CHAPTER VII

THE ECONOMIC, SOCIAL AND POLITICAL ASPECTS OF THE ECOLOGICAL IMPLICATIONS OF THE GREEN REVOLUTION

Economic Implications
Social Implications
Political Implications
Administrative Response
After a detailed study of the ecological implications of the Green Revolution, it becomes necessary to understand the fallouts of these implications for the economy, society and polity of Punjab. The manner in which man has transformed the character of the environment being apparent, the reciprocal effect of the environment on man is equally important to assess. While a lot has been written about the economic, social and political effects of the Green Revolution, little has been stated about the impact of its ecological consequences.

The research assessment of the economic, social and political consequences of the Green Revolution is contradictory. There are scholars who view it as being highly beneficial. Self-sufficiency in food, general upliftment of the agricultural classes, including their acquiring political clout, rapid transformation of the countryside and stimulus to agro-based trade and industry are listed among the positive outcomes of the Green Revolution. It is stressed that these benefits were pervasive and penetrated all sections of society (Sen, 1970; Randhawa, 1974; Fernando and Thomas, 1978; Chadha, 1979; Farmer, 1981; Swaminathan, 1985; Glaeser, 1987; Rigg, 1989).

The other group of scholars argues on different lines. They point out that the Green Revolution has caused structural distortions. The uneven distribution of the benefits of the Green Revolution, wherein the bigger farmers emerged as the main beneficiaries, is cited as an illustration. The increased
dependence of farmers on uncertain sources for their inputs is another point which is highlighted in association with the problems of unemployment, poverty and inequality. At one point, it was feared that the Green Revolution may even turn red due to these issues (Ladejinsky, 1969; Frankel, 1971; Parthasarthy, 1971; Oommen, 1971 and 1989; Griffin, 1974; Morgan, 1978; Rahman, 1979; Dasgupta, 1983; Aggarwal, Arora and Gupta, 1989; Dak, 1989; Gangrade and Chaturvedi, 1989). Likewise, an accentuation in regional disparities is also attributed to the Green Revolution having confined itself to a few irrigated areas (Raza, 1978; Bhardwaj, 1982; Kundu and Raza, 1982).

As stated earlier, very little work has been done on the ecological aspects of the Green Revolution and virtually nothing has been said on how the transformed ecology has influenced economy, society and polity. While attempting a redressal of this imbalance, this chapter is handicapped by the lack of any direct data or literature on the theme. It is, thus, in the shape of a conceptual framework. It endeavours to raise some new questions. The implications have been noted as being economic, social and political in nature. A note has also been taken of the administrative response.
Economic Implications

As an essential corollary of the Green Revolution, the farming operations became dependent on heavy monetary inputs. Additionally, as a result of depletion of water table, a decrease in soil fertility and an increase in pest problem, there was an added burden on the pocket of the farmer. Over the 1970-71 to 1985-86 period, as stated earlier, the yield per hectare increased by 58 per cent for wheat and 81 per cent for paddy, while fertilizer use went up by 400 per cent. For the same period, the cost of fertilizing a hectare went up by 237 per cent and the cost of keeping it pest-free multiplied manifold from a zero base. The high-yielding variety seeds required three times as much water as the traditional ones. In over 50 per cent of Punjab, the water table had dropped dramatically due to intensive irrigation. Farmers had to deepen their tubewells repeatedly and install heavy duty motors to pump out the water. All this pushed up the agricultural costs.

In areas of canal irrigation and associated waterlogging, the farmers had to face economic hardship associated with the cost of reclaiming salt affected fields. Even after reclamation, these soils did not regain their original fertility, thereby affecting yields and resulting in lower profits. In heavily waterlogged areas, the soils were permanently damaged and agriculture had to be abandoned. As an illustration, village Khui Khera in Firozpur district, was a serious victim of such a situation.
The paddy-wheat rotation is the dominant aspect of the Green Revolution in Punjab. Continuous cereal cultivation resulted in a regular depletion of the same nutrients causing deficiencies in soils. As a result, yields suffer. Shiva (1991, p.60) estimates this loss at four tonnes per hectare in the case of paddy, wheat and maize.

