeds anew for the next growing season. It is the crime of all crimes against the farmers of India. Tragically, the vice chancellors of agricultural universities in India are compelled to move in tandem with agro-industry executives and tow their line, despite that it means the suicide of thousands.²⁸

What is most disturbing to learn, however, are the health effects of soya. Soybean contains trypsin inhibitors that cause inhibition of pancreatic processes and possibly lead to cancer. It is found with highest concentration in soybean flour, a food not normally consumed in America or even in traditional soybean-eating countries, where people primarily consume fermented soybean products.²⁹ Pancreatic cancer is the fifth most common cancer in the U.S. Soybeans also contain lectins which interfere with the gut's immune system. They contain phytic acid which interferes with the absorption of critical minerals such as magnesium, zinc, copper and calcium.

The most dangerous concern, however, is the extremely high estrogen content, particularly in the genetically modified soybean. It is already well established that women who take synthetic estrogen have three times as many miscarriages as women not taking the estrogen. Today soybean is used in countless food products, including baby food, which means that infants given soy-based formula are ingesting the equivalent of 8 to 12 contraceptive pills daily.³⁰ Mothers have no idea of the danger or of what their babies are actually consuming. One can only imagine how many law suits will be filed in future when the facts are properly publicized.

According to Reuters, on November 17, 2009 a report issued by several nonprofits, including the Organic Center (TOC), the Union for Concerned Scientists (UCS) and the Center for Food Safety (CFS), stated that the rapid adoption of GM corn, RR soya and Bt cotton have created a huge increase in pesticide use, an additional huge increase in herbicide-resistant weeds, and increased chemical residues in food consumed by Americans.³¹

Bt maize shows the same yields as conventional crops. Bt cotton likewise shows no real increase in yields. In all countries where Bt cotton was introduced,

such as Australia, United States and South Africa, the yields were no higher than that of conventional cotton crops. Secondary pests resistant to Bt cotton rendered Bt cotton ineffective in China.³² The Bt cotton used in India failed because it was created for the short growing season typical in the US, while India has a far longer growing season and hence the crops lost their insecticidal properties. Agricultural scientist Devinder Sharma says the former chairman and members of the GEAC (Genetic Engineering Approval Committee in New Delhi) should be put behind bars for the damage they have done to cotton farmers as a direct consequence of introduction of Bt cotton. Hundreds of thousands of cotton farmers committed suicide, which means that the “scientists have blood on their hands.”³³

Rice is also a serious issue. As Arun Srivastava points out, 3.7 billion Asians live on rice, specifically in Sri Lanka, Nepal, India, Bangladesh, Korea, China, Cambodia, Thailand, Malaysia, Indonesia, Japan and Philippines. With the ancient origins of rice in the former Gondwanaland that later became Asia and Africa, just two varieties, *Oryza sativa* and *Oryza glaberrima*, gave birth to thousands of others which differ in size, shape and aroma and include drought-resistant, flood-resistant, saline-resistant and pest-resistant varieties,³⁴ all a result of thousands of years of breeding. Scientists estimate that at one time there could have been up to 140,000 extant varieties of rice.

Hitherto 331 million households in Asia were engaged in rice farming, with a large percentage of them women, who traditionally take care of planting, weeding, harvesting and processing. Today we are witnessing the destruction of rice cultivation by the poor, and its replacement in mono-cropping farms owned by transnational agri-corporations.³⁵ This process is destroying the last vestige of small farms in Asia, which by their very nature are sustainable, healthy and ecologically peaceful. The strategy of the corporations is to get control of the farmers' seeds, contaminate them, and then use them to kill people at their whim.

These tactics, legitimized by trade agreements such as TRIPs and TRIPs Plus, have been quietly destroying Asian farmers for decades. The only evidence of the destruction to people living at a distance is when we read in the newspapers, for example, that seven more farmers committed suicide in Vidarbha within 24 hours on November 25, 2009.³⁶ A total of 42 farmers committed suicide in November, while in October the total was 54. The Vidarbha Janandolan Samiti organization has been tabulating the number of suicides in different districts of India since 2001. Invariably, the cause is inability to repay debts owed either to banks or moneylenders due to crop failure. Of the seven who died on November 25, six men consumed the same imported pesticide which contributed so horribly to their bankruptcy, and the seventh, a woman, set herself ablaze. Thus far 154 cotton farmers have ended their lives this year due to monsoon failure.³⁷ The mainstream media allots just a few lines to this growing tragedy, and certainly does not offer solutions.

It is unfortunate that Asian government leaders believe or have been economically terrorized into believing that agricultural industrialization should take place to the point of displacing and removing traditional, small rice farmers across Asia and replacing them with imports from the US government-subsidized American rice cartel comprising of Riceland Foods, Producers Rice Mill and Farmers Rice Cooperative. Due to woefully inadequate financial compensation, the small farmers

still producing rice in Asia face low returns, endless debt, bankruptcy and abject poverty.³⁸

Two additional threats continue, the first being Bayer BioScience, which has illegally planted GM rice in India, leading to known contamination of traditional rice crops in Jharkhand state. The second threat is Nano-rice, which is posing a serious threat to the population, as rice plants transmit nanomaterials to the next generation, which causes one month delay in flowering and reduction of seed setting rate by 4.6%.³⁹ Tragically, the Asian mainstream media is silent on all these issues of genetically modified seeds and Nano foods, which are posing a real threat to both food security and health of the people of Asia and India in particular.

From 1996 to 2008 herbicide use worldwide increased by 282 million pounds, with 46 percent of the increase taking place between 2007 and 2008. Insecticide use has dropped due to the use of GM crops. However, it does not compensate for the staggering 318 million pound increase in pesticide use.⁴⁰ Again, the most popular GM crop is the Roundup Ready, marketed around the world by Monsanto Co. Genetic engineering, says Vandana Shiva, is designed to destroy biodiversity and thereby increase corporate profits.

The notion of sustainability wrought by a green revolution is a myth, as it implies that biotechnology has brought higher yields with zero ecological impact. Everything produced by agri-corporations, including Roundup Ready soya and Bollgard cotton, synthetic fertilizers and pesticides, has ecological impact. We need to return to traditional, small-scale agriculture which never harmed the ecosystem; rather farmers worked in tandem with Nature. Another myth is the notion of fewer pesticides being used with GM crops. Rather, greater quantities are being used, as GM seeds only have the ability to withstand one or two or three pests when there are in fact scores of pests. So in reality, GM seeds are useless. Roundup herbicide destroys all the weeds, as it inhibits EPSP synthase, an enzyme essential to the growth of the plant. It thus establishes a roadblock in the weed's metabolic pathways.⁴¹ However, this process is disastrous for poor people, particularly poor rural women, who use those very weeds as food for survival or as medicine.

GM seeds have severe health side effects on humans unknown to the masses. All GM crops contain genes which are resistant to antibiotics. The effect is to expand the spread of antibiotic resistance among humans. For this very reason Britain rejected Ciba-Geigy's transgenic maize.⁴² When L-tryptophan, a nutritional supplement was marketed, 37 people died and 1,500 people came down with a severe circulatory disorder called eosinophilia myalgia. When biotechnologists took a gene from the Brazil nut and added it to soybeans to enhance protein content, the allergenic properties of the nut also transferred, affecting thousands who had no understanding of the cause of their suffering. The worst effect of GM soya, however, as mentioned earlier, is the high estrogenic content which serves to destabilize the delicate hormonal systems of humans. Thus dairy cows consuming GM soya, whose milk is then consumed by humans, are transferring the high estrogen levels to humans.⁴³

What is the solution? Prakash Singh Raghuvanshi, a farmer-breeder located in Varanasi, Uttar Pradesh, has developed more than 100 improved varieties of rice, wheat, pulses and even vegetables and fruits, the seeds of which have been

distributed to thousands of farmers.⁴⁴ Conducting his research and experiments on just three acres of land, Prakash Singh is adamant that if farmers have their own seeds and do not have to depend upon seed companies, which for the most part are selling GM seeds, then farmers can have a profitable farm business. Invariably the government tries to push so-called “improved” seeds onto the farmers and remove the farmers’ seeds from the market. But, the company seeds most times fail to germinate or are found to be contaminated. Despite these anomalies, the seed companies continue to convince government officials that the farmers’ seed are to blame, not their own. It is an example of the struggle that lies ahead for the common people to resist all efforts by governments and private agri-corporations to carry out massive contamination of agricultural land and crops in India and elsewhere.

Vandana Shiva talks about food dictatorship and food democracy. By food dictatorship she means the control over food and seeds by multinational corporations whose sole interest is personal profit, not the welfare of humans or the ecosystem. In the process of seeking infinite profit, they create biodevastation.⁴⁵ Food democracy is about ordinary people everywhere reclaiming their right to have control over their food, their seeds, their ecosystem and thus their lives. It is about hundreds or thousands of diverse groups including environmental, farmer, consumer, sustainable-agriculture, ecological, organic, animal rights, health and other movements coming together on a “middle ground” to fight the biodevastation being wrought around the world in the form of genetically modified seeds, terminator seeds, pesticides, herbicides and synthetic fertilizers. Food democracy is about all species again having the right to food, even down to the little earthworm.

Poor farmers always practice organic farming as they cannot afford to do otherwise. Today consumers and farmers worldwide are joining poor farmers in a conscious movement to ban foods and seeds which harm our ecosystem and biodiversity. In the US, genetically modified foods are not even labelled; hence, consumers have no way of knowing what they eat and how harmful it might be. They do not know, for example, that any food with soya in the contents should be censured and banned for its estrogen content.

In India, ARISE organization for organic agriculture holds courses in villages throughout the country to encourage giving up synthetic fertilizers, pesticides and herbicides and return to ecological agriculture, which supports every level of life and is hence called by some as *ahimsic krishi*, or “non-violent agriculture.”⁴⁶ Its philosophical source is compassion for all beings and all species, a mindset not yet understood in many western countries.

The organization called Navdanya, founded by Dr. Shiva, is the official movement in India for saving indigenous, organic seeds passed on from father to son and keeping them in village seed banks. It is about carrying out non-violent non-cooperation with unjust laws and unjust governments presently controlled by corporations. As Mahatma Gandhi said, no tyranny can enslave a people who believe it is immoral to obey unjust laws. On March 5, 1998 more than 2,000 organizations coalesced to start the *bija satyagraha* movement against patents on seeds and plants.⁴⁷ The movement stands as a refusal to accept the colonization of life through patents and anti-ecological technologies. It is also about the fundamental right to food freedom, access to healthy, nutritious food, and to Nature’s vast

biodiversity. The movement is about moving from food dictatorship to food democracy.

