

bushel with the fodder of the horses that drew the carriages of the Vaspuhran of Indraprastha; and that mortalization should proceed forthwith.

And Akhenator and Vazgurd Framadar were sore vexed! And they pleaded with Imf and Worlb, the archangels of Mammon, to stay their hand until the judgement of the judges of Yama be forthcoming. And Imf and Worlb gave them that which they asked.

And so, the multitude, the mortals and immortals all, awaited the Judgement of the Dastevar of Yama with baited breath.

#### Notes:

- 1 Great Houses, inmates thereof.
- 2 The prognostications of the chapati makers of 1857 bore a short-lived fruit. The blood that ran in that red year was more the blood of the chapati makers than that of their accursed enemies. The guns and lances of the God-empress put paid to the chapati. Nonetheless, the chapati did put paid to the Company Bahadur.
- 3 Kavir the Smith, incidently, was the offspring of the immortal scribe himself, he that inscribed the speeches of the great Jackass upon stone.
- 4 The political tablets expressed the joy of the scribes at the disrobing of one of their number, for they said he was no scribe but a jaded individual, a condemned character and a yellow scribe.
- 5 The Tablet of the Chronology of Ra was of the variety of Osiris, for it died and was resurrected, in much the same manner as the second coming of its masters, earlier the major-domos of the Lakeside Palace.

# MODERN SCIENCE - WESTERN, PATRIARCHAL MYTH?

## Part II

### THE GREEN REVOLUTION AS WESTERN, PATRIARCHAL AND ANTI-NATURE AGRICULTURE

Meera Nanda

**T**his part of the essay will examine a typical example of the populist critique of science-based development projects: the much maligned, "western patriarchal myth," the Green Revolution. Given her propensity for a total critique, Vandana Shiva spares nothing. All physical inputs, farming practices and social relations of production associated with the Green Revolution are examined, compared with traditional peasant agriculture and without exception, declared deficient. Even worse, Shiva holds them directly responsible for the sad lot of women, peasants, the animals and the good earth of India.

Shiva's critique of the Green Revolution strategy is replete with some very questionable assumptions that, unfortunately, are widely shared by a cross section of environmentalists and leftist critics of modernization. The emotion and anger that spews out of Shiva's attack on the Green Revolution begin to make sense if read as the lament of a defender of an older, and supposedly more just social order, the so-called "moral economy" of pre-capitalist, pre-industrial peasants.<sup>1</sup> Very briefly, the moral economy argument maintains that pre-capitalist relationships and institutions (based on patron-client bonds between elite landowners and smallholder and landless peasants) protected the peasantry against

hardships and starvation. It is these pre-existing forms of insurance and subsistence guarantees that are destroyed by capitalism. Moral economists and proponents of new social movements, like Chipko, believe that this breakdown of subsistence mobilizes the peasantry (mostly the middle peasantry or the family farmers) against capitalism. But the goal of this mobilization is not socialization of means of production, but simply a restoration of the pre-capitalist order. Since moral economists view the earlier order as "moral" and just, this struggle of the peasants to restore the *status quo ante* is assumed to be "progressive" and worth supporting.

It is amazing how, despite the disasters in Tanzania and China, this faith in traditional peasant societies as communitarian by preference is still adhered to with almost religious zeal by populists like Shiva. She views the modernization of agriculture as an invasion of alien and destructive forces - that of capital and commodity relations - in the wholesome communities of peasants. These good, hardworking peasants worked communally owned resources to produce food and other goods not for sale, but simply for subsistence. They apparently lived in a world without markets; a world where the subsistence needs of all community members, and not the mar-



ket, decided how the social product would be distributed. This assumption is no mere romantic nostalgia. It provides the essential underpinning of moral economy.

The problems with this view are legion. Historical research affirms that in pre-colonial India, there was trade, there was commerce and widespread use of money in exchange of commodities.<sup>2</sup> The entire thesis of moral economy has been subjected to sharp criticism by Samuel Popkin who shows that relations in peasant society are based on the same calculus of risks/gains that operates in all pre-capitalist and capitalist societies. Furthermore, Popkin shows that these societies are not particularly just when it comes to distribution of social surplus or moral when it comes to providing insurance for all its members.<sup>3</sup> Tom Brass has recently shown that this overall moral economy world-view meshes in well with the other idealistic assumptions of post-modernism.<sup>4</sup> Thus, Shiva places the "violence" of the Green Revolution in the very "epistemology and reductionism of western patriarchal anti-nature model of agriculture." Secondly, she presents the traditional and modern sectors of agriculture as two exact opposites with no overlap: the former solely devoted to need satisfaction and ecological stewardship, the latter solely concerned with profits and ecological destruction. Next, Shiva assumes the virtues of traditional farming practices both as ecologically more sustainable *and* socially more harmonious without examining how the price for the former was often a denial of the latter.

