

Block

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ISSUES IN AGRICULTURAL SECTOR-I

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BLOCK INTRODUCTION

Despite the initiatives taken and the significant achievements made by the agricultural sector in India, many serious issues continue to be faced by the sector. The present block focuses on an appraisal of these issues. The related themes are distributed into four units as follows.

Unit 19 deals with the theme of ‘food security’. What does the term actually mean and what measures have been instituted to address the concern on this front in India? Are the measures instituted working well or do they require a reorientation in their approach and focus? Beginning with an appraisal of the various government initiatives in this regard, the unit makes an assessment of the impact of governmental policy on the stake holders in general. Identifying the gaps in the government’s strategy in this respect, the unit outlines a ‘future strategy’ for implementation.

Unit 20 focuses on ‘agricultural price policy and food inflation’. After explaining the importance of price policy in agriculture and identifying the various constituents of the economy which are affected by its impact, the unit discusses the factors that determine the evolving of agricultural price policy. The concept of ‘food inflation’ and the policy option for its management and control are also explained.

Unit 21 deals with the issue of ‘environmental impact of agricultural progress’. Beginning with an outline of what constitutes environmental disturbance in the context of agricultural practices, the unit describes the factors that have contributed to it over time. It then states the various efforts that have been made to restore the environmental balance by specific policy efforts which have been discussed in the earlier units of the course. The specific policy measures which have contributed to the environmental disturbance are discussed in a framework which juxtaposes the dual impact of agricultural progress achieved at the cost of environmental damage.

Unit 22 deals with ‘New Agricultural Strategy’. The agricultural progress that we have attained during the last five to six decades has been possible mainly due to the policy initiatives of the government. The unit first makes an appraisal of these efforts and then spells out the reorientation that it received towards the turn of the century by way of a new agricultural policy. In line with this policy, the previous decade of the present millennium has witnessed many new strategic approaches. The unit dwells on these approaches with a view to familiarising the learners on the recent policy initiatives taken in the face of current policy challenges.

UNIT 19 FOOD SECURITY

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19.0 OBJECTIVES

After reading this unit, you will be able to:

- define the various concepts associated with the issue of ‘food security’;
- discuss the trend in foodgrains scenario in terms of per-capita availability and per capita consumption of foodgrains in India;
- provide a theoretical explanation to the declining trend in per-capita food consumption under alternative policy options;

- explain the policies and programmes of the government followed in India in providing food security;
- comment on the impact of government policy on PDS to the stake holders in general; and
- indicate the gaps in the policy of ‘food security’ pursued and in its light outline a ‘future strategy’ for its effective implementation.

19.1 INTRODUCTION

The issue of ‘food security’ encompasses the twin aspects of adequate availability of foodgrains and its effective distribution to ensure its access to all. The availability needs to be ensured as ‘entitlement’ i.e. creation of conditions under which the really needy can access them with ease. This means that if the purchasing power of the poor is not adequate enough to buy the food, they should be enabled to either buy them at a subsidised price or their purchasing power should be suitably enhanced. While the former is achieved by a distributional policy, the latter is achieved by the implementation of specific programmes. The task of distribution (i.e. taking the food to the door step of every household, particularly the household living below the poverty line i.e. BPL families) is a gigantic task which is carried out in India by the public distribution system (PDS). The PDS is implemented through the operation of fair price shops (FPS) established all over the country. The task of such a mammoth distribution is preceded by the ‘procurement of foodgrains’ from the farmers under a policy of price support called the ‘minimum support price’ (MSP). By implementing such policies (i.e. procuring and distributing foodgrains through FPS, running food-for-work programmes, etc.) over the last six decades, the government has succeeded in according a measure of ‘food security’ to millions of poor people. The impact of this is seen in the declining poverty ratios over time. The accuracy of estimates of people living below the poverty line in India, estimated by different methodological frameworks, is subject to debate. However, as per a UN report, in the post-reform years of 1990s alone, the proportion of poor below the poverty line has declined from 51.3 percent in 1990 to around 26 percent in 2010. Notwithstanding this degree of success, there are three serious issues which cast a deep shadow on the efficiency of our food security policy. These are: (i) the ‘buffer stock’ is getting affected due to inadequate storage space, (ii) the targeting error in the PDS system has excluded many real poor from the PDS benefit (and many non-poor included), and most serious of all, (iii) the surplus subsidised foodgrains are exported to other countries with a huge further burden on the exchequer as subsidies. It is, thus, ironic that while millions continue to face acute poverty [with their children (of below 5 years) suffering from severe *malnutrition* with the consequent high rates of infant mortality; which in 2009 was estimated by UNICEF as 66 per 1000 live births (having declined from 118 in 1990)], the buffer stock of foodgrains is exported where they are used by animal feed manufacturers in countries like Malaysia, Indonesia, Oman, Iraq, Philippines, etc. It is in the face of this tragic truth that the term ‘food insecurity’ is used to describe a condition in which severe malnutrition persists among children in a population where there is no scarcity of food supply. Against this background, the present unit seeks to deal with two major issues of concern to agricultural development viz. (i) the policies adopted by the government to achieve a higher rate of ‘food security’ and (ii) the future strategy that needs to be adopted to make the policies of food security more efficient. We begin with a description of the various concepts involved.

19.2 CONCEPTUAL OUTLINE

We have already introduced above many of the concepts which we shall elaborate in this section. We shall begin with a distinction of the two terms viz. food self sufficiency and net production.

19.2.1 Food Self Sufficiency

A country is said to have achieved 'self sufficiency in food *production*' when its food production at the aggregate level matches with the food requirement of all its people. In other words, it refers to a state in which a country is in a position to feed its people from its own domestic production without having to depend on import of foodgrains from other countries. On the other hand, an economy, is said to be deficient in food production when its domestic production falls short of its requirement. If the deficiency is large, in the absence of help from other countries, the economy could witness starvation. It is important to note, however, that for a country to be 'food secured', it is not necessary to develop its own agricultural production (see 19.2.3 below).

19.2.2 Net Production

The entire foodgrains produced in a country is not available for human consumption. A part of it would be used as seeds for its subsequent ploughing while another part of it may be lost due to improper storage. A part of foodgrains output is also used as animal feed. The remaining portion, which is available for human consumption, is termed as 'net production'. The proportion of net production in total production depends upon various factors like method of cultivation, storage and marketing of foodgrains. This proportion is likely to vary from one country to another. In India, 87.5 percent of total foodgrains production is taken as net production.

19.2.3 Food Security Versus Food Insecurity

At a national level, food security is defined as 'availability' of food in the 'required quantity and quality' to all individuals. The availability should be in a manner which is adequate to lead a 'healthy and active life'. A further condition of food security also requires that the availability should continue on a 'lasting or sustained basis'. Thus, *theoretically*, food security is achieved by a combination of factors spanning the household, community, national and even international levels. However, in its *operation*, it is applied at the *individual* level. In view of this, 'self-sufficiency in food production' at the national level is neither necessary nor sufficient to guarantee 'food security' at the individual level. This becomes clear when we take the examples of countries like Singapore and Hong Kong which are not food self-sufficient but their people are food secured whereas while India as a country is food secured, all of its people are not. Thus, while all the four elements of food viz. availability, access, utilization and stability of access are equally important to ensure food security, in practical terms it depends upon the extent up to which an individual can access his 'entitlement' to food. Further, the condition of 'utilisation of food to lead a healthy and active life' brings-in the significance of non-food items (like adequate diet, clean water, sanitation and health care) to food security. Thus, if a person is unable to make use of the food because he/she is sick, with no resource being available as help, then the 'food utilisation' condition remains unsatisfied. Similar is the case about food availability because the question is not merely about the availability of food but whether there exists a mechanism by which it is effectively distributed to all the individuals who are poor. Likewise, the 'stability of access' underscores the possibility of 'vulnerability' of poor who might find themselves

without food on any day that they fail to find employment. It is in this sense, that the element of 'food entitlement' (i.e. resources by which one can claim food as entitlement) becomes important. The report on *The State of Food Insecurity, 2000* states that: 'whereas close to half the population in the world is vulnerable to hunger, about one-seventh of them are *undernourished*'. Thus, 'food insecurity', which is the opposite of 'food security', underscores the prevalence of *undernourishment* in an economy. From the point of view of policy implementation, food insecurity poses a far higher challenge to be dealt with on the path of attaining food security at the individual levels.

19.2.4 Public Distribution System (PDS)

In a free-market economy characterised by inequalities in income among households, there are many poor households who are not in a position to buy adequate food at the prevailing market price. Such households are, therefore, food insecure. A mechanism by which food at a cheaper rate is made available to such poor households is the 'public distribution system' (PDS). PDS are of two types viz. Universal-PDS (UPDS) and Targeted-PDS (TPDS). A public distribution system in which all the households are provided a uniform scale of foodgrains is known as the UPDS. On the other hand, a public distribution system in which households are classified into two categories viz. poor and non-poor, with the objective of providing the poor households a higher scale of ration than the non-poor households, is known as the TPDS. The TPDS is, therefore, basically meant to provide better food security to the poor.

19.2.5 Targeting Errors: Type-E and Type-F Errors

The food insecure households are provided a ration card which will enable them to purchase food from the fair price shops (FPS) at a subsidised rate (i.e. a rate which is lower than the market price). In the process of distribution of ration cards two types of errors can creep-in. A deserving household (i.e. poor) may be *excluded* from the benefit of a ration card thereby denying him the benefit of the PDS. Such an error is called Type-E error. On the other hand, a non-poor household may get *included* for the benefit of subsidised foodgrains from the PDS. Such an error is called Type F error. The efficiency of PDS depends on the capacity of the government to control both these types of errors. Further, the efficiency of PDS can get severely battered if the system suffers from 'pilferage' or 'corruption' (i.e. leakage of foodgrains from the FPS to the open market). Poor households are classified as BPL families (i.e. households below the poverty line) while the non-poor households are classified as APL families (i.e. households above the poverty line). In short, a public distribution system is supposed to provide food security to the poor by insulating them from the impact of rising prices of essential commodities thereby maintaining a minimum nutritional status. The essential commodities distributed through the FPS mainly include the four main items of wheat, rice, kerosene and sugar. However, to protect the BPL families from the effect of rising food prices the government may at times distribute pulses and edible oils at subsidised rates through the 'ration shops' (alternative name used for FPS). PDS can ensure food security, in true sense, only when both cereal and non cereal items (like pulses) are distributed through PDS. In practice, only cereal food items are distributed through PDS.

19.2.6 Procurement of Foodgrains

During a good agriculture year, prices may sharply decline. Consequently, farmers may suffer due to low price while the consumers may benefit. On the other hand, during a bad agricultural year consumers suffer due to price rise but the benefit of such price rise is likely to be cornered by middlemen and traders as farmers are mostly illiterate and

not well organised. Thus, the gains to the poor farmer may not be much as he has little surplus to sell. A poor farmer is also badly affected by inter-seasonal differences in foodgrain price. For instance, while during harvesting season, when prices are low, the economic condition of the poor farmer might force him to sell his produce, during the off-season he might have to buy foodgrains at a much higher price. To protect the farmers from such fluctuations in price, the government adopts a policy of ‘procurement’. Under this, during the harvesting season, the government buys foodgrains from the farmers at a price called the minimum support price (MSP). Such procurement operations facilitate the government to build-up buffer stocks which is used for feeding the PDS.

19.2.7 Buffer Stock

Buffer stock is an important pre-requisite for providing food security. It is well known that consumption of food takes place throughout the year while output of foodgrain comes at specific periods in a year. To bridge the inter-seasonal differences in production and consumption, there is a need to maintain a stock of foodgrains called the ‘buffer stock’. Such buffer stock are off-loaded during the lean season to maintain price stability. Stock of foodgrains is also required to counteract price fluctuations due to cyclical variations in agricultural production. Besides these reasons, as said above, stocks of foodgrain are also required to run the PDS. To sum up, government need to maintain buffer stock of foodgrain to: (i) control inter-seasonal price fluctuations; (ii) counter-act the harmful effects of cyclical fluctuation in food production; and (iii) run the public distribution system. Besides these factors, maintenance of buffer stock also serves as a disciplinary device against private traders who might hoard food items to create an artificial scarcity resulting in price hike.

19.2.8 Minimum Support Price

To insulate cultivators from price risk, the government announces the purchase price for a crop at the beginning of each agricultural season. This is called as the minimum support price or the MSP. At the time of harvest, if the market price is lower than the MSP, then the government is ready to purchase all the crop brought to the market by a farmer at the pre-fixed MSP. It is a matter of debate whether the MSP announced by the government ensures adequate returns to the farmer. Implementation of the MSP policy varies from crop to crop.

Check Your Progress 1 [answer in about 50 words using the space given]

- 1) Mention the twin aspects encompassing the issue of ‘food security’?

- 2) Which economic indicator reflects the impact of policies of food security pursued? By what margin, this indicator has declined in India over the period 1990 to 2010?

3) State the three serious issues which casts a deep shadow on the efficiency of 'food security' policies pursued in India.

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4) What does the term 'food insecurity' connote?

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5) When is a country said to have attained a status of 'food self-sufficiency'? Is such an attainment necessary or sufficient to claim a status of 'food security'?

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6) Mention any three factors which contribute to enhancing the 'net production'. What is the estimated proportion of 'net production' for India?

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7) Theoretically, which four factors are important to ensure 'food security'? In practice, however, which factor actually governs the issue of 'food security'?

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8) What distinguishes the targeted-PDS from the universal-PDS? Which of the two provides a better 'food security' cover and why?

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- 9) Which of the targeting errors is characterised for ‘exclusion’ of a poor household from the PDS? In what way the PDS is supposed to provide ‘food security’ to the poor?

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- 10) Mention the three reasons why the government maintains a ‘buffer stock’ of foodgrains?

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19.3 FOODGRAINS SCENARIO IN INDIA

In order to understand the concept of food security vis-à-vis the level of its attainment, it is important to look at some empirical facts. In this section, we take a look at the trends, over 1951-2010, in: (i) total area under agriculture, its production and productivity; and (ii) per-capita availability/consumption of foodgrains. While the area/production/productivity throws light on the overall availability of foodgrains, the per-capita availability/consumption helps us to relate food security to the distribution/policy dimensions. Further, for agrarian economies with abundant population, *‘for the availability of foodgrains to increase, it is important that the growth rate of food production is greater than the growth rate of population’*. Additionally, the per-capita consumption of foodgrains would depend upon many other factors like: (i) per-capita income of household, (ii) open-market prices, (iii) policy on procurement and release of buffer stock, etc. In view of this, the per capita consumption of foodgrains need not increase merely because the per-capita availability is increasing. Such a situation would, therefore, require more pro-active policy initiatives for attaining food security. While we shall look at the efforts made in this direction in section 19.5, presently we shall analyse the empirical facts on availability/consumption of foodgrains. The analysis does not take into account cyclic variation in agricultural production.

19.3.1 Area, Production and Productivity

Table 19.1 presents the trend in area, production and productivity of foodgrains over the long term period of 1951-2010. The trends in these three variables reveal the following:

- 1) There is a 25 percent increase in area under foodgrains over the six decade period. The increase is marked with wide fluctuation from one period to the other. The highest increase was in the decade 1951-61 (19 percent) followed by 1961-71 (8 percent). Over the next two decades of 1971-81 and 1981-91 there was a marginal increase of 2 and 1 percent respectively. During the post-reforms period of 1991-2010, there has been a decline (-5 percent) in the area under foodgrain production. The decline might mean a shift in the cropping pattern from foodgrains to non-foodgrains.

Table 19.1: Trends in Area, Production and Yield of Foodgrains in India

Year	Area	Production	Yield
1950-51	97.3	50.8	522
1960-61	115.6	82.0 (4.9)	710 (3.1)
1970-71	124.3	108.4 (2.8)	872 (2.1)
1980-81	126.7	129.6 (1.8)	1023 (1.6)
1990-91	127.8	176.39 (3.1)	1380 (3.0)
2009-10	121.3	218.2 (1.1)	1798 (1.4)
Percentage Increase over 1951-2010	24.7	330 (2.5)	244 (2.1)

Notes: (i) Area in million hectares, production in million tons and yield in kgs per hectare; (ii) The period-to-period (i.e. 1951-61, 1961-71, 1971-81, 1981-91 and 1991-2010) percentage change for area are: 19, 8, 2, 1 and -5 respectively; (iii) corresponding percentage change for production are: 61, 32, 20, 36, 24 and for productivity: 36, 23, 17, 35, 30; and (iv) figures within brackets in columns 3 and 4 are compound average (annual) growth rates [CAGR] for the periods: 1951-61, 1961-71, 1971-81, 1981-91 and 1991-2010.

Source: Economic Survey, Govt. of India.

- 2) The trend in foodgrain production shows an increase of more than four times from 51 million tons in 1951 to 218 million tons in 2010. The highest increase (of 61 percent) was in the decade 1951-61 which translates to 6.1 percent increase per annum. This is followed by the next highest increase of 36 percent during 1981-91. In the post-reform period of 1991-2010, the increase in production is by 24 percent. In terms of average annual percentage increase in production of foodgrains, therefore, the post-reform years has registered the lowest increase of 1.3 (24 ÷ 19) percent per annum.
- 3) In terms of the growth rate in foodgrains production, the increase has been highest (4.9 percent) during 1951-61 followed by 3.1 percent during 1981-91. The lowest growth rate of 1.1 percent in foodgrain production is during the post-reform years of 1991-2010 during which period the population growth has been 1.8 percent per annum. The combined period growth rate in foodgrains, over 1951-2010, is 2.5 percent which is higher than the population growth rate over this period of 2.04 percent. Thus, in spite of the higher growth in foodgrain production, there has been food security problem in India. This, therefore, suggests that higher growth in foodgrains production could at best be a necessary condition for food security in overpopulated agrarian economies.
- 4) The productivity per hectare (see 'key words') has increased by nearly 3.5 times (from 522 kgs in 1951 to 1798 kgs in 2010). However, in terms of average annual (compound) growth rate, the growth in productivity over 1951-2010 is 2.1 percent which is only marginally higher than the population growth rate of 2.04 percent.