However, the odds are stacked against the common people. In the Yale Environment 360, published by the Yale School of Forestry and Environmental Studies, a one paragraph article appeared on December 2nd, 2009 stating that farmers' organizations and environmental groups are fighting the approval of India's first GM crops. India's biotechnology regulator and the GEAC (Genetic Engineering Approval Committee, a branch of the central government) have just concluded that Bt brinjal is safe for human consumption. Bt stands for *bacillus thuringiensis*, which creates a toxin that kills a particular moth known to destroy the fruit and stem of the eggplant. Monsanto claims the Bt brinjal is resistant to the moth. However, Monsanto fails to tell the negative effects, which have been delineated earlier herein. As Pushpa Bhargava, a senior biotechnologist who sits on the approval committee said, "We do not need GM foods – not now, not 20 years later."⁴⁸ Already Bt cotton has wrought havoc on the poor Indian farmers. Now it remains to be seen whether Bt brinjal will soon cover the Indian landscape.

We need to explore healthy ecological alternatives to biotechnology and genetically modified seeds and foods. We also need to explore societies that are free of the capitalist economic model and talk about how we can create many more such communities by changing the economic model to one called a cooperative commonwealth, by imbibing participatory democracy in all decision-making, and by engendering moral and spiritual values in every individual so as to create an ecological, moral and spiritual revolution in the entire village and then the nation. We need to talk about the near utopian community established by Anna Hazare in his village in the Indian state of Maharashtra. We will present various facts provided in the discourses of Shrii Prabhat Ranjan Sarkar related to farming, water conservation, irrigation, afforestation, and the fundamental requirements for creating ecological and economically sustainable communities. Definitely there are alternatives to corporate greed and ecological destruction of our planet. We need to write about those alternatives and then disseminate the information as quickly as possible, particularly to the poor and disinherited who are presently suffering the most under global financial capitalist collapse. Hundreds of thousands of human beings are living in plastic tents or under just one piece of plastic stretched across a couple of poles or a wall. This is intolerable. We need to spread the sustainable community model like wildfire across the earth and especially to the neglected, downtrodden, half naked, starving human beings. Through such communities, in which they will rule their own joyous destiny, let the disinherited people reclaim their dignity and nobility.

Agrarian Strategies for Sustainability

Developing a concern for deeper politics surrounding environmental resource conflicts takes one down the road of political ecology, which addresses issues of resource access and control and the politics and ethics behind land conflicts. Agrarian struggles for land and resources invariably involve political ecology. It is essential for understanding local productive relations and macro-economic processes.⁴⁹

During the Green Revolution, only the wealthy farmers in each country benefited. The poor remained poor, living primarily on hillsides and semi-arid land. Yet, it is these marginalized farmers who are feeding their country's population, not the wealthy farmers who grow for export only. Chilean native Miguel Altieri, Professor of Entomology at University of California, Berkeley, points out that poor farmers grow not one crop but many crops, so the goal is to maximize the entire agricultural system. He gives a mind-boggling example of how when studying in Florida he was taken along by an agronomist, and agricultural economist to Guatemala to 'advise' the farmers there. The Guatemalan farmers were growing corn every meter, planting five seeds of corn and then three seeds of beans, and in between was an abundance of weeds.

The American agronomist began to tell the farmers that their production was low and that they should plant every six inches and very densely. Then the farmers asked him, "And how do you feed your animals?" The agronomist replied they do not have animals in Iowa, which scenario he was describing to them. The farmers replied to him, "Well, we do. And the grass in between [the corn and beans] is to feed the animals."⁵⁰ It is a poignant example of why Americans should not barge into third world countries thinking they have the answers. Rather, they should visit those countries with humility and try to learn some of the ancient wisdom that the poor farmers there possess.

Dr. Samuel Huntington, author of *The Clash of Civilizations and the Remaking of World Order*, made this statement. "The West, and especially the United States, which has always been a missionary nation, believes that the non-Western peoples should commit themselves to the Western values of democracy, free markets, limited government, human rights, individualism, the rule of law, and should embody these values in their institutions. Minorities in other civilizations embrace and promote these values, but the dominant attitudes towards them in non-Western cultures range from widespread scepticism to intense opposition. What is universalism to the West is imperialism to the rest. The West is attempting and will continue to sustain its preeminent position and defend its interests by defining those interests as the interests of the 'world community.'"⁵¹ The above dialogue in Guatemala aptly demonstrates the unbounded arrogance of multiple western minds, as described in the words of Samuel Huntington. As Huntington acknowledges elsewhere, "The industrialization of the West led to the de-industrialization of the rest of the world."⁵² Hence, the well-founded scepticism of the Guatemalan farmers and millions of other farmers in Third World countries regarding any ideas coming from the western world.

A serious problem emerging in recent years is the outright land-grabbing going on by wealthy nations of poorer nations that have abundant fertile agricultural land. It is about wealthy nations and private companies securing food supplies and other raw materials for themselves in a neo-colonial pact, as FAO Chief Jacques Diouf had earlier stated,⁵³ As noted Indian journalist, agricultural scientist and outspoken critic of industrial agriculture and genetic engineering Devinder Sharma says, the FAO has taken a U-turn and called for a "voluntary code of conduct," which brings its stance into the same camp as food importing countries, the World Bank and International Food Policy Research Institute (IFPRI) in Washington DC, a think tank invariably having thoughts biased in favour of agri-corporations.⁵⁴

Sharma refers to the present land-grabbing as food piracy that leaves millions of hungry people in its wake. The United Nations has begun drawing up conduct codes for nations to follow; however, they will not be ready for at least a year and meanwhile the “farmland grab” deals carried out by countries such as Saudi Arabia and South Korea continue unabated. African countries are suffering maximally under these schemes as, in the desperation that comes from impoverization, they allow countries and companies such as Daewoo to purchase fertile farmland for a song, praying in return for assistance with infrastructure and job creation which never seems to happen.

The recent appointment of Rajiv Shah to head USAID, according to Sharma, is a careful ploy on the part of the Washington administration to ensure that the Second Green Revolution will become quickly palatable to an unsuspecting Indian populace. Similarly, the earlier appointment of Indra Nooyi as CEO of PepsiCo helped greatly to cause the entrenchment of PepsiCo in Punjab for the past several years. If the Second Green Revolution, subsidized by Bill Gates and Warren Buffet, occurs, then farming as we know it today will vanish. Farmers will disappear, farmland will become destitute and infertile, and food will no longer be produced on the land but in food factories. The World Bank is already considering funding these future factories, which will require neither farmers nor farmlands.⁵⁵

In India, China, South America and Africa people are suffering from severe hunger. In Purulia district of West Bengal the staple food for nearly five months every year is grass seeds. In Orissa, Maharashtra and Rarh in West Bengal, the farmers sell their wheat and rice and eat coarse grains and grass seeds.⁵⁶ As a result they have severe malnutrition and consequently leprosy is widespread. In certain parts of Africa the staple food year round is rats and mice. In Tamil Nadu there are coastal belts but the plateau area is very poor due to lack of a proper irrigation system. The latter problem can certainly be resolved through proper study and implementation of water conservation measures.

Even in Europe, in parts of Wales and Scotland there is also severe poverty. The people live on potatoes, and if the potato crops fail, then severe malnutrition takes place. Shrii Prabhat R. Sarkar says: “We must do something concrete for these people, otherwise the hunger of these downtrodden and distressed people will destroy the peace and tranquillity of the entire globe. You must not forget this fact. There should be an immediate influx of food from outside to these malnourished areas.”⁵⁷

According to Shrii Sarkar, the first task is to provide immediate relief in the form of food and other essential services. This is an extension of what he calls the multi-purpose development scheme. Both extensive and intensive types of service are required. Extensive service means providing service down to the village level, while intensive service refers to serving the greatest number of people possible. Mass feeding and cheap kitchens are the need of the hour, along with distribution of medicines, clothes, school supplies and if possible shelter. All governments should undertake this service program to the poor and needy in their country.⁵⁸ Once these basics are provided, the next urgent service is education, because most of the poor people are illiterate. Hence their education is mandatory. In the present era, and with acute poverty raging around the globe, the prime educational focus now must be on

ecological and economic sustainability. Education on these and related topics is the crying need of the day.

Greenpeace has come out with a 60-page report entitled "Agriculture at a Crossroads: Food for Survival," in which they call for a new ecological approach to agriculture in the face of both food and climate crises facing the world. They summarize therein the key findings of the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD), which is a global assessment of the state of agriculture compiled by more than 400 scientists and researched under the auspices of the World Bank and United Nations.⁵⁹ The IAASTD admits that present models of agricultural production are failing. Scientists involved further admit that chemical-intensive agriculture has been a big factor in destruction of the environment as well as in climate change, being responsible for 14 percent of global greenhouse gas emissions. It was the general consensus that biotechnological and Green Revolution agriculture were almost wholly responsible for the present problems of food shortages, food contamination and general air, soil and water pollution.

The Green Revolution was simply a market expansion program of the American chemical industry, paid for primarily by U.S. aid programs. Martin Khor gives examples of biotechnological destruction of the Third World that make one shudder in shame. By 1998, fructose, produced by biotechnology, had captured more than 10 percent of the global sugar market, causing sugar prices to fall and throwing hundreds of thousands of sugar workers in Third World countries out of work. Many western agri-corporations have shifted their base of operations to Third World countries where environmental laws are either lax or nil, and proceed to cause all kinds of ecological destruction, letting toxic chemicals out of the factories and into the water and soil. Those same corporations produce and sell cheaper quality products that would be banned back home in America.⁶⁰ They take advantage of people's ignorance and further douse them via their substandard products with toxins and poisonous chemicals.

Pharmaceutical drugs, contraceptives and pesticides banned in the early nineties in Europe are being sold and distributed in Third World countries. American cigarettes with far higher levels of tar and nicotine are sold in Third World countries. In 1999 it was estimated that 40,000 people in Third World countries die from poisoning by imported pesticides annually.⁶¹ Many of the indigenous customs and work methods have been lost since the mid-nineties due to the heavy onslaught of advertising by western corporations.