Two other annoying assumptions continually hover in the background. The first assumes that traditional Hindu practices like cow and tree worship (which she consistently keeps equating with *Indian* practices) can be understood by citing ancient Sanskrit texts. Apart from the fashionable chauvinism of subsuming "Indian" under the category of "Hindu," Shiva has also appropriated many ecological practices of tribal people and forest dwellers as a part of "Indian" (and "Hindu") practices.<sup>5</sup> The second presumes a vile conspiracy on the part of western capitalists. Reading her critique of the Green Revolution, one would end up believing that it began and is sustained by no other motive but a desire on the part of multinational corporations and white male scientists to extract profits out of poor Third World peasants. The conspiracy appears so total and sinister as to lead one to wonder if the 850 million people of India are mere puppets on a string. It is truly amazing how close this thinking, prevalent among "racial" populists and dependency theorists, resembles the old racist orientalist myth of Asia and Africa as lands whose people had no history and creativity.

## Green Revolution is Patriarchal

This claim is based on a number of analytical distinct theses:

a) *Commodification of farming "devalues women"*: Production for profits and commodification of farm inputs leads to a "decline in their status in society and within the household."<sup>6</sup> I find this to be one of the most questionable and intellectually dishonest claims Shiva makes in her entire book. It goes against the findings of almost all the important studies on this subject and is based on thoroughly metaphysical and romantic assumptions about what women themselves and the larger society value in their lives and their work. Following Bina Agarwal's well-known work on the impact of the Green Revolution on women's status, Shiva admits that female participation in wage labor has increased since the Green Revolution technology was introduced in India.<sup>7</sup> But given her advocacy of the "feminine principle," she puts a greater value on the women's "invisible" work (along with earthworms and such) in "partnership with nature." Increase in visible, wage earning, income-generating work is written off as a sign of devaluation of women and nature for it apparently breaks some organic bonds ("links involving partnership") between them.<sup>8</sup> Similarly, the control and ownership of land, the other factor that objectively enhances the status of women is trivialized in favor of a romanticized "non-property relation of cooperation with the earth."<sup>9</sup>

Once Shiva establishes, to her satisfaction, that employment for wages and food production for profits devalues women, she goes on to present the higher incidence of discrimination against women in Northwest India as an apparent "result" of the Green Revolution. Quoting Agarwal, Shiva writes:

The north west states of Punjab and Haryana rank among the highest in terms of the adoption of new Green Revolution technology.... However, it is precisely the north western regions where discrimination against females is most noted both historically and in recent periods (p.118).

What Shiva does not tell her readers is that Agarwal was not using this co-relation between the two trends as a cause and effect. Unlike Shiva, Agarwal was trying to examine how the introduction of this technology has impinged on the *pre-existing* gender differences sanctioned by culture and traditions in different regions of the country. One of the main aims of Agarwal's paper cited by Shiva was to examine how the state's agricultural and natural resource use policies relate to "the pre-existing



patterns and class and gender relations in the rural community and the changes if any resulting from state policies."<sup>10</sup>

Agarwal, accordingly, gives due attention to the history of female infanticide prevalent in the north-west and examines cultural factors that legitimized it (e.g. hypergamy, heavy dowry expenditure, and prevention of land fragmentation. She also explores other cultural practices peculiar to the region to understand why the Green Revolution in this region has led to a resurgence of vicious anti-female practices. Similarly, Pranab Bardhan, another major scholar who has studied this issue systematically, also carefully examines the history of female infanticide in the Green Revolution areas.<sup>11</sup>

Any analysis of pre-existing, traditionally-sanctioned anti-female bias is completely missing from Shiva's account of the Green Revolution, indeed from her entire book. This omission is very significant. For if one takes into account the fairly long and culturally-sanctioned history of violent discrimination against women, then all one can say about the Green Revolution is that it has not, so far, succeeded in alleviating it. One can even grant that the new technology is leading to changes in class structure, encouraging some forms of discrimination generally associated with upper classes and castes (withdrawal of women from the workforce, and the increase in dowry, among others).

