STAYING ALIVE

Women, Ecology and Survival in India

VANDANA SHIVA

kali for women

women UNLIMITED

Introduction: The Gendered Politics of Food and the Challenge of Staying Alive

Agriculture, the growing of food, is both the most important source of livelihood for the majority of the world's people, especially women, as well as the sector related to the most fundamental of economic rights, the right to food and nutrition.

Women were the world's original food producers, and continue to be central to food production systems in the global South, in terms of the work they do in the food chain. The worldwide destruction of the feminine knowledge of agriculture, evolved over four to five thousand years, by a handful of white male scientists in less than two decades has not merely violated women as experts — since their expertise in agriculture is related to modelling agriculture on nature's system of renewability — the destruction of their expertise has gone hand in hand with the ecological destruction of nature's processes and the economic destruction of poor people in rural areas.

Agriculture has been evolved by women. Most farmers in the world are women, and most girls are future farmers; they learn the skills and knowledge of farming in fields and farms. What is grown on farms determines whose livelihoods are secured, what is eaten, how much is eaten, and by whom it is eaten. Women also make the most significant contribution to food security by producing more than half the world's food, and providing more than 80 per cent of the food needs of food-insecure household and regions.

Food security is therefore directly linked to women's food-producing capacity. Constraints on their capacity leads to erosion of food security, especially for poor households in poor regions. From field to kitchen, from seed to food, women's strength is

diversity; women's capacities are eroded when this diversity is eroded.

Diversity is the characteristic of women's work, of their planting and sowing of foodcrops, and of the pattern of their food processing. The dominant systems of economics, science and technology have conspired against women and girls by conspiring against diversity. Economics has rendered women's work as food providers invisible, because women provide for the household, not the market, and perform multiple tasks involving diverse skills.

Women have remained invisible as farmers despite their contribution to farming. People fail to see the work they do in agriculture, their production tends to go unrecorded as 'work' or as 'production boundary' by economists. Agriculture as a future vocation for girls is thus closed. Problems of data collection on agricultural work arise not because too few women work, but because too many women do too much work.

There is a conceptual inability on the part of statisticians and researchers to define women's work inside and outside the house (and farming is usually part of both); this non-recognition of what is and is not labour is exacerbated both by the great volume of work that women do and the fact that they do many chores at the same time. It is also related to the fact that although women work to sustain their families and communities, most of their work is not measured in wages. Women's work is also invisible because they are concentrated outside market-related or remunerated work.

Science and technology have rendered women's knowledge and productivity invisible by ignoring the dimension of diversity in agricultural production. As the Food and Agriculture Organisation's report *Women Feed the World* says, women use more plant diversity, both cultivated and uncultivated, than agricultural scientists know about. In Nigerian home gardens, women plant 18–57 plant species; in sub-Saharan Africa they cultivate as many as 120 different plants in the species left, alongside the cash crops managed by men; in Guatemala, home gardens of less than 0.1 ha have more than ten tree and crop species. In a single African home garden more than 60 species of food-producing trees were counted. In Thailand, researchers found 230 plant species in home gardens. In Indian agriculture

women use 150 different species of plants for vegetables, fodder and healthcare. In West Bengal 124 'weed' species collected from rice fields have economic importance for farmers. In the Expana region of Veracruz, Mexico, peasants utilise about 435 wild plant and animal species of which 229 are eaten. Women are the biodiversity experts of the world. Unfortunately, girls are being denied their potential as food producers and biodiversity experts under the double pressure of invisibility and domination by industrial agriculture.

While women manage and produce diversity, the dominant paradigm of agriculture promotes monoculture on the false assumption that monocultures produce more. Quite the contrary — monocultures do not produce more, they just control more. As mentioned in FAO's (World Food Day, 1998) report, a study in eastern Nigeria found that home gardens occupying only two per cent of a household farmland accounted for half the farm's total output. Closer home, Navdanya's studies on biodiversity-based ecological agriculture indicate that women-run farms produce more food and nutrition than industrial, chemical farms.

Clearly, if women's knowledge was not being rendered invisible, the use of the two per cent land under polyculture systems should be the path followed for providing food security. Instead these highly productive systems are being destroyed in the name of producing 'more' food.

Just as women's ways of growing food produce more while conserving more resources, women's ways of food processing conserve nutrition. Hand-pounding of rice or milling rice with a foot-operated mortar and pestle preserves more protein, fat, fibre and minerals. If the rice is preserved, these nutrients are conserved even more dramatically. Thus, when mechanical hullers replace hand-pounding — as is the case in Bangladesh where 700 new mills supplanted the paid work of 100,000 to 140,000 women in one year by reducing the labour input from 270 hours per tonne to just five — they not only rob women of work and livelihoods, they also rob girls of essential nutrients. Yet in patriarchal economics, this process of food value destruction is called 'value addition'. Feeding the world requires producing more food with fewer resources, i.e, producing more with less. Women are experts in this and their expertise needs to filter into

our institutions of agricultural research and development.