In Madagascar 70,000 farmers who grew vanilla were thrown out of work when a Texas corporation began producing synthetic vanilla. A company in New York began producing gum which again threw thousands of Sudanese out of work who produced gum Arabic for exporting.

Fishing was earlier a major export business for Third World communities. It was indeed a community effort, as boats and nets were made with local materials and everyone was involved in fishing, preserving the fish, mending the nets, repairing the boats, making sure that the mesh size of the nets did not catch the small fish, making sure that the breeding grounds were not disturbed so that fish stocks could multiply in a state of ecological equilibrium.

Then came the western trawl fishing brought by western companies, which led to gross overfishing, as in most cases the fish was not for human but for animal consumption. The thinking was maximum catch for maximum profit. Nothing else was relevant to these western businessmen. Thousands of Third World communities were destroyed both ecologically and economically with the introduction of trawl fishing in their midst. Such is the legacy of western biotechnology over and over in the Third World. Toxic pesticides now fill rivers and rice ponds, making freshwater fish inedible for the poor people.⁶²

Human rights lawyers should take up these cases and file charges against both government institutions and the corporations who wrought and continue to cause so much havoc on the sweet, simple people in Third World countries. Finally the perpetrators should be sentenced and put in prison in the Hague. But even that seeming micro-justice cannot undo the massive economic exploitation done to millions of people and the precious ecosystem of the earth. The damage has been done, and within just a few decades the earth will become virtually uninhabitable and people will be compelled to move to other planets for their existence.

After the hard life experience, after vast portions of the earth's soil and water have been destroyed, the top scientists of the world today admit that it is time to return to ecological farming.⁶³ The poor people, the poor farmers, never left ecological farming as they could never afford to purchase the costly herbicides and pesticides that came as part of the American agricultural package called GM crops. So now it is universally recognized that we need to return to nurturing nature and growing crops in harmony with nature, recognizing that nature is in control of us and not the reverse. By returning to ecological farming, crop yields will grow.

Greenpeace in their separate report provide five policy initiatives, as follows: (1) prioritizing resource needs and knowledge of small-scale ecological farmers; (2) supporting ecological farming in combination with research and investment to support this agriculture; (3) supporting the multiple ecological functions of agriculture; (4) addressing climate change by supporting ecological farming, and (5) acknowledging the connecting principles of food sovereignty and the right to food.⁶⁴

In a similar vein, Kentucky author and agriculturalist Wendell Berry makes us cognizant of six agricultural fallacies. The first fallacy says it is false to assume that agriculture can be dealt with as an industry. Agriculture is interwoven with living creatures and plants and with biological processes. In contrast, the materials of industry are inanimate and mechanical. It reflects the antithesis of farmer versus industrialist. The farmer is a nurturer of life, a preserver of all creatures. In time industries die. Top soil, if carefully maintained, will last for 5,000 years. The motives of agriculture and the motives of industry are antithetical to one another. For farmers, the home and the farm are one. This is in sharp contrast to the wage earner, whose motives, whose incentive to work, cannot match that of the farmer. This was proven in the Soviet Union where the small, private farms substantially out-produced the communal fields owned by the state.⁶⁵

Shrii Sarkar has a contradictory stance, and says that agriculture should be treated as an industry because at present farmers are badly exploited by receiving very low prices for their produce. His key stipulation is that the prices of agricultural produce should be determined by considering all costs involved, including

agricultural income, expenses and other necessities.⁶⁶ As examples, he cites the farmers of Burdwan, West Bengal who presently are forced to sell their rice at throwaway prices. In Hooghly district, also of West Bengal, farmers are forced to sell their potatoes way beneath market prices. Farmers in Nadia district are compelled to sell their jute at prices so low that they can never repay the debts incurred to grow the jute. Hence, agricultural prices must be raised across the board so that millions of subsistence farmers around the world see an end to their economic exploitation.

The second fallacy is that a sound agricultural economy cannot be based on export markets. Berry clarifies this by saying that a sound agricultural economy cannot be based on any market unless it controls that market.⁶⁷ All peoples, all communities, should grow their own food so that dependence and charity will not be forced upon them. Commercial farming can never be separated from subsistence farming. Families should always be able to survive from their farm. They should as far as possible provide for their own food, shelter, fuel and building materials, so that their minimal subsistence is assured. We need only remember the farmers in Appalachian Kentucky to visualize lives of subsistence farming. Only those items not required for local people, which are surplus items, can be exported.

This is also a key principle of Shrii Prabhat R. Sarkar's Prout economy⁶⁸ and espoused by many progressive agricultural scientists and economists today. Shrii Sarkar has provided four requirements for achieving economic democracy: (1) The minimum requirements of the age should be guaranteed to all people; (2) Increasing purchasing capacity should be guaranteed to all people; (3) The power to make all economic decisions must be placed in the hands of local people, a la Wendell Berry; and (4) Outsiders must be strictly prevented from interfering in a local economy.⁶⁹ This would refer to corporate capitalists living on Wall Street, Fifth Avenue, Pennsylvania Avenue or anywhere else. In a Proutist, decentralized economy wherein the people are practicing economic democracy, outside capitalists will be *persona non grata*.

The third fallacy given by Berry is that "free markets" can preserve agriculture. He says that rather it is bad for agriculture because it only gives a value to the product, but neglects to give a value to the sources of agricultural products: to the topsoil, the ecosystem, the farm, farm family and farm community. The free market capitalist economic model values production at the cost of all else, or rather, all else is irrelevant. In Berry's conception of agriculture, all externalities are considered and given a value. Surpluses are not more profits; they are always produced in agriculture to compensate for potential crop failure.⁷⁰

The fourth fallacy expounded by Berry is that productivity is a sufficient standard of production. American agriculture is hugely productive, but less known is that it is also exorbitant in costs. Costs include not just monetary costs but loss in topsoil, water pollution, food pollution, the degradation of towns and communities, and the whole vulnerability of the food supply system.⁷¹ Productivity numbers never reflect these enormous costs. Berry says that we need to replace the word productivity with thrift, as thrift implies concern for the means of production, for ecological externalities which free markets never consider. Thriftiness implies a thriving ecosystem.

One example of creating a thriving ecosystem while using thrift instead of the highest productivity model is to use bio-fertilizers or organic fertilizers instead of synthetic. Bio-fertilizers, i.e., organic fertilizers, contain positive bacteria which nurture the plants. Sheep dung and urine make the best manures for crops. For producing bio-gas, cow, sheep and buffalo dung can be used. Water hyacinths are also an excellent raw material for producing bio-gas, but cow dung is superior.⁷² Hybrid animals are more prone to disease than pure breeds of animals, hence the dung of pure breeds is also superior. For raising green vegetables, the best fertilizer is rotten vegetables. When growing various types of gourd or squash, oil cakes and mustard cakes mixed in equal amounts with the soil will increase the yield.

Invariably synthetic or chemical fertilizers destroy the land of the farmers and cause it to become infertile. If agriculture is managed using the cooperative business model, then the combined resources of the people can lead to collective research to develop chemical fertilizers that do not harm the land.⁷³ This is an example of the societal benefit of creating a cooperative commonwealth within a sustainable community so that the intellectual capacities of all the people are utilized collectively, This is bound to produce positive results.

The fifth agricultural fallacy is that we have too many farmers. As noted elsewhere herein, Shrii Sarkar states that 35 percent of the workforce should be in agriculture. In the United States the myth that there are too many farmers, when in fact only two percent of the workforce is in agriculture, has caused the migration of millions of people in rural areas to the towns and cities. Farmers in America have been replaced to a large extent by machinery, chemicals, fuel and credit. Even at two percent, more farmers continue to file for bankruptcy and move in desperation to the cities looking for work. Many never find work and come under the category of the permanently unemployable.⁷⁴ We see here two serious societal issues that should be solved urgently: (1) The propaganda by the US government to the common people not to farm should be reversed, until 30-35 percent of the population are engaged in agriculture, as per the guideline of Shrii Sarkar. (2) Every village, town and city must immediately create a Department of Employment, and that department will be mandated to find jobs for all unemployed people. This should not be difficult to do, as always jobs would be available in the area of public works. Always there can be improvements to existing structures and institutions, and always there can be expansion in every arena of life.

The sixth fallacy of agriculture is that manual labor is bad. Berry gives the example of forced migration of bankrupt farmers who become dispossessed of the farms, saying the government wants to convince them that in any case they were just doing manual labour which is not dignified work. However, manual work done on a farm in the company of family and friends may be something beautiful in contrast to working on a machine as an employee in someone else's farm or factory.⁷⁵ Using the hands, manual labour, may become the greatest boon to the American people, many of whom for multiple reasons lead completely sedentary lives. In order to restore ecological equilibrium also, the hands will be the best instrument.

Numerous strategies exist to ease the life of the rural population and the farmers, and to save the ecosystem in which they live. According to Shrii Sarkar, no western or Indian synthetic pesticides, insecticides or fertilizers should be used on the paddy crops, and only the bare minimum amount of copper sulphate spray

should be used. Alternative organic pesticides include neem paste, which can be prepared with neem leaves. Additionally, before planting the paddy, neem oil cakes can be ploughed into the soil.⁷⁶ If insects attack the paddy, then neem paste mixed with urea can be sprayed on the crop. Copper sulphate mixed with urea can achieve the same results.

Fish should be cultivated in the paddy fields during the rainy season and then be allowed to move to the lakes, ponds and rivers. Fish are not for human consumption. They are the natural food of so many animals, birds, crustaceans and other fish. Hence, by cultivating fish in all the water bodies, farmers will be helping to maintain the ecological balance in their community.

Many other agrarian remedies have been provided by Shrii Sarkar. For example, wherever wax gourd is grown, snakes will also be found. To keep the snakes at a distance, *Aristolochia indica* Linn. can be put next to the gourd because snakes do not like the odor emanating from this plant.⁷⁷ Snakes are also afraid of copper salt and will stay away wherever it is used on the ground.

Most of the world's present problems, including hunger, poverty, climate change, loss of biodiversity, water crisis and food contamination, can be traced to disastrous agricultural methods. Political neglect and public neglect, particularly of rural peoples, is a major cause of the problem. While more and more people are moving to cities, it is actually becoming imperative that we return to the rural areas and remove that disconnect between urban and rural. We need to revitalize rural areas and regenerate and support ecological farming. There is no other option now. If we can take this first major step, it will lead us to becoming economically, socially and ecologically sustainable. This is the goal.