To sum up, therefore, over the period 1951-2010: (i) there is an increase of 25 percent in the area under foodgrain production and (ii) a modest increase in foodgrain productivity.

19.3.2 Per Capita Availability of Foodgrains

If the increase in production is utilised for building up stocks by either government agencies or private traders, then the per capita availability will not increase. The effect of exports of foodgrains will be similar. Thus,

Per Capita Net Availability = [Net Production – Exports + Imports +/- change in stock with government and private traders] ÷ Population

The trend in the per-capita availability of foodgrains (which is a better measure of food security than based on the aggregate indicators considered above), is presented in Table 19.2. The major inferences that can be drawn from this data are as follows.

- 1) The per-capita availability of foodgrains on the whole (i.e. by considering both cereals and pulses) has increased from about 395 grams in 1951 to 444 grams in 2009. The increase over the period of six decades is to an extent of 12.4 percent.
- 2) In terms of the two major cereals viz. rice and wheat, the increase in the per capita availability of wheat is far higher (by 135%) as compared to rice (for which the increase is by only 19 percent).
- 3) The increase in the per-capita availability of ‘other cereals’ has declined sharply (–42 percent) over 1951-2009. For aggregate cereals, however, there is an increase of 21 percent over the six decade period. In the per capita availability of pulses, there is a steep decline of 40 percent over this period.

In sum, therefore, (i) there has been improvement in the per capita availability of foodgrains and superior cereals like wheat and rice; (ii) but there is a steep decline in the availability of pulses.

Table 19.2: Trends in Per Capita Availability of Foodgrains in India

Year	Rice	Wheat	Other Cereals	Total (Cereals)	Pulses	Food Grains
1951	158.9	65.7	109.6	334.2	60.7	394.9
1961	201.1	79.1	119.5	399.7	69.0	468.7
1971	192.6	103.6	121.4	417.6	51.2	468.8
1981	197.8	129.6	89.9	417.3	37.5	454.8
1991	221.7	166.8	80.0	468.5	41.6	510.1
2001	190.5	135.8	56.2	386.2	30.0	416.2
2005	177.3	154.3	59.4	390.9	31.5	422.9
2009	188.4	154.7	63.9	407.0	37.0	444.0
Change (%) over 1951-2010	19	135	-42	21	-40	12.4

Notes: (i) Availability in grams per day; (ii) Total (cereals) = rice + wheat + other cereals; (iii) foodgrains = total cereals + pulses;

Source: Economic Survey, Govt. of India. [while the Economic Survey is an annual publication which is a ready source of all secondary data, for ‘food statistics’, the ‘Bulletin on Food Statistics’ published by the Directorate of Economics and Statistics, Ministry of Agriculture, Government of India, is a primary source of data].

19.3.3 Per Capita Consumption of Foodgrains

Besides the availability of foodgrains, the per capita consumption of foodgrains depends upon other factors like: per capita income of household, open market prices, tastes and preferences of people, etc. Estimates of consumption of foodgrains is provided by the results of Household Consumer Expenditure Surveys conducted by NSSO at quinquennial intervals. Using this data, the estimated results of per capita consumption is presented for the period 1973-2010 in Table 19.3. The data is presented, separately for both rural and urban areas, as per two reference periods viz. a monthly consumption pattern (in kgs) and a daily consumption pattern (expressed in gms). The trends reveal that, except for urban area during 1973-78, there is a steady decline in the consumption of foodgrains for both the urban and the rural households. Besides the factors contributing to this decline mentioned above, other factors which could have influenced the consumption trend include an inadequate supply scenario. This could be either due to the non-release of buffer stock to the open market in time or due to the artificial shortage created by hoarding by traders. We shall first seek a theoretical explanation for this trend in section 19.4 below.

Table 19.3: Trends in Per Capita Consumption of Cereals in India

Sl. No.	Year	Rural		Urban	
		A	B	A	B
1	1972-73	15.26	509	11.24	375
2	1977-78	15.25	508	11.62	387
3	1983	14.8	493	11.30	377
4	1987-88	14.47	482	11.19	373
5	1993-94	13.40	447	10.63	354
6	2004-05	12.12	404	9.94	331
7	2009-10	11.35	378	9.39	313

- Notes:** (i) A= Consumption for 30 days in kgs. B= Daily consumption in grams.
(ii) 1999-2000 estimates are not cited due to huge difference in estimates based on the two reference periods viz. week and month.

Source: Various rounds of NSSO on Household Consumer Expenditure Surveys.

19.4 FOOD SECURITY UNDER ALTERNATIVE POLICY CONTEXTS

The divergence between increasing per capita food availability on the one hand and declining per capita consumption on the other, poses food security concern relating to policy option and its implementation. From a theoretical perspective, we can consider three alternative policy contexts as follows.

19.4.1 Free Market Operation

Let us consider a hypothetical situation where there are only two consumers: (i) a poor consumer and (ii) a rich consumer. Let the demand curve of poor consumer be D_1D_1 and that of rich consumer be D_2D_2 (Figure 19.1) with SS representing the market supply curve. The aggregate demand curve DD is obtained by the horizontal summation of the two individual demand curves. The point of intersection of these two curves (point E) represents the equilibrium price OP prevailing in the market with the quantity transacted being OQ . At price OP , the poor consumer will buy quantity ' Oq_1 ' and the rich consumer will buy quantity ' Oq_2 ' with $Oq_1 + Oq_2$ being equal to OQ . It is possible

that the quantity of foodgrains bought by poor consumer may be below the minimum norm of foodgrains required for maintaining a healthy life and the quantity of foodgrain bought by rich consumer above such a norm. The total quantity of foodgrain transacted in the market i.e. OQ , if properly distributed, would make both the consumers food secure. The situation can be generalized to multiple consumers of differing economic background. The policy challenge, therefore, is to create conditions necessary for an efficient distribution of available foodgrains.

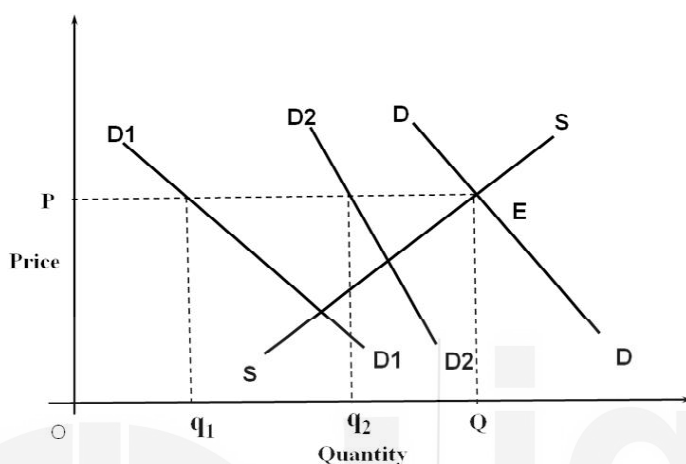


Fig. 19.1: Free Market Operation

19.4.2 Impact of Government Procurement

Suppose the government intervenes by procuring foodgrains from the producers. This will reduce the supply of foodgrains in the market. Consequently, the supply curve will shift leftwards, to S_1S_1 (Figure 19.2). As a result of this shift, the equilibrium price will increase from OP to OP_1 . This will compel the poor consumer to reduce consumption while for the rich consumer there is no such compulsion. On the whole, there will be reduction in the overall consumption from OQ to OQ_1 . Thus, although the per-capita availability of foodgrains in the economy may be high, the per capita consumption would be low when government only procures foodgrains but not release it to the open market or distribute it to the poor. Similar outcome emerges when government permits the export of foodgrains or puts restriction on its import.

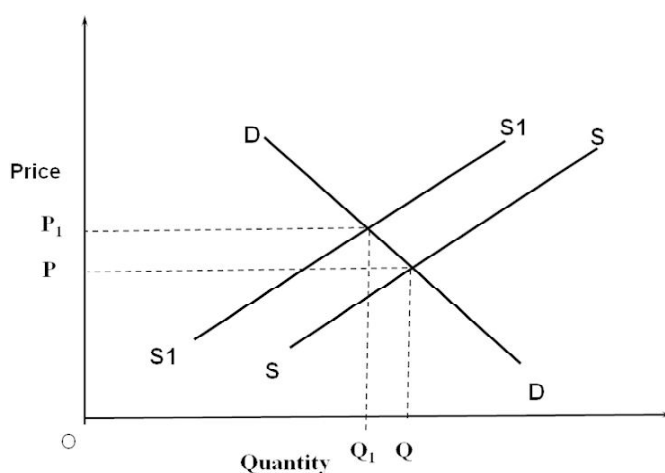


Fig. 19.2: Impact of Government Procurement

19.4.3 Impact of Government Procurement and Distribution

A more optimal situation is one when the government not only procures foodgrains from the producers, but also distributes a part of it to the poor consumer. As discussed in 19.4.2, the procurement action shifts the supply curve leftwards from SS to S1S1. But due to the distribution of foodgrains to the poor consumers, their dependency on the open market would decrease. The aggregate demand curve also, therefore, shifts leftwards i.e. from DD to D1D1 (Figure 19.3). Due to the shifts in supply and demand curves, for the quantity transacted at OQ_2 , the equilibrium price will be OP_2 . The price OP_2 is higher than OP (price prevailing in Case 1) but lower than OP_1 (price prevailing in case 2). The quantity transacted in the market will also be lower than in the two cases

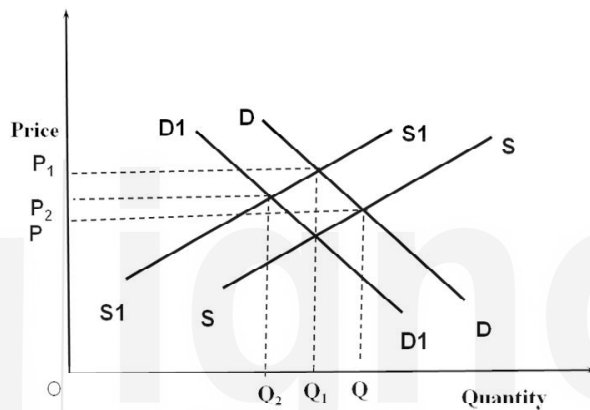


Fig. 19.3: Impact of Government Procurement and Distribution

discussed above. As far as the impact of such government action on the consumption of poor consumers is concerned, the consumption is likely to increase as the poor consumer is able to meet a part of his food requirement at subsidized rate supplied by the government. But he has to buy the remaining requirement from open-market at a higher price. The net impact on the consumption of poor consumer depends upon other factors like: (i) per capita quantity distributed; (ii) subsidized price; (iii) impact of procurement on market supply; (iv) impact of distribution on market demand; etc.

Thus, to sum up, the per capita food consumption in an economy may, therefore, decline even when the per capita food availability is adequate. This may happen when: (i) the government procures foodgrains from domestic producers but uses it only for building buffer stock; (ii) government encourages domestic producers to export but puts restriction on imports; (iii) government procures foodgrains from domestic producers but distributes only a part of it to consumers and hoards the major part for building a buffer stock. In the first two cases, the open-market price would rise in response to which the consumers, especially the poor consumers, would reduce their foodgrains consumption. In the third case, the aggregate consumption depends upon other factors like: scale of ration and its price, open-market price, distributional efficiency, etc.

Check Your Progress 2 [answer in about 50 words using the space given]

- 1) Mention any three factors, other than the availability of foodgrains, on which the per-capita consumption of foodgrains would depend?

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2) In which period there is a decline in the area under foodgrains production? By how much is the decline and what does such a trend possibly suggest?

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3) Over the period 1951-2010, which two periods are marked for the highest and the lowest average annual percentage increase in production of foodgrains? What is their respective average annual percentage increase?

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4) Which indicators for India point out to the fact that 'higher growth in foodgrains production is at best a necessary condition for food security?

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5) On the basis of the empirical evidence, in the ultimate analysis, how would you characterise the growth in foodgrain productivity in India?

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6) State with empirical support, the two broad inferences on the trends in per-capita availability of foodgrains.

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7) Which agency/survey provides data useful for deriving the consumption trends of foodgrains in India? What are the two reference periods for which the data is provided by this source? What inference on the trend in per-capita consumption can be made from this data source?

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- 8) Is it necessary for per-capita food consumption to always increase when there is increase in per-capita food availability? If not, state the contexts with implications, when such a situation might occur?

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19.5 POLICIES AND PROGRAMMES FOR FOOD SECURITY

Many policies and programmes have been implemented by the government towards realising the objective of food security. Some of the programmes have aimed at improving the income levels of the people by providing wage employment, or by improving the skills and earning capacity of the people. Others have aimed at promoting food consumption by providing food at a subsidized rate. Such programmes include specific efforts under PDS, mid-day meals programme for school going children, food for work programme, etc. Some of these programmes are universal in nature while others confine to a particular segment of the population.

19.5.1 Efforts Under PDS

Of all the food safety operations in India, the most far reaching, in terms of coverage as well as public expenditure on subsidy, is the PDS. The main objectives of the PDS are: (i) provide essential consumer goods at affordable price to the poor; (ii) maintain stability in open market prices of foodgrains; (iii) procure foodgrains from surplus regions and distribute it in deficit regions; and (iv) protect the domestic producers of foodgrains from unfair practices of traders by procuring foodgrains directly from farmers at remunerative prices. Both the central and state governments participate in the procurement and distribution of foodgrains. The Central Government has the responsibility for procurement, storage, transportation and bulk allocation of essential commodities (viz. wheat, rice, sugar, imported edible oil and kerosene) to the states. The state governments have the responsibility of its distribution to the consumers through a network of fair price shops (FPSs) spread over the length and breadth of the country. The commodities are made available by the centre to the state governments at a price called the central issue price (CIP). The CIP is usually lower than the economic costs of foodgrains which includes storage and transportation costs. The difference between the economic cost and the CIP is called the ‘consumer subsidy’ which is borne by the central government. The operation of PDS has resulted in mounting food subsidy owing mainly to the widening difference between the procurement price of the government and the price at which it is finally sold in the PDS. For instance, in 2011 while wheat was procured at a rate of Rs. 11.2 per kg, it was sold at Rs. 4.15 per kg. to a BPL family and Rs. 6.10 per kg. for a APL family. Over the period 1992-2011, the consumer subsidy has risen (from Rs. 2850 crores in 1992 to Rs. 62930 crores in 2011) by a steep 16.7 average annual percent.

19.5.2 Food Based Welfare Schemes

Many specific programmes or schemes involving the distribution of foodgrains at concessional prices to the poor households have been launched by the government.

Some of the important ones are: (i) the Antyodaya Anna Yojana (AAY) launched in 2000; (ii) the Annapurna Scheme launched in 2001; and (iii) the Sampoorna Gramin Rozgar Yojna (SGRY) launched in 2001. The AAY aims at providing subsidized foodgrains (at the rates of Rs. 2 per kg. for wheat and Rs. 3 per kg. for rice) to 1 crore poorest of the poor families (or around 5 crore persons) identified as unable to get two square meals a day on sustained basis through out the year. The identification of the families is done by gram panchayats and gram sabhas. The Annapurna Scheme targets poor senior citizens above the age of 65 years (and who are not covered by the National Old Age Pension Scheme) to provide 10 kgs. of foodgrains per person per month free of cost. The SGRY envisages the undertaking of employment based programmes in which foodgrains (supplied free of cost by the centre to the states) are used to give payment for work done i.e. the compensation for work done is paid in kind through foodgrains. Another important welfare scheme is the 'midday meal programme (MMP)' in government schools in which cooked food is provided to children of classes I-VIII. The programme aims at enhancing the energy and protein level of poor children besides providing an incentive to attend schools. Additional nutrients like iron, folic acid and vitamin-A are also provided to the poor children as supplements in a larger scheme of convergence viz. the 'national rural health mission' (NRHM).

19.5.3 National Food Security Mission (NFSM)

The NFSM was launched in 2007 as a crop development scheme. The mission aims at achieving the enhanced production of rice, wheat and pulses by 10, 8 and 2 million tons respectively. The time target for this achievement was the end of XIth plan (i.e. 2012). The mission has since achieved the production of 25 million tons of additional foodgrains, a year ahead of its targeted date. The mission's approach consists of: introduction of new farm practices, distribution of HYV seeds, treatment of soil to enhance its fertility for higher productivity, etc.

19.5.4 National Food Security (NFS) Bill

Apart from reiterating the provision of foodgrains to priority households, the NFS Bill proposes to reform the targeted-PDS by: (i) doorstep delivery of foodgrains; and (ii) application of ICT (i.e. information and communication technology). The latter is further leveraged with 'aadhaar', the scheme for allotment of unique identification number, for efficient identification/targeting of beneficiaries. In case of non-supply of foodgrains, the Bill proposes to provide a food security allowance to the beneficiaries. The Bill provisions for transparency and accountability by measures like social audits, establishment of grievance redressing mechanisms, setting up of vigilance committees, etc.

19.6 IMPACT OF GOVERNMENT POLICY

There have been both negative as well as positive effect of government policy on food security vis-à-vis its policies of procurement, distribution under PDS, etc. These can be explained as follows.

Consequences of Excess Stock: The policy of procurement, without regard to requirement, has had several deleterious effect. First, it has deprived consumers of more free access to grain. Had the foodgrains not been procured, to that extent a larger quantity would have been available in the market. Second, it is not the case that this additional procurement was in the interest of expanding the buffer stock. The stock of foodgrains has generally been significantly higher than buffer stock norms and this extra

stocking has only led to extra cost of storing them. Third, procurement beyond requirement adversely affects prices. Had the additional supplies been available in the market, it would have had a sobering effect on prices. Lastly, it is common knowledge that losses during storage depends upon the duration of storage, the longer the storage the higher the losses.