Women's lack of property rights is a major constraint on their capacity to feed the world. Property rights include rights to land, as well as common property rights to common resources like water and biodiversity. New intellectual property rights (IPRs) are alienating women's rights to biodiversity and erasing their innovations embodied in agricultural biodiversity. If the erosion of women's capacity for feeding the world has to be prevented, IPR regimes need to evolve sui generic systems that recognise and protect women's collective and informal innovation.

While women are being denied their rights to resources and we are seeing the feminisation of subsistence agriculture, dominant agriculture is showing increasing signs of masculinisation as it appropriates resources and rights from women in subsistence agriculture and presents itself as the only alternative for feeding the world.

A common myth used by the global corporation and the biotechnology industry is that without genetic engineering, the world cannot be fed. However, while biotechnology is projected as increasing food production four times, small ecological farms have productivity that is hundreds of times higher than large industrial farms based on conventional farms.

Women farmers in the Third World are predominantly small farmers. They provide the basis of food security, and they provide food security in partnership with other species. This partnership between women and biodiversity has kept the world fed through history, at the present time, and will continue to feed the world in the future. It is this partnership that needs to be preserved and promoted to ensure food security.

Agriculture based on diversity, decentralisation and improving small farm productivity through ecological methods is a women-centered, nature-friendly agriculture. In this agriculture, knowledge is shared, other species and plants are kin, not 'property', and sustainability is based on renewal of the earth's fertility, and the renewal and regeneration of biodiversity and species richness on farms to provide internal inputs. In our paradigms, there is no place for monocultures of genetically engineered crops and IPR monopolies on seeds.

Monocultures and monopolies symbolise a masculinisation of agriculture. The war mentality underlying military-industrial

agriculture is evident from the names given to herbicides which destroy the economic basis of the survival of the poorest women in the rural areas of the Third World. Monsanto's herbicides are called 'Round Up', 'Machete', 'Lasso'. American Home Products which has merged with Monsanto calls its herbicides 'Pentagon', 'Prowl', 'Scepter', 'Squadron', 'Cadre', 'Lightning', 'Assert', 'Avenge'. This is the language of war, not of sustainability.

The most widespread application of genetic engineering in agriculture is herbicide resistance, i.e., the breeding of crops to be resistant to herbicides; Monsanto's Round Up Ready Soya and Cotton are examples of this application. When introduced to Third World farming systems, this led to an increased use of agri-chemicals, thus increasing environmental problems. It also destroyed the biodiversity that is the sustenance and livelihood base of rural women: what are weeds for Monsanto, are food, fodder and medicine for Third World women.

While women have maintained the continuity of seed over millennia in spite of war, flood and famine, the masculinisation of biodiversity has led to violent technologies which ensure that seed does not germinate on harvest. This has been described as terminator technology. Termination of germination is a means for capacity accumulation and for capital accumulation and market expansion. But abundance in nature and for farmers shrinks as markets grow for Monsanto. When we sow seed, we pray, 'May this seed be exhaustless'. Monsanto and the US Department of Agriculture (USDA) on the other hand are saying, 'Let this seed be terminated so that our profits and monopoly are exhaustless.'

The violence intrinsic to the methods and metaphors used by global agribusiness and biotechnology corporations is a violence against nature's biodiversity and women's expertise and productivity. The violence intrinsic to the destruction of diversity through mono-cultures, and the destruction of the freedom to save and exchange seeds through IPR monopolies, is inconsistent with women's diverse, non-violent ways of knowing nature and providing food security.

Genetic Engineering and IPRs will rob women of their creativity, innovation and decision making power in agriculture. In place of women deciding what is grown in fields and served in kitchens, agriculture based on globalisation, genetic engineering

and corporate monopolies on seeds will establish a food system and worldview in which men who control global corporations also control what is grown in our fields and what we eat. Corporate men investing financial capital in theft and biopiracy will present themselves as creators and owners of life.

Agriculture systems shaped by women have a number of key features. Farming is done on a small scale. Natural resources — soil, water, biodiversity — are conserved and renewed. There is little or no dependence on fossil fuels and chemicals, vital in a period of climate change and peak oil. Inputs needed for production such as fertilisers are produced on the farm from compost, green manure, or nitrogen-fixing crops. Diversity and integration are key features, and nutrition is a key consideration. Women-run small farms maximise nutrition per acre while they conserve resources.