Soil loss, sustainability and the search for the socio-environmental "middle ground"

Perhaps the biggest cause of soil loss is erosion, which is caused in great measure by deforestation, as nothing remains to catch the soil and keep it in place. Due to constant rainfall the rains wash away the loose top soil, causing the layer of soil underneath to lose its fertility. Even just a few decades ago in India, abundant forests existed. The forests attracted clouds, causing heavy rainfall, and yet simultaneously bound the soil to the roots of the trees and other plants growing in the forest, thus preventing soil erosion.⁷⁸ Most trees were hence able to preserve the water near their roots. Trees having tightly bunched roots have greater capacity to store water. When the dry season arrives and water levels decline, the trees gradually release the water stored in their roots and thus keep water moving through the soil.

Excessive deforestation over the entire 20th century has caused massive soil erosion. Lack of trees causes the loss of invaluable top soil, greatly reduced rainwater in catchment areas and, as deforestation accelerates, there is increased water runoff to rivers with increased and extensive flooding in both urban and rural

areas further downstream. Due to massive soil erosion there is excessive silting in the rivers; thus, the water has nowhere to go but to flood its banks.

Every year the Nile River, moving northward from Sudan up to the Mediterranean Sea, was the most stunning example of over-flooding due to the silt, black sediments, pebbles and decaying plants, along with phosphate and silicate minerals, which form its geological and biological wealth. These geological materials combined to cause the mighty Nile River to overflow its banks, ushering new life to the plants and human beings that lived along its riparian shores. Unfortunately, today this gift of silt, of sediment, lies trapped in the huge reservoir behind the Aswan Dam, unavailable to human beings or other creatures. In some instances the flooding of rivers provides a great boon to those living on her shores. In other cases flooding causes unbounded destruction of life.

Shrii Sarkar describes central Rarh in West Bengal, which 3,000 years ago was lush and full of flora and fauna, and large rivers.⁷⁹ Even up until 50 years ago dense forests existed. Today hardly any trees stand in Rarh. As a result the animals also vanished and the rivers have nearly dried up. The soil became hard and barren, as it contains hardly any organic material, hence not allowing worms and other micro-organisms to survive therein. Annual monsoon rains cause even further soil erosion and thus the soil layer left exposed is coarse and full of sand. In this scenario, the entire region is now prone to flash floods and severe soil erosion.

David Tillman, Professor at the University of Minnesota, conducted an experiment to back up his claim that greater biodiversity enhances the ecosystem and has many positive side effects, such as protection against drought, famine and the arrival of new species. He marked off hundreds of small plots on the land, each about one square meter. Then he counted the number of plant species in each plot for eleven years, and found that more diverse plots, i.e., plots containing a higher number of species, were more resistant to climate change and invading species.⁸⁰ The higher species number also served to prevent soil erosion and led to greater productivity. Later his findings were distributed by the Ecological Society of America to members of Congress and other federal agencies.

Transforming dry regions into fertile land is the need of the hour, and can be done phase-wise. In the first phase, fast growing trees should be planted, which grow to their full height within six months to two years. Trees which grow rapidly in tropical regions such as India include *cassuarina*, *Albezzia lebbeck*, *Dalbergia*, *Sesbania grandiflora*, *Pandanus andamanensium* (large screwpine), *Moringa oleifera* (drumstick), *Santalum album* (red sandalwood), agave and *Eterocarpus chaplasa*, which is a variety of wild jackfruit.⁸¹ In the second phase, slower-growing trees should be planted. They will provide green cover and after 30 years can be harvested, while the fast-growing trees can be felled after three years, as this will provide income for community residents. For very dry regions jojoba should be planted, as it produces seeds containing oil, which can be used instead of diesel oil. *Acacia Arabica* should also be planted in very arid regions.⁸²

Lakeside and riverside plantations will stop soil erosion, nurture the top soil and provide a steady supply of water year round. According to Shrii Sarkar, five plant types should be planted around lakes: slope plants, boundary plants, wire plants, aquatic plants and surface plants. Slope plants include pineapple, asparagus, aloe

vera, brinjal and chilli.⁸³ These five hold the water in their roots and halt soil erosion. Slope plants should be planted in symmetrical horizontal rows and never in vertical lines, as in this case the water will flow away and lead to soil erosion. Terraces will help to prevent surface water runoff and check soil erosion. In general, all sloping land should be terraced. Mounds and furrows on slopes should be dug perpendicular to the slope.

Boundary plants include palm trees and flower creepers, vegetables and fruits. Palm trees should be planted round lakes. This includes palm trees, coconut trees, Palmyra, betel nut palms, date palms and banana trees. Creepers can be grown together with the trees: specifically black pepper creepers can be planted together with coconut trees, jasmine creepers with Palmyra trees, and medicinal creepers can be planted with date palms.⁸⁴ Brick walls should be planted around the lake with wires running along the top. Plants should be grown along the wires. This includes creeping vegetables such as beans, bottle gourd, pumpkin, morning glory, moonflowers, melon, passion fruit and grapes. Aquatic plants can be planted in the water and include lotus, *Victoria regina*, water lilies and water chestnut. Using these strategies, water can be nurtured, stored and conserved year round. Water tables can be raised to just six meters below the ground or even higher. This is the goal. Hence, aside from check dams, watersheds and drip irrigation, it becomes essential when planning for water conservation and checking of soil erosion to create both river and lakeside plantations.

Watts and Peet state that environmental injustice has the capacity to bring people from all walks of life together onto one platform to oppose and transform the present hegemonic social order. Just like domestic violence is an issue that cuts across all income levels, races, political affiliations and religions, similarly environmental issues cut across all differences and hence have the potential to unite a large mass of people and create a massive social movement for change. It was done in Bolivia, and that means it can be done in all other nations. As Watts and Peet state, it is “nothing less than the way people understand their humanity.”⁸⁵ It is what they also call the socio-environmental “middle ground.” We noted earlier that in India 2,000 organizations comprising a large variety of platforms united on the one platform of saving our seeds, saving our food, and saving food democracy.

Deforestation

Today we see wanton deforestation around the world which has already resulted in drastic reduction of rainfall along with increased frequency of intense flooding, as occurred along the Karnataka-Andhra Pradesh border in India in October, 2009, causing the displacement of 2.5 million people. As a result of deforestation we see areas that once contained lush vegetation transformed into semi-arid and desert lands. The south-eastern portion of the Indian state of Rajasthan is an example. In the words of Shrii Prabhat Sarkar, “We must not forget even for a moment that the seed of destruction of the human race lies in the wanton destruction of forests. No more deforestation should be allowed. Our aim should be large-scale afforestation.”⁸⁶

As Martin Khor informs us, forests everywhere were inhabited by indigenous peoples who practiced swidden agriculture, also referred to as shifting cultivation,

which in fact was an ecologically sound system that created minimal soil erosion and was sustainable for millennia.⁸⁷ The cultivated or cropped area is shifted regularly so that the soil can recover its original re-growth and nutrients. Fields are cultivated for a short time and then allowed to recover for a longer time. Eventually the fallowed land will again be cultivated and crops raised. This swidden agriculture or cyclical farming is called jhumming in India.

Tragically, western companies brought logging to the Third World for export to industrialized countries, or to convert precious forest land (including the Amazonian rainforests) to cattle-grazing land to satiate the American greed for hamburgers.⁸⁸ According to Khor, between 1900 and 1965, half the forests in Third World countries were cleared. Since 1965 the destruction has accelerated with millions of acres either degraded or wholly destroyed. Deforestation has destroyed the lives of literally millions of tribal peoples in India and throughout the Third World.

Many problems arise when trees vanish. Carbon dioxide rises instead of being absorbed by the trees, bringing changes in the earth's atmosphere, including global warming. There comes then a domino effect, as global warming leads to glaciers melting into the ocean which causes rising sea levels (RSL). If RSL comprises just a few feet, say under ten feet, most major cities of the world will be flooded.⁸⁹ Predictions are for much higher RSLs, even up to 30 feet.

Of late we are hearing of plans in America for a new biomass, "renewable energy" electricity plants. More than 100 such plants are already running or approved, and another 200 are in the process of being approved. Thus far new biomass plants are functioning in Maine, Florida, Arkansas, Massachusetts and Georgia. In Oregon, however, Governor Ted Kulongoski has vetoed any plans to move ahead with biomass plants and have opted instead for wind farms.⁹⁰ The biomass facilities use steam boilers which drive generators, which technology has been around for 200 years. However, these plants are not using coal. They are using forests.

The idea is to grind up small trees, cover plants, dead standing trees and fallen debris. It is ecologically insensitive, as every single tree, cover plant, dead tree, and fallen debris have their role to play in maintaining nature's equilibrium. Dead plants and debris are the future oil. Nothing in nature is unutilized. Hence, to strip forests of seemingly less significant parts is a gross error from an ecological standpoint. As Michael Donnelly says, there is no such thing as "waste" in nature.⁹¹ By removing so many parts of the forest, ecological equilibrium is gone. Thirty percent of all bird species use the dead trees as their homes. Without debris soil becomes abnormally compacted and degraded. According to some ecologists plentiful dead trees are a sign of a healthy forest ecosystem.

The very process of extracting natural resources from the Third World and bringing them to the so-called First World causes all kinds of ecological disasters such as massive soil erosion, desertification, water pollution, poisoning from factory toxins and industrial accidents, none of which are monitored by Third World governments or consumer groups as they are in America.

In 1999 20 percent of the world's industrial wood came from tropical forests in Third World countries, but more than 50 percent was exported to wealthy countries. The so-called developed countries keep 80 percent of the world's industrial wood but

import nearly all of the world's remaining timber, not for essentials but for luxury items such as furniture, housing, and even matchsticks.⁹² Meanwhile people in the Third World cannot even find wood to make a fire for cooking their dinner, nor can they find wood for making a simple home to protect them from monsoon rains.

According to Shrii Sarkar, certain plants, such as *Albizia lebbeck benth*, *Dalbergia sissoo Roxb*, the Himalayan white oak, i.e., *Quercus incana Roxb*, and ferns have the capacity to attract rain clouds.⁹³ This fact should be widely propagated so that the plants can be grown in all arid and semi-arid regions of the world. This is also the kind of education that should be taught to illiterate villagers so as to help them to become self-reliant.