The frightening increase in amniocentesis tests in the Green Revolution areas can then be properly viewed as a technologically sophisticated continuation of the traditionally-sanctioned, age-old practice of female infanticide, in this case carried out even before female fetuses have a chance to grow into infants. The Green Revolution did not create this fatal bias against women; it has only created conditions of relative affluence that allow the growing class of newly-rich peasants, aided by modern technology, to mimic the practices long followed by the upper and middle classes. By suppressing the history of the traditionally-sanctioned, patriarchal practices, Shiva passes off the co-existence of the Green Revolution with cruel and violent forms of discrimination against women as if the former caused the latter. Such an interpretation serves her political end of portraying this situation as the bloody result of modernity itself.

Suppression of history is not all. Shiva's thesis that commodification of food production and participation in wage labor devalues women is completely at odds with all other empirically supported studies of the gender dimension of the Green Revolution. Pranab Bardhan, Bina Agarwal and Ursula Sharma have all found women's status to be positively linked with their ability to command wages or to have independent rights to income-generating assets like land.<sup>12</sup> Agarwal in fact places

the "visibility" of women's work at the center of her analysis:

The question of visibility of women's work is especially important as it does not appear enough that women and girls do productive tasks but also that the work is *socially recognized* as valuable. Agricultural field work which is physically more visible and which brings in earnings, which is economically more visible than say "free" collection of fuel wood, fodder and water appears to be given (by no means justifiably) a higher social valuation.<sup>13</sup>

Bardhan's hypothesis that survival chances of the female child are related to the expected employment or earning opportunities of female adults has been found to be empirically valid. (Bardhan proposed this hypothesis to explain the higher female to male sex ratios in paddy-growing regions in the South as compared to the wheat-growing regions of the north west. Paddy cultivation is more labor intensive). Bardhan concludes:

Expanding employment opportunities for women or lowering the male-female wage differential in rural India is not just another "feminist" cause: it may actually save the lives of many little girls in rural households.<sup>14</sup>

To Shiva such a way of assessing the worth of work and workers itself is a sign of the morbidity and crass materialism of modernity: "In a world dominated by capitalist patriarchy, cash is the only measure of worth - of women as of everything." One could ignore it simply as a nostalgia for some paradise lost when material possessions supposedly did not play any role in defining status. But unfortunately, this kind of emotional thinking has gained a substantial following and if allowed to direct political action, it has some real and dangerous implications. It diverts attention from where the real struggles are. As Agarwal shows, women agricultural workers are paid less than half of men's wages and the wage differential has been increasing over the last ten years in six out of 15 states studied, and is the highest in Punjab.

Progressive struggles must focus their energies on improving the share of labor in the gains made through the Green Revolution, create more opportunities for paid employment in both agriculture and non-agricultural sectors for women and help women workers get an equal share for equal work. The policies that follow from Shiva's focus on women's special relation with nature and subsistence can only demand, if they are to remain consistent, that women be further pushed into productive but socially invisible work inside the home or on the family farm. The kind of work, in other words that women have always done, everywhere, without any material



rewards and recognition. This will only further hasten "feminization" of the subsistence sector, another of Shiva's worries that we examine next.

b) ***Feminization of subsistence farming:*** The claim here is that modernization of farming based on the Green Revolution inputs has split the farming economy into "a cash mediated masculinized sector and a subsistence, food-producing 'feminized' sector" (p.113). And since all the state-funded institutional support (aid, credit, extension service) go to the masculine "chemical intensive and mechanized, capital intensive agriculture," it is far out-pacing the feminine subsistence sector. Shiva claims a "world wide" recognition of this phenomenon but gives no empirical evidence to support that this split is in fact taking place in all societies where the Green Revolution technology is introduced. She refers to a study from Africa and gives no evidence from India or any other part of South Asia for this phenomenon.

The feminization thesis as applied to Africa has come under critical scrutiny. According to a recent article by Ann Whitehead,<sup>15</sup> this thesis was put forward by Ester Boserup in 1970 who used it to popularize the idea that sub-saharan Africa was initially a female farming area and that modernization had captured men (for income earning export crops) and had left women behind to grow food for their families. According to Whitehead,

... research has shown this idea to be wrong. Production data show that export crop production and food production tend to rise and fall together. Both are produced by a wide variety of techniques. Food crops are also grown as cash crops. Research on the sexual division of labor has shown that Boserup overstates the extent of female labor in African farming and underestimated the involvement of women in "modern" sectors of economy (p.55).