With food grown for eating, most food is consumed at the household or local level, some is marketed locally, some goes to distant places. Women-centered agriculture is the basis of food security for rural communities. When the household-community is food-secure, the girl child is food-secure. When the household and community are food-insecure, it is the girl child who pays the highest price in terms of malnutrition because of gender discrimination. When access to food diminishes, the girl child's share is last and least.

The politics of food is gendered at multiple levels.

First, food production, processing and provisioning has been women's domain in the social division of labour (women grew, cooked, processed and served food). Women-centered food systems are based on sharing and caring, on conservation and well-being.

Second, corporate globalisation driven by capitalist patriarchy has transformed food, food production and distribution. The control over the entire food chain, from seed to table, is shifting from women's hands to global corporations who are today's 'global patriarchs'. In the process, seed is turning to non-seed. Seed multiplies and reproduces; genetically modified and hybrid seeds are non-renewable. Food is nourishment; as an ancient Indian text says, 'Everything is food, everything is something else's food.' Corporate-controlled food is no longer food, it becomes a commodity — totally interchangeable between biofuel for

driving a car, feed for factory farms or food for the hungry. Not only is food displaced, women's knowledge and work, skills, productivity and creativity are destroyed.

Five Gene Giants and Five Food Giants have replaced billions of women producers and processors, creating new risks for food security and food safety. In 2008, food riots took place in more than 40 countries as prices skyrocketed. More than one billion people are denied access to food, and another two billion are cursed with obesity and related diseases due to eating industrial/junk foods. Among those who suffer the two kinds of malnutrition, women and girls are the worst affected.

Third, a new food revolution is underway, building on women's food and agriculture heritage to create just, sustainable and healthy food systems which secure safe and healthy food for all.

First the seed: globalisation and the gendered politics of seed

Seed is the first link in the food chain. For five thousand years peasants have produced their own seeds, selecting, storing and replanting, and letting nature take its course in the food chain. The feminine principle has been conserved through the conservation of seeds by women in their work in food and grain storage. With the preservation of genetic diversity and the self-renewability of food crops, has been associated the control by women and Third World peasants on germ plasm, the source of all plant wealth. All this changed with the green revolution.

The green revolution commercialised and privatised seeds, removing the control over plant genetic resources from Third World peasant women and giving it over to western male technocrats in the International Maize and Wheat Improvement Centre (CIMMYT), the International Rice Research Institute and multinational seed corporations.

Women have acted as custodians of the common genetic heritage through the preservation of grain. In a study of rural women of Nepal, it was found that seed selection is primarily a female responsibility; in 60.4 per cent of the cases, women alone decided which type of seed to use, while men decided in only 20.7 per cent cases. As to who actually performs the task of seed selection in cases where the family decides to use their

own seeds, this work is done by women alone in 81.2 per cent of the households, by both sexes in eight per cent, and by men alone in only 10.8 per cent households.

Throughout India, even in times of scarcity, grain for seed was conserved in every household, so that the cycle of food production was not interrupted by its loss. The peasant women of India have carefully maintained the genetic base of food production over thousands of years. This common wealth, evolved over millennia, was defined as 'primitive cultivars' by the masculinist view of seeds, which saw its own new products as 'advanced' varieties.

The green revolution was a strategy for breeding out the feminine principle by the destruction of the self-reproducing character and genetic diversity of seeds. The death of the feminine principle in plant breeding was the beginning of seeds becoming a source of profits and control. The hybrid 'miracle' seeds are a commercial miracle, because farmers are forced to buy new supplies of them every year — they do not reproduce themselves. Gains from hybrids do not produce seeds that duplicate the same result because hybrids do not pass on their vigour to the next generation. With hybridisation, seeds could no more be viewed as a source of plant life, producing sustenance through food and nutrition; they were now a source of private profit only.

Green revolution varieties of seeds were clearly not the best alternative for increasing food production from the point of view of nature, women and poor peasants. They were useful for corporations that wanted to find new avenues in seed and fertiliser sales, and they were useful for rich farmers wanting to make profits. The international agencies which financed research on the new seeds also provided the money for their distribution. The impossible task of selling a new variety to millions of small peasants who could not afford to buy the seeds was solved by the World Bank, UNDP, FAO and a host of bilateral aid programmes which began to accord high priority to the distribution of high-yielding variety seed in their aid programmes.

Over the past decade, through new property rights and new technologies, corporations have hijacked the diversity of life on earth and people's indigenous innovation. Intellectual Property Rights regimes, globalised through the TRIPs agreement of

WTO have been expanded to cover life forms, thus creating monopoly control over biodiversity.