Unhealthy/Unsustainable Production Practices: High procurement prices of rice encouraged farmers to produce rice, a highly water-intensive crop. The report on long-term grain management by the Abhijit Sen Committee observed that this 'mono-crop-strategy', which is environmentally unsustainable, has happened in regions which were not suitable for rice production from long-term sustainability point of view. Further, free electricity to the farmers leads to wasteful use of a scarce common property resource like ground water which cannot be sustained for long. As a result of intensive use of ground water for irrigation, water table in these regions has depleted. Farmers now have to bore much deeper for water. This has drastically increased irrigation costs.

Decentralisation of PDS: In recent past, instead of providing foodgrains, the centre is providing financial assistance to the state governments to procure and distribute foodgrains to BPL families at subsidized rates. Although at present, owing to their own infrastructural constraints not many states have come forward to adopt this policy, it is feared that decentralized procurement would increase the likelihood of less procurement, even non-procurement, which would be against the interests of poor farmers (who would be compelled to resort to distress sales). The Abhijith Sen committee had also in its report recommended continuation of the existing minimum support price base system of open-ended procurement of foodgrains by the centre/FCI. The committee has, however, advocated rationalization of the MSP to reflect actual production costs incurred by farmers.

Exports of Foodgrains: With the increase in production, India has become a net exporter of foodgrains. This is happening even when a large part of the country's population goes hungry. The export price of wheat has been pegged at Rs. 4310 per tonne. This means the government is selling grain (wheat and rice) to foreign nationals at a price sold to the BPL families at less than half of its economic cost. On the one hand, the government refuses to lower the issue price for the BPL families on the contention that it would further increase the subsidy burden. But, on the other, it is continuing to provide heavy subsidy to foodgrain exports. Thus, the benefits of food subsidy, paid for by the Indian tax payer, are being enjoyed by consumers and animal feed manufacturers (in countries like South Korea, Malaysia, Bangladesh, UAE, Indonesia, Oman, Iraq and the Philippines) rather than the poor Indian families it is intended for.

Impact of PDS on Poverty: The gains in terms of income transfer from PDS to the poor is low as PDS is not effective in states with high incidence of poverty. Consequently, wide inter-state differences in performance of PDS and reduction in poverty levels have resulted. Many empirical studies have revealed that many poor households have been denied ration cards, while many non-poor households have managed to obtain them. Thus, high levels of Type E and Type F errors have hampered the efficiency of PDS in India. Due to these leakages, the subsidy on PDS is ineffectively utilized. NSS consumption data indicates that PDS provided only about 8 to 20 percent of the food purchases of the poor; the rest having been purchased from open market purchases. PDS, therefore, needs massive reforms. In spite of these shortcomings, a subsidized PDS in a well-targeted manner continues to be the best form of food security for the poor.

19.7 FUTURE STRATEGY

India has made great strides towards increasing the production of foodgrains since the mid-sixties. Presently, India ranks high in the production of rice, wheat, fruits and vegetables, etc. However, technological break-through achieved in 1960s has outlived its effective duration. The demand for foodgrains is, inter-alia, increasing due to increase in income of people in general. Further, as we noted above, the government has initiated steps to introduce the food security Act which would impose larger burden on our domestic production compelling us to import foodgrains from other countries. This, therefore, requires appropriate strategies to be adopted.

Institution of Safety Nets: The poor being ill-equipped to withstand the impact of food inflation, there is a need to institute safety nets for their welfare. For this, the PDS needs to be reformed and further strengthened. Concerted efforts should be made to reduce the targeting errors in the PDS. Many more programmes need to be introduced to improve the purchasing power of the poor and their food intake. As a short term measure, to the extent the supply conditions warrant, essential items like pulses, edible oils, sugar, etc. should be imported to feed the PDS. But the long term strategy should be to increase domestic production and link programmes like food-for-work to generate assets leading to capital formation and sustained capacity to earn income by suitable productive self-employment activities.

Extension of AAY: The Antyodaya Anna Yojana should be expanded to cover more poor families with enhanced entitlements. Unlike other schemes such as mid-day meals which are marred by logistic problems, the AAY scheme can be better administered. This would entail increased subsidy which is but a small price to pay for the food security gains of large number of people living below the poverty line. It would also provide a solution to the problem of excessive food stocks.

Second Green Revolution: It is projected that the demand for cereals in 2020 range between 224-296 million tonnes. On the other hand, estimates of availability of cereals from domestic production range between 222 to 268 million tonnes. To meet the gap, there is a need for focusing on integrated approaches/mechanisms to achieve a second green revolution.

Check Your Progress 3 [answer in about 50 words using the space given]

- 1) Mention the four objectives of PDS.

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- 2) Why is the CIP usually lower than its 'economic cost' of foodgrains? What is the difference between the two called as and what has been the extent of its increase over the period 1992-2011?

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3) Mention the three important food based welfare programmes. Which one of them is a programme of 'food for work'?

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4) What has been the goal of NFSM? Which specific approaches have been adopted for its achievement?

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5) How does the NFS Bill propose to compensate cases of non-supply of foodgrains? What are its other important features?

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6) What are the two areas of impact of government policy on food security on which the Abhijit Sen committee made its observations? What was the committee's recommendation on the issue of decentralised procurement of foodgrains?

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7) What is the reason for the widening inter-state poverty difference? What lacuna in the PDS requires to be effectively addressed to minimise this disparity?

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8) Mention the three areas in which concerted action is required as our 'future strategy' on food security.

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19.8 LET US SUM UP

In spite of a boost in foodgrains production and improvement in per capita availability of foodgrains during the post-independence period, there has been a steady decline in the per capita consumption of cereals in India. To enhance the food security of weaker sections of the population, the government has introduced many programmes of which the PDS is the most far reaching. These programmes/schemes involve huge subsidy but due to their inefficient operation have not yielded the expected benefits to the targeted groups. The policy of building huge buffer stock of foodgrains, encouragement of exports at a relatively low price, etc. are counter-productive in their character. Provision of food security to all the people in India is definitely a big challenge. To meet this challenge there is a need for second green revolution and reforming the PDS. In particular, the government has to make concerted efforts to reduce the targeting errors in PDS and introduce other programmes to improve the purchasing power of the poor.

19.9 KEY WORDS

Consumer Subsidy	: The consumer subsidy is the difference between the economic cost and the central issue price.
Economic Cost	: The cost incurred by the central government by way of procurement, storage, transportation and distribution.
Central Issue Price	: Price at which the central government issues foodgrains to State Governments for distribution through the fair price shops.
Issue Price	: Price at which foodgrains are distributed to the ultimate consumers through fair price shops.
Food Subsidy	: The food subsidy is the total of the consumer subsidy and the carrying cost of the buffer stock.
Minimum Support Price (MSP)	: The price at which the government buys farm produce from farmers. The farmers can sell their produce to the government at this price if they are unable to sell at higher price in the market.

19.10 SUGGESTED BOOKS/REFERENCES FOR FURTHER READING

Datt and Sundaram: Indian Economy, S.Chand Publisher, Delhi, 2011.

Krishnaji, N and T.N.Krishan: Public Support for Food Security- The Public Distribution System in India, Sage Publications, New Delhi, 2000.

Radhakrishna R (and Others): India's Public Distribution System - A National and International Perspective, World Bank Discussion Paper 380, 1997.

19.11 ANSWERS/HINTS FOR CYP EXERCISES

Check Your Progress 1

- 1) See section 19.1 and answer.
- 2) See section 19.1 and answer.
- 3) See section 19.1 and answer.
- 4) See section 19.1 and answer.
- 5) See section 19.2.1 and answer.
- 6) See section 19.2.2 and answer.
- 7) See section 19.2.3 and answer.
- 8) See section 19.2.4 and answer.
- 9) See section 19.2.5 and answer.
- 10) See section 19.2.7 and answer.

Check Your Progress 2

- 1) See section 19.3 and answer.
- 2) See section 19.3.1 and answer.
- 3) See section 19.3.1 and answer.
- 4) See section 19.3.1 and answer.
- 5) See section 19.3.1 and answer.
- 6) See section 19.3.2 and answer.
- 7) See section 19.3.3 and answer.
- 8) See section 19.4.3 and answer.

Check Your Progress 3

- 1) See section 19.5 and answer.
- 2) See section 19.5.1 and answer.
- 3) See section 19.5.2 and answer.
- 4) See section 19.5.3 and answer.
- 5) See section 19.5.4 and answer.
- 6) See section 19.6 and answer.
- 7) See section 19.6 and answer.
- 8) See section 19.7 and answer.

UNIT 20 AGRICULTURAL PRICE POLICY AND FOOD INFLATION

Structure

- 20.0 Objectives
- 20.1 Introduction
- 20.2 Impact of Agricultural Prices
 - 20.2.1 Income Effect
 - 20.2.2 Influence on Cropping Pattern
 - 20.2.3 Resource Allocation
 - 20.2.4 Distribution Effect
 - 20.2.5 Industrial Output
 - 20.2.6 Technology
 - 20.2.7 International Competitiveness
 - 20.2.8 Food Inflation
- 20.3 Factors Determining Agricultural Price Policy
 - 20.3.1 Proper Remuneration
 - 20.3.2 Equitable Income Distribution
 - 20.3.3 Stable Prices for Inflation Control
- 20.4 The Commission for Agricultural Costs and Prices
 - 20.4.1 Political Economy of Procurement Prices
 - 20.4.2 Emerging Trends: Efforts at Rationalisation
- 20.5 Food Inflation: Policy Options
- 20.6 Let Us Sum Up
- 20.7 Key Words
- 20.8 Suggested Books/References for Further Reading
- 20.9 Answers/Hints for CYP Exercises

20.0 OBJECTIVES

After going through this unit, you will be able to:

- state the importance of proper ‘pricing’ of agricultural products;
- identify/outline how the agricultural prices influence the major sections of the economy;
- explain the factors that are important to be considered while determining the agricultural prices;
- describe the institutional mechanism implicit in the role of the Commission for Agricultural Costs and Prices and the change in its thrust on price policies; and
- discuss the concept of ‘food inflation’ and suggest policy options for management and control of agricultural prices.

20.1 INTRODUCTION

We are aware that with more than half of India's labour force continuing to be still dependent on agriculture (directly or indirectly), and with the entire agriculture and allied activities contributing less than 15 percent to the national income, productivity in agriculture is low. This means that the income of large number of poor farmers engaged in agriculture is low. Further, as agricultural operations are carried out under conditions of uncertain land tenure, constraints of low technology, credit/marketing services, etc. there is open/disguised unemployment and poverty in the sector. In such a scenario, as noted in unit 19, the role of the government in providing a just and remunerative prices to the farmers assumes critical importance. To recall, remunerative price for agricultural products ensures that the: (a) farmers are not forced to sell their crop at very low prices during post-harvest times; and (b) agricultural prices do not get out of control in a year of crop failure which may result in food price inflation. In other words, pricing of agricultural products is aimed at striking a balance between the interests of: (a) the producers by ensuring a minimum support price; and (b) the consumers by maintaining stable food prices. In order to achieve this, the various mechanisms instituted by the government are: (i) declare a minimum support price (MSP) [or procurement price] for important crops, (ii) procure crops at the MSP through its various agencies like the FCI, (iii) strengthen the agricultural marketing system like market infrastructure and warehousing, (iv) distribute the foodgrains at subsidised prices through the PDS, and (v) monitor regularly the prices through an elaborate arrangement of data collection, processing and dissemination. While we have already studied about these issues in the previous unit on 'food security', in the present unit we shall mainly focus on studying the mechanism of fixing agricultural prices, the factors which determine the policy of agricultural pricing, the major institution in CACP (i.e. the commission for agricultural costs and prices) which is set up to administer this process, the constraints and emerging problems which the CACP faces in discharging its tasks, etc. A major issue on which we especially focus in the unit relates to 'food inflation'. In this, we shall elaborate on the role played by stable agricultural prices in controlling it. We begin by recapitulating the impact of agricultural prices on different sections of the economy.

20.2 IMPACT OF AGRICULTURAL PRICES

To understand the impact of agricultural prices, we must be clear about which price is being referred to as there are a host of prices for the same product at different stages of its journey from the farmer to the final consumer. In this, the first is the 'farm gate price'. This is the price that the farmer gets from the buyer who in many cases is a local trader. From the local trader, the produce passes through layers of intermediaries to reach the wholesaler. The wholesaler sells at the wholesale price to the retail seller, who in turn, sells at the retail price to the ultimate consumer. Therefore, when one talks of ensuring remunerative price to the farmer, one is referring to the 'farm gate price'. But due to the wide 'price spread' between the farm gate price and the ultimate price paid by the consumer to the retailer (which means there is a profit realised by the various intermediate players), the farmer ends up getting a low share of the consumer price. Thus:

Final price paid by the consumer = farm gate price + margin of the local buyer + margin of the whole seller and other traders + margin of the retail seller + transport and storage cost + taxes.

However, other things remaining optimum, it is only a higher farm gate price which would ensure a higher income to the actual producer/farmer. It is important to note in this context that fixing the prices of farm products as in the case of MSP for foodgrains, or ensuring a better farm gate price for other crops, besides ensuring higher income to the farmers also has other significant repercussions. As we know, close to one-fourth of

our one billion-plus population live below the poverty line spending a sizeable portion of their income on food. Therefore, keeping the food prices under check minimises the negative impact of high food prices on such poor families. On the other hand, better prices for agricultural produce influences the pattern of farming in other regions and could become a determining factor for prosperity as also regional inequality. This is because higher prices of a given crop not only increases the income of those farmers who cultivate that particular crop but also, in turn, encourages other farmers to change their cropping pattern by adopting the use of new technology which such a change entails. There is thus a cyclical effect with wider implications. We elaborate this below.

20.2.1 Income Effect

If farmers are left to the mercy of free functioning of the market the agrarian economy may become unstable. This is because farmers who own small pieces of land (less than 2 hectares) or farmers who are referred to as 'marginal and small farmers' constitute a sizable majority of Indian farming population (86 percent in 2002-03). When price of output falls, usually the producer reduces the supply so that low price does not affect him adversely. But when the producer is poor he cannot afford to cut or hold back the supply. This is what is referred to as 'distress selling'. As a result, due to higher supply, price falls further depressing the income of the poor farmer. Quite often, they suffer because of the collusive behaviour of traders who by acting in a coordinated manner often manage to influence the price of agricultural products. This collusion may be so strong that the traders extract crop from farmers at low price. Low farm gate price adversely affects the poverty and inequality in the economy.

20.2.2 Influence on Cropping Pattern

The change in the income levels of the farmers can, in turn, change the cropping pattern too. As an example, let us consider two crops: rice and wheat. Let us assume that: (i) price of input used in the production of these two crops is fixed, (ii) the land which is under rice production can be used to produce wheat also, and (iii) technology of enhanced production is available to both the crops. In this case, an increase in price of wheat would imply higher profits for wheat producers. This could induce the rice producers to divert their land and capital to wheat production. Thus the cropping pattern could get affected due to price differences as the production decisions are susceptible to profit or income returns. In other words, price of a particular product can influence the decision on the cropping pattern.

20.2.3 Resource Allocation

As a farmer opts for a more profitable crop in place of a less profitable one, the resources he has is diverted for the production of the more profitable crop. While this is true at the individual farmer level, at a broader level also a similar effect could be there. As many farmers start cultivating a particular crop, the government would be pressurized to divert resources to facilitate the marketing of that crop. For instance, sugarcane farming needs fast transportation of canes to sugar mills. If paddy farmers shift to sugarcane, adequate roads and transportation services would be required in that area. In other words, the resources could get transferred for the servicing of that crop whose prices are more profit generating to the producers than others. This is what happened in the case of Indian agriculture in the last few decades. Before the 1990s, there were many restrictions on export of agricultural products. After the restrictions were lifted, cultivators found that cash crops were more lucrative than coarse grains as they fetched higher price in the international market. As a consequence, a shift in production practices leading to differences in the 'area under crops' took place. For instance, in 1995-96 the gross cropped area under Jowar as a percentage to total area was 6.3 percent

which fell to 4.9 percent by 2007-08. Likewise, area under Bajra fell from 5.5 percent to 4.2 percent. But for cotton, the corresponding percentage rose from 3.8 percent to 4.8 percent. Results of such switching over have not been uniformly positive. As coarse cereals provide fodder and fuel (besides forming a major part of the consumption basket of the poorer sections of the population), with lower production of these crops poorer sections of people had to buy them from the market affecting their expenditure pattern adversely.

20.2.4 Distribution Effect

Effects of changes in agricultural prices on income distribution work through various channels. A rise in agricultural prices would result in a rise in the income level of farmers. On the other hand, as prices rise, for the buyer it would mean a contraction of his purchasing power i.e. there is a decline in real income. However, food is a commodity which has very low price elasticity of demand. This means that if food prices increase, the demand for food does not decrease much. However, while a rise in agricultural prices would lower the real income level of the poor, the rich would be affected much less as food constitutes a small portion of the consumption expenditure of the rich. Thus, the distributional impact of agricultural prices would differ for rich and poor persons. Such an impact has other dimensions particularly for the poor farmers. Since the poor farmers sell their food crops immediately after harvest and buy their food needs during lean season from the market, increase in food prices has the potential to increase their poverty level. Thus, while the price rise benefits the poor farmers positively, the negative impact of the price rise which they face as buyers is more acute for them. However, rich farmers who produce marketable surplus (additional crop over and above the consumption requirement and having the ability to store foodgrains) are beneficiaries of the rise in food price. In other words, the distributional impact is adverse for poor farmers compared to the rich.

20.2.5 Industrial Output

Output of the industrial sector is affected through both demand and supply mechanisms as a result of changes in agricultural prices. We have seen above that as a result of the rise in agricultural prices the real income of poor is adversely affected. This also means that there is less demand for industrial goods. With low demand for industrial goods, less industrial goods are produced. This leads to less employment in the industrial sector. The other effect is from the supply side. As agricultural products are used as inputs in the production of many agro-industrial goods, a rise in agricultural prices would raise the cost of production pushing up the prices of such industrial goods. With higher price, the demand for industrial goods would fall in general. Thus on both the demand and supply sides, there is a contraction of industrial output due to rise in agricultural prices.