Whitehead believes that the thesis of feminization of subsistence farming is based on stereotypes of sexual politics in Africa in the 1940s and 1950s. These stereotypes do not take into account the change in gender relations brought on by commercial agriculture. She also points to the problems with a category like "rural African women" that completely obscures the economic and other differences between them. Whitehead also cautions against remedies that assume women as tied to subsistence alone for they put an artificial limit on the opportunities for them. These critical remarks should be heeded and categorical statements proposing neat divisions between male and female economies should be tempered with actual empirical studies.

c) *The Green Revolution displaces and devalues "women peasants as experts, as plant breeders, as soil scientists,*

*and as water managers"* (p.98). There is no denying that many environmental issues are localized and that the peasants have a fund of useful, situation-specific knowledge. Their knowledge is valuable and must not be allowed to die out. But does Green Revolution farming really rule out local knowledge? Contrary to the critics, there are sufficient areas of overlap between the new seeds and the old knowledge. As the next section will show, farmers can in fact usefully combine their good soil husbandry practices with the high-yielding seeds. The two are far from being mutually exclusive as the critics have long held.

### The Green Revolution is Anti-nature

No other idea enjoys such unquestioned allegiance from the populists and environmentalists in general as the view that the Green Revolution has worsened or, even led to, the massive environmental problems of Third World countries. It is taken for granted that the new agricultural technology is the main cause of soil erosion, desertification, pesticide and fertilizer pollution of water and food and erosion of genetic diversity.

These charges stem from an understanding of the Green Revolution as a "package deal" that requires high use of chemical inputs (fertilizers, and pesticides) which end up in water, soil and food as poisons. The genetic diversity of crops, in turn is supposed to be eroded by the pressures for mono-culture and the "multinational control of seeds." It is alleged that the HYV seeds have tied the farmers to multinational seed and chemical industries and this unholy trinity of "power, profit and control" (Shiva, 134) is held to be responsible for the Green Revolution which begins to appear like a grand conspiracy against the peasants.

However, the "package" deal is not built into the nature of HYV seeds. They can combine the labor intensive and non-chemical methods of traditional fertilization and pest control and still out-perform traditional seed varieties. The seeds of major food crops like rice and wheat are not hybrids and do not need to be freshly purchased every year. Only crops like maize and sorghum have hybrid seeds but new strategies are now available that can circumvent the need to purchase new seeds even for these crops.

Shiva holds the Green Revolution responsible for the "death of soils" (due to chemical fertilizers, waterlogging, soil-mining and the abandonment of women's soil-building methods), pesticide poisoning (which breed pests and destroys the feminine methods of non-violent pest control) and so on. I will not go into the details of these trite and tired charges, for Shiva brings no new empirical evidence or insights. I will only point to the problems



with a critique that focuses so single mindedly on the technology alone.

Given all their talk of "holism," the populists' exclusive concern with the technical aspects of the Green Revolution makes their critique closer in spirit to technological determinists they so love to condemn. Populist techno-pessimists fail to provide a more complex and nuanced framework for analyzing India's ecological problems that can do justice to historical, cultural and political-economic factors under which the Green Revolution technology has been used in India. Such a framework must take into account the role played by India's traditionally low yielding, extensive agriculture whose roots lie firmly in the class and caste relations sanctioned by the traditional Indian cosmology.<sup>16</sup> The loss of forest cover - half of India's forest cover has been lost since the last century - is a result largely of low-productivity, traditional practices of extensive farming. Moreover, the extremely high cattle to human ratio (1:2 as compared to 1:10) in China) - another traditionally sanctioned practice - has played a significant role in soil erosion.<sup>17</sup>

In the context of these enormous pressures on land, the land-augmenting feature of the new technology has a significant potential for ecological preservation. Populists are reluctant to admit this potential because of their general anti-science stance. The concerns about excessive and unwise use of dangerous pesticides and fertilizers and waterlogging are real. But these problems can be corrected and controlled through legislation (an outright ban on dangerous chemical pesticides and a vigorous search for safer chemical or organic alternatives) and better, location-specific technical support and extension services to farmers.