The Biodiversity Act, 2002, which should have been aimed at defending community rights, has instead facilitated the privatisation of biodiversity and indigenous knowledge. This is why the success of movements in forcing Syngenta to back off from piracy of our rice collections is significant.

As one of the world's oldest and largest agricultural societies, India has an impressive diversity of at least 166 species of crop plants and 320 species of wild relatives of cultivated crops. Forests, which contain much, though by no means all, of India's biodiversity, now comprise about 64 million hectares, or 19 per cent of land area, of which roughly 33 per cent probably represents primary forest. About 10 million hectares are managed as 'protection forests' for ecological stability, 15 million for production of timber and 25 million as social forests to meet the demand for fuelwood and fodder. About 14 million hectares lie within national parks and wildlife sanctuaries.

Of an estimated 15,000 plant species, about 15,000 species of flowering plants (six per cent of the worldwide total), an estimated 33 per cent are endemic to India. Areas rich in endemism are the north-east, the western ghats and the north-western and eastern Himalayas. However, the Andaman and Nicobar Islands contribute at least 200 endemic species to endemic flora. Estimates of other plants include 5,000 species of algae, 1,600 lichens, 20,000 fungi, 2,700 bryophytes and 600 pteridophytes. And of the estimated 81,000 fauna species are 50,000 insects, 4,000 molluscs, 200 fish, 140 amphibians, 420 reptiles, 1,200 birds and other invertebrates. India's bird species represent about 13 per cent of the world's total. Mammal fauna comprise 372 species, with 63 per cent found in Assam. Thus India is home to about two lakh species of living organisms.

Seventy per cent of India depends upon traditional systems of production for their survival. The majority of the people in rural areas are small, marginal farmers and peasants. Seeds produced and sold by farmers account for over 70 per cent of the total seed supply in the country. Similarly, more than 70 per cent of India's healthcare needs are met by traditional systems of medicine, whose practitioners use over 7,500 varieties of medicinal plants as part of their healing work. In fact, the bio-

diversity-based traditional healthcare system is being kept alive by 3,60,740 Ayurvedic practitioners, 29,701 Unani experts and 11,644 specialists of Siddha, according to an ethno-botanical survey in the late 1990s. In addition millions of housewives, birth attendants and herbal healers carry on village-based health traditions.

The sharing and exchange of biological resources and knowledge of their properties and use has been the norm in all indigenous societies, and it continues to be so in most communities, including modern ones. But sharing and exchange are converted into 'piracy' when individuals, organisations or corporations who receive biodiversity and knowledge from indigenous communities freely, convert this gift into private property through IPR claims.

Seed, the common resource shared and saved by women, now becomes the 'property' of Monsanto for which royalties must be paid. Seed pirated from communities is now treated as 'pirated' if it is saved or shared. The highest human values are converted into a crime; the lowest human traits are elevated to 'intellectual property rights'.

The Trade Related Intellectual Property Rights Agreement of WTO is the one aspect of globalisation which can become the biggest threat to people's food security when combined with the opening up of the seed industry. The section of TRIPS that most directly affects farmers' rights and agriculture biodiversity is Article 27.5.3(b), which states:

> Parties may exclude from patentability plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than non-biological and micro-biological processes. However, parties shall provide for the protection of plant varieties either by patents or by an effective sui generis system or by any combination thereof. This provision shall be reviewed four years after the entry into force of the Agreement establishing the WTO.

The article thus allows two forms of IPRs in plants — patents and a sui generic system. The Patent Act and the National Plant Variety legislation drafts are becoming a major concern of contest between public interest and corporate interest.

The 1970 Patent Act excluded all methods of agriculture and horticulture from patentability. In addition, the exclusion of product patents in the area of agro-chemicals was also ensured through Section 5a. The Patent (Amendment) Bill 1995 removes these restrictions in the field of agriculture. Further, since it does not articulate new demarcation criteria for exclusion, it allows the patenting of plants, plant products, plant characteristics, their genes, bio-pesticides, bio-fertilisers, etc. The totally unrestricted scope of patenting in agriculture that this Bill proposed would have undermined Indian agriculture, threatened Indian farmers, and imperilled food security. It failed to pass through Parliament because of these serious implications.

In Navdanya, we conserve 2,000 rice varieties in our community seed banks, one of which is basmati, the aromatic rice for which Dehradun is famous. This variety, which farmers in my valley have been growing for centuries, is today being claimed as 'an instant invention of a novel rice line' by a US Corporation called Rice Tec (patent no. 5,663,454). The 'neem' which our mothers and grandmothers have used for centuries as a pesticide and fungicide, has been patented for these uses by W.R. Grace, another US corporation. We have challenged Grace's patent with the Greens in the European Parliament and in the European Patent Office.