20.2.6 Technology Effect

Higher profitability of a crop induce producers to raise the production of that crop by introducing better technology. In the Indian context, this is what happened during the period of green revolution in the states where it made a deeper impact. The government also procures a larger quantity of grain for its public distribution system from such regions. Regular procurement and higher assured prices by the government encourages the farmers to adopt improved productive technologies. This is the technology effect of rise in the prices for agricultural products.

20.2.7 International Competitiveness

Global market for foodgrains is a different platform than domestic market. Consumers of developed countries which import grain are more quality conscious. In the international market, the Indian agricultural products have to compete with the products of other

countries. Hence, competitive prices are essential to get access to global agricultural market. This is thus a motivating factor for quality conscious agricultural production attributable to international influence.

20.2.8 Food Inflation

Rising price of food affects people in a developing country badly. It is a fact that food prices have a strong influence on the general inflation rate as food items constitute a substantial portion of the items in the ‘basket of goods’ considered for calculating the consumer price index. Food prices and the general price level of all goods taken together, therefore, rise or fall in tandem. In recent years, especially since 2006, food prices in India has risen at a faster rate. For instance, while in February 2004, food price rose by 4.4 percent per annum, in 2006 it rose by 6.1 percent, in 2007 by 9.2 percent, and in 2010 it touched a peak of 20.2 percent. The high growth of food price shows a lack of response to the policy measures pursued. Figure 20.1 presents the impact of agricultural price rise in a nutshell.



Fig. 20.1: Impact of Agricultural Price

Check Your Progress 1 [answer in about 50 words using the space given]

- 1) State the two objectives sought to be served by the official pricing of agricultural products?

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- 2) Mention the different mechanisms instituted by the government of India to achieve its objectives of agricultural price policy.

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- 3) What is meant by ‘farm-gate price’? State two reasons on why it is important to focus on better farm-gate price?

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- 4) How does low farm-gate price adversely affect poverty and inequality in an agrarian economy like India?

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- 5) Do you agree that changing income levels of farmers (on account of price differences among crops) can influence the cropping pattern? How?

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- 6) What influence does the differential profitability level among crops carry on the ‘resource allocation’ at a general level?

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7) Why is the distributional impact of agricultural prices adverse for the poor farmers?

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8) Do you agree that as a result of rise in agricultural prices, industrial output also suffers? How?

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9) What do you understand by the ‘technological effect’ of a rise in prices for agricultural products?

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10) How does ‘international competitiveness’ serve as an important factor for better quality production of agricultural products?

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11) Why do ‘food prices’ make a strong influence on the overall general inflation rate? In which recent year did the food inflation touch its peak in India?

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20.3 FACTORS DETERMINING AGRICULTURAL PRICE POLICY

The role of the government in monitoring the agricultural prices is clear in the light of the discussion above. Prices should not be so low that they result in losses for producers.

They should rather be conducive to higher agricultural production, investments and growth. These factors are of vital importance particularly in a developing country. On the other hand, prices should not be so high that they erode consumers' purchasing power. Retardation of growth of industries and services may take place if people end up spending a larger chunk of their budget in meeting the essential food requirements. How then must the government go about determining the agricultural prices? In this section, we dwell on the objectives of an appropriate agricultural price policy which must be aligned to the factors that should be kept in view in their formulation.

20.3.1 Proper Remuneration

More than 80 percent of Indian farmers fall under the category of small and marginal farmers. Apart from the uncertainty of the monsoon, the other main risk they have to bear is the movement in market prices for their product. Unlike industrial products, agricultural commodities have many features of a perfectly competitive market e.g. (i) the products are homogenous in nature; (ii) there are large number of small buyers and sellers. These factors mean that the producers have negligible control over the prices. Agricultural prices are, therefore, much more volatile than the industrial goods. Low prices for the produce can ruin the farmer. Therefore, price-regulating authorities try to fix the price (or a range of prices) at a level that the agricultural producers are assured of a minimum return. Another important factor to be kept in mind is that the less endowed farmers often borrow large sums to carry out production. In view of this, if they get unremunerative prices it becomes difficult for them to repay the loan. Suicide deaths in recent years by the cotton farmers of Vidarbha region of Maharashtra, and other places such as Punjab, Karnataka, Andhra Pradesh, are examples of what may happen if remunerative prices do not prevail. In many cases, failure of harvest adds to the crisis, but low price is a major reason.

The issue of remunerative price for the producer is interlinked with the price of inputs. A sharp rise in the price of inputs adversely affects the profit of the farmer. Taking this factor into account, the government stressed the importance of subsidized inputs. This was in the decades following independence. In the last two decades after the introduction of the policies of economic reforms, many of the production subsidies (e.g. free electricity or low priced electricity to farmers, subsidized fertilizers, seeds and irrigation) have been (or are being) withdrawn. This has adversely affected the farmers by increasing their cost of production. As a consequence, growth rate of output, as well as investments in agriculture, have declined in the 1990s compared to the previous decades. This issue is particularly related to the shrinkage of public investment in agricultural infrastructure development. All these factors which contribute to raising the cost of production of the farmer requires to be duly considered while fixing the agricultural prices for procurement.

20.3.2 Equitable Income Distribution

We mentioned earlier that agricultural prices influence both the general income distribution as also the level of employment (vide 20.2.4 & 20.2.5). So what should the regulatory authorities do? In the post-independent India, the official approach was to fix a Minimum Support Price (MSP) as procurement price. The foodgrains so procured is subsequently distributed through the Public Distribution System (PDS) at controlled cheap rates, called the *issue price*. Since the procurement price is often higher than the issue price, the deficit is borne by the government as subsidy. The subsidy compensates: (i) the consumers, since the issue price at the PDS outlets is lower than the open market price; and (ii) the producers, since the procurement price would be higher than the market price. Figure 20.2 explains this diagrammatically. Here P_M is the open market price, which is too low for the producers to earn a reasonable profit and too high for the

consumers to satisfy their food requirements. Therefore, the government intervenes in the market and purchases grains from the farmers at price P_C which is greater than P_M . Therefore,

$(P_C - P_M)$ is the subsidy given to the producers. Subsequently, the grains are sold at price P_I through the fair price shops. Since P_I is also less than P_M , $(P_M - P_I)$ is the subsidy given to the consumers. The total subsidy given per unit of crop is thus the difference between the procurement price (P_C) and issue price (P_I) i.e. $(P_C - P_I)$. The situation depicted in the figure is, however, an ideal one which need not always prevail. At times, the issue price P_I could be higher than the open market price P_M . This has become common after targeted public distribution system has been introduced. In the targeted PDS, the issue price for the above poverty line section is set at a high level.

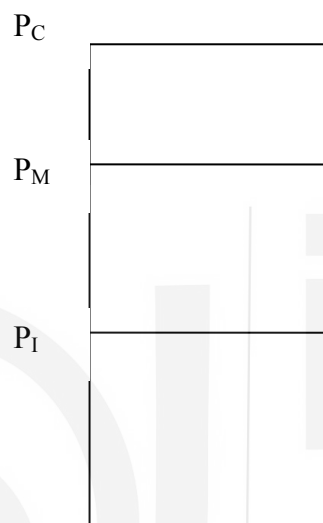


Fig. 20.2: Market Price, Procurement Price and Issue Price

Government intervention in the prices of agricultural products is not limited to foodgrains alone. Cotton, jute etc. also are protected through the Minimum Support Price. For products which are of non-food nature, various agencies like the CCI (Cotton Corporation of India), JCI (Jute Corporation of India) and Tobacco Board ensures that the prices play a balancing role. Apart from the effect on producer and consumer, agricultural pricing policy should also consider the distribution of gains between the producers of various regions. You have studied about this in detail in ‘unit 12’ of this course. Setting a high price for a crop produced in some regions makes the producers of those regions and crop better-off than the rest. Therefore, the producers of other crops may shift to the production of that particularly remunerative crop. This causes grievance among the producers of other regions. The regulatory authorities needs to keep this also in mind while fixing the procurement price.

20.3.3 Stable Prices for Inflation Control

We have noted above that small farmers are adversely affected if there is uncertainty regarding prices that they are going to receive. If the prices are higher than what is necessary to earn a minimum profit level, they are better motivated. If, on the other hand, prices fall below this level the farmers in general, and the small farmers in particular, are affected badly. Since the small farmers are often dependent on loans to carry out their production, such depression in the prices might leave them bankrupt. Therefore, the pricing authorities should not only aim at providing a remunerative price to the producers but the price should be stable. Stability in the procurement prices has a stabilizing influence on open market price. Stability of prices reduces the uncertainty of

the producers regarding investment, employment, etc. Unstable prices has the potential of triggering food inflation. As we noted before, high food inflation causes the general inflation rate also to shoot up. The objective of price fixation from the point of view of maintaining stability through controlling inflation is thus underscored.

Check Your Progress 2 [answer in about 50 words using the space given]

- 1) What are the detrimental consequences of very low and very high agricultural prices?

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- 2) Do you think agricultural markets are perfectly competitive? In what way does it affect the producers?

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- 3) How is the issue of remunerative price for the producers inter-linked with the price of inputs? In what way the recent policy trends in this respect have affected agricultural output and investment?

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- 4) What is 'issue price'? How is the deficit between the procurement price and issue price bridged?

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- 5) Can the 'issue price' be higher than the 'open market price'? When?

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6) Do you think the regional concerns play a role in the fixation of procurement price? When and why?

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7) Do you agree that high food prices influence the general price level too? How?

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20.4 THE COMMISSION FOR AGRICULTURAL COSTS AND PRICES

In 1965, the government of India constituted the Agricultural Prices Commission (APC). The commission was to advise the government on the price policy of agricultural commodities with a view to evolving a 'balanced' and 'integrated' price structure. In this, the perspective of the overall needs of the economy in general, and the interests of the producers and the consumers in particular, was to be kept in view. While recommending the price policy and relative price structure, the commission was enjoined to keep in view the: (i) need to provide incentive to the producer for adopting improved technology for maximizing production and (ii) the likely effect of the price policy on the rest of the economy, particularly on the cost of living, wages, impact on industry, etc. You may note from this that there is an emphasis that the concern for consumer interests should not be allowed to override the farmer's incentive to adopt improved technology by making necessary investments for the purpose.

While the above has been the policy on paper, operationally, there has been failure on several counts particularly with regard to controlling inflationary tendencies. This is mainly because the procurement operation by the government have quite often led to price rise in open market. Many state governments felt that the pricing policy of the government has been more in favour of the producers than the consumers. They, therefore, sought to protect the consumers by setting an upper limit to the price level fixed under the procurement policy. The increasing trend in agricultural procurement prices nevertheless continued due to reasons of both rise in costs of production as also to keep up the interest or spirits of the producers. In 1985, the government renamed the APC as the Commission for Agricultural Costs and Prices (CACP). With this, the emphasis was explicitly brought on costs. The Sixth Plan (1980-85) document drew the emphasis on stable agricultural performance and prices by observing that: (i) prices of agricultural commodities exercise a dominant influence on the behaviour of the overall or general price level; (ii) past experience suggests that relative stability in general price level has often coincided with years of good harvest; and (iii) the general overall inflationary pressure have often been triggered by a fall in agricultural output and consequent rise in agricultural prices. In light of this, the Plan reiterated that agricultural production strategies in the Sixth Plan should be based on the need for increasing the production of commodities in short supply thereby helping to maintain price stability.

The Seventh Plan (1985-90) observed that: (i) the use of high yielding varieties aided by incentive prices and public procurement have contributed to a break-through in the output of certain crops, notably wheat; (ii) this has led to the creation of surpluses which cannot be readily absorbed while shortages persist in respect of certain other commodities; (iii) agricultural price policy needs to be increasingly concerned with the maintenance of a scale appropriate to the relative prices of crops so that the supplies of different commodities are in line with the respective demands; and (iv) procurement operations must be strengthened for crops like rice, oilseeds and pulses in areas inadequately served with marketing infrastructure so as to ensure that the producers are able to sell at prices fixed by the government. All this, led to the evolving of a list of factors to be taken into account by the CACP while recommending agricultural prices. The factors include: (i) cost of production; (ii) changes in input prices; (iii) input-output price parity; (iv) trends in market prices; (v) inter-crop price parity; (vi) demand and supply situation; (vii) effect on industrial cost structure; (viii) effect on general price level; (ix) effect on cost of living; (ix) international market price situation; and (x) parity between prices paid and prices received by farmers (terms of trade).

20.4.1 Political Economy of Procurement Prices

The issue of fixing procurement/minimum support prices is not simple in reality. Since procurement price influences distribution of income, different pressure groups influence the process of fixing the official procurement prices. This, in turn, affects the magnitude of grain procurement. A high price induces the farmers to sell high quantity of their harvest to the government. However, this is not always helpful as there are costs of transportation and warehousing. In recent years, India has experienced stock piling of foodgrains in FCI godowns. At present, the food stock is twice the recommended buffer stock norm. This has led to pilferage and wastage of grains. The Supreme Court has ruled that the government must distribute free foodgrain to the poor rather than letting them rot. The practice of government resorting to the export of grains to cut losses in such situations is criticised as it amounts to neglecting the domestic food problem. The clout of the regionally concentrated rich farmers lobby have often succeeded to ensure that a major part of procurement of grains takes place from the traditional green revolution regions. The rich producers have thus influenced the pricing policy of the government in their favour.

20.4.2 Emerging Trends: Efforts at Rationalisation

Since the early 1990s, the government has adopted a new policy package which includes cutting down subsidies and budget deficit. Recall that the price differential between the procurement price and the issue price is the subsidy that the government provides. One way to cut this subsidy is to lower the procurement price. The other way is to raise the issue price under the PDS. Because of pressure of farmer lobbies, lowering of procurement prices or curtailing the procurement operations has not worked. A way out was to reduce the scale of PDS so that there is a decline in the total subsidies. Recall from your study of the previous unit that as an alternative, the government has adopted the policy of two issue prices: one for people above Poverty Line (APL) and another for people below Poverty Line (BPL). This has ensured that the BPL population is the chief beneficiary of PDS since the price for the APL population is often at par with the market price.

There has been a debate on how to reduce the leakages in the PDS and increase the efficiency of price control measures. You are aware that due to errors in survey and official mismanagement, food earmarked for BPL population often does not reach the

intended target group. Also, identification of BPL population is fraught with corruption and mismanagement as quite often the rich and the influential get themselves recorded in BPL list to corner the subsidies. It has been estimated that half of the population who should have got the BPL cards, are not there in the BPL list of the government. In light of this, the government is considering doing away with the PDS. An alternative proposed is to provide the BPL consumers with food coupons (or direct cash) which can be used to buy food from the market.

Check Your Progress 3 [answer in about 50 words using the space given]

- 1) At the time of the constitution of the APC in 1965, what are the two factors on which maximum focus was laid? What was an additional emphasis laid in this context?

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- 2) What were the three observations of the Sixth Plan to emphasise on stable agricultural performance and prices? What was its particular suggestion for achieving this?

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- 3) State the observations of the Seventh Plan to emphasise on the reorientation needed in the agricultural price policy of the government.

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- 4) By the end of 1980s, what factors were identified as necessary to be taken into account by the CACP while recommending the agricultural prices?

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- 5) Mention the problems that arise due to high procurement prices and the ways in which such situations are tackled. In this context, what is the political economy dimension behind high buffer stock storage?

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- 6) In the context of price differential between the issue and market prices, what strategy is adopted by the government to minimise the subsidy bill?

20.5 FOOD INFLATION: POLICY OPTIONS

Food prices are the major contributor to CPI-inflation [i.e. consumer price index inflation: recall your study on this in ‘unit 8’ (section 8.2 on prices and price indices) of the course BECE 002)] reflective of the price effect on the consumption pattern of people over time. This is different from ‘core inflation’ calculated after removing food and energy prices. With rising incomes, consumption pattern generally accelerates with the pattern of consumption differing between food items and non-food items. Further, within food items there will be shift towards higher protein food articles. The recent trends in India in food inflation reflect a growing demand for protein rich food articles consisting of fruits and vegetables, eggs, meat and dairy products. This shift in higher protein rich food is noticeable across regions/classes. In particular, for rural Indian households, the proportion of food budgets on cereals has fallen from 40 percent in 1987-88 to 30 percent in 2007-08. The demand pressure on cereals thus tend to be lower with increase in income levels. The trends further reveal that while consumption of food in general is increasing by around 3 percent per year, between food items the increase is higher at 4 percent for protein rich articles and lower at 1.5 percent for cereals.

Problem of Plenty: The MSP is notified for 24 food articles on the basis of costs for procurement by the FCI. The FCI transports grains from surplus to deficit states for releasing them at subsidized rates through the FPS. An open procurement policy is followed in which the FCI buys any quantity delivered at the procurement centres within a specified time period. In particular, it procures about one-third of overall production of wheat and rice. The amount of procurement depends upon the attractiveness of the MSPs relative to the open market prices. This sometimes results in large accumulation of stocks many times more than the storage capacity. Large accumulation in bumper crop years creates ‘problem of plenty’ leading to high wastage. However, such high supply cannot bring down the open market prices as the procurement prices themselves are high. Besides normal factors like transportation costs, wholesaler/retailer margin, etc. supply disturbances for reasons of failed monsoon, destroyed harvest, practice of hoarding, etc. adds to the open market prices being high. This is the reason for the situation of high prices coexisting with excessive stock obtaining in India. The increase in procurement leads to a significant increase in the fiscal costs. In India, subsidy on account of ‘food and fertiliser’ has increased from around 1 percent of GDP in the mid-1990s to about 1.5 percent of GDP in 2009. Fiscal consolidation must therefore be a priority both for demand management and building fiscal space to cope with shocks. One argument made is that food subsidies should be substituted by public investment in agriculture and outlays on extension services as these could increase agricultural production leading to lowered prices. Another argument made is that since the private

sector's handling and storage costs are far lower than that of the FCI's, the role of private sector in procurement and distribution management should be considered.