It is time to take up two myths accepted with almost religious faith by the critics of the Green Revolution:

a) *The myth of the HYV "package"*: This states that HYVs are not really high yielding but only HRVs or "high responding varieties" because without a heavy input of chemical fertilizers and water their yields are comparable to or even lower than the traditional varieties (Shiva, 122). It is time to discard this myth. It is based on a thorough misunderstanding of the scientific principles on which the high yielding varieties are selected. It also ignores the advances in plant breeding that have produced HYVs of poor people's crops (sorghum and millet) that outperform traditional varieties without any chemical fertilizers at all. As Michael Lipton makes it clear in his recent book,<sup>1</sup>

... modern varieties are designed to make better use of nutrients *irrespective of the source* [i.e., chemical or organic] and hence normally turn

them into more grain than do traditional varieties, even if no such nutrients come from chemical fertilizer (p.43) [emphasis added].

It is true that earlier varieties (like IR-8 rice) sometime did worse than traditional varieties on unfertilized soils - hence the package myth. But newer varieties of maize (produced at CIMMYT), pest resistant wheat, rice (e.g. IR 36) and even poor people's crops like sorghum and millet (e.g. the Indore series widely used in Karnataka) have been shown to out-perform the traditional varieties "even under unfavorable conditions" including zero external fertilizer input.<sup>19</sup> HYVs, furthermore, are not chemical dependent for they can make equally good use of organic fertilizers used by traditional farmers: compost, inter-cropping, biological nitrogen fixation. As Lipton argues, "plants do not live off nutrient sources (e.g., fertilizers) but off nutrients" which can be provided by a variety of sources. In principle, there is no reason why these varieties cannot be grown using ecologically sound techniques, an option that is now being aggressively pursued by some IARCs (International Agricultural Research Centers). There is a danger of soil mining with traditional methods as the HYVs use up some important micro-nutrients at a higher rate than organic fertilizers can supply but that can be remedied with appropriate inorganic additives.<sup>20</sup> While Lipton by no means suggests that chemical fertilizers are irrelevant to performance of the HYVs, or that a dependence on them has not been problematic to small farmers, he cautions, however, against "naive ecologism" or "... the view that even economically justified and scientific modernization of farming methods are almost certain to threaten sustainable environments."

Apart from opening up new research on non-polluting and labor-intensive biological fertilizers that can be used along with new seeds, the recognition that HYVs can be "un-packaged" has an enormous ideological significance. It cracks open the essentialism that characterizes all populist critiques: that the new seeds are inherently chemical dependent; and that they were designed to be chemical dependent; that such dependence is encoded into the western mode of thinking, and so on. An open-minded assessment of the evidence should convince populists that the Green Revolution "package" does not exclude ecologically sound practices. If that is so, the local knowledge of women and peasants can be fully integrated with the yield advantages of HYVs. Shiva's worry about science's arrogant denial of people's knowledge systems is exaggerated, at least in agriculture.

b) *Seeds as Commodities*: Shiva also argues that the Green Revolution has commercialized seeds and forced the farmer to buy new seed supplies every year, an



assumption widely shared and repeated *ad nauseam* by the critics. This is a striking example of how a half-truth can gain the status of a first principle by mere repetition.

The critics do not make any distinction between the inbreeding (self pollinating) nature of the major Green Revolution seeds (wheat and rice; also barley and oats) and the out-breeding (cross pollinating) nature of crops like maize and sorghum. The former produce stable varieties that do not need to be rejuvenated every year. The farmer can keep the rice or wheat HYV seed and almost all the offspring from the seed will show the same features as their parents for many years.<sup>21</sup> It is only with hybrid crops (maize and sorghum) that seeds need to be purchased afresh every year. Only recently have plant breeders in China and Philippine's IRRI succeeded in producing hybrid varieties of rice and wheat. If commercialized, these seeds can create the kind of problems the critics have been worrying about. I chose to focus on the seeds to show how a disregard of basic scientific facts of the matter has led the populists into blind alleys. For their critique to retain some teeth, they will have to do some serious, dispassionate study of the scientific work going on in research laboratories around the world.

What is keeping critics like Shiva from accepting the legitimate need for agricultural modernization in India is their adherence to assorted theories of "moral economy" that supposedly characterized pre-capitalist societies. As mentioned at the beginning of this section, these theories are ahistorical and romantic descriptions of peasant societies. The pre-capitalist social order was ruled by scarcity, the cruelest forms of patriarchy and inegalitarian social relations. And in modern societies where the state itself has, at least in principle, assumed the role of providing a minimum income, it makes perfect sense for the peasants to engage in yield and profit-maximizing behavior. With technical means made available by modern genetics and plant sciences, it would indeed be irresponsible not to try.