This phenomenon of biopiracy through which western corporations are stealing centuries of collective knowledge and innovation carried out by Third World women is now reaching epidemic proportions. Such biopiracy is now being justified by Monsanto as a new 'partnership' between agri-business and Third World women. For us, theft cannot be the basis of partnership — partnership implies equality and mutual respect. Partnership with Third World women necessitates changes in the WTO/TRIPS agreement which protects the pirates and punishes the original innovators, as in the case of the US/India TRIPS dispute. It also requires changes in the US Patent Act which allows rampant piracy of our biodiversity-related knowledge. These changes are essential to ensure that our collective knowledge and innovation are protected, and that women are recognised and respected as knowers and biodiversity experts.

Raw to cooked: the gendered politics of food processing

If patriarchal 'intellectual property rights' are used to destroy biodiversity and usurp women's knowledge and embodied breeding in seed, 'sanitary and phyto sanitary' laws — food safety defined from the perspective of capitalist patriarchy — is used to destroy women's expertise in producing quality, health and taste and replacing it with processed junk food.

Though the WTO provisions lay down that the minimum five per cent market access may have to be given by importing countries, developed countries impose certain quality norms, product specifications and other sanitary and phyto-sanitary regulations. The EU for example, now insists that milking cows be fully mechanised to avoid contamination and potable water used to process milk! It also prescribes that only steel machinery and filtered air be used for processing. To adhere to these norms the Indian dairy industry may have to invest much capital in the required infrastructure, either through cooperative efforts or cooperative sector intervention. However, this is likely to increase the cost of milk at the present yield level. Besides, this is beyond the financial capability of most cattle owners as they have only one or two milking animals. Similar measures have been prescribed for agro-processing.

When new IPR regimes are introduced in the technologically and culturally plural economy of India — which has not been crushed by formalisation of laws but been governed by customary codes and moral law — we have to ensure that changes introduced into our national laws in the context of globalisation have the necessary safeguards for preventing piracy, including biopiracy, breeders' rights, and cultural and intellectual piracy.

The attack on local processing

Global agri-business is now attempting to take over food processing by making fresh, locally produced food appear 'backward', and stale food clothed in aluminium and plastic appear 'modern'. Industrial processing and packaging was first applied to edible oils, destroying the livelihood of oil-mill operators and small farmers because of imported soyabeans. An attempt is now being made to take over the wheat economy.

The Indian wheat economy is based on decentralised, small-scale local production, processing and distribution. Wheat and flour provide livelihoods and nutrition to millions of farmers, traders, and local mill operators. The decentralised, small-scale, household based economy of food production and food processing is huge in aggregate — it generates millions of livelihoods while ensuring that fresh and wholesome food is available to people at accessible prices. Moreover, such production and processing has no negative environmental impact. It is estimated that more than 3.5 million family run kirana shops supply wheat to Indian consumers, and more than two million small neighbourhood mills produce fresh flour. In addition, flour is also produced by millions of women working at the household level. The rolling pin for making rotis has always been a symbol of women's power.

While 40 million tonnes of wheat are traded, only 15 million tonnes are purchased directly as atta because India loves freshness and quality in food. Less than one per cent of consumed atta caries a brand name, because Indian consumers trust their own supervision of quality at the local chakki better than a brand name attached to stale, packaged flour. This decentralised, small scale economy based on millions of producers, processors and traders works with very little capital and even less infrastructure. People are the substitute for capital and infrastructure. However, such a people-centred economy impedes large-scale profits for big agri-business, which is therefore eyeing the Indian wheat economy to transform it into a source of profit.

The destruction of millions of livelihoods, of local decentralised economy and of people's access to fresh and cheap atta is described as 'modernisation of the food chain'. In the Third World packaged food is promoted as the food of the rich, even though the rich in industralised countries in fact eat fresh food, while the poor are forced to eat food that is heavily processed and packaged. Packaging is not 'modernisation', rather an obsolete aspect of a non-sustainable economy that uses packaging and branding as a way to displace cheaper and more efficient systems through which food is processed locally in front of people's eyes, ensuring quality and freshness.

Hunger, malnutrition and the politics of food

Food riots succeed in making front-page news but there is a much less noted hidden hunger which denies nearly a billion people of their right to food, as well as a problem of malnutrition linked to obesity and other food-related diseases. Hunger and obesity (or the fear of them) are feminist issues both because their worst victims are women and girls, and also because they are the result of a food system shaped and controlled by capitalist patriarchy.

