Food and Climate Change: a Perspective

.... if modern agriculture continues to follow the path it is on now, it's finished. The food-growing situation may seem to be in good shape oday, but that's just an illusion based on the current availability of petroleum fuels. All the wheat, corn and other crops that are produced on big Maerican farms may be alive and growing, but they're not products of real nature or real agriculture. They're manufactured rather than grown. The earth isn't producing those things, petroleum is!
-- Masanobu Fukuoka[i]

Climate Change and Agriculture

Agriculture began around 20,000 years ago[ii], in the Mesolithic, when humans were evolving from hunter-gatherers to settled pastoralists. Then, the idea of growing specific plants to feed communities became real. It is a fact that the same number of plants that were eaten then, are still consumed today. So, in the 60 years of the Green Revolution, there has been no discovery of new plants. There has reportedly, been a lessening of the gene pool. Humans have made an impact on the environment, planting crops that they would eat in larger quantities, however, in the last 60 years, there has been an unprecedented negative impact on food, agriculture and the environment.

Since the Industrial Revolution, agriculture changed from using manual labour to using machinery. This increased the amount of fossil fuels used on farms. Currently, the industrialised countries use large quantities of fossil fuel and machinery on their farms, whereas the developing countries still rely on manual labour for a large portion of the work done on the farm.

Agriculture is the largest emitter of greenhouse gases, according to the IPCC's report. This plays a large role in climate change. Climate Change is the greatest crisis that we will face. With Climate Change will come a vareity of issues, all of which will require the poorest and most vulnerable to adapt. Globalization, ironically, will cause the poor to marginalise even further. The inequity and inequality between the developed and the lessser-developed countries will grow still larger, in parallel with the gap between the rich and the poor. Land use change is one of the main reasons for climate change. Landuse change is defined as deforestation/afforestation. This means using land for other than forest purposes. Forestry, according to the report is the single largest emitter, with about 17% attributed to it. The link between landuse change and agriculture is direct as forests are cut down to increase land under agriculture, thereby reducing the amount of natural sequestration of Carbon. This land is used to grow monocultures and genetically modified crops, a practice that can degrade the land and reduce absorption by the soil, thereby increasing carbin emissions.

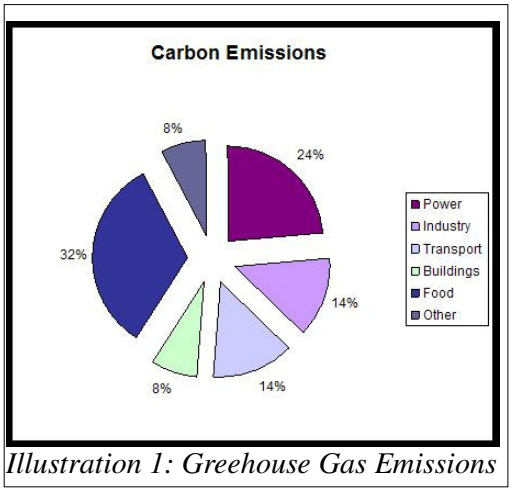

Illustration 1: Greehouse Gas Emissions

Landuse change and development

Deforestation is described as one of the major causes of climate change. It is seen that a large portion of the deforestation takes place to account for monoculture plantations and agriculture, a heavy fossil-fuel based industry. Carbon that could essentially be sequestered in large tracts of forests are converted to agricultural lands, by burning; another reason for increasing carbon content in the air. Agricultural land is also taken over for development purposes, to set up polluting industries or for housing. A shortage of food, can therefore not be unpredictable, when these changes take place so rapidly, all in the name of development.