Policy Options: The discussion above brings forth the importance of '*foodgrain stock management*' underscored as the first policy option. The second is '*increasing agricultural output and productivity*' by a *comprehensive strategy* with a focus on technology, improved water management, rural infrastructural development, agricultural diversification, food security, private sector investment in marketing and agro-industry development, etc. In this context, the success of Gujarat is offered as a salutary example of how such a comprehensive approach could work. A third policy option suggested is to '*delink the safety net from direct public procurement of wheat and rice*' by increasing the role of the private sector in foodgrain marketing. This option is not meant to be an end to subsidized distribution of food but only aimed at increasing the efficiency in management by minimizing losses. A fourth option is to focus on '*development of market based tools for management of risks*'. Due to volatility in exchange/interest rates, commodity prices has reached unprecedented peaks. This is not likely to ease owing to uncertain political and economic conditions which has become common to contend with. This has generated renewed interest among borrowers and policy planners in market based tools for assistance in management of risks.

20.6 LET US SUM UP

Agricultural prices play a major role in a developing country where majority of the population is dependent on agriculture. It affects the overall economy through two channels. First, if the prices are un-remunerative, it affects profits of farmers which influences area under different crops and thereby the cropping pattern. It also, by the same logic, affects the resource allocation both at the individual and aggregate levels. Adoption of technology and its related investment decisions are also affected by changes in prices. Second, it affects the real income of the purchasers. If the agricultural prices increase rapidly it adversely impacts the already poor and thereby the poverty level in general. As a spiralling effect, it also reduces demand for industrial products. As a consequence, the prices of industrial goods, industrial output and employment suffer.

Pricing of farm products, therefore, has to be given due attention to maintain a degree of stability. However, in the Indian context we find that pricing policy has been tilted more in favour of the producers than consumers. Subsidies are granted to make up for the gap in procurement price and issue price. To reduce subsidies, issue prices at PDS outlets needs to be raised. In the context of economic reforms pursued after the 1990s, these issues are attracting renewed interest. While the government is forced to cut down on subsidies, the procurement policies could not be changed due to political pressure. All these have led to falling cereal consumption, higher demand for protein rich food items and wasteful accumulation of PDS stock in basic foodgrains i.e. wheat and rice.

20.7 KEY WORDS

Price Spread

- : The difference between the farm gate price and the retail price of food items is referred to as the price spread. It reflects charges for processing, transporting, profit margins of various intermediaries like wholesalers and retailers, taxations margin, etc.

- International Competitiveness :** This determines whether the goods or services are capable of getting sold in the global market. It depends upon factors such as the price at which the good in question is offered for sale at the international market, its quality and trading terms and condition at the global market.
- Issue Price :** The price at which goods are sold through the PDS outlets. This price is decided by taking into consideration the purchasing power of the poor, market price level and the subsidy effect on the fiscal position of the government.
- Open Market Price :** The price prevailing in the market as determined by the interaction of demand for and supply of goods without any external intervention.
- Price Elasticity of Demand :** This measures the responsiveness of demand for a good to change in its unit price. Generally, food has low price elasticity of demand especially for the poor people. This is because food being a necessity, the effect of price rise on reduction in quantity demanded is low.
- Procurement Price :** The price fixed by the government for different crops at which it buys crops from the farmers.
- Terms of Trade :** It is the ratio of prices prevailing in two sectors. For example, if agricultural price is P_A and industrial price is P_B then the terms of trade between the sectors would be P_A/P_B .

20.8 SUGGESTED BOOKS/REFERENCES FOR FURTHER READING

Kapila, U. (ed.), 2009, *Indian Economy Since Independence 2008-09*, Academic Foundation, New Delhi.

Misra, S. K. and V. K. Puri, 2010, *Indian Economy*, Himalaya Publishing House, New Delhi.

Patnaik, U., 1999, *The Long Transition*, Tulika Publications, New Delhi.

Raj, K. N., 1990, *Organizational Issues in Indian Agriculture*, Oxford University Press, New Delhi.

20.9 ANSWERS/HINTS FOR CYP EXERCISES

Check Your Progress 1

- 1) See section 20.1 and answer.
- 2) See section 20.1 and answer.
- 3) See section 20.2 and answer.

- 4) See section 20.2.1 and answer.
- 5) See section 20.2.2 and answer.
- 6) See section 20.2.3 and answer.
- 7) See section 20.2.4 and answer.
- 8) See section 20.2.5 and answer.
- 9) See section 20.2.6 and answer.
- 10) See section 20.2.7 and answer.
- 11) See section 20.2.8 and answer.

Check Your Progress 2

- 1) See section 20.3 and answer.
- 2) See section 20.3.1 and answer.
- 3) See section 20.3.1 and answer.
- 4) See section 20.3.2 and answer.
- 5) See section 20.3.2 and answer.
- 6) See section 20.3.2 and answer.
- 7) See section 20.3.3 and answer.

Check Your Progress 3

- 1) See section 20.4 and answer.
- 2) See section 20.4 and answer.
- 3) See section 20.4 and answer.
- 4) See section 20.4 and answer.
- 5) See section 20.4.1 and answer.
- 6) See section 20.4.2 and answer.

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UNIT 21 ENVIRONMENTAL IMPACT OF AGRICULTURAL PROGRESS

Structure

- 21.0 Objectives
- 21.1 Introduction
- 21.2 Concepts
 - 21.2.1 Bio-diversity
 - 21.2.2 Green House Gases
 - 21.2.3 Agro Economic Systems
 - 21.2.4 Watershed Management
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 - 21.3.1 Intensive Agricultural Practices
 - 21.3.1.1 Monoculture
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 - 21.3.1.3 Tillage
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 - 21.3.2 Inputs Associated with Intensification
 - 21.3.2.1 Inorganic Fertilisers
 - 21.3.2.2 Pesticides
 - 21.3.2.3 Irrigation Systems
 - 21.3.2.4 New Seed Varieties
 - 21.3.3 Intensive Rice Production
 - 21.3.4 Industrial Crop Processing
- 21.4 Policy Issues
- 21.5 Let Us Sum Up
- 21.6 Key Words
- 21.7 Suggested Books/References for Further Reading
- 21.8 Answers/Hints for CYP Exercises

21.0 OBJECTIVES

After going through this unit, you will be in a position to:

- define the concepts relating to the environmental impact of agricultural progress;
- identify the factors contributing to adverse impact of agricultural progress on environment;
- describe the agricultural practices having an adverse impact on environment;
- explain the factors associated with the intensified use of inputs creating a negative impact on environment; and
- outline the policy issues related to disturbing/restoring sustainable agricultural progress.

21.1 INTRODUCTION

The issue of environmental impact of agricultural progress relates to the degradation and unsustainable depletion of natural resources used in its production viz. soil, land, water, air, other matters of ecological system, etc. The concern on this issue has of late become so prominent that you would have noticed that in many of the previous units also we have discussed this aspect within the limits of the focus in those units. For instance, unit 2 discussed about the factors influencing soil erosion. Unit 11 discussed both the positive and the negative impacts of agricultural progress in the context of our achievements by green revolution. Unit 14 discussed the ‘sustainability related practices’ and ‘conservation agricultural practices’ both as has been traditionally practiced and also recently adopted following the awareness on the importance of minimising environmental damage while focusing on achieving higher output. Given this background, the objective and scope of this unit is to consolidate (by recapitulation supplemented by an extended discussion) the various aspects discussed before and then look at its policy dimensions. In this, both the policy initiatives that have contributed to environmental degradation and those that have since been taken to reverse them would be discussed. As ever, we will begin by studying some concepts of relevance to the theme of this unit.

21.2 CONCEPTS

In the context of environmental impact of agricultural progress, it is necessary to know in the first place what constitutes environment? This requires us to know the meaning and scope of the broader term ‘bio-diversity’. Evidently, apart from basic natural resources like air, water, forests, etc. bio-diversity includes many other bodies and micro-organisms all of which play their role in keeping the environment balanced in a sustainable manner. How far the practices in the direction of achieving higher agricultural output is causing the larger ecological system to be affected? We shall familiarise ourselves with the definition of some of the terms related to this issue in this section.

21.2.1 Bio-diversity

The term bio-diversity, or biological diversity, refers to the variability in ecosystems. There are different ecosystems like seas and oceans, rivers and lakes, deserts and grasslands, forests and mountains, main land and hinterland, etc. These ecosystems provide habitat for a community of living organisms (i.e. humans, plants, animals and microbes) and non-living components of environment, important for sustaining life like air, water, soil, etc. Within each ecosystem there are various species of living organisms in which each individual is genetically different. This diversity within the ecosystem needs to be conserved for the reason that the entire life system on a planet (e.g. earth) is interconnected with direct or indirect dependence on each other referred to as the ‘web of life’. Due to this, if one species becomes extinct, it affects other species. This could eventually start a chain reaction leading to the death of several species thereby disturbing the ecosystem in a lasting manner. In the context of agriculture, harvesting the trees in the forest, to make way for more agricultural land, has the potential of reducing the forest cover on the one hand and disturbing the habitat of many wild animals on the other. Likewise, pollution of water bodies could make the fish population suffer. Soil also could lose out its fertility levels due to excessive use of chemical fertilisers and over drawing of water from deep underneath. The disturbance to the ecosystem in terms of the quality of land, water, soil and air constitutes an environmental damage which can be observed in a shorter time span. In contrast, the disturbance to the environment in terms of ecosystem changes happens over a comparatively longer time span. Biodiversity changes resulting in degradation of environment impacts human health both positively

and negatively. While pollution of water and soil leads to the contamination of agricultural produce thereby harming the health of its consumers, loss of biodiversity (e.g. by the usage of HYV seeds) have resulted in the displacement of many indigenous species and agricultural systems leading to the extinction of valuable gene pools (vide 11.3.2.2). While these are instances of negative environmental impacts of agricultural progress, achievement of food security and the potential for the discovery of many medicinal products (most of which are sourced to plants and animals growing/living in the natural wilderness) with its immense benefits to mankind are positive dimensions of conservation of biodiversity. A type of biodiversity specific to agriculture is 'agricultural biodiversity'. This connotes all forms of life directly relevant to agriculture such as rare seed varieties, other organisms like weeds, pests, etc. including all animal breeds.

21.2.2 Green House Gases

In recent times, there is a growing realisation that the growth process must take due note of the sustainability and inclusive concerns. While this calls for expansion of activities spanning all sectors of the economy, in agriculture its manifestation encompasses the dimensions of meeting: (i) the food security concerns on the one hand and (ii) the need for agricultural diversification with the supporting expansion of non-farm sector on the other. In this context, controlling the unsustainable practices contributing to environmental disturbance is a major policy challenge. To understand the linkage, it is necessary to bear in mind that a basic tenet of all living organisms, including modern machinery and equipments, is that they need energy to function. And a major off-shoot of the generation/consumption of energy is the releasing of harmful gases into the atmosphere. It is here that the environment plays a crucial role in maintaining the biodiversity balance. This mechanism works as follows.

In the natural process, the amount of radiation from the sun rays is filtered by the atmospheric gases making the earth optimally warm thereby enabling life to exist on earth. But the increased demand for power/energy needed to fuel the growth process releases huge amounts of pollutants into the atmosphere. In most cases, this is released in one or the other of its gaseous forms. These gases (which are broadly five viz. water vapour, carbon dioxide, methane, nitrous oxide, and ozone) are called green house gases (GHGs). When the production of these gases is in excess of the nature's capacity to assimilate or absorb, the unabsorbed part radiates backwards (called re-radiation) to the lower layers of earth's surface. This causes the average climate on the earth to increase with the phenomenon popularly referred to as *global warming*. The crucial role of the environment is in the absorption of green house gas emissions. The limits on its absorptive potential are, however, set by the extent of sustainable/unsustainable practices pursued by man owing to demands of all round technological development. In particular, this potential is decreased when the green cover is reduced and increased when the amount of GHG emissions are not high. In view of this, the importance of matching afforestation and nature conserving measures needs no emphasis.

World over, it is estimated that agriculture is responsible for about 20 percent of green house gas emissions. The policy challenge is, therefore, to make the growth efforts so balanced that the GHG emissions (with its consequent re-radiation effect) are not allowed to outpace the capacity of environment to absorb and nullify their negative effect on earth. We have already seen that the contribution of agriculture to this phenomena is abetted by the changing cropping practices and improved post-harvest agricultural facilities (like establishment of cold chains, transportation and processing facilities, etc.). To recapitulate and expand on some of the other factors: (i) deforestation leading to higher concentration of carbon dioxide in air; (ii) unscientific

livestock manure management practices and intensified rice production contributing to higher emission of methane; and (iii) excessive usage of chemical fertilizers contributing to higher nitrous oxide emissions. The measurement of greenhouse gases is made in terms of their potency to contribute to global warming. In other words, the potency of a greenhouse gas is referred to as its global warming potential. Taken in units of carbon dioxide equivalent, it is estimated that methane's potency is 23 times higher and nitrous oxide's potency is 310 times higher than carbon dioxide. From this, the extent of impact on environment by the two agricultural emissions can be clearly understood.

21.2.3 Agro Economic Systems

The technological changes which act as drivers for environmental impact are also influenced by the agro economic system (AES) specific to a region. In this sense, besides the major domain of environmental impact i.e. biodiversity (of which air, water, soil, etc. are parts), the AESs themselves become domains of impact. The AESs are classified by their geographical characteristics like: (i) arid or dry region; (ii) coastal region; (iii) hilly and mountainous region; (iv) rain-fed region; (v) irrigated region; etc. The environmental impact on the AESs are a result of either the establishment of agriculture promotive facilities due to technological developments or the adoption of an agricultural practice unsuited naturally to that region. Such instances include: (i) construction of dams to provide irrigation to overcome the arid character of a region (instead of promoting dry-land farming); (ii) excessive grazing and conversion of common land for cropping purposes making the land become dry and grass scarce for animals; (iii) growing a water intensive crop in a water scarce region rendering the water table levels to sink (a result of HYV seed development); etc. We may, however, note that redistribution of a scarce resource like water from a surplus region to a deficit region by channelizing its course so that water does not go waste, paying attention to the commercial viability of a crop to yield higher income to the farmers, etc. are issues of importance justified in their own right. However, to the extent that their adverse environmental impacts are the result of intensified agricultural practices with unsustainable resource use, there is an adverse impact on environment. This calls for the adoption of a balanced and scientifically determined course of action. A policy thrust of Indian agricultural development pursued [from the Eighth Plan period (1992-97) onwards] has been to divide the country into specific agro economic zones (AEZs) [under the agro-climatic regional planning approach] and pay attention to its specific features for development. Another major feature of policy dimension has been the adoption of watershed management practice which was introduced during the seventh plan period (1985-90).

21.2.4 Watershed Management

Watershed management is defined as an integration of technologies within the natural boundaries of a drainage area for optimum development of land, water and plant resources in a sustainable manner. Their importance over the last nearly three decades on the policy front indicates a shift to micro level conservation practice. Watershed management aims at improving the productivity of soil by minimising its erosion due to continuous flow of water in a region most of it not only going waste but also creating human distress due to flooding. In agriculture, the approach is aimed at ameliorating the problems of low yield in areas dependent on rains by developing appropriate technology suitable to the natural framework of a region. In particular, the technique aims at achieving rainwater efficiency to improve productivity of crops in arid regions. Watershed studies record the benefits of this approach to: (i) increase the cropping area and cropping intensity; (ii) minimise or eliminate the problem of soil erosion; (iii) promote high value crop like groundnuts (in place of traditional low yield low value cereals like finger millet); (iv)

increase the number of working days per year in comparison with non-watershed areas; (v) increase yields ranging from 10 to 100 percent; and (vi) result in qualitative improvement like increase in water table levels. The environmental significance of watershed management's principle are thus clear from this illustrative list of benefits.

Check Your Progress 1 [answer in about 50 words using the space given]

- 1) What does the term bio-diversity imply? Mention its various components.

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- 2) Why is it important to conserve bio-diversity? Give examples to indicate its importance to agriculture.

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- 3) The impact of bio-diversity changes on environment are both positive as well as negative. Give illustrations in support of this statement.

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- 4) What are the five main greenhouse gases (GHGs)? In what way environment plays a natural role in containing their adverse effect on earth?

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- 5) Mention the three specific ways in which agriculture contributes to disturbing the bio-diversity balance. What specific measures would you suggest to restore the balance in this regard?

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6) In quantitative terms, how much is the estimated global contribution by agriculture to the GHG emissions? In what unit-equivalent are they measured? Which two GHG emissions, and by what measure, agricultural development potentially contributes to the environmental damage in this regard?

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7) Geographically, which are the five different agro-economic systems (AESs) that are also the domains of environmental impact on bio-diversity?

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8) Mention any three examples to indicate the manner in which the technological developments for agricultural growth contribute to disturbing the AES of a country.

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9) Mention the two policy responses that have been adopted in India to counter the adverse impact on environment by agricultural growth.

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10) Mention the various economic and environmentally beneficial advantages that have accrued by the adoption of watershed management practices in Indian agriculture.

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21.3 FACTORS CONTRIBUTING TO ADVERSE IMPACT ON ENVIRONMENT

We can classify the various agricultural factors/practices that contribute to adverse impact on environment under four heads: (i) intensive agricultural practices in general;

(ii) inputs associated with intensification; (iii) intensive rice production in particular; and (iv) industrial crop processing. Under each, among other things, we shall discuss how they contribute to disturbance of bio-diversity in general and/or the type of GHG emission that they release in the process in particular.

21.3.1 Intensive Agricultural Practices

Under this, we discuss five types of agricultural practices viz. monoculture, continuous cropping, tillage, intensive cultivation in hillside areas and intensive livestock systems.

21.3.1.1 Monoculture

Monoculture refers to the cultivation of a single crop species in a field. Unlike poly-culture, which mixes or intersperses crops with other activities like rearing domesticated animals or planting trees, monoculture is adopted for achieving higher yields through economies of scale. However, this practice impacts negatively on biodiversity as it provides for a narrower range of habitat to crops than in poly-culture fields. The practice also tends to need more chemical pesticides as crops are found to be more susceptible to insect infestation and other plant viruses. There are the consequent negative impacts on water quality, wildlife population and human health.