A few visionary persons have returned to the ancient Aztec custom of creating forest gardens. It was the late Robert Hart who brought this vision to Britain in the 1960s and gave it its name.⁹⁴ By studying the forests around his home, he rearranged his own garden using the principles he observed in the forest, planting edible layers of perennials that would provide either food, fuel or medicines, and in addition support the wildlife. By planting trees, shrubs, and perennial ground cover and vines, one can create what amounts to a sustainable food, fuel and medicine bank. Hart observed and then created seven layers in his forest garden, comprising roots, ground cover, herbs, fruiting shrubs, dwarf trees, tree canopy and finally tall trees, all of which can co-exist together in ecological equipoise. Vines can be planted to cover walls and fences along the border. One can also plant edible hedges specifically to attract bees and butterflies to the forest garden. Roses can be mixed with rhubarb and beetroot. Figs and quinces can be mixed in with native trees such as beech, oak and holly. Plants and trees that require heavy watering are to be avoided.

As Adam Thorogood, a forest garden expert at the Center for Alternative Technology in Wales says, the concept of clipped lawns and borers should be considered a non-viable option in the face of growing climate change.⁹⁵ With increasingly reduced water supplies, the far better option is the forest garden, which can be planted on even one third acre of land.

The same principles can be followed in tropical regions. Earlier we described lakeside plantations which will greatly help in conserving water. Riverside plantations will serve the same purpose and will serve to prevent floods, regulate the water flow in the river and nourish the soil. Banyan tree, date palms, neem (margosa) tree, tamarind and fruit trees should all be planted along rivers. If horticulture is planted along riverbanks, the rivers will never be without water.⁹⁶ Aside from horticulture, tea gardens can be grown along riverbanks.

The most urgent crisis today is water. We need to bring water back to the earth. The fastest way to do this is afforestation. We need to double the present quantity of surface water, something that can easily be done when there is a decentralized approach to water management. The depth of ponds and lakes should be increased. The second step is to expand afforestation programs around all water bodies. This process can be multiplied by constructing new ponds and lakes and following the same process of lakeside plantations. If these steps are taken, humans will have ample surface water for their use and will not need to tap the subterranean water. While millions of trees need to be planted in every village, as we see from the

example of Anna Hazare's village, we can also create a very careful compendium of forest gardens containing all perennial plants which serve as food, fuel or as vital minerals for the roots of other plants. No one can say that the water crisis is unavoidable. It is manmade and can be completely reversed with afforestation.

Critical Need for Existing and New Wetlands in the Coming Water Crisis

"If it does not rain anywhere on earth for only one year, all life on the planet will be destroyed. This is because all creatures – from the smallest organisms to the largest animals – need water. If there is no water, first the small creatures will die, then the ecological balance of the planet will be lost. Next, human beings will also die, and soon the earth will become a barren wasteland."⁹⁷

Shrii Prabhat R. Sarkar

Wetlands are natural ecosystems, and comprise of areas of land that are wet for at least part of each year. Some wetlands are covered with up to six feet of water the entire year. Other wetlands are underwater only at particular times. In some wetlands water will not be visible on the surface but the soil is completely waterlogged. Wetlands form when either saline or freshwater collects. Water feeding wetlands may come from groundwater or precipitation or from runoff of either groundwater or precipitation.

In wetlands the soil traps the water and causes it to accumulate in the upper layers. The lower layer of bedrock prevents the water from moving down and draining away. Sometimes large pools of water or aquifers form on the bedrock. Large aquifers exist on the Israeli-Gaza border as well as in southeast Libya. The Libyan aquifer is such a huge size that its water moves through large man-made pipes which carry it to the coast and human habitation. Some people call the vast network of pipes in Libya carrying aquifer water to the coast as the eighth wonder of the world.

Wetlands can be found in every corner of the world, and often form at the place where lakes, rivers and oceans meet the land. Certain plants in the wetlands are able to filter pesticides from incoming water, thus keeping it relatively safe for all its inhabitants. For decades or longer, human beings did not understand the importance of retaining wetlands. They cleared away thousands of acres of wetlands to convert the land to farmland or for constructing houses. Later, however, they understood the value of wetlands, and today laws have been enacted which forbid anyone to harm wetland areas. Seasonal wetlands are wetlands that dry up for part of the year. Inland wetlands do not form on the shores of water bodies. They form inland and have some steady source of fresh water.

Only certain plants called hydrophytes are able to survive in the waterlogged soil, referred to as hydric soil, found in wetlands. Some hydrophytes such as pondweed are completely submerged in water. Floating hydrophytes such as water hyacinths and water lilies lie on the surface of the water. The leaves of the lily take in carbon dioxide, which moves down the hollow stem to nourish the roots. Emergents

refer to plants such as cattails, rushes and reeds, which have their roots in the soil under the water but the actual plant grows above the water.⁹⁸ They resist the water, causing the sediment being carried by the water to remain on the bottom and collect around the roots. This process of terrestrialization enables new plants which can live in shallow water to take root and grow.

Animals abound in wetlands, ranging from microscopic to large reptiles and mammals. Crustaceans such as crabs, shrimp and crayfish can also be found, along with birds, rodents, snakes, turtles, frogs and salamanders. Each part of the wetlands ecosystem must be preserved, as if one part is disturbed or destroyed, the entire ecosystem loses equilibrium and more parts will die.

The four main types of wetlands are marshes, swamps, fens and bogs. Freshwater marshes are found on the edges of lakes, rivers and ponds. They are covered in water year round. Marsh ecosystems support a large variety of plant and animal life, including fish, birds, mammals and reptiles..

Swamps are wetlands where trees are able to grow, as the water is shallow due to built up sediment and during the warm season the water may dry up completely. In temperate climates certain trees such as ash, oak, maple, elm and cypress can live and survive in swamp areas. Mangrove swamps are coastal saline wetlands and usually form in tropical areas. They comprise of emergent plants and a large variety of mangrove trees, which often perform a critical role in buffering incoming tidal waves

Fens are wetlands with shallow water levels and waterlogged soil, and often comprise of dips in the land which cause water to collect and remain.⁹⁹ Grasses and sedges often cover fen wetlands due to the shallow water level. Bogs are wetlands that receive water only from precipitation; hence, they form in areas having heavy rainfall and often with snow and cooler temperatures. Surface water may not be visible but underground water is deep. Bogs are generally acidic and hence few plants grow therein. Dead plants and animals break down and form layers at the bottom called peat, which stores large amounts of water and oxygen.

Wetlands are critical for the earth. Their plants filter pollution from the water. More particularly they reduce flood damage by absorbing large amounts of rainfall. They provide a safe habitat for thousands of endangered species. In any part of the world where wetlands have developed, it is essential for humans to preserve and protect them.

The population of Gambia, a small country on the west coast of Africa, sustains itself by planting rice and other vegetable crops year round in the vast expanse of wetlands that cover two-thirds of the country. Gambia is a small narrow strip of land about 14-30 miles wide and 300 miles long, which encloses a low-lying river basin that gradually rises to a plateau of about 100 meters.¹⁰⁰ The plateau forms one third of the country. The remaining two third of the land is used for cultivation of millet, sorghum, maize and peanuts. Rainfall varies greatly from season to season, and consequently the people have developed lowland farming in the wetlands which continues year round. It is due to the Gambian wetlands that the people are able to survive and have rice and other crops available to them. Wetlands water comes from the alluvial plain which is flooded by rivers as well as inland swamps which receive water from high water tables, artesian wells (aquifers) and occasionally tidal

flooding.¹⁰¹ The lowland swamps are best suited for rice growing, As the local people understand their value, they have been cultivating wetlands since the 17th century.

According to Shrii Sarkar, subterranean water should not be used for irrigation, as its use will cause the water table to fall, leading to acute water shortage. Rather, everything possible should be done to create more wetlands which will raise the water table, as we see in the village of Anna Hazare. The best system, hence, is to collect the surface water and the rainwater. All rainwater, even from drizzles or light showers, should be caught at the site and stored for later use.¹⁰² We know that in Libya the great man-made river of huge pipes has been constructed taking huge quantities of water from the huge aquifer under the desert in southeast Libya up to the coastal area full of human habitation. As a consequence, all water holes in the vicinity of the aquifer have dried up. Shrii Sarkar says that more harm than good may result in the emptying of underground aquifers. The solution then is to study all ways of catching rainwater and conserving the surface water, creating more and more wetlands.

The nature of wetlands is to hold water, and water shortage is the coming global crisis that no one seems to talk about. In India 80% of fresh water is used for agriculture. However, in the summer of 2009 monsoon rains failed, leaving disaster in its wake as farmers crumpled up in desperation at their failed crops, many of them committing suicide. The demand for water in cities is expected to double by 2025. The fresh water that presently flows through cities has become heavily polluted with both industrial and human waste. Since 1999 Nacharam Lake in Andhra Pradesh is heavily polluted with barium, nickel, copper and zinc coming as waste from nearby steel. Chemical and other industrial plants.

The Himalayan glaciers are melting due to global warming, and some climatologists predict they may vanish altogether, in which case how will the waters of the Ganges and other great rivers of India be fed? In some areas such as the Gangetic basin the water tables remain high and hence water is available to all. In other areas such as Telangana, severe shortage prevails, and one man having a deep well may pump up water causing his neighbours to go without. Some may call it the tragedy of the commons, where the short-term goal of one person is satisfied at the cost of the long-term goal of many. The examples above simply indicate the critical urgency of maintaining and increasing wetlands.

On July 7, 2009 the Brihan Mumbai Municipal Corporation in Mumbai, India implemented a 30 percent water reduction for all residents. (how many residents?) On December 3, 2009 a huge rally of angry citizens, under the umbrella of the NGO 'Swabhimarn', marched on the Corporation demanding water.¹⁰³ They pulled down barricades put up by the police and attempted to go into the Corporation headquarters; hence, they were lathi-charged by the police. One man died and hundreds more were beaten. The Corporation had again recently implemented a 15 percent reduction in water supplies, claiming that lakes in the city were going dry.

The prime known cause of drought is deforestation, the wanton destruction of plants and trees. With deforestation there are no longer plants which can nurture the soil. In forests, as we mentioned earlier, the roots will keep the soil and water both amidst its roots. For example, during the dry season in Bengal, one will see water trickling down near the fields. That water has been released from the roots of the

standing crops. Once the crops are harvested, the water dries up. The problem of deforestation has been caused by human beings and can easily be resolved by human beings.