According to a report by Food and Water Watch[iii], "*between 2006 and the middle of 2009, the International Food Policy Research Institute found that foreign investors sought or secured between 37 million and 49 million acres of farmland in the developing world*." Also the same report says that since 95% of Asia's farmlands are now utilised, Africa and Latin America are seen as good investments. Is this what globalisation has wrought? Countries that depend on food imports, are seeking out lands to buy, to secure their food security. They are accomplishing this by buying the land *WITH* the water. A lot of these lands will be filled with monocultures and plantations of palm oil or other cash crops or genetically modified crops. This will not ensure food security for the country in which the land has been bought, infact, food security will become a major problem in these poor countries. The same report states that a large part of the landgrab deals are in countries that have been designated as Food Insecure by the FAO, some of the very poor countries of Africa. When large corporates buy land, they push small landholders off the land, which includes 70 percent of small farmers in the developing world who are women.

As water becomes even more scarce in the developing countries, land investors who have bought the land, would inherit the water sources as well, pushing the poor into even more duress. This is the latest form of corporate totalitarianism, where rich foreign investors dislocate the poor by buying land. There is no equity in this scenario; no democracy. This is only a different form of feudalism perpetrated by the rich, where the poor have no stakes and are not considered. How can we allow this to continue?

Global Warming and the Climate Change crises are reasons to look to answers, beyond the profit-driven monoculture of the industries. Diversity allows for more leeway to combat climate change-related problems that could arise if the monocultures were to continue unchecked. Activist and writer, Vandana Shiva, a stalwart in the field of biodiverse organic farming is aware that climate change will cause serious disturbances to farming and that empowering these communities would be one of the most important ways to lessen the impact. Encouraging local markets and ensuring the safeguard of the poor and small scale industries/farmers from plain corporate greed is the only way to ensure stability and inclusivity.

Livestock and Climate Change

Agriculture and the meat sector are the highest greenhouse gas emitters acccording to the IPCC and other leading scientific organisations. The meat industry is the highest emitter at 18% of total global greenhouse gas emissions. The West according to the IPCC, is the higher emitter than the developing countries, however, meat production has increased considerably even in the developing countries. Industrial farms typically house thousands of cows, which are fed large amounts of proteins and injected with hormones to make them produce more

meat and more milk much sooner than in natural cycles.

Dr. R.K. Pachauri, the Chairman of the IPCC in a presentation[iv] stated that 80% of emissions from agriculture was from livestock. He stated that to produce equal amounts of vegetables and meat, meat required almost 25 times the amount of energy as the vegetables. This itself shows the scale on which greenhouse gas emissions are increasing, simply by rearing more beef. Not only that, the livestock sector was the single largest sectoral user of land and water pollution, with nitrates and phosphorus from silage and run-off. Another shocking fact was the amount of food that goes to feed livestock. 1/3rd of the world's cereal harvest and 90% of soy is used to feed animals. In the same presentation, he also urged meat-eaters to reduce their consumption of meat, for their own health of as well as the health of the environment.