Over-emphasis on paddy-wheat rotation, with a reduced genetic base, led to an acute pest problem. To correct it, expensive pesticides need to be applied. This added to the farmers' financial burden.

The reduction in area under pulses has made it a dear commodity. In a hot and vegetarian country, these are a major source of protein. A rise in their price has affected the pocket of the people and also deprived many of this protein source.

In addition, no fallow lands were kept and land devoted to self-fertilising leguminous crops was significantly reduced. Subsequently, expensive chemical fertilizers had to be applied in bigger quantities. This raised the cost of agriculture.

The loss of wastelands and the reduced size of the river beds deprived many of their source of livelihood. They were the people who depended on wild grass growing in such areas for their vocation. This aggravated their poverty.

It has been established that the returns from agriculture decreased and a fall in income was experienced during the late
1970s (Government of Punjab, 1986, p.6; Shiva, 1991, p.60). The yields of the two principal crops of paddy and wheat reached a plateau level by the early eighties. The promise of increasing or steady returns, introduced by the Green Revolution, did not hold out for long. With the erosion of profits, largely on account of the ecological imbalance, the picture was no longer rosy.

Social Implications

The impact of the ecological imbalances has been indirect on society and mostly it is in the nature of hardship or even a life threat to people. This is illustrated by several situations.

A regular deepening of water table requires frequent lowering of tubewells whose pits are usually of small diameter and have unplastered walls. A lot of underground masonry and other work is involved. This has, in many instances, caused injury or death to workers due to collapse of walls of the wells under reconstruction.

Quite often, farmers go down into the tubewell pits for minor repairs of pumps or removal of entrapped air. Deaths have been known to occur in many cases due to asphyxia caused by the presence of carbon dioxide as well as carbon monoxide. Cases of such mortality are on record for Samana subdivision of Patiala district (Gupta and Mehta, 1988 and Mittal, 1991).

Extension of irrigation in Punjab has caused the spread of diseases like bilharziasis and malaria, which threaten the
health of the population (Uppal, 1984, p.26). The latter disease experienced a resurgence in the wake of the Green Revolution, as noted in the previous chapter. There is also an increased incidence of allergies which are related to an excessive use of chemicals in agriculture.

**Political Implications**

The Green Revolution made water a very precious resource. Almost the entire cropped land is under irrigation in Punjab. People of the state have become sensitive to any sharing of water. They are not allowing the construction of the Satluj-Yamuna Link Canal, which as a part of an inter-state agreement, was to carry water to the adjoining state of Haryana. Any effort on the part of the Punjab government to complete its construction work faces a strong political opposition from the farmers. This canal project is assessed as one of the contributory causes of the Punjab problem.

The core of the Punjab problem has been the Sikh community's demand for greater autonomy vis-a-vis the central government. Such a demand has also been voiced by several other states at times. This is a natural reaction to efforts at greater centralisation of powers on the part of the national government.

In Punjab, in the wake of the ecological implications and economic costs of the Green Revolution coming onto the surface in the early eighties, the farmers started feeling restless.
This is evident from an observation made by a representative of a Punjab Farm Organisation in the Christian Science Monitor (May 1984, p.10): 'For the past three years, we have increasingly lost money from sowing all our acreage with wheat and paddy. We have been held hostage to feed the rest of India. We are determined that this will change'. Such expressions intensified the political heat of the difficult Punjab situation. Happily the scenario has dramatically changed in favour of peace now.

**Administrative Response**

The emerging ecological imbalances, as impacting upon agriculture, did receive due attention from the government. One important decision was to set up an Expert Committee, chaired by S.S.Johl, in 1986. The constitution of the committee was basically impelled by the problems being faced by farmers in marketing their large surplus produce of paddy and wheat. A need was felt to encourage alternative farm enterprise not only to remedy this situation but also to check the adverse impact of paddy-wheat rotation on the agro-ecosystem. The committee recommended a replacement of 20 per cent of the area presently under paddy-wheat rotation by other crops, such as sugarcane, oilseeds and vegetables/fruit.