Constructing deep tube wells is not the answer to drought, even in desert conditions. Tube well irrigation causes the water table to drop. In some parts of the United Arab Emirates the water table is 1,000 feet below the earth, which is an untenable situation.¹⁰⁴ However, the local Bedouin do not know of other solutions. The water table is so low there despite the fact that they are careful to conserve water on their farms in the desert and use only the drip irrigation system. Even the date trees are irrigated with drip irrigation.

The water table in any community should remain above 20-25 feet, as in this case surface vegetation will not suffer. If the water table drops below even 50 feet, however, the surface of the land will dry up and gradually turn into a desert within 50 years.¹⁰⁵ Elsewhere herein we have mentioned that if there is one deep tube well from which water is regularly drawn, it causes neighbouring shallow tube wells to dry up, leaving neighbours without drinking water.

In certain deep tube wells harmful elements such as heavy minerals and mineral salts mix with the water, causing salinity. In this instance the land irrigated with such water will become unfit for farming. Deep tube wells can be used on a temporary basis only until more sustainable water conservation methods can be built which have no deleterious effects on the surrounding environment. These include river and reservoir irrigation, small check dams, ponds, canals, lakes, shift and lift irrigation. We need to always remember that when starting any sustainable community, as Anna Hazare also understood, the first order of work is the water supply and creating all kinds of water conservation projects, including wetlands.

A Coherent Model Reflecting Ecological and Economic Equipose

In November, 2004, environmental experts met in Helsinki, Finland to discuss the problems of indigenous peoples in relation to the environment as well as the absolute need for ecological democracy. In Brazil the rubber tappers in the Amazon rainforests are fighting year-round with the mega-agri-corporations and up to ten activists are killed every year.¹⁰⁶ In Kenya the production of flowers for export has been snatching more and more land from the poor peasants and leaving their water polluted and the peasants and their families covered in rashes.

Activists insist that we cannot separate ecological issues from participatory democracy, or ecological democracy as they refer to it. It means that the peasants themselves, the rubber tappers, the activists on behalf of the poor, must have a voice in the decision-making of what happens to their local ecologies. Second, as activist professor Thomas Wallgren pointed out, we should avoid “green paternalism”¹⁰⁷ and should instead seek to analyze global power structures and likewise demand greater ecological democratization. “We can bring in the best World Bank experts to give advice on how best to tackle the problem but that is not sufficient unless we involve the people affected by the problem,”¹⁰⁸ he said at the meeting.

In an interview with Russell Schoch for the *California Magazine* (June 2001), Chilean native Miguel Altieri, Professor of Entomology at University of California, Berkeley, described a beautiful model demonstrating both ecological and economic equipoise. He calls it “agroecology” or “sustainable agriculture.”¹⁰⁹ He explains that in 2001 one sixth of the global population faced starvation. He asked, what has the Green Revolution accomplished in this scenario, and furthermore, what is the present Gene Revolution accomplishing? Where is the change? Where is the final removal of poverty and production of food abundant enough to feed the world?

While Altieri studied in the United States, clearly his heart was very much in South America, as he gradually understood that the ancient agricultural systems of the so-called illiterate, impoverished farmers produced better results than either the Green or Gene Revolution propagated with endless arrogance by western agriculturalists. According to Altieri, western agricultural methods cannot deal with Third World agriculture, primarily because they are unsustainable. His predecessor at University of Berkeley was Robert van den Bosch, author of *The Pesticide Conspiracy*,¹¹⁰ often touted as the successor to Rachel Carson’s *Silent Spring*.¹¹¹ Altieri also informs about the growing divide between wealthy farmers producing export crops for the north and poor farmers who struggle to produce subsistence crops for family and community. Amazingly, the poor farmers, having ageless wisdom passed on through generations, are able to utilize semi-arid and non-fertile soil and grow very productive crops with high yields, higher than land using biotechnology, pesticides and imported fertilizers. Spending six months of every year working with poor farmers in Latin America, Altieri knows whereof he speaks, which is predominantly about sustainable agriculture. His textbook, *Agroecology: The Science of Sustainable Agriculture*, is a guide for people around the world.¹¹²

Thousands of Third World farmers already use integrated pest management, crop rotations or cover crops and releasing of beneficial insects which protect their crops by up to 30-50 percent and eliminate the need for pesticides.¹¹³ Americans along with other western nations have the end goal of controlling or dominating nature. Third World farmers never think along these lines. Their attitude is to live with nature and work within its laws. Thus, the Third World farmers have long understood the meaning of ecological and economic equipoise.

An example of ecological and economic equilibrium on a micro scale is the people-driven development work of Anna Hazare in his village of Ralegan Siddhi in Maharashtra, India. After fifteen years in the army he obtained early retirement at the age of 35 and dedicated the rest of his life to bettering his village and the lives of its inhabitants. The first thing he did on his return was to use his pension money of Rs. 20,000 to renovate and restore the temple, realizing that the village temple is the hub of village life – its cultural life as well as spiritual life.

Twenty percent of the villagers were well-to-do farmers with stable incomes. The remaining eighty percent were poor farmers who lived at the mercy of nature, specifically the rains. Hazare understood that this was the most immediate problem to solve. He convinced the villagers to build embankments on the hills to catch the water and also stop the soil erosion that was rendering their lands infertile. Essentially, he created wetlands all around the village, which caught and held the rainwater and sediment, and raised the water table. Then he utilized the drip irrigation system to water many of the crops. He convinced the villagers to engage in

massive afforestation. Anna Hazare was not a learned man or a scholar. He studied only up to 7th standard before joining the Indian army. He realized these solutions intuitively, we can say, and moved forward to carry them out. He convinced the villagers to manage the rainwater runoff through watershed development and then build multiple check dams.

Once the basic economic status of every villager was stable, he moved on to change the entire culture and morality of the village. He called them all to the temple and convinced them to take an oath that alcohol will be banned henceforth from the entire village. Taking this oath inside the temple created a moral and spiritual significance for the villagers. Directly thereafter eighty percent of the liquor stores shut down. The remaining 20 percent were smashed to pieces by the youth group that always carried out the decisions of the villagers as suggested by Hazare and then voted on by all. If any villager was found drunk more than three times he was tied to a pole and flogged, i.e., humiliated in public to create social pressure so as to compel him to mend his ways. The next step was to persuade the villagers to collectively agree to ban cigarettes, tobacco and beedis (local Indian cigarettes made with leaves) from the village. Then even stealing was forbidden. If a single fruit was stolen from a tree, the thief would be tied to a pole and the stolen fruit hung in front of him, again as a social humiliation and pressure to reform and follow the expected code of morality. Thus using collective decision-making and collective social pressure, Anna convinced all the villagers to raise their own moral standards, their own moral conduct.¹¹⁴

What Anna Hazare did was to create a village revolution. He transformed his village. To do that he had to bring together all the villagers, irrespective of whether they were well-to-do landowners or untouchables, Hindu or Muslim. He involved all sections of society such that no one was left out. All participated in the village meetings, and all voted. Through the force of his own personality and his love, he created that middle ground and caused every individual in the village to accept his proposals, as they had become convinced that whatever he proposed would lead to the betterment of themselves and the entire ecosystem. His ideas when carried out by the villagers themselves caused the village to be completely sustainable both economically and ecologically. But as we see, the definition of sustainability went far beyond economics and ecology, as he sought and succeeded in uplifting his village family culturally, morally and spiritually.

Hazare has received countless awards and honours over the past twenty years. Now he has moved to other villages to create the same transformation. As he says, you cannot change a village without transforming every individual in the village, and you cannot change a country without transforming all the villages. He also clearly says that you cannot bring about rural development without simultaneously evolving social and economic development. The two must move forward together, hand in hand.

B. Mishra, in his study of Hazare's Ralegan Siddhi Village as a model of participatory watershed management, opined that Anna Hazare's work showed the success of a Gandhian approach to people's participation in watershed management.¹¹⁵ It resulted in the collective decision of all 325 families in the village to renovate the temple, ban alcohol, undertake water harvesting via constructing four watersheds, construct check dams, again to harvest the water, and plant half a

million trees to establish a forest. They implemented controlled grazing, and via building embankments raised the water table from 20 meters to 6.5 meters. They made solar street lights, village toilets, used biogas as fuel, started organic farming, began keeping livestock, built the first high school, and above all they institutionalized the system of collective decision-making. Anna created village assemblies called Gram Sabha, in which all participated. As mentioned earlier, they voluntarily accepted and implemented higher moral standards, and created both voluntary organizations as well as action committees to ensure implementation of items voted.

Without spirituality, he says, education will not bring about permanent development, with development being defined herein as socio-economic and spirituo-cultural upliftment. Again and again he emphasizes that education alone will not bring development or progress. It must be taught alongside cultural instruction and spiritual way of life. On the one hand the ideas and innovations he implemented in the village were simple and straightforward. On the other hand, if they were to be analyzed by Peet and Watts, those same ideas and innovations would be found to encompass the entire gamut of liberation ecology, including politics, economics, anthropology, sociology, social work, spirituality or religious studies, philosophy, environmental studies, geography and geology. His work is a superb model of economic, ecological and cultural equilibrium, achieved by seeking the middle ground, gathering the collectivity, and moving forward together with implementation. Integration of three factors are required for sustainable development, including recognition that human beings are interlinked with all other creatures of the earth; development is not about growth at all costs but rather about rendering human lives more harmonious and enjoyable; and there are thresholds of irreversibility which neoclassical economists never acknowledge but which are acknowledged by ecologists.¹¹⁶ Thus it might be correct to say that the Green Revolution saved countless lives for the short term, but it should have been recognized, in view of the horrendous harm it did to the ecosystem, including human beings, that it was a short-term solution only, not a long-term solution.

Shrii Sarkar provides concrete, constructive information in his discourses on farming, agriculture, horticulture, afforestation and many other topics. For example, he tells us that the stems of the okra can be used to cause the pineapples to produce fruits and flowers. If the stems of the okra are burnt and scattered in the field of pineapple trees, the fumes and smoke will rise up and help the pineapple to produce fruit and flowers simultaneously.¹¹⁷ He provides detailed information on inter-cropping or mixed cropping. As an example, he says, if the land is extremely rocky and there is no soil, then soil should be brought from elsewhere so that palm trees and custard apple (sitafel) saplings can be planted in between mulberry plants. If the soil is of somewhat better quality, then date palm and again custard apple can be planted between the mulberry plants.