## Conclusions

Populism is a deeply flawed philosophy as it sets up false boundaries between an essentialized "west" and a "Third World" equally frozen in time and "nature"; between "Eurocentric" discourses of natural and social science (including Marxism) and a more "authentic" self-understanding of Third World societies; and between the interests and aspirations of stereotyped "Third World women" and women in the west.

While this article has taken issue with each of these divisions, its major conclusions can be summarized as a call to action:

(i) *Against "Science is nothing but..." ism*: This increasingly popular and radical rejection of science lies at the heart of the populist critique of development. Such attempts to reduce the theoretical content of scientific ideas to their social origins alone are riddled with major philosophical lacunae.

While it is legitimate to study the production of knowledge both as science and as ideology, the two studies should not be confused. There are clear criteria for determining which is which: in so far as methods are used to allow the mechanisms present in the intransitive object to determine the results of an inquiry, it is science and in so far as the relations of power in a society determine the results, it is ideology. The latter may, and often do, guide the broad focus of a field of inquiry but do not provide the criteria for justifying a scientific finding. For instance, elements of Newton's world-view might have led him to ask certain questions about gravity but his law of gravity does not stand or fall by his personal beliefs. Newton's law of gravity becomes a law by having withstood rigorous testing by his peers and thousands of physicists since his discovery.

(ii) *Against anti-technology utopias*: Populists have not shown convincingly with science and technology are irrelevant to the project of development. This article has attempted to defend Marx's insight that emancipation from oppression is absolutely dependent on increasing human power over nature. That alone will make it possible for everyone to have the leisure and education for self-development and self-government. Even such human emancipation as has already taken place is dependent on increased power over nature through application of science in industry. Indeed, to vote for relinquishing human power over nature through science and technology, as radical science critics and eco-feminists would have us do, is tantamount to voting for the *permanent oppression of the many by the few*.

The populist rejection of technology is gaining ground because of false premises about the role of science in human societies. Growth of scientific knowledge and technological control over nature by itself has not and indeed cannot bring increased prosperity for all of humanity. But apart from technology aficionados, no one ever promised instant, come-what-may salvation. Like all other human and societal interventions, science and technology have to be democratized. Our troubles with science stem from the fact that while our power over nature had increased, our power over that power has not kept pace. The former does not necessarily preclude the latter. There is nothing in the character of scientific ideas themselves or in the processes of arriving at them that preclude their appropriation by the people, for the people.



Populist intellectuals like Shiva, furthermore, are guilty of hypocrisy and double standards. While they spare no effort in shredding the very idea of science and progress to pieces, they fail to acknowledge that their own growth as intellectuals and activists owes a tremendous debt to the products of these ideas.

(iii) *Against anti-socialism*: Socialism is essential for taming the power of science. The threat to human survival comes not from the augmentation of power as such, but from the division of that augmented power between competing capitals, classes, and nation-states. The economic and political unification of the world, and the working people, through socialism is the only alternative. These are old truths that need to be reasserted in the face of the growing irrationalism and parochialism on the left.

#### Notes:

- 1 This thesis dates back to the Russian populist Chayanov who projected independent smallholders - the middle peasants - to be a class that can reproduce itself through family labor and self exploitation under any social system from feudalism to capitalism or indeed socialism. This eternal middle peasant and his social world has been enshrined in the theory of "moral economy" whose leading exponent is James Scott in his famous *The Moral Economy of the Peasant*. Yale University Press, 1976. This line of thinking is also advanced by historians working within the subaltern studies perspective and activists of new social movements like the Chipko.
- 2 See Barrington Moore Jr., *Social Origins of Dictatorship and Democracy: Lord and Peasant in the Making of the Modern World*. Chapter 6 passim.
- 3 Samuel Popkin, *The Rational Peasant*, Berkeley and Los Angeles: University of California Press, 1979.
- 4 Tom Brass, "Moral Economists, Subalterns, New Social Movements, and the (Re-)emergence of a (Post-) Modernized (Middle) Peasant", in *Journal of Peasant Studies*, Vol.18, No.4, (July 1991).
- 5 D.N., another critic of Shiva has taken her to task for claiming the "forests have been central to India's civilization." He points out that "mainstream India" has appropriated these practices from forest dwelling tribal communities whom it has subjugated. "Far from the sacred groves being created and maintained through out India, the destruction of these groves and their replacement by temples is the expression of the mainstream Indian civilization's subjugation of the tribal," *EPW*, April 14, 1990.
- 6 A constant reference to the scriptural sources of "Indian" civilization appears to be a new fashion in populist writing. And it comes to me, an old fashioned secularist, as a bit of a shock. It disturbs me no end to find the "Hindu" so "naturally" extended to all things Indian. Moreover, what purpose do such references serve? I would like to learn instead what they actually meant to real men and women over history, how they conditioned social relations between classes, castes and genders.
- 6 Shiva, p 114-120. For a full flavor: "the penetration of capitalism and the money economy has led to a marked and devastating erosion of the productive power of land and the power of women" (p.113); "Commodification either destroys the basis of women's work or devalues it. With the decline in the perceived or real productivity of women is associated a decline in their status in society and the household" (p.117):