Malnutrition is a consequence both of denial of access to food as well as of the disappearance of nutrition from our farms and processing systems.

The disappearance of biodiversity on farms is linked to the disappearance of women from farms — this is food insecurity for the girl child. Malnutrition in childhood leads to malnutrition in adulthood, of which anaemia is the most significant deficiency that women suffer from. It is also the most significant reason for maternal mortality. When underfed girls become mothers, they give birth to low birth-weight babies, vulnerable to disease and deprived of their right to full, healthy, wholesome personhood.

These issues of health are not normally connected to farming and growing food, but just as nutrition begins on the farm, so does malnutrition.

We are what we eat.
But what are we eating?
What are we growing on our farms? How are we growing it?
What impact does it have on our health and on the planet?

Food safety, food security and agriculture are intimately interrelated. How we grow our food and what we grow determines what we eat and who eats, it determines the quality and safety of our food. Yet food safety, food security and agriculture have been separated from each other. Food is being produced in ways that is robbing the majority of people of it, and compelling those who eat to consuming bad food. One billion people on the planet are hungry; another two billion are suffering from food-related diseases such as obesity, diabetes and hypertension. Those who are not getting access to food are victims of the

malnutrition related to being poor; those who can buy food in the global supermarket are victims of another kind of malnutrition, the malnutrition of the rich. Third World countries carry the triple burden of food-related diseases, hunger and obesity. The WHO/FAO have predicted that by the year 2020 70 per cent of ischaemic heart disease deaths, 75 per cent of stroke deaths, and 70 per cent of diabetes deaths will occur in developing countries. These diseases, called non-communicable, are directly linked to diet.

The globalised, industrialised food system is creating hunger in many ways. First, industrialised agriculture is based on the destruction of small farmers — uprooted and dispossessed peasants join the ranks of the hungry.

Second, industrialised agriculture is capital intensive. It is based on costly external inputs such as purchased and non-renewable seeds, synthetic fertilisers, pesticides and herbicides. Peasants incur huge debts to purchase these inputs. To pay it back they must sell all they grow, thus depriving themselves of food. If they cannot repay their debts they lose their land, and they are increasingly losing their lives. More than 150,000 farmers in India have so far committed suicide as costs of inputs have increased, and the price of their produce has fallen, thus trapping them in endless cycles of indebtedness.

Malnutrition and hunger are also growing because farmers are being pushed into growing cash crops for export. The nature of agriculture and the nature of food is being transformed. Agriculture, the care of the land, the culture of growing good food, is being transformed into corporate, industrial activity. Food is being transformed from being a source of nutrition and sustenance into being a commodity, and as a commodity, it flowed first to factory farms and now to cars. The poor will get the leftovers.

Factory farms are a negative food system because they consume more food than they produce. Industrial beef requires 10 kg of feed to produce 1 kg of food. Industrial pork requires 4.0–5.5 kg of feed to produce 1 kg of food. Factory-farmed chicken requires 2.0–3.0 times more feed than it produces as food.

Industrial biofuels are placing new pressures on food. Prices of corn in Mexico, the staple for Mexican tortillas, have

doubled as corn is increasingly being used to make ethanol for fuel. Corn, soya, canola are all being diverted to feed cars while people starve.

The globalisation and industrialisation of agriculture and food systems

Across the world, a food tsunami is occurring, transforming small farms run largely by female peasants into 'factories' producing 'commodities'. Globalisation has led to greater industrialisation of agriculture, and industrial agriculture displaces women from productive work on the land.

Agriculture globalisation has been driven by agri-businesses seeking global markets for their non-renewable inputs — seeds, fertilisers and pesticides — as well as markets for their food commodities. The Agriculture Agreement of WTO and the structural adjustment programmes of the World Bank have been the most important instruments for the globalisation of agriculture. This globalisation involves multiple shifts: it shifts control over food production from local and national levels to the global level, and from women farmers to global corporations, whether it be in the area of seed or systems of maintaining and renewing soil fertility.

The industrialisation of agriculture marks a shift from internal inputs to purchased, external inputs, from ecological to chemical, from biodiversity to monocultures. And it is a shift from women as the primary source of knowledge and skills about farming — from seed saving to composting, cultivating poly-cultures in the right balance, harvesting, storage, processing — to an agriculture without women.

Humanity has eaten more than 80,000 edible plants through its evolution. More than 3,000 have been used consistently. However, we now rely on just eight crops to provide 75 per cent of the world's food, and with genetic engineering, production has narrowed to three crops — corn, soya, canola. Now these, too, are being diverted to biofuel. Monocultures are destroying biodiversity, our health, and the quality and diversity of food and they lead to malnutrition—for those who are underfed as well as those who are overfed. Monocultures have been promoted as an essential component of industrial isolation, assumed to produce more food. However, all they produce is more control

and profits — for Monsanto, Cargill and Archer Daniel Midland. They create pseudo surpluses and real scarcity by destroying biodiversity, local food systems and food cultures.