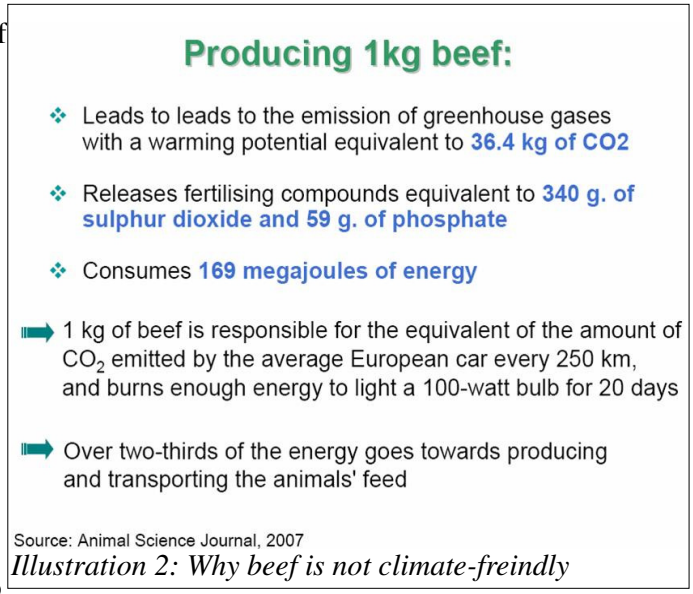

Illustration 2: Why beef is not climate-freindly

Monocultures and the Green Revolution

The current systems of production are heavily fossil-fuel based in the developed countries. In the third world countries, where production is still in transition to fossil-fuels there is potential to revert/convert to a system that is more based on natural systems. Climate change and scientists' warnings of the various impacts of Climate Change, provides us with more than enough reason to be more cautious and make changes that can potentially reduce damage. According to a report by FCRN[v], changes in landuse patterns cause more quantities of greenhouse gas emission. According to the above-mentioned report, "*From the farm gate onwards, the importance of CO_2 emissions from the use of heat, transport fuels and electricity during processing, storage, and so forth, becomes relatively more important. By contrast the contribution of CH_4 and N_2O are negligible...*". The data given above is mainly data from the UK. However, if this is extrapolated to the whole of the developed world, then there is more reason for us to consider indigenous farming methods and local production units and markets as alternatives and probable solutions.

Even if global warming and climate change were not significant, it would indeed be a "sensible" choice to move to local indigenous farms and produce. Globalisation brought about a change in the way we viewed food; as a commodity, more than a relationship built with the land and the water. For over 20,000 years, humans have tamed nature to suit them, but there was always a sense of connection with the land. Completely organic farming, with no chemicals, where self-sufficiency was the viewed outcome (not profits), was the followed method. Indigenous farming practices would revert to using less chemicals, produce seasonal food, thereby reducing the stress on the environment.

Gandhian philosophy is about sustainabliltiy and self-sustainability. This encourages India to contain itself (mostly) within its borders and ensure equitable distribution within, before

moving to export. In the 60 years of the Green Revolution, there has been as Vandana Shiva has put it so eloquently, a violence associated with the way we grow our food. She also says that the Green Revolution misled most of our farmers. While initially, they made profits, as the years went by, their profits reduced. These are the farmers that are reverting to traditional practices of agriculutre and keeping our traditions alive. The idea of self-sufficiency also includes low-input farming, wherein the farmers would not have to reduce their dependence on materials that come in from outside, like pesticides, fertilizers and even seeds. Monocultures even discard ideas of land being used for anything other than its productivity per crop. In mixed farming and polyculture, the land is used to produce many different crops in the same year, timber and non-timber based produce also.

Genetic engineering of seeds has been dominated by large corporations They make the farmer dependent on them for everything from the seeds to the pesticides for the plants. They use a technology known as terminator technology, which destroys the ability of the plant to reproduce. This even emasculates the farmers as they become once again dependent on the corporation to supply them with seeds. This also takes away the seed sovereignty of the farmer. So while it is a moral wrong, it is also encouraged by political vested interests.

The Green Revolution brought with it High Yielding Varieties, a myth perpetrated by corporations. Research that has been done on these has revealed that they are not inherently high yielding. They respond well to chemicals, and even that only partially. This was another scheme plotted out by the corporations. And even now, it continues. When NGOs and institutions both inside and outside of the US are trying to come up with measures for climate change mitigation, corporations that are primarily US based including Monsanto, Cargill and Syngenta are still focused on using Genetic Engineering to create seeds and plants and in essence food that will need more chemicals to grow, despite their claims that these plants are pesticide-resistant.

Gene Revolution and Development

The Gene Revolution started with High Yielding Varieties and moved on to genetically modified versions, the most famous of which is Bt Cotton, in India. Bt Cotton was made to make the cotton plant resistant to bollworm, a persistent pest. The Bt cotton, while being resistant to the pest, also was made resistant to resistant to pesticide as a part of its genetic makeup. According to reports, the Bt gene was inserted at random into the genetic makeup of the plant, and the way it inserted would not be known until the time the seed grew into the plant. A large portion of the cotton in India may be illegal Bt cotton[vi], even upto 80%. These are also considered high yielding when compared to native varieties.