An urgent need for diversification of cropping pattern, as also of agriculture itself, was highlighted in the Seventh Plan (1985-90) document. A greater allocation of funds was made for allied agricultural activities, such as animal husbandry,
commercial dairying, fishing and forestry, under the plan. The combined allocation to agriculture and its allied sectors was raised by 1.5 times during the Seventh Plan as compared to that during the Sixth (1980-85).

The Eighth Plan (1992-97), in particular, recognises the damage caused to the ecosystem by the paddy-wheat rotation. A strategy for diversion from paddy-wheat cultivation to alternative commercial crops, especially sugarcane, oilseeds, pulses and fruits, has been adopted. In addition, biological methods of pest control are to be given preference over the use of pesticides.

Here it would be pertinent to mention that the task of diversification is not without its problems. First, it is difficult to wean the farmer away from the lucrative paddy-wheat rotation. Secondly, paddy-wheat has an assured market while that for alternative crops remains uncertain. Finally, farmers are reluctant to adopt the change at the individual level. They would like that all the farmers of an area take to the change simultaneously. This would spare their crops from a concentrated attack of birds or pests. A good lesson has been learnt from the damage done by parrots to the sunflower crop when raised by a few farmers on their isolated fields. The government, however, remains serious in promoting diversification, especially through its pricing mechanism.
Alongwith, significantly enhanced allocations were made for reclamation of kallar/saline soils, conservation of soils and promotion of forestry. Things were taken care of even at the micro level. The maximum allocation of funds for soil reclamation was made in Sangrur, Amritsar and Kapurthala districts in 1988-89 (Table 7.1).

### Table 7.1


(Rupees in million)

<table>
<thead>
<tr>
<th>District</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gurdaspur</td>
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</tr>
<tr>
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</tr>
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<td>Firozpur</td>
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</tr>
<tr>
<td>FaridKot</td>
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</tr>
<tr>
<td>Bathinda</td>
<td>2.1</td>
</tr>
<tr>
<td>Sangrur</td>
<td>10.5</td>
</tr>
<tr>
<td>Patiala</td>
<td>3.5</td>
</tr>
</tbody>
</table>

*Source: Planning Department, Punjab.*

Measures taken for soil conservation include the levelling of land, bench terracing, gully reclamation and installation of underground pipelines. Schemes for the purpose were started in Hoshiarpur and Rupnagar districts, in particular (Table 7.2). The Kandi Watershed Area Project, with a thrust on soil conservation and management, was also started here with assistance from the World Bank.
Table 7.2

(Rupees in million)

<table>
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</tr>
<tr>
<td>Patiala</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Source: Planning Department, Punjab.

For promotion of forestry, plantation schemes were popularised in a big way. Social forestry, which was directed mainly at the small farmers to raise trees for food, feed and fuel, and farm forestry, which was adopted by some farmers as a commercial proposition, were given special incentives. Saplings, in particular, were supplied by the government at highly concessional rates. The submontane districts received maximum attention for the purpose (Table 7.3).
Table 7.3

Punjab: Districtwise Fund Allocation for Forestry Schemes
1988-89

(Rupees in million)

<table>
<thead>
<tr>
<th>District</th>
<th>Amount</th>
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<tbody>
<tr>
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<tr>
<td>Firozpur</td>
<td>6.0</td>
</tr>
<tr>
<td>Faridkot</td>
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<tr>
<td>Bathinda</td>
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</tr>
<tr>
<td>Patiala</td>
<td>7.2</td>
</tr>
</tbody>
</table>

Source: Planning Department, Punjab.