- 7 Bina Agarwal, "Neither Sustenance nor Sustainability. Agricultural Strategies, Ecological Degradation and Indian Women in Poverty," in Bina Agarwal (ed), *Structures of Patriarchy*, Zed Books, 1988. From 1961 to 1981, the percentage of rural women classified as agricultural laborers doubled from 25.6 per cent to 49.6 per cent. On the question of agricultural labor, I found Kalpana Bardhan the most illuminating ("Agricultural Growth and Rural Wage Labor in India," *South Asia Bulletin*, Vol.9, No.1 (1989).
- 8 "Traditionally women are productive in precisely those links in farm operations which involve a partnership with nature and are crucial for maintaining the food cycle - in the soil and in the local food economy. And it is these cycles that are broken when cash crop, Green Revolution agriculture replaces subsistence agriculture. There are two disposessions of women implicit in such a shift. Firstly, women's role shifts from the ecological category of being soil-builders and primary producers of farm productivity to the economic category of subsidiary workers and wage earners on an agricultural assembly line" (Shiva, p.114).
- 9 "Although they appropriate nature, their appropriation does not constitute a relationship of dominance or a property relation. Women are not owners of their own bodies or of the earth, but they cooperate with their bodies and with the earth in order to grow and make grow" (p.43).
- 10 Agarwal, p.84.
- 11 Pranab Bardhan "Sex disparity and child survival in rural India," in T.N.Srinivasan and Pranab Bardhan (eds.), *Rural Poverty in South Asia*, Columbia University Press, 1988, pp.473-483.
- 12 Ursula Sharma, "Women Work and Property in North West India," in Hamza Alavi and John Harris (eds.), *Sociology of "Developing Societies:" South Asia*, Monthly Review Press, 1989.
- 13 Agarwal, p.93
- 14 Bardhan, p.478
- 15 Ann Whitehead, "Food Crisis and Gender Conflict in the African Countryside," in H.Bernstein et al (eds.), *The Food Question: Profits v. People*, Monthly Review Press, 1990.
- 16 See Barrington Moore, Ch.6.
- 17 The beginnings of such a framework can be found in C.H.Hanumantha Rao, "Agricultural development and Ecological Degradation: An Analytical Framework," *EPW*, Dec 24, 1988, p.A142-146.
- 18 Michael Lipton, *New Seeds and Poor People* John Hopkins University Press, 1989. Lipton is concerned with answering one central question: given its pro-poor biological features, why have the poor not made larger gains from the Green Revolution? His goal is to suggest how plant breeders and international research organizations can better design varieties that have pro-poor biological features. The book offers an excellent survey of recent literature.
- 19 Lipton, p.44-45
- 20 According to Lipton, HYVs do not by themselves call for inorganic sources of nitrogen. Instead, attracted by the promise of bumper crops and government subsidized chemical fertilizers, farmers tend to give up the traditional soil building practices ( like mixed cropping with legumes, composting etc).
- 21 Lipton, *ibid*, p.36-37. A similar point is also made by B.H.Farmer, "Perspectives on the Green Revolution in South Asia," *Modern Asian Studies*, 20, 1 (1986), p.175-199. Farmer states: "Contrary to what is sometimes asserted, none of the released HYVs of wheat and rice are F1 hybrids which do not breed true for good Mendelian reasons and thus demand the purchase of fresh seeds every year; rather they are stable hybrids. But it is true that F1 hybrids of maize and jowar have been issued to the great delight of seed merchants who no doubt wish all HYUs were F1s" (P.183).