Corporations are forcing us to eat untested food such as GMOs. Even soya, which is now present in 60 per cent of all processed food, was not consumed by any culture 50 years ago. It has high levels of isoflavones and phyto-oestrogens which produce hormone imbalances in humans; traditional fermentation found in the food cultures of China and Japan reduce levels of isoflavones. The promotion of soya in food is a huge experiment promoted with US$13 billion subsidies from the US government between 1998 and 2004, and US$80 million a year from the American soya industry. Local food cultures have rich and diverse alternatives to soya; for protein there are thousands of varieties of beans and grain legumes — pigeon-pea, chick-pea, moong bean, urud-bean, rice-bean, azuli bean, moth-bean, cow-pea, peas, lentils, horse gram, faba bean, winged bean. In edible oils we have sesame, mustard, linseed, niger soffola, sunflower, groundnut.

By depending on monocultures, the food system is being made increasingly dependent on fossil fuels — for synthetic fertilisers, for running giant machinery, for long distance transportation, which adds 'food miles'. With the spread of monocultures and the destruction of local farms, we are increasingly eating oil, not food, threatening the planet and our health.

Moving beyond monocultures of the mind has become an imperative for repairing the food system. Biodiverse small farms have higher productivity and generate higher incomes for farmers, while biodiverse diets provide more nutrition and better taste. Bringing biodiversity back to our farms goes hand in hand with bringing small farmers back to the land. Corporate control thrives on monocultures; citizens' food freedom depends on biodiversity.

Biofuels, fuels from biomass, continue to be the most important energy source for the poor in the world. The ecologically biodiverse farm is not just a source of food, it is a source of energy. Energy for cooking comes from inedible biomass like cowdung cakes, stalks of millets and pulses, agro-forestry species on village wood lots. Managed sustainably, village commons have been a source of decentralised energy for centuries. Industrial

biofuels are not the fuel of the poor; they are the food of the poor, transformed into heat, electricity and transport. Liquid biofuels, in particular ethanol, and bio-diesel, are one of the fastest growing sectors of production, driven by the search for alternatives to fossil fuels, both to avoid the catastrophe of peak oil and to reduce carbon dioxide emissions. While he was President, George Bush tried to pass legislation to make the use of 35 billion gallons of biofuels mandatory by 2017. M. Alexander of the Sustainable Development Department of the FAO has stated: 'The gradual move away from oil has begun. Over the next 15 to 20 years we may see biofuels providing a full 25 per cent of the world's energy needs.' Global production of biofuels alone has doubled in the last five years and is likely to double again in the next four. Among the countries that have enacted a new pro-biofuel policy in recent years are Argentina, Australia, Canada, China, Colombia, Ecuador, India, Indonesia, Malawi, Malaysia, Mexico, Mozambique, the Philippines, Senegal, South Africa, Thailand and Zambia.

There are two types of industrial biofuels — ethanol and bio-diesel. Ethanol can be produced from products rich in saccharose, such as sugarcane and molasses, substances rich in starch such as maize, barley and wheat, and is blended with petrol. Bio-diesel is produced from vegetables only, such as palm oil, soya oil and rapeseed oil, and is blended with diesel.

Representatives of organisations and social movements from Brazil, Bolivia, Costa Rica, Colombia, Guatemala and the Dominican Republic in a declaration titled 'Full Tanks at the Cost of Empty Stomachs', wrote, 'The current model of production of bio-energy is sustained by the same elements that have always caused the oppression of our people's appropriation of territory, of natural resources, and the labor force.' And Fidel Castro in an article titled 'Foodstuff as Imperial Weapon: Biofuels and Global Hunger' says, 'More than three billion people are being condemned to a premature death from hunger and thirst.'

Worldwide, the biofuel sector has grown rapidly. United States and Brazil have established ethanol industries, and the European Union is fast catching up in exploring the potential market. Governments all over the world are encouraging biofuel production with favourable policies. United States is pushing other nations in the South to go in for biofuel production so

that their energy needs are met at the expense of plundering others' resources.

Inevitably this massive increase in the demand for grains will come at the cost of the satisfaction of human needs, with poor people priced out of the food market. On February 28, 2008, the Brazilian Landless Workers' Movement released a statement noting that 'the expansion of the production of biofuels aggravates hunger in the world. We cannot maintain our tanks full while stomachs go empty.' This diversion of food for fuel has already increased the price of corn and soya, and this is just the beginning. Imagine the land needed for providing 25 per cent of the world's oil from food.