Shrii Sarkar discusses lac culture or lacquer produced by insects grown on trees. In apiculture bees can produce honey and pure beeswax from many flowers. This would include wild bees such as the wild rock bees and bush bees, which can be domesticated. All bees should be welcome in community gardens. Bee boxes can be placed near oil seeds, flower gardens, neem (margosa) trees, Indian olive trees and grape plants.¹¹⁸ I would venture to say that if all of Shrii Sarkar's ideas for sustainable development are implemented, then that community would experience

ecological equilibrium, due to the deep respect for nature that is integral to the neohumanistic philosophy of Shrii Sarkar, and economic equipoise, due to the vast number of products suggested by him that can be made from the various plants.

Ecological and Social Strategies for Building Sustainability

As the Great Depression of the 21st century begins to take hold of the world, we can expect many things. Accelerated unemployment already stares us in the face, in every country. Mortgage foreclosures are skyrocketing, particularly in the source country of this Depression, which is the United States. We see credit card defaults, corporate and personal bankruptcy, poverty, unmanageable debt, domestic violence, child abuse, increased alcoholism and drug abuse, crime, homelessness, prostitution, divorce, abortions, child abandonment, gambling, sexually transmitted diseases, malnutrition, spiralling mental illness, suicide, excessive demand on charities for food and shelter, and finally a growing disregard for authority due to the rage and discontent brought on by the utter helplessness of poverty.

To add insult to extreme poverty, we will see accelerated inflation such that even the basic essentials, including food, water, clothes, heating oil, electricity, phone and internet connection will become out of reach for millions. If this scenario lasts for an extended period, there is a real chance of civil unrest and resulting imposition of martial law. All these point to the absolute urgency of returning to an ecological lifestyle, if necessary moving to rural areas and learning new ways of becoming self-sufficient. It points to the absolute necessity of creating sustainable communities where people will control their own currency, their own agriculture, their own education, and can even get off the corporate electrical grid and produce their own energy, so that in no sphere will the common people be dependent on private corporations and governments for their survival.

William Greider wrote a book called, *Who Will Tell the People?* Here also, I want to ask the question, who will tell the people? The times are too serious and the urgency is too great not to tell the people what is required today for survival and for both short and long-term sustainability. We need to return to our ecological and agricultural roots. We need to embrace the most simple of living standards so as to survive the coming financial devastation that will have no mercy and may spare no one. Let us again discuss concrete steps on the path to economic and ecological liberation.

Altieri in his research focused on mixed cropping or poly-culture and discovered it being used maximally in Latin America. A very refreshing stance of Altieri is that he does not support the Malthusian concept so widely propagated that human population must be controlled to solve the problem of food shortage.¹¹⁹ According to Altieri, which identically correlates with the stance of Shrii Sarkar, there is plenty of food on the earth, or can be, to feed even nine billion people. It is all about access and distribution. As he points out, a vast majority of grain including soybean are raised for animals in America. Huge swathes of land are occupied for this purpose. The end goal is the slaughter of all those animals to become food for humans. If instead all the grains presently fed to animals were fed to humans, there would no longer be hunger on the earth.

In a Prout-based sustainable community, animals will never be slaughtered, nor will they be sold for slaughter. Instead, prosperous dairy farming can be done having milk production from dairy cows, goats, sheep and buffaloes. Milk powder and dehydrated yogurt can be produced and sold after giving to all the community residents.¹²⁰ In a PROUT community all animals are to be loved and nurtured as per Shrii Sarkar's philosophy of Neohumanism which propagates the concept of universalism, i.e., loving and respecting not just other human beings but all creatures and even the inanimate objects.

According to the PROUT economic model, there is no such thing as a population problem. Population growth will automatically find a natural level if the following four factors are present: (1) Purchasing capacity of the people should be high so that they enjoy a good standard of living. In such a scenario overpopulation will not take place. (2) Everyone should have sound health and a balanced glandular system so as to transform their physical energy into psychic energy; In this scenario also, overpopulation will not occur. (3) People should be free from worries and tension, as when the mind is free from mental agony, people can enjoy peace and assimilate more subtle ideas. (4) The intellectual standard of people must be continually elevated, as with intellectual emancipation people will gravitate towards their spiritual potentiality.¹²¹ These factors demonstrate that population growth is not simply economic, it is also biological, psychological and intellectual.

The deeper problem today is that capitalists continue trying to check population via birth control because a greater population is detrimental to capitalism. However, in a collective economic structure such as PROUT, birth control will not at all be emphasized. Rather, it will be acknowledged that a growing population will help in producing essential commodities. Furthermore, vast food resources have been found on the ocean sea bed, which can be harnessed to meet any challenge for food. Through rational distribution of these resources, there will be no food problem and all of humanity will be fed and nurtured. Imposing a fear of population growth is simply a conspiracy by vested interests to exploit the common people. Those who understand this point should unite to expose this conspiracy and work to create an economy wherein rational distribution of food and other resources will be the first priority.

Joshua S.S. Muldavin discusses the value of allowing peasants to engage in long-term decision-making processes alongside short-term market decisions. This process is a unique social mechanism that builds both resilience and sustainability as the collectivization is utilized by the poor peasants to spread risk and increase their efficiency and power.¹²² It is in marked contrast to the growing individualism that invariably accompanies a market-driven economy such as China has become. China is a hybrid mix of command and market economies which Muldavin calls a new form of "micro-feudalism,"¹²³ referring to the local government protecting the peasants and ensuring that their needs are met while simultaneously guaranteeing a comfortable surplus for themselves.

Yet, we read in the newspapers about constant strikes and protest demonstrations by Chinese peasants, which are often brutally suppressed. It means that their basic needs are not being met by this hybrid economic mix. Rather, the problem of market triumphalism has simply been replaced by socialist-market triumphalism. A better paradigm is required for the common people, in this case for

the suffering farmers in China. The collectivization of the farmers is a step in the right direction, but thus far they did not see justice. The emerging paradigm must simulate the Bolivian paradigm, with the masses taking matters into their own hands and making their own collective decisions related to justice, related to meeting their basic needs and related to exactly what is required by a local government. If nothing is required, then let the bonus or dividends be churned back into the collective for their proper utilization and rational distribution.

The collective group of farmers in any given area can also decide together not to dismantle their collectivity, not to shift from command economy to market economy; they can decide collectively to run their companies or factories as cooperatives which they alone control. Hence, by remaining united and refusing to shift over to individual production units as in a market-driven economy, they can avoid the severe ecological consequences that could lead to non-sustainability of their society.

In a Prout sustainable community, self-reliance is the key in farming. Local farming should not be dependent on outside resources. Rather, it should be integrated with all aspects, such as “agriculture, horticulture, floriculture, sericulture, silk culture, apiculture, dairy farming, animal husbandry, irrigation, pisciculture, pest control, using organic fertilizers, cottage industries, energy production, research centers and water conservation.”¹²⁴

Water conservation, irrigation and afforestation will be critical and will be the first work to be done when creating any sustainable community because unfertile soil along with arid and semi-arid soil can become fertile with regular water and other strategies. Fish should be cultivated in all bodies of water, including lakes, dam reservoirs and ponds, because they help to conserve and purify the water. Small fish should be cultivated in paddy fields during the rainy season.

If a community includes all these projects in an integrated style, then it will become self-reliant, i.e., sustainable. In Bengal, as an example, it means growing staple crops, which include various pulses, cereals, coarse grains, oil seeds, sugar and vegetables. Pulses provide protein to humans and nitrogen to the soil. Cereals include rice, wheat, corn, oats, barley and rye, also millet, sorghum and buckwheat. Oil seeds include mustard, soya, sesame, linseed, safflower and sunflower. Here we are not referring to any biotechnological or genetically modified version of soya and other products, as we have already established their danger to humans and the entire ecosystem. Sugar crops include sugar cane, sugar beet, date palm and palmyra. Many medicinal plants can be grown in Bengal¹²⁵ and other tropical areas as well as in temperate climates. Still other crops such as coffee, cocoa, tea and rubber can be grown, along with seasonal vegetables.

Fruit and vegetable gardens should be created in every community. Raw fruits and their juices cure many diseases and can also be cooked and made into jams, jellies, marmalades and chutneys. Flower cultivation should also take place in every community. Tube roses, for example, can be sold all over the world just like roses are today. Essences can be made from jasmine, magnolia and other sweet-scented flowers, and from those essences more products can be made. According to Shrii Sarkar, the floral nectar from the lotus can be used for many eye diseases and particularly for retinal detachment.¹²⁶ Honey can be made from the flowers of the

lotus, lily and the cotton tree. Floral nectar should be produced from floriculture using a dropper or syringe. Floral nectar and honey can be sold at high prices in the market due to their medicinal value.

Societal Changes to Enable Ecological Liberation

On November 25, the New York Times published a story quoting Michael Mack, the chief executive of Syngenta, a Swiss-based agri-corporation that produces pesticides and seeds, as saying that organic foods are harmful and destructive to human life because they use up 30 percent more land to obtain the same yield as non-organic crops. He added that this percentage will vary from crop to crop. But the damage of his words is done. His words are published in the New York Times and millions of people believe what is written in the New York Times. This author cannot find any source or scholarly reference anywhere to substantiate this wild claim on the part of Michael Mack.

Mr. Mack further stated that pesticides have been proven safe and not harmful either to the environment or to humans,¹²⁷ as they have been certified and approved by both the FDA (Food and Drug Administration) and the EPA (Environmental Protection Agency). Yet, how many of those very pesticides have finally been banned for use in the United States, after countless court cases showing their irreversible damage to human health, and then shipped off to Third World countries such as India, to be used in extreme excess by illiterate farmers who have no clue as to the hazards of their use?

We can see from the above that a large part of the problem is lack of education because agriculture has become so politicized with heavy stakes involved for agri-corporations such as Monsanto, Syngenta, Cargill, and other conglomerates who are only looking at cost-benefit analysis or pure economics, as opposed to seeing the agricultural scenario from an ecological, societal and ethical stance or, as Faber might say, from the point of view of justice. Ecological economists like Altieri will walk into conferences with their on-site data while agri-corporations with CEOs like Michael Mack will walk into the same conferences with an entirely different and conflicting set of data, always supporting their products such as GM seeds, synthetic fertilizers and pesticides.