21.3.1.2 Continuous Cropping

The historical practice of leaving fallow periods has of late been given up in preference to continuous cropping systems. This is due to the rising demand for food and the changing demand for food preferences associated with the rising incomes of people resulting from economic growth. However, this has led to detrimental impact on soil conditions as consecutive crop cycles reduce the nutrient supply to the soil. In regions with good rainfall or irrigation facilities, this problem can be overcome with use of fertilizers. However, even in such areas, over time, soil tends to develop micro nutrient deficiencies. The long term effect of continuous cropping could lead to negative impacts on biodiversity as changes caused by the disruption of farmer's ability to take advantage of natural pest balances. In light of these facts, there has recently been an emphasis for allowing a period of fallow with leguminous crop rotation to restore the levels of soil fertility.

21.3.1.3 Tillage

Tillage reduces soil's organic matter content. This makes soil lose its ability to absorb and retain water rendering themselves prone to erosion and run-off. An important indicator of overall soil quality is its organic matter content derived from the falls of animals and plants. Abbreviated as soil organic matter or SOM, it provides many benefits to soils and crops such as: (i) protection against erosion by binding and stabilizing the soil particles, (ii) providing energy for soil micro-organisms, (iii) enhancing storage and transmission of water and nutrients, etc. Intensive tillage tends to reduce SOM levels, negatively affecting the air and water quality. Tillage also increases carbon dioxide emission. In light of this, there is a trend towards adopting 'zero tillage' practices on which you have studied in section 14.5 of unit 14.

21.3.1.4 Intensive Cultivation in Hillside Areas

Cultivation in steep slopes of hilly areas causes environmental impact of a different type than in the plains. Due to scarcity of land by large population depending on agriculture, there is a tendency to increasingly adopt intensive cultivation methods without proper soil conservation techniques. This degrades soil quality. Such soil when hit by the rainfall shifts the sediments and nutrients to lower regions rendering the upward sloping soils

less fertile. Further, the run-off of fertilizers and chemical particles makes the water quality for downstream human population contaminated. Over time, intensive cultivation practices have, therefore, the potential to adversely impact the eco-system of the hill region.

21.3.1.5 Intensive Livestock Systems

Livestock like cattle, sheep, goats, etc. play an important role by: (i) providing organic manure for fertilizers; (ii) supplying draft power for field operations; (iii) serving as a diversified source of food and income; etc. However, due to excessive grazing necessitated by intensified livestock population, they could: (i) convert grasslands into desert lands, (ii) place greater demand on water resource, (iii) result in soil compaction and erosion, (iv) destabilize stream banks and release large amounts of sediment into fragile aquatic ecosystems, (v) necessitate reseeded of natural meadows displacing native grassland plants, (vi) degrade water quality by excess application of inorganic fertilisers (which the reseeded usually requires) and unscientific livestock waste disposal practices, etc. Degraded water quality may also pose health risks to humans who rely on open water resources for their drinking purposes. In short, the impact on bio-diversity and water quantity/quality by intensive livestock rearing pose an environmental threat alongside its certain benefits to the farming families.

21.3.2 Inputs Associated with Intensification

The environmental impact on account of inputs associated with intensification could be discussed under four heads viz. (i) inorganic fertilizers, (ii) pesticides, (iii) irrigation systems and (iv) new seed varieties.

21.3.2.1 Inorganic Fertilisers

Usage of synthetic supplements have yielded increases in per year yields significantly. However, their inefficient application and crop uptake have impacted soil fertility, water and air quality and released lot of GHG emissions. For instance, impact on soil happens due to a process of chemical seepage into soils called acidification and nitrate leaching. Likewise, accumulation of unabsorbed nitrogen and other nutrients leaks into aquatic ecosystems leading to a state of overabundant nutrient concentration. This results in oxygen depletion reducing fish population and species diversity. Impact on air quality manifests in terms of nitric acid gas emissions contributing to smog and acid rain. Unabsorbed nitrogen is emitted as nitrous oxide, a GHG, which is estimated to have contributed to 38 percent of total global agricultural GHG emissions. Additionally, use of natural gas to manufacture inorganic fertilizer contributes to significant levels of carbon dioxide gas emissions.

21.3.2.2 Pesticides

Increased use of chemical pesticides, since mid-1900s, to limit crop losses from pests and plant diseases has affected biodiversity by harming animal and human health. Estimated efficiency rates of pesticide application are far lower than fertilizers with some estimates indicating that less than 0.1 percent of pesticides applied to crops actually reach the intended pests. A large remainder, therefore, accumulates in soil which filters down into ground water sources proving toxic to micro-organisms, aquatic animals and humans. Domesticated livestock also get affected by exposure to pesticides. Increased pesticide use spurs weeds and pests develop pesticide-resistance resulting in a constant need to develop new varieties of pesticides. This creates a chain reaction of negative biodiversity impacts.

21.3.2.3 Irrigation Systems

Over-irrigation and poor drainage causes water logging and soil salinization which decreases soil productivity. This prevents plant roots from getting adequate oxygen. One of the most common negative environmental impact of excess irrigation is that it makes water tables to rise artificially. As water tables reach the soil surface, water evaporation leaves behind salts which increases the salinity levels. This causes lowered soil productivity. The problem of salinization particularly affects semi-arid and arid regions more on account of lower amounts of rainfall which could otherwise help clear away the accumulated salts. However, such run-offs damage downstream natural ecosystems. Irrigation discharge also contains numerous suspended particles. This becomes another factor for degrading the ground and surface water qualities.

21.3.2.4 New Seed Varieties

Technological advances have greatly increased the ability to manipulate plants' genes. This has led to developments in gene revolution which relates to development of hybrid seeds to provide both high yields and better resistance to pests. In developing countries as a whole, modern semi-dwarf wheat varieties make up for about 80 percent of wheat cultivation. Environmental concerns around such seeds centre around their high input requirements and effect on biodiversity. This is because to realise the high potential of such hybrid seeds, increased quantities of fertilizer, nutrient supplements and water are needed. We have already studied the negative impacts of such excess inputs on soil and aquatic life. Such seeds are also feared to affect the genetic diversity considered vital for future development of new seeds. For instance, conventional breeding and biotechnology draw on the stocks of genetic diversity contained in seeds responsive to environmental conditions. With higher usage of hybrid or genetically manipulated seeds, the traditional genetic diversity would be lost. In order to protect against such losses, countries have established centres to store gene banks. However, such ex-situ collections separate the natural seed qualities available in the natural ecosystems. Scientists are also concerned about the consequences of genetic exchange between transgenic crops and wild plant population. You have already studied about these concerns in section 11.5 of unit 11.

21.3.3 Intensive Rice Production

Intensive rice production through HYV seed technology requires all of the above discussed methods viz. monoculture, continuous cropping, irrigation, fertilizer & pesticide use, etc. The environmental impact of this production are, therefore, on soil, water quantity & quality, human and animal health through contaminated water flows and declining water levels, nutrient deficiencies, etc. In areas lacking water supply, this has the potential of depleting the water supplies for other regions. This has happened in Tamil Nadu where 80 percent of paddy fields are irrigated and in one decade water table has fallen by as much as 25 to 30 meters. Usage of urea, which provides 80 percent of nitrogen demand to rice, makes nitrogen dissolve in irrigated water. Such water, when flows to other regions, causes water pollution proving lethal to fish in downstream ecosystems. The low oxygen conditions of flooded rice paddies makes the waterlogged soils ideal habitat for methane producing microbes. This is the reason why intensive rice production also emits significant levels of methane gas into the atmosphere. Globally, rice systems account for 11 percent of agricultural GHG emissions. In South and East Asia they are accountable for 82 percent of total methane emission. The environmental impact of intensive rice cultivation must, therefore, be quite clear by this.

21.3.4 Industrial Crop Processing

With agricultural exports becoming an important item of international trade, and cash crops among the items occupying a significant overall share of such exports, the post-harvest processing has assumed industrial dimensions. Such crops include: coffee, cotton, cocoa, etc. all of which impacts on water quantity and quality, air quality and climate change. Moreover, processing requires substantial amounts of water whose use varies by the method adopted for processing. For instance, the 'wet method' processing of coffee seeds used for separating quality coffee seeds from defective ones transports the berry husks from coffee grains threatening the supply of water for other human use. Water used for processing becomes polluted with chemicals and other heavy metals from all stages of the production cycle. Such untreated water effluents are discharged into river or other water bodies due to laxity in laws or their strict implementation. There would thus be negative impact of such effluents on fish population due to depleted oxygen. Besides these factors, the energy-intensive processing machinery are a source of carbon dioxide emissions. Emissions from processing plants also degrade air quality by contributing to acid rain and ozone depletion.

Check Your Progress 2 [answer in about 50 words using the space given]

- 1) State the four broad areas into which the agricultural practices contributing to adverse environmental impact can be classified? State also the four heads under which the intensified use of agricultural inputs can be grouped?

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- 2) In what way does 'monoculture' negatively impacts the biodiversity of a region?

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- 3) State the distinguishing feature between the traditional cropping system and the modern continuous cropping system? In what way does the latter affect soil quality? What is the long term impact on biodiversity in the continuous system of cropping?

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- 4) How does 'tillage' affect soil quality? Which particular GHG emission does it emit?

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5) How does intensive cultivation in hills adversely affect the eco-system of the region?

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6) State the various ways in which excessive grazing in intensive livestock systems pose an environmental threat in a region?

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7) Which two GHG emissions are released by the use of inorganic fertilizers in agriculture? How does it affect the aquatic life of a region?

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8) In what way does the irrigation facility contribute to damaging the natural ecosystem of a region?

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9) How does the 'new seed varieties' pose an environmental concern? What measure is taken to protect the genetic diversity posed by this? Despite this step, what major concerns are being faced by mankind?

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10) State the different adverse environmental impacts posed by 'intensive rice production'. Which GHG emission is released by this production system?

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- 11) How does 'industrial crop processing' contribute to adverse environmental impact? What particular negative impact does this pose for the aquatic life and air quality of a region?

21.4 POLICY ISSUES

Alongside the various developments marking for negative environmental impact, there have been various conservation measures initiated for negating the negative environmental impacts of agricultural progress. We have already studied some of them in Unit 14. To recall and add on to some of these positive impacts of agricultural progress on environment are: (i) mechanical and agronomic soil and water conservation (SWC) measures (e.g. contour cultivation, contour strip-cropping, mixed cropping, tillage and surface mulching, zero tillage, etc.); (ii) change in land use (e.g. livestock farming in arid AES regions, agro-forestry in hilly areas, integrated farming system in coastal regions, etc.); (iii) water harvesting through tanks; (iv) watershed based management system; (v) resource conserving technologies (RCTs) (e.g. rice-wheat consortium or crop establishment options for wheat/rice, site-specific nutrient management, etc.); (vi) integrated pest and nutritional management; etc. Thus, both the positive and negative impact on environment are a result partly of government policy introduced for agricultural progress and partly due to lack of awareness on proper utilisation of modern practices. In this section, we shall briefly classify and discuss some of these policy initiatives that have contributed to these impacts on environment.

Output Price Policies: As noted before in units 19 and 20, the policy of minimum support price in favour of rice and wheat crops became more pronounced after 1980. This led to the accumulation of huge grain stocks. Further, crop specific policies heavily protected oilseeds in the years following 1980s. These policies greatly influenced the choice of crops grown by farmers in total disregard to available natural resource endowments.

Input Subsidy Policies: The higher output support price policies were also accompanied by input subsidies on water, fertilizers and power. Subsidies on these three factor inputs have formed the bulk of total subsidy for the farm sector. Over the period 1980 to 1990s, as a percentage of GDP the subsidy on these items increased from 3.4 percent during 1980-81 to 9.8 percent during 1995-96. Due to increased use of fertilizers, the production of fertilizers during 1999-2000 fell short of consumption by as much as 27 percent. The policy of government to accelerate food production introduced bias in favour of states with more/better irrigation facilities. This encouraged the production of irrigation intensive crops like wheat and rice in these states. To rectify this bias, many researchers suggested that there was a need to reorient policies to promote agriculture in states like North East, M. P., Rajasthan and H. P. where agriculture was prone to

high risks and relatively less developed. While this was done in the subsequent years, the result of which are now becoming evident with some of these states having become the leading agricultural producers, there was policy emphasis for promoting balanced and integrated use of fertilizers. For instance, a national project on the development and use of organic/bio-fertilizers was launched in a big way during the Tenth Plan period. Policy initiatives to reduce the use of chemical pesticides, under integrated pest management (IPM) policies had also been launched since 1985. It is thus clear that efforts to promote agricultural growth which contributed to environmental degradation have simultaneously been pursued with nature conservation measures right from the 1980s.

Irrigation: The creation of irrigation potential was matched with policies for promotion of their optimum utilization. This was done by way of fixation of water usage charges for agriculture at low rates. It has been criticised that these rates did not cover even the working expenses of providing the service let alone the capital costs of its supply. Low charges on irrigation prevented the farmers from adopting efficient water usage practices which could in turn have reduced methane emission levels. There were also wide variations in the water charges between crops and among states. This encouraged farmers to opt for water intensive crops in preference to crops which were environmentally sustainable.

Electricity: In addition to low water charges, heavy subsidy on electricity greatly contributed to increased irrigation levels and over extraction of ground water. The policy of subsidy was biased to irrigated farming which led to changes in cropping pattern in favour of water intensive crops like rice. This has since been identified as a major factor of environmental externalities. The increasing cost of extracting water due to falling water table levels was not getting reflected in the private costs of farmers as they were paying electricity charges to operate tube wells at flat rates. In other words, the marginal cost of extracting ground water was zero. Thus, the policy of subsidies led to: (i) distortions in the cropping pattern in favour of water intensive crops; (ii) adverse environmental effects like water logging and salinity; (iii) depletion of ground water levels; and (iv) serious long term implications for inter-regional disparities in agricultural development due to bulk of benefits having gone to irrigated areas.

Credit, Investment and Trade Policies: The credit flows to agriculture and rural sector have concentrated in a few regions and on well-to-do farmers. As noted before in Unit 18, the eastern and central states were particularly affected due to their low credit share. Although the major share of land holding are from the small and medium farmers segment, the credit system has not been favourable to meet their credit needs. This has prevented this large farming community from adopting practices needed from the point of view of environmental and natural resource concerns. Capital investment policies have also largely favoured major irrigation works to the neglect/exclusion of investment in other categories. This has led to large areas becoming waterlogged and saline. In the matter of trade liberalisation, which is more encouraging for horticulture, floriculture, fisheries, etc., the strategies needed are different for eastern/dry land/wasteland regions in view of their comparative advantage in horticulture and livestock products. For harnessing the export potential of such diversified products in these regions, it is necessary to reorient trade/investment policies towards these regions. This would minimise degradation of the natural resource base in these regions by discouraging the growing of water intensive crop like rice which is being practiced in these regions.

Institutional Issues and Peoples Participation: From the conservation and sustainability perspective, tenancy reforms are argued to be less likely to receive soil conservation investments. However, legislative measures like the 73rd and the 74th

constitutional amendments have accorded a definitive role for local bodies in the management of natural resources like land, water and forests. Thus, to off-set the inabilities of small farmers in adopting conservation measures, collective structures like cooperatives are suggested as best institutions for sustainable development. This is required to be pursued actively in the coming years.

Check Your Progress 3 [answer in about 50 words using the space given]

- 1) State some of the major policy measures which have contributed to a positive impact on environment due to agricultural progress.

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- 2) Do you agree that the output price policies have contributed to negative environment externalities? How?

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- 3) Which are the three agricultural inputs that have received the bulk subsidy support? In what way has this contributed to becoming an environmental concern?

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- 4) Mention some of the major policy measures initiated during the earlier plan periods for the promotion of balanced and integrated use of natural resources.

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- 5) How has subsidised water charges contributed to environmental degradation?

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6) In what specific respects the policy of subsidised electricity supply to agriculture has contributed to adversely affecting the environment?

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7) How have the credit and investment policies contributed to degradation of environmental and natural resources?

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8) Do you think there is a need for reorientation of strategies to promote commercial agricultural practices? In what way it would help in minimising natural resource degradation?

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9) How would you say that the promotion of tenancy reforms has contributed to natural resource degradation? What strategy would you suggest to rectify this situation?

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21.5 LET US SUM UP

The progress of agriculture in India during the last few decades have had both positive and negative impacts on the natural eco-system of the country. Many of these are a direct result of policies adopted to promote agricultural growth. While many specific policy initiatives to minimise the environmental damage from agricultural practices have also been implemented, environmental distortions in terms of GHG emissions and imbalanced regional development are marked in the agricultural progress in India. The trend in the former (i.e. GHG emissions) is, however, not unique to Indian agriculture alone. It is a global phenomenon in which the contribution of modern agricultural practices to adverse climatic change has become a matter of international concern. Among the factors which have contributed to this adverse impact on environment, intensive agricultural practices like monoculture, continuous cropping, tillage, etc. on the one hand and intensified use of inputs in terms of inorganic fertilisers, pesticides, new seed varieties,

etc. on the other, could be enumerated. In respect of agrarian economies like India in particular, there is a need to reorient strategies in order to institute collective participation aimed at adoption of sustainable agricultural practices.

21.6 KEY WORDS

- Global Warming** : Normally, when the sunlight and its radiation (i.e. heat or energy) reaches the earth's atmosphere, part of it is absorbed by the atmospheric gases and the rest by the earth. This process maintains the potential of the environment to keep the earth's climate at an optimum level. However, in the presence of unsustainable emission of GHGs, this optimum potential of the environment is disturbed. As a result, while a part of the GHG emissions are absorbed, the unabsorbed part radiates back to the earth. This makes the earth warmer causing the earth's average temperatures to rise. This is called as the global warming effect.
- Watershed Management** : Watershed is a hydrological unit of an area having only one outlet for drainage of runoff/surface flow of water. Watershed management refers to the 'in situ' (i.e. with in a localised area or place) control of rainfall for its optimal use within the boundary of an area.
- Water Logging and Water Runoff** : Water logging refers to water stagnation due to excess irrigation and poor drainage facility. It causes increased salinization and decreased soil fertility. Water runoff, on the other hand, is a problem of water flow from uphill areas to downhill areas in hilly regions. It causes transportation of contaminants like chemicals making the downstream water sources polluted and harmful for human and animal consumption. Both are factors for loss of potential water resources.