In addition, rural water supply and environmental improvement of urban slums (through supply of drinking water, sanitation, drainage, paving of streets and street lighting) were also catered for under the plans. Rural water supply got larger funds in Sangrur, Amritsar and Bathinda districts (Table 7.4). By comparison, environmental improvement of urban slums received greater attention in the Sangrur, Bathinda, Jalandhar and Patiala districts (Table 7.5).
### Table 7.4

(Rupees in million)

<table>
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<tr>
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</thead>
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<td>Hoshiarpur</td>
<td>11.0</td>
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<tr>
<td>Rupnagar</td>
<td>13.1</td>
</tr>
<tr>
<td>Ludhiana</td>
<td>-</td>
</tr>
<tr>
<td>Firozpur</td>
<td>15.3</td>
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<tr>
<td>Faridkot</td>
<td>11.8</td>
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<tr>
<td>Bathinda</td>
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<td>Sangrur</td>
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</tr>
<tr>
<td>Patiala</td>
<td>6.3</td>
</tr>
</tbody>
</table>

Source: Planning Department, Punjab.

### Table 7.5

(Rupees in million)

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<tbody>
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<td>Bathinda</td>
<td>0.7</td>
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<tr>
<td>Patiala</td>
<td>0.7</td>
</tr>
</tbody>
</table>

Source: Planning Department, Punjab.

In an overall assessment, concern for ecology on the part of the government has been in the nature of fire-fighting.
Strategies were devised only when the situation turned bad. The schemes relating to reclamation of waterlogged and saline land is a case in point. For reasons not easily understandable, the government did not frame a policy of combining canal and tube-well irrigation in the state or even regulating the tubewell irrigation in given areas. These measures would have gone a long way in solving the problem of a depleting water table.

An environment and ecology wing has been constituted as a part of the state department of science and technology. Strangely, its budget is very limited and the funds are used mostly for the study of urban air pollution. An agriculturally prosperous state like Punjab, requires an environment and ecology wing which is sensitive to the needs of the rural/agricultural sector.

Conclusion

It has become increasingly clear that the ecological implications of the Green Revolution had a far reaching effect on the state's economy, society and polity. The increase in the cost of cultivation, due to rising expenditure on irrigation, fertilizers, land reclamation and pesticides, made the farmers feel victimised due to an erosion in profits. This feeling has in great measure contributed to the present Punjab crisis. The more discerning among them believe that the Punjab farmer is being tempted to produce a surplus of foodgrains, particularly paddy, at the cost of the state's ecology.
The government has given due recognition to the ecological problem as it exists in the agricultural sphere. Its efforts at solving the ecological problems arising out of the Green Revolution are, however, constrained. Farmers' response to its advice for a shift from the paddy-wheat fixation is lukewarm. Considerations of personal economic gains are far more powerful than those of ecological costs in their case.

The concept of sustainable development, seeking a balance between ecology and economy, must be one of the guiding principles of Punjab agriculture. Here one has to keep in mind the conflict between the priority to foodgrain production at the national level and that to preservation of ecology at the state level. Punjab has to resolve the conflict between its short term gains and long term prospects. The situation calls for a handling with a balanced vision.
MODEL V: THE GREEN REVOLUTION AND OUTCOME OF ITS ECOLOGICAL IMPLICATIONS

- Economic implications:
  - Deep water table
  - Waterlogging and soil salinity
  - Negative impact on soil fertility
  - Lack of genetic diversity
  - Frequent lowering of tubewells
  - Pumping cost higher
  - Land reclamation
  - Increased use of fertilizers
  - Increased use of pesticides
  - Increase in cost of agriculture

- Social implications:
  - Hardship of tubewells to people due to ponding of water for paddy
  - Malaria

- Political implications:
  - Tubewell irrigation
  - Depleted water resource
  - Refusal to share river waters
  - Contributory factor to Punjab problem

- Green Revolution
  - Deepening of tubewells
  - Refusal to share river waters
  - Malaria

- Green Revolution
  - Economic implications
  - Social implications
  - Political implications