One tonne of corn produces 413 litres of ethanol; 35 million gallons of ethanol require 320 million tonnes of corn. The US produced 280.2 million tonnes of corn in 2005. As a result of National American Free Trade Agreement (NAFTA) the US made Mexico dependent on US corn and destroyed the small farms of Mexico. This, in fact, was the basis of the Zapatista uprising.

Industrial biofuels are being promoted as a source of renewable energy and as a means to reduce greenhouse gas emissions. However, there are two ecological reasons why converting crops like soya, corn and palm oil into liquid fuels can actually aggravate climate chaos and the CO_2 burden. First, deforestation caused by expanding soya and palm oil plantations is leading to increased CO_2 emissions. The FAO estimates that 1.6 billion tonnes or 25 to 30 per cent of all greenhouse gases released into the atmosphere each year come from deforestation. By 2022, biofuel plantations could destroy 98 per cent of Indonesia's rainforests.

According to Wetlands International, the destruction of South East Asia peat lands for palm oil plantations is contributing to eight per cent of global CO_2 emissions; and according to Delft Hydraulics, every tonne of palm oil results in 30 tonnes of carbon dioxide emissions or *10 times as much as petroleum producers.* However, this additional burden on the atmosphere is treated as a clean development mechanism in the Kyoto Protocol for reducing emissions. Biofuels are thus contributing to the same global warming that they are supposed to reduce. (*World Rainforest Bulletin* No. 112, Nov. 2006, p. 22.)

Further, the conversion of biomass to liquid fuel uses more fossil fuels than it substitutes. One gallon of ethanol production requires 28,000 kcal. This provides 19,400 kcal of energy. Thus the energy efficiency is 43 per cent. The US will use 20 per cent of its corn to produce 5 billion gallons of ethanol which will substitute just one per cent of oil use. If 100 per cent of corn were used, only seven per cent of the total oil would be substituted. This is clearly not a solution either to peak oil or to climate chaos.* Corn uses more nitrogen fertiliser, more insecticides, more herbicides than any other crop, plus it is a source of other crises — 1700 gallons of water are used to produce one gallon of ethanol.

Agriculture without women farmers, society without girls

The prevailing view is that economic globalisation will modernise societies and improve women's status, but the opposite seems to be happening. Patriarchal values of the market are combining with the anti-women values of religious patriarchy, leading not just to women's marginalisation, but to their very dispensability. The growing phenomenon of female foeticide in India illustrates how capitalist patriarchy and religious patriarchy converge to unleash new levels of violence against women.

This regression is no accident. The Green Revolution region of Punjab was the place where female foeticide first began; it was also the first to turn amniocentesis into a tool for facilitating it. Between 1978 and 1983, 78,000 female foetuses were aborted after sex-determination tests. The child sex ratio has declined from 976 in 1961 to 927 in 2001, and it has been sharpest since 1981, as sex-determination technologies became increasingly available.

India's population grew 21 per cent between 1991 and 2001 to reach the 1.03 billion mark. While the population grew, girls were disappearing. The change in sex ratio combined with population growth reveals that there are *36 million fewer females* in the population than would be expected. This is half the world's 60

---

* David Pimental at the International Forum on Globalisation conference on 'The Triple Crisis', London, 2007.

million 'missing' women — those who were not allowed to be born because of sex-selective abortions.

If female foeticide were only a result of a traditional bias against women, it would be restricted to areas where the bias against girls has been extreme in the past, and would decline as socio-economic changes eroded traditional structures. However, it is spreading like a plague across Indian society: regions with high economic growth and more rapid 'modernisation' and integration into the global economy exhibit higher rates of female foeticide and lower child sex ratios. The greater the economic growth and prosperity, the larger the number of missing girls.

Food has literally become a life and death issue for women, whether it is through hunger and starvation; self-starvation in the form of anorexia nervosa; obesity; or female foeticide.

Worldwide, women are resisting the policies which destroy the basis of their livelihood and food sovereignty. They are also creating alternatives to guarantee food security for their communities based on different principles and methods than those governing the dominant, profit-oriented global economy. They are:

- Localisation and regionalisation instead of globalisation
- Non-violence instead of aggressive domination
- Equity and reciprocity instead of competition
- Respect for the integrity of nature and her species
- Understanding humans as part of nature instead of as masters over nature
- Protection of biodiversity in production and consumption

The future of food needs to be reclaimed by women, shaped by women, and democratically controlled by women. Only when food is in women's hands will both food and women be secure.

VANDANA SHIVA

Delhi, 2009