21.7 SUGGESTED BOOKS/REFERENCES FOR FURTHER READING

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Sudhakar Yedla and Sowjanya Peddi, India Environment National Assessment, October, 2003. [ftp://ftp.fao.org/es/esa/roa/pdf/2_Environment/Environment_IndiaNA.pdf]

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21.8 ANSWERS/HINTS FOR CYP EXERCISES

Check Your Progress 1

- 1) See section 21.2.1 and answer.
- 2) See section 21.2.1 and answer.
- 3) See section 21.2.1 and answer.
- 4) See section 21.2.2 and answer.
- 5) See section 21.2.2 and answer.
- 6) See section 21.2.2 and answer.
- 7) See section 21.2.3 and answer.
- 8) See section 21.2.3 and answer.
- 9) See section 21.2.3 and answer.
- 10) See section 21.2.4 and answer.

Check Your Progress 2

- 1) See sections 21.3.1 & 21.3.2 and answer.
- 2) See section 21.3.1.1 and answer.
- 3) See section 21.3.1.2 and answer.
- 4) See section 21.3.1.3 and answer.
- 5) See section 21.3.1.4 and answer.
- 6) See section 21.3.1.5 and answer.
- 7) See section 21.3.2.1 and answer.
- 8) See section 21.3.2.3 and answer.
- 9) See section 21.3.2.4 and answer.
- 10) See section 21.3.3 and answer.
- 11) See section 21.3.4 and answer.

Check Your Progress 3

- 1) See section 21.4 and answer.
- 2) See section 21.4 and answer.
- 3) See section 21.4 and answer.
- 4) See section 21.4 and answer.
- 5) See section 21.4 and answer.
- 6) See section 21.4 and answer.
- 7) See section 21.4 and answer.
- 8) See section 21.4 and answer.
- 9) See section 21.4 and answer.

UNIT 22 NEW AGRICULTURAL STRATEGY

Structure

- 22.0 Objectives
- 22.1 Introduction
- 22.2 Strategic Initiatives
 - 22.2.1 Pre-Reform Period: An Overview
 - 22.2.2 Economic Reforms Period: 1990s
- 22.3 New Agricultural Policy: 2000
 - 22.3.1 Salient Features
 - 22.3.2 Issues Under Focus
 - 22.3.2.1 Sustainable Agriculture
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 - 22.3.2.3 Generation and Transfer of Technology
 - 22.3.2.4 Inputs Management
 - 22.3.2.5 Incentives for Agriculture
 - 22.3.2.6 Investment in Agriculture
 - 22.3.2.7 Institutional Structure
 - 22.3.2.8 Risk Management
- 22.4 Performance During the Xth and XIth Plan Periods
 - 22.4.1 Regional Variations in Growth
 - 22.4.2 Special Initiatives and Programmes
- 22.5 Let Us Sum Up
- 22.6 Key Words
- 22.7 Suggested Books/References for Further Reading
- 22.8 Answers/Hints for CYP Exercises

22.0 OBJECTIVES

After going through this unit, you will be able to:

- distinguish between the terms ‘planning’ and ‘strategic planning’;
- outline the various agricultural strategies adopted during the pre-reforms period;
- indicate the approach adopted for reorienting the agricultural development policies during the post-reform years of 1990s;
- state the objectives of the ‘New Agricultural Policy (NAP), 2000’;
- delineate the approach of NAP, 2000 in terms of its specific policy features;
- explain the proposed paths for tackling the issues under focus in the NAP, 2000; and
- analyse the trends of post-2000 years on the performance of agricultural sector during the Tenth and Eleventh Plan periods.

22.1 INTRODUCTION

We have already discussed in detail the efforts made under Green Revolution in unit 11. We also noted briefly (in section 11.4) the post-green revolution efforts made during the 1980s after the benefits of the first green revolution period began to taper off. These efforts, which were aimed at making us self-sufficient in food and spread the benefits of green revolution to the other as yet unreached regions, are what is referred to in literature as the 'new agricultural strategy'. This approach also includes what we studied in unit 8 on the diversification trends in Indian agriculture. While the objective of making India self-sufficient in foodgrains production has been achieved by the strategies adopted during the Green Revolution period, the challenges that our agricultural sector is facing in the post-economic reforms period are distinctly different. To cope up with this, the government formulated and implemented various strategies during the different plan periods of the post-reform years. In the present unit, we first take an overview of the strategic initiatives taken in the pre-reform period. We then focus more on knowing about the strategic initiatives that have been undertaken in the context of the pressing challenges facing the sector in the period since the initiation of economic reforms in the country in the early nineties. Before we do this, we will distinguish between the terms planning, policy and strategy.

Planning is the process of defining the objectives and develop a detailed outline of future course of actions required to be pursued to achieve the objectives laid. This includes the setting of targets along with the allocation of financial resources required for their achievement. Thus, planning is an intellectual exercise that rationally attempts to select from among available alternatives in a manner that best suits the achievement of the pre-defined objectives. It is a decision-making process that is consciously based on the planners understanding of the objectives and includes financial estimates of expenditure. The purpose of planning is to bridge the gap from 'where we are' to 'where we want to be'. In the first few decades of our planning for the development of the agricultural sector in India, four broad objectives have been kept in view. These are: (i) increase agricultural production; (ii) increase employment opportunities; (iii) reduce the pressure of population on land (by reducing the number of people working in agriculture); and (iv) reduce income inequalities in rural areas. However, development of the plan itself is not enough as the financial resources allocated are quite often not expended fully. Hence the actual implementation of the plan is of crucial importance as any faulty implementation and leakages in the system often leads to poor implementation of plan projects. Policies, in this context, are general statements (or undertakings) that guide the thinking in decision making. Policies relate to a specific area in which a decision has to be made and then ensure that the implementation of the decision is made in such a manner that it conforms to the achievement of the objectives laid. As guides to decision-making, policies allow a certain amount of discretion which makes them different from rules. A policy need not always be a statement; it can also be an unwritten way of doing certain things.

The terms 'policy' and 'strategy' are often used synonymously. There is, however, a difference between them. 'Strategy' refers to a comprehensive action plan, more than what is expected to be stated in a policy, that details how a stated objective will be achieved. A strategy outlines a specific programme of action indicating the direction of deployment of human and physical resources to maximise the chances of achieving an objective meeting the challenges that might lie in the way. In other words, a strategy is a game plan that is employed to achieve the position that 'we would like to be in' from 'where we are now'. It, thus, reflects the choices that the planners and administrators have made. In general, given the plan objectives for the agricultural sector mentioned

above, the strategies that have been employed in India include: (i) action plans directed towards increasing agricultural production and rural employment (e.g. implementation of community development programmes and agricultural extension services throughout the country, expansion of irrigation facilities, promotion of use of high yielding varieties of seeds, fertilisers, plant protection chemicals, and agricultural machinery and expansion of transportation, marketing and credit infrastructure); (ii) development of rural non-farm sector by inducing movement of people out of agriculture to non-farm activities (e.g. promotion of agro-industries and handicrafts); and (iii) land reforms related strategies aimed at reducing inequality and ensure social justice in rural areas. In this unit we shall be focusing on some of the specific strategies that have been adopted to meet the challenges that the agricultural sector has faced in the last two decades.

22.2 STRATEGIC INITIATIVES

As described above, strategy is an action plan that is implemented to achieve a desired objective i.e. to move 'to a situation/position where we would like to be' in relation to 'our current position'. A strategic initiative, therefore, requires that it must be well thought out and carefully controlled and monitored during implementation. For such a strategic initiative, various outcome indicators can be defined. These outcome indicators reveal the degree of success of the strategic initiatives. For instance, depending upon the nature of the initiative and the challenge that is being sought to be met, for agricultural and allied sector, some of the more common indicators that indicate the outcome of the initiative may be: (i) contribution to output or GDP (measured in value terms and expressed as growth rate over a suitable time frame like a decade or a five year plan period); (ii) changes in production and productivity in quantitative terms (expressed in absolute terms or per hectare/per animal terms, respectively); (iii) rising trends in export of agricultural commodities (expressed in percentages); (iv) declining share in employment in agricultural/livestock production and its corresponding increase in non-farm employment (relative percentage terms); (v) actual growth rates achieved relative to targeted rates for different sub-sectors/activities, etc. We shall, in this section, study the salient features of the agricultural strategy pursued and note the achievements in different periods marked for specific thrust areas in the different plans.

22.2.1 Pre-Reform Period: An Overview

The agricultural policy followed during the pre-reform decades can be categorised into three phases, viz.: (i) period from 1950-51 to mid-1960s (the pre-green revolution period); (ii) the 1960s to the end of 1970s (called the green revolution period); and (iii) the wider technology dissemination period of the 1980s.

The **pre-green revolution period** was marked by: (i) major agrarian reforms; and (ii) institutional changes for development of major irrigation projects. Other policy initiatives taken during this period include: (i) establishment of a food distribution network; (ii) nationwide community development programmes for village development; (iii) bringing fallow land under cultivation to increase land use efficiency; (iv) thrust on irrigated agriculture; (v) soil conservation programmes; (vi) development of cooperative institutions and national extension service; (vii) technology dissemination through community development network; (viii) adoption of improved technology to increase land productivity; (ix) adoption of area development approach for development; (x) extension of non-agricultural activities in rural areas; etc. The contribution of 'agriculture and allied' sector to GDP during the decade 1951-60 was 2.7 percent. This, however, declined to 1.5 percent during the decade 1961-70. A notable increase during the two periods was in the production of fruits & vegetables whose growth increased from a mere 0.6 percent in 1951-60 to a significant 5.8 percent during 1961-70.

The **green revolution period** was set off with a food crisis situation of early 1960s. There was a desperate search for quick breakthrough in agricultural production necessitated by the increasing dependence on food aid and imports. The period witnessed the development and spread of dwarf HYVs of wheat followed by rice. These HYVs were highly responsive to chemical fertilisers and irrigation and this strategy produced quick results with a quantum jump in the production of wheat and rice. Within a short span of six years from 1965-66 to 1971-72, Indian agriculture witnessed an increase of 30 million tonnes of foodgrains over that achieved in the period 1951-65. This marked for the biggest achievement of new agricultural strategy viz. the attainment of self-sufficiency in foodgrains. The period was also marked by a fast growth of agro input industry. On the policy front, research & extension, input supply, credit, marketing, price support and spread of technology received maximum attention. Specific policy thrust witnessed during the fourth and the fifth plan periods (i.e. 1969-74 & 1974-79) were in the areas of: (i) higher cropping intensity; (ii) emergence of agricultural price policy; (iii) second phase of land reforms with land ceiling acts and consolidation of holdings; (iv) implementation of 20-point economic programme; (v) continuation of area development strategy; (vi) drought-prone area development projects; (vii) impetus to dry-land farming; (viii) attention to issues of land degradation and land management in irrigated command areas; and (ix) modernisation of irrigation in select irrigation command areas. In spite of these initiatives, the period was characterised by a marginal increase in the contribution of 'agricultural and allied sector' to the GDP: from 1.5 percent in 1961-70 to 1.7 percent during 1971-80. Two specific areas which witnessed comparatively higher growth over the two periods of 1961-70 and 1971-80 are: (i) non-horticultural crops from 1.1 percent growth to 1.6 percent; and (ii) livestock from 0.4 percent to 3.9 percent.

The **post-green revolution period** Indian agriculture began in early 1980s. This period saw the wide dissemination of the green revolution technology with the rapid spread of the seed-fertiliser revolution to new areas and new crops leading to productivity increases in major foodgrains. During this period there was (i) growth in the agricultural sector accompanied by increase in real farm incomes in several regions/pockets; (ii) a considerable increase in subsidies and support to agriculture sector; and (iii) a decline in public sector spending in agriculture for infrastructure development. However, due to higher private investment by farmers, the rural economy witnessed diversification resulting in faster growth in non-foodgrain output like milk, fishery, poultry, fruits & vegetables, etc. The growth was thus largely market-driven which substantially contributed to growth in agricultural GDP during the 1980s. The increase in agriculture GDP was from 1.7 percent during the 1970s to 3.0 percent during the 1980s. In particular, the contribution to GDP from crop production per se (i.e. main agriculture) increased from 1.9 percent to 3.1 percent and in fishing from 2.9 percent to 5.8 percent. Major policy thrust for development of agriculture during this period included: (i) drought-prone areas and wasteland development programmes; (ii) lagging areas from green revolution benefits getting attention; (iii) soil erosion and land degradation receiving major attention; (iv) water conservation efforts getting a boost under the National Watershed Development Programme; (v) launching of oilseeds and pulses development programmes; and (vi) initiation of long term view of land management.

22.2.2 Economic Reforms Period: 1990s

The reforms decade of 1990s began with the Eighth Plan (1992-97) laying emphasis on: (i) trade sector priorities by generating surplus agricultural production for exports; (ii) increased emphasis on oilseed sector; (iii) incorporation of agro-climatic regional planning approach; (iv) initiation of productivity enhancement schemes; (v) promotion

of horticulture sector; (vi) institutionalisation of people’s participation in land management at village level; (vii) emphasis on watershed development approach; and (viii) soil conservation merged with watershed development programmes. The Ninth Plan (1997-2002) continued to regard agriculture as a priority sector. Its policy thrust was on: (i) boost to agricultural research; (ii) emphasis on horticultural crops for exports; (iii) management of wastelands by bringing under-utilised land for cultivation; and (iv) institution of panchayati raj system of management for village land development. As a result of these efforts, the growth in agricultural GDP during the decade 1991-2000 increased to 3.3 percent from the 3.1 percent growth during the decade 1981-90. In particular, the fruits & vegetables sector grew impressively from its 2.4 percent growth during 1981-90 to 6.0 percent growth during 1991-2000. However, the challenges faced by the agricultural sector were becoming intense owing to the opening up of the sector for international trade. Until the 1990s, agricultural trade, channelled through state trading, was strictly regulated by high tariffs and quantitative restrictions. But the new international trade accord with WTO in the mid-1990s required the opening up of domestic market creating strong apprehension on its adverse impact on Indian agriculture. These developments compelled the government to come out with a New Agricultural Policy Statement in the year 2000. We may, therefore, conclude the present section by noting that over a long term time frame of 1951-2000, Indian agriculture (i.e. agriculture & allied sectors) grew at an average annual rate of 2.6 percent with three of its sub-sectors having grown at a higher than this average annual growth rate. These are: livestock (3.1 percent), fruits & vegetables (4 percent) and fishing (4.3 percent).

Check Your Progress 1 [answer in about 50 words using the space given]

- 1) State the distinguishing elements of ‘strategic planning’.

- 2) State any four outcome indicators which would reveal the impact of ‘strategic policy initiatives’ on agricultural development.

- 3) What were the four major areas of policy thrust during the pre-green revolution years?

- 4) State the specific policy initiatives of the pre-green revolution years?

Issues in Agricultural Sector-I

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5) Indicate the trend in the contribution to GDP by the ‘agricultural and allied sectors’ during the roughly two pre-green revolution decades?

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6) Mention the specific policy initiatives for agricultural development during the IVth and the Vth plan periods.

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7) Which factor contributed to diversification of agriculture during the 1980s? Which two sub-sectors contributed to GDP substantially? How much was the increase/growth of these two sub-sectors?

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8) State the specific policy emphasis laid on agricultural development during the Eighth and the Ninth plan periods.

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9) Which particular sub-sector of agriculture, showed impressive growth during the 1990s? What was the magnitude of this increase?

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10) State the circumstances which compelled the government to come out with a New Agricultural Policy statement in the year 2000.

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- 11) Overall, how would you categorise as the growth profile of Indian agriculture over the five decade time period of 1951-2000? Which sub-sectors have performed better than this aggregate growth rate?
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22.3 NEW AGRICULTURAL POLICY: 2000

The broad objective of the new agricultural policy, 2000, (NAP, 2000) is to facilitate the sector to grow in excess of an annual 4 percent by the year 2020. It seeks to achieve this target by a multi-faceted approach consisting of measures like: (i) strengthening the rural infrastructure to support faster agricultural development; (ii) promoting value addition by accelerating the growth of agri-business; (iii) creating employment opportunities in rural areas to secure a higher standards of living on the one hand and discourage migration to urban areas on the other; and (iv) enabling the sector to face the challenges arising out of economic liberalisation by catering to both domestic and export markets. The approach of the NAP is discussed in the salient features of the policy delineated below.

22.3.1 Salient Features

The approach to achieving the objectives stated in the NAP, 2000 are indicated in terms of its specific features as follows.

- a) Greater private sector participation through promotion of contract farming methods;
- b) Price protection to farmers aided by the launch of a National Agricultural Insurance Scheme (NIAS) to cater to unforeseen situations like crop failure;
- c) Dismantling the restrictions on movement of agricultural commodities throughout the country;
- d) Promoting strategies for rational utilisation of country's water resources for optimum use of irrigation potential;
- e) According high priority to promotion of allied agricultural activities like horticulture, animal husbandry, poultry, dairy and aquaculture;
- f) Establishing conducive environment for capital inflow with assured markets for crop production;
- g) Exempting the payment of capital gains tax on income accrued from compulsory acquisition of agricultural land necessary for infrastructural development;
- h) Taking suitable measures to minimise fluctuations in commodity prices by continuous monitoring of international prices;
- i) Bringing about a legislation for protection of plant varieties;

- j) Supplying of quality inputs to farmers in adequate and timely manner;
- k) According high priority to rural electrification; and
- l) Setting up of agro-processing units for creation of off-farm employment opportunities in rural areas.