Risks of genetic modification are related to ecological and social impacts:

- risk of genetic pollution and genetic contamination through cross-pollination and hybridization
- impact of Bt toxin on non-target beneficial species
- emerging resistance in target species
- socio-economic comaprisons with alternatives to synthetic pesticides

Food Security

According to a report by IFPRI[vii], *"Climate change will result in additional price increases for the most important agricultural crops–rice, wheat, maize, and soybeans. Higher feed*

prices will result in higher meat prices. As a result, climate change will reduce the growth in meat consumption slightly and cause a more substantial fall in cereals consumption". They also suggest as recommendations, to improve relations with local farmers, input suppliers, traders and consumer groups so that all stakeholders may be more able to meet the challenges of climate change.

Climate Change will also affect water availability and this will hit irrigated crops the hardest. With higher temperatures the amount of precipitation will be affected as will the water requirement of crops. Areas of low rainfall will be affected the worst. A report by IFPRI, has indicated that areas of the Middle East, North Africa and Sub-Saharan Africa will witness a reduction in precipitation by four percent. The same report also says that South Asia will be affected the worst in all crops. The recommendation that IFPRI makes for this is to increase planting of drought-resistant crops. Policy changes are needed to commit agriculture to the top of the climate change agenda list and there is a need to improve these keeping in mind the importance of agriculture and the communities associated with it.

Property Rights

Dr. Vandana Shiva is one of the leading scientists in India in the field of agriculture. She has been an opponent of the globalization of agriculture, especially through Intellectual Property Rights like the TRIPS Agreement. The TRIPS agreement ensures that corporations have control over the farmers, with rights to sell seeds and fertilizer to the farmer, and make the farmer completely dependent on them in the process. This has been a major cause of suicides[viii] in India. She has been very vocal about the reason for these suicides, particularly in the state of Andhra Pradesh, where Bt cotton became very prevalent.

The TRIPS agreement allows developed countries to dump artifically cheap agricultural products from the US with US subsidies into Indian markets, and exports produce from India with Indian subsidies, depriving the Indians of their food and livelihoods. There is a need to encourage woman-centred biodiverse organic farming, where knowledge does not become a property, but can be shared. Policies that are specific and open to organic agriculture and that will allow small landholders and farmers to pursue organic agriculture.

Conclusions

1. Climate Change is the most imprortant crisis that we will face in the coming years.
2. It is best to be prepared to adapt to the environmental issues that will arise from climate change.
3. Agriculture is the largest sectoral emitter of greenhosue gases. A large part of this is from landuse change involving burning of forests to increase agricultural land.
4. The Livestock industry is responsible for 80% of the emissions from the agricultural sector.
5. Monocultures do not absorb as much carbon as forests and are responsible for a large portion of soil and water pollution and also about 14% of total greenhouse gas emissions.
6. The Gene revolution will not be the solution to food security issues.
7. Food security will be a major issue in coming years with the climate change crisis.
8. Property rights are not the solution to ensuring food security.

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i Masanobu Fukuoka, *Mother Earth News* interview, 1982
ii Http://en.wikipedia.org/wiki/History_of_the_world
iii *Global Land Grab Undermines Food Security in the Developing World*, Food and Water Watch, July 2009
iv R.K. Pachauri, *Global Warning! The Impact of Meat Production and Consumption on Cliamte Change,* London, 8th September 2008
v Garnett, Tara. *Cooking up a Storm*, Food and Climate Research Network, September 2008.
vi Jayaraman, K.S. Illegal seeds overtake India's cotton fields, *Nature Biotechnology*, November 8, 2004
vii IFPRI, *Climate Change Impact on Agriculture and Costs of Adaptation,* Food Policy Report
viii Shiva, Vandana, Soil Not Oil