Clearly, the distinguishing feature between ecologists and economists is the factor of ethics or justice. When we bring ethics into economics, then it is no longer about cost-benefit analysis. It becomes an issue of whether any action taken will harm anything: will it harm humans, or will it harm the animals and plants? The entire ecosystem is taken into consideration.

Not only is this a problem of economics versus ecology, it is a problem of a highly exploitative, profit-driven economic model called capitalism. In capitalism only profit is considered. Externalities and spill-over effects are irrelevant to a capitalist. Capitalists are represented herein as the owners and CEOs of agri-corporations who do not hesitate to lay waste to a region via chemical pollution or exhausting its water supplies in the name of corporate profit. So the issue is not only one of moving from economics to ecology, or ecological economics. It is also an issue of moving from an immoral, inhumane economic system to a kinder, gentler and sweeter economic

system that has morality at its core. The morality stems from putting human, animal and plant life at the very top of the pyramid, and putting other issues further down the pyramid. The morality further stems from an internal oath taken by every spirituo-moralist to never harm another living creature.

Hence, the problem is about education that teaches past profit and loss and towards ecological-societal equilibrium. It is a daunting task because in university departments of agriculture, for instance, biotechnology and GM crops will be propagated as far superior and without human or environmental side effects. We need to remove both corporations and government from interference in universities so as to allow objective research to take place where students can absorb the actual facts surrounding corporate agriculture, which is presently designed for maximum economic gain and minimum societal gain.

As Altieri, says, we are talking about different world views, one bent on profit at all costs, the other bent on eradicating hunger from the face of the earth. This can be done simply by empowering the farmers, working with them collectively, sharing and studying their ancient wisdom and augmenting that wisdom with our own knowledge. This is not a difficult thing to achieve. It is already being done in communities around the world.

What needs to happen is that western industrialized nations need to vastly cut back on their consumption and seemingly unlimited demands for material goods. It is time that the entire economic and financial order be rebuilt from the grassroots, such that developed nations cease with their irrationally high consumption simply to maintain demand and keep the capitalist economy grinding away. The biotechnology developed over the past 40 years in America primarily needs to be thrown into the waste bin of history and replaced by the sound, ancient, traditional systems of ecological agriculture utilized still in some areas of the Third World which have managed to escape the havoc of American biotechnology. In other words, we must return now not only to traditional ways of growing our food but also to living and working together as communities, because this worked very well for millennia, and it is not too late to restore the beauty of those natural systems which are bathed in ecological equilibrium.

Unfortunately, it is difficult to imagine that the industrialized world will voluntarily give up all its luxuries and adopt a simpler life pattern. However, it is possible that the Great Depression presently bearing down on the world may bring newfound humility in America and other western nations as the entire financial system collapses around them and they are compelled to struggle for subsistence and finally then start to learn from so-called Third World farmers the beauty of economic and ecological equipoise, which is to be gained not by controlling nature but rather by working and breathing within its boundaries. As Altieri points out, science is the result of a particular society. It is not absolute. Hence, we have to go into each society and learn new ideas, new scientific methods, new agricultural practices, new ideas in ecological economics and methods of sustainable living which are not at all new but which have been passed down through generations of farmers.

In America only two percent of the population are engaged in farming. This creates a severe and unhealthy imbalance in the economy. As mentioned earlier,

according to Shrii Sarkar, in a properly functioning economy about 30-45 percent of the people should be engaged in agriculture while the remaining population should be employed in industries or other sectors such as the service sector.¹²⁸ In India more than 70 percent of the people are engaged in agriculture, which puts undue strain on the economy as many remain unemployed for most of the year. It causes great waste of human labor. The unemployment problem arising from an excessive number of people engaged in agriculture should be solved immediately.

A simple solution to the problem of excess agricultural employment is to engage many of those farmers in agri-industries such as clothing industries using silk, cotton and other natural materials. There would also be ample scope to produce materials for the housing industry, including lime and cement production using local materials.¹²⁹ Another area of development for excess agricultural workers could be in producing educational supplies, such as pens and paper and book production. Production of medicines will also be a large manufacturing base as knowledge of indigenous medicines becomes industrialized.

A very important task ahead is to remove the arrogance from the American mind, including amongst its agricultural researchers and scientists. Removal of arrogance, i.e., the assumption that all things, all ideas, all plans, must originate in the United States, can go a long way in their learning practices that have worked for generations and that work better than the Green and Gene Revolutions combined. American agricultural scientists need to move past the organic gardening practiced in the US and take a big step towards the traditional, ancient farming methods which by their very nature are organic and maximally safe for human consumption. American standards for organic farming are irrelevant to Third World farmers, who have their own standards which are to be respected. Third World farmers already practice a bottom-up approach and have little interest in the top-down approach presented by visiting American agriculturalists. Again, it is about accepting the ancient wisdom of Third World farmers and augmenting that wisdom with agro-ecological knowledge along with sociological, anthropological and other fields of interdisciplinary knowledge so as to maximally utilize natural resources and arrange for their rational distribution to the common people.

In both first, second and third world countries we need to move away from luxury items (though how that is defined will vary from culture to culture) and focus on providing everyone with the basic essentials of life. We can do that by providing them food crop production, housing and health care, along with clothes and education. An accelerated reduction or complete elimination of biotechnological practices must take place in order to preserve what little remains of the earth's biodiversity. We can work towards creating self-sustaining communities which, due to their self-reliance, will lead to global income redistribution along with resurgence in traditional, indigenous agriculture. As this process takes place, Third World people can become tough with industrialized countries and compel them by force to import only those goods that maintain the ecological equilibrium of the developing country and that enhance sustainable development. Third World people must acquire the legal and military power to send ecological criminals, be they corporations or outside government institutions, out of their country. It is the duty of all of us to help them to gain this strength.

Michael Watts and Richard Peet theorize that liberation ecology can refer to a coalescing of many movements into one major social movement. It can also be defined as an intimate relation between society and nature. It is about humans seeking to understand, rather than control, nature and then studying and seeking to find ways to stem ecological degradation and call that solution, that path, as development. Liberation ecology also refers to the “liberatory potential of struggles and conflicts exactly around these processes.”¹³⁰ Liberation ecology, they write, is about understanding western reasoning and rationale, but moving beyond towards a new, democratic kind of reasoning, one that is in the public domain, one that involves participatory democracy, one that transforms both social and natural systems. It means moving beyond the typical concept of Western development and onto something different, onto alternative concepts towards the environment and our place in it.

A great flaw in the mindset of Watts and Peet, however, is that they shun the open idealism of people like Dr. Vandana Shiva and so-called green movements spreading across Latin America.¹³¹ We need to move past sceptics clearly bogged down by intellectual abstractions and join hands with people creating a love revolution on this earth, and by love revolution I am referring to those very people like Vandana Shiva, Miguel Altieri, Prakash Singh Raghuvanshi, Shree Padre and countless other unknown and unheralded farmers and ecologists who, through their life work, are moving to create a utopian society on the earth. All we need to do now is to spread their knowledge and imbibe their commitment to bettering the human condition.

Wendell Berry says that humans cannot live separately from nature, yet if we live inside it, we insist on changing it. However, he says, all creatures do this. So what we call nature is the sum total of changes made by humans and all other creatures on natural forces. Nature is unique because of each and every bird and animal. It could be the hummingbird or the ants busily moving about in the soil. Each and every creature brings uniqueness to nature. And as Berry says, “The making of these differences is the making of the world.”¹³²

In January 1990 the Committee for Sustainable Agriculture met in Colfax, California to draft the Seven Challenges of Sustainable Agriculture, which were then unanimously approved by the 800 delegates attending the 1990 Ecological Farming Conference a few days later in Asilomar, California. One of the key points in the Declaration was the decision to convince agencies in the US, such as the Agency for International Development (USAID), the World Bank, the World Trade Organization and the IMF to start promoting sustainable agriculture.¹³³ Community Supported Agriculture (CSA), Local Employment Trading Systems (LETS) in the US and Europe are clear signs that the American ecological movement should be wielding its influence on global institutions to make this critical switch.

Pondering the work of Anna Hazare can cause us to understand that his work was extraordinary. It was not just about ecology. It was about a complete societal transformation, a moral, cultural and spiritual revolution in every individual of the village. As he said, nothing less was required. Anyone can build a check dam or watershed to catch the water. Anyone can plant even half a million trees. But how many people can change the moral conduct of 325 individuals as Anna did, and raise that conduct to ever higher levels? How many people can create a societal

revolution? The problem today is that while he carried out his vast transformative work from the age of 35 to his present age of 69, there is no one to replace him, no one who has his moral-spiritual vision and love. It tells us that the urgent imperative of today is to create great leaders who will become Anna number 2, 3 and 4, who will create more cultural revolutions in more and more villages until the entire country is transformed. How to create those leaders? How to imbibe the qualities of deep love for the people, particularly the weak, suffering and helpless people, the women, and the intense and life-long self-sacrifice? These questions remain to be answered in this author's mind.

As we search for sustainable development bereft of ecological destruction, we should acknowledge that the new, ecologically sound societies originated in the Third World and will be regained there also. In other words, it is the Third World people who will lead the way towards planetary ecological equilibrium. We need to hark back to traditional, indigenous, agricultural practices and give renewed importance to agriculture as the bedrock of our lives. It will be the first step in a continuing process of development, which will include adopting ecologically secure policies to meet everyone's basic necessities in the areas of water, food, clothing, shelter, health care, education and information. We can collectively decide which products are essential, useful and safe for human adaptation, always bearing in mind that the entire planet of people must be taken care of in an equitable manner. No one is to be left behind. An ideal sustainable community will incorporate even more than the above. It will incorporate not just ecological and economic equilibrium. If along the lines of Anna Hazare we can create a moral revolution in our own community, then there is nothing stopping us from expanding that to a global moral revolution. From every standpoint, political, economic, social, cultural, moral and spiritual, we need a total transformation. The ideal community should not merely be physically sustainable, it should be sustainable in every other aspect of life as well. Hence, the work of building such a community is never-ending. In the words of Shrii Sarkar:

“Human movement is movement towards ecological equipoise – towards the supreme synthesis. In the inner world, balance must be maintained as this leads to spiritual progress. Ecological order is not only for the earth but for the entire universe, and it must be maintained both within and without... balance must be maintained between the internal and external spheres. In all aspects of human life this subtle balance must be maintained. This is ecological equipoise.”¹³⁴

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