22.3.2 Issues Under Focus

A multi-pronged strategy has been indicated in the NAP, encompassing several areas of critical concern, in order that specific policy prescriptions for achieving the envisaged growth target in a sustainable and equitable manner are evolved. To achieve this, the NAP indicates direction in terms of the following broad focal areas: (i) sustainable agriculture; (ii) food and nutritional security; (iii) generation and transfer of technology; (iv) inputs management; (v) incentives for agriculture; (vi) investments in agriculture; (vii) institutional structure; and (viii) risk management including other management reforms.

22.3.2.1 Sustainable Agriculture

The NAP notes that the erosion and narrowing of India's plant and animal genetic resource base has affected the biodiversity of the country. To rectify this situation, the NAP suggests the following specific strategies: (i) survey of genetic resources in a time bound manner to list, catalogue and classify country's vast agro bio-diversity; (ii) promotion of bio-technology for evolving plant species that are – (a) drought/pest-resistant, (b) contain more nutrition and consume less water, (c) give higher yields in an environmentally friendlier manner, etc.; (iii) sensitization of the farming community for balanced and conjunctive use of bio-mass, organic and inorganic fertilizers and controlled use of agro chemicals through integrated nutrient and pest management practices; (iv) promotion of agro-forestry and social forestry to balance and augment bio-mass production in agricultural systems; etc.

Currently, a major challenge being faced by the agricultural and allied sector in India is the possible adverse impact on production due to climatic variability. It is felt that the adverse impact due to climate change and extreme weather events could be severe if appropriate adaptation and mitigation strategies are not adopted with serious consequences in terms of shortages of food articles and rising prices that can negatively impact the food and livelihood security of the country. As a specific strategy to tackle this challenge, the Government of India has launched the National Mission for Sustainable Agriculture which seeks to transform Indian agriculture into a climate resilient production system through suitable adaptation and mitigation measures in the domain of crops and animal husbandry. To achieve this, the Mission will: (i) conduct research and development activities; (ii) absorb the improved technology and best practices; (iii) create physical and financial infrastructure and institutional framework; and (iv) facilitate access to information and promote capacity building. Focus will be on the development of suitable drought and pest resistant crop varieties for dryland agriculture and integrating farming systems with management of livestock and fisheries in rainfed areas besides ensuring adequate institutional support for this purpose. To ensure that agricultural production continues to grow in a sustainable manner, the Mission seeks to undertake strategic planning at agro-climatic zone level, develop customized interventions to enhance productivity, ensure easy access to information and institutional support, and linking laboratory to land.

22.3.2.2 Food and Nutrition Security

For raising the productivity and production of crops to meet the growing demand for food and raw materials needed for agro-based industries, a regionally differentiated

strategy (taking into account the agronomic, climatic and environmental conditions) will be pursued. For promoting animal husbandry, a national livestock breeding strategy will be evolved to meet the demands for milk, meat, egg and other livestock products. The involvement of cooperatives and private sector will be encouraged for development of poultry and dairy. In horticulture and floriculture, major thrust will be on the development of rain-fed and irrigated systems. It will especially focus on: (i) promotion of plantation crops particularly roots & tubers and aromatic & medicinal plants, (ii) bee-keeping, (iii) tissue culture laboratories, (iv) seed farms, etc. In fisheries, an integrated approach to design and promote sustainable aquaculture practices will be adopted. It will particularly focus on deep sea fishing to take advantage of vast potential of the country's exclusive economic zone.

A specific strategy adopted for improving food security is the National Food Security Mission, a centrally sponsored scheme launched in 2007-08 in 311 districts of 17 states. The objective of the Mission is to: (i) increase production of rice, wheat and pulses through area expansion, and enhance productivity in a sustainable manner in certain identified districts of the country through restoration of soil fertility and productivity at the individual farm level; (ii) creation of employment opportunities and; (iii) enhancing farm level economy to restore confidence among the farmers. The Mission seeks to involve all stakeholders in the planning, execution and monitoring of the programme. Through promotion and extension of improved technologies (like seed, nutrients, plant protection, soil amendments, resource conservation, farm machines and tools), it is envisaged to increase the production of rice, wheat and pulses to the tune of 10, 8 and 2 million tons, respectively.

22.3.2.3 Generation and Transfer of Technology

In technology application, developments in frontier sciences like bio-tech, remote sensing, energy conservation, etc. would be used to evolve location-specific varieties of agricultural and horticultural crops. This approach would also be extended to development of livestock species and aquaculture. The research and extension linkages would be strengthened to make it broad-based and to revitalise crop, livestock and fisheries based production systems. For promotion of demand-driven production systems, the role of KVKs (krishi vigyan kendras), NGOs (non-government organisations), farmers' organisations, cooperatives, corporate sector, etc. would be encouraged. Appropriate structural, functional and institutional measures will be initiated to empower women and build their capabilities so as to improve their access to inputs, technology and other farming resources.

22.3.2.4 Inputs Management

The endeavour would be to provide adequate and timely supply of quality inputs including bio-pesticides, agricultural machinery and credit at reasonable rates. To optimise efficient nutrient use, balanced use of chemical fertilisers with organic and bio-fertilisers would be promoted. A National Seed Grid would be established to ensure the supply of seeds especially to areas affected by natural calamities. Selective and eco-friendly farm mechanization through appropriate technology will be promoted to make agriculture efficient and competitive. Research and breeding of new varieties would be encouraged in the private sector with a focus on safeguarding the proprietary rights of individual researchers and corporate players.

In the case of seeds, a centrally sponsored scheme called the 'Development and Strengthening of Infrastructure Facilities for Production and Distribution of Quality Seeds' was launched during the Tenth Plan. A Seed Bank scheme was launched in 1999-

2000 with the objective of ensuring availability of quality seeds to the farmers particularly during contingency situations and to develop the infrastructure for storage of seeds. An important strategy in case of seeds has been the 'Seed Village' scheme. The New Seed Policy of 2002 seeks to strengthen this scheme to facilitate production and timely availability of seeds at local level.

22.3.2.5 Incentives for Agriculture

For creating a favourable economic environment aimed at increasing the capital formation in agriculture: (i) distortions in the incentive structure between sectors would be removed by improving the terms of trade for agriculture vis-à-vis industry; and (ii) external and domestic markets would be rationalised by effecting necessary tax reforms. Commodity-wise strategies for protecting the domestic growers from adverse impact of undue price fluctuations in world markets would be formulated. This would involve promotion of other aspects of marketing such as quality, choice, health and bio-safety standards. For promoting exports, a two-pronged strategy of: (i) diversification of agricultural production; and (ii) establishment of supportive public management system would be adopted. The latter would include rationalisation of import duties on manufactured commodities used in agriculture. The domestic agricultural market would be liberalised by removing all restrictions on the movement of agricultural commodities throughout the country. Other incentives like exemption of capital gains tax to farmers on compulsory acquisition of agricultural land and measures for keeping the agricultural sector outside the regulatory and tax collection systems would also be adopted.

22.3.2.6 Investment in Agriculture

A conducive environment would be established to promote private investment in agriculture. This would be done by a mix of price and trade related reforms. The quality of electricity supply to rural and agricultural needs would be improved by according high priority. For this, measures like: (i) bridging the gap between irrigation potential created and utilised; (ii) completion of all on-going projects for modernization of irrigation infrastructure; and (iii) encouraging the use of new and renewable sources of energy for agricultural purposes would be initiated. Due emphasis would be laid on development of marketing infrastructure and techniques for preservation, storage and transportation of agricultural produce with a view to reducing post-harvest losses. Producer markets on the lines of Ryatu Bazars, with the active involvement and direct control of PRIs would be promoted throughout the length and breadth of the country. Establishment of cold chains and improvement of retail marketing arrangements would receive priority. Upgradation and dissemination of market intelligence will receive particular attention. Collaboration between producer cooperatives and corporate sector will be encouraged to promote agro-processing industry.

22.3.2.7 Institutional Structure

In view of the predominance of small and marginal farmers in Indian agriculture, policy of rural development and land reforms would focus on: (i) consolidation of holdings; (ii) redistribution of surplus and waste lands among the landless, unemployed, etc.; (iii) recognition of the rights of tenants and sharecroppers in the matter of tenancy reforms; (iv) development of lease markets to allow for the increase in the size of land holdings by making necessary legal provisions; (v) provisioning for giving private lands on lease for cultivation and agri-business; (v) updating of land records and its computerisation with the ultimate objective of providing pass books to farmers on their land holdings; and (vi) recognition of women's rights in matters of land ownership. The process of implementation of land reforms would increasingly involve PRIs, voluntary groups, social activists and community leaders. For allowing accelerated technology transfer, private

sector’s participation through contract farming and land leasing arrangements would be encouraged. The rural credit institutions would be geared to promote savings, investments and risk management. Special measures would be taken to revamp cooperatives to remove institutional and financial weaknesses and evolve simplified procedure for sanction and disbursement of agricultural credit.

22.3.2.8 Risk Management

The scope of National Agriculture Insurance Scheme (NAIS) would cover all farmers and all crops. There would be built-in provisions for insulating farmers from financial distress caused by natural calamities, price fluctuations, etc. The practice of ensuring remunerative prices through the announcement of MSPs would be continued. The price structure and trade mechanisms would be continuously reviewed to ensure a favourable economic environment. Domestic market prices would be closely monitored to prevent distress sales and public and cooperative and marketing agencies would be strengthened. The coverage of futures market would be progressively enlarged to cover all commodities so as to minimize the adverse effect of wide fluctuations in commodity prices. In matters of other management reforms, the central government will complement the state governments’ efforts through crop/area/target group efforts formulated in an inter-active mode and implemented in a spirit of partnership with states. Grading and standardisation of products would be promoted for export enhancement. The database for agriculture sector will be strengthened to make the estimates and forecasts more reliable and helpful in the process of planning and policy making. Greater use of remote sensing and IT would be made to collect, collate and disseminate ‘real time data’ on agricultural prices to analyse signals emanating from farms and markets for the benefit of farmers.

Check Your Progress 2 [answer in about 50 words using the space given]

- 1) What are the four broad objectives of NAP-2000?

- 2) Among the specific approaches indicated in the NAP-2000, state the ones which are aimed at providing the benefit of price, insurance, tax and better capital flow to the agricultural sector?

- 3) What are the eight broad focal areas under which the specific policy prescriptions are elaborated in the NAP-2000?

4) Which four specific approaches are suggested in the NAP-2000 to establish the balance in the disturbed biodiversity base of the country?

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5) State the four major thrust/focal areas indicated in the NAP-2000 to promote the horticulture and floriculture segments of allied agriculture.

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6) Which two specific approaches/strategies are indicated in the NAP-2000 for: (i) creating a favourable economic environment for capital formation; and (ii) promotion of exports, in Indian agriculture.

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7) What specific measures are envisaged to be initiated in the NAP-2000 to ensure the supply of quality electricity needed for agricultural and rural development?

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8) What are the specific *institutional reforms* suggested to be implemented in the NAP-2000 for assisting the large 'small and marginal farmers' segment in India?

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9) How is the issue of 'risk management' sought to be addressed in the NAP-2000?

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10) In which areas an inter-active spirit of partnership is sought to be pursued for achieving a better coordination with the state governments in the implementation of agricultural development policies?

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22.4 PERFORMANCE DURING THE XTH AND THE XITH PLAN PERIODS

In section 22.2, in the brief indicative discussion on the policy initiatives during the economic reforms period, we noted that during the decade of 1991-2000, the growth of agriculture GDP was 3.3 percent. In this, the growth of agriculture sector during the Eighth Plan period (1992-97) was higher at 4.8 percent. But due to a downturn in the agrarian situation of the Ninth Plan period (1997-2002), during which time the agricultural sector grew at a much lower 2.5 percent, the decadal growth rate up to the year 2000 was pulled down to 3.3 percent. Also, as we noted before, the compulsion for the government to come out with a comprehensive strategy to boost the sector resulted in the first ever national policy to be announced in the year 2000. Despite the various initiatives taken in the years subsequent to the announcement of NAP-2000, the growth of the agricultural GDP during the Tenth Plan period (2002-07) was also low at 2.4 percent. However, in the subsequent Eleventh Plan period, the sector accelerated to grow at an annual 3.9 percent during the four year period of 2006-11. However, the year-to-year growth during the XIth plan period has been quite varied. While the sector grew at its highest ever growth rate of 7 percent during 2010-11 (at constant 2004-05 prices), in the subsequent year of 2011-12 the sector's growth plummeted to 2.5 percent. This decline was in spite of the good harvest in 2011-12 in which the total foodgrain production touched a new peak of 250.4 million tons. Evidently, the growth in the larger 'agriculture & allied' sector is influenced not merely by the total foodgrain production but also by its other allied sub-sectors and the inter-state differences in the performance. Due to these reasons, the average growth in 'agriculture & allied sector' for the entire Eleventh Plan period (2007-12) is placed around 3.5 percent. The volatility in the growth pattern of agricultural sector is also revealed by the higher coefficient of variation (1.6) in the 2000s as compared to the 1990s (1.1). This variation is far higher (nearly six times more) than that for the overall GDP growth of the country. Thus, the implication of this feature of volatility, which is expected to continue to prevail owing to climate change (or global warming), for the policy challenge to sustain the momentum required for the long term average annual 4 percent growth in the agricultural (and allied) sector is clearly evident.

22.4.1 Regional Variations in Growth

Since agriculture is a state subject, the overall performance of agriculture heavily depends on the initiatives and achievements of different state governments. As an explanation to the above noted wide differential in the year-to-year growth performance of the sector at the aggregate all-India level, we may note that the low performance of some of the larger states during the 2000s has contributed to this aggregate performance. For instance, during 2001-09, while the states of Rajasthan, Gujarat and Bihar performed better (at 8.2, 7.7 and 7.1 percent respectively), the two major states of U. P. and

W. B. performed poorly (at 2.3 and 2.4 percent respectively). Other states which have shown strong growth performance in agriculture (having improved from their earlier poor performing levels) are Orissa (3.2 percent), Chhattisgarh (6 percent) and H. P. (5.1 percent).

Another feature of comparative importance is that while the total economy has grown at a high rate of 6.5, 5.7, 7.6 and 8.2 percents in the Eighth, Ninth, Tenth and Eleventh five year plan periods respectively, the agricultural sector's growth has been at the rates of 4.8, 2.5, 2.4 and 3.5 percents respectively. Many analysts have pointed out that this shows an increasing divergence in the growth trends of the total economy with that of 'agriculture and allied sector'. The relative under performance of agricultural sector is linked to certain specific drivers. These are: (i) low public investment in GCF (gross capital formation) as percentage of agri-GDP during the 1990s (i.e. during the 8th and the 9th plan periods when it had slid below the 10 percent level which was later rectified to raise to the level of 13.9 and 18.7 percent, respectively, during the 10th and the 11th plan periods); (ii) the higher expenditure on subsidies which had the effect of crowding out public investment in agricultural research, irrigation, rural roads and power; and (iii) the changing structure of public and private investment ratio (which was nearly equal in the 1980s but changed adversely during the early 2000s making the private investment far larger than the share of the public investment at 2004-05 prices).

22.4.2 Special Initiatives and Programmes

Since 2004-05 priority has been given to increasing the production in the crop and horticulture sectors by certain mission mode schemes/initiatives. These include: (i) the National Food Security Mission (NFSM) (on which you have already studied in unit 19: section 19.5.3); (ii) Rashtriya Krishi Vikas Yojna (RKVY); (iii) the Integrated Scheme of Oilseeds, Pulses, Oil Palm and Maize (ISOPOM); (iv) National Horticulture Mission (NHM); (v) the Macro Management of Agriculture (MMA) scheme; etc.

The RKVY is primarily a project oriented scheme aimed at incentivizing the states to increase public investment in agriculture and allied sectors by taking into account the agro-climatic conditions of the states. Under the RKVY, in 2011-12, many new sub-schemes with exclusive financial allocation have been launched. These are: (i) Bringing Green Revolution to Eastern Region (BGREI); (ii) Integrated Development of 60,000 Villages for Pulses in Rainfed Areas; (iii) Special Programme on Oil Palm Area Expansion; (iv) Vegetable Initiative for Urban Clusters; (v) Initiative for Nutritional Security Through Intensive Millet Promotion; (vi) National Mission for Protein Supplements; (vii) Accelerated Fodder Development Programme; (viii) Rain-fed Area Development Programme; and (ix) Saffron Mission Economic Revival Programme. While these initiatives would show their impact in the coming years, the post-2000 year efforts have yielded significant results particularly during the years 2006-12 [Table 22.1]. For instance, while the total 'foodgrains' production has doubled in terms of its growth rate during the decade 2001-2011 (2.2 percent) as compared to that during the 1990s (1.1 percent), its performance during the years 2006-12 is 3.1 percent. The effect of this is seen in the overall growth of 'cereals' in general which has grown at 3 percent over 2006-12. Further, in case of pulses and oil seeds, the growth rates have been still higher with 4.0 and 5.9 percent annual average growths during the years 2007-12 and 2001-11 respectively. Likewise, the centrally sponsored NHM scheme has resulted in significant expansion of the area under cultivation over the period 2001-11. The scheme has covered many horticultural crops like: fruits & vegetables, spices, plantation crops, medicinal & aromatic plants, roots & tubers, flowers, etc. In particular, nearly 2.93 lakh farmers, including many women farmers, have been trained in various aspects of

Table 22.1: Impact of Food Security Mission: 1991-2011/12**(million tons)**

Year	Food Grains	Rice	Wheat	Cereals	Pulses	Oil Seeds
1990-91	176.4	74.3	55.1	162.1	14.3	18.6
2000-01	196.8	85.0	69.7	185.7	11.0	18.4
2005-06	208.6	91.8	69.4	195.2	13.4	28.0
2006-07 (pre-NFSM)	217.3	93.4	75.8	-	14.2	
2010-11	244.8	96.0	86.9	-	18.2	32.5
2011-12	250.4	102.8	88.3	233.1	17.3	-
Growth Rate (%)						
1991-01	1.1	1.4	2.4	1.4	-2.6	-0.1
2001-11	2.2	1.2	2.2	-	5.2	5.9
2001-12	2.2	1.7	2.2	2.1	4.2	-
2006-12	3.1	1.9	4.1	3.0	4.3	-
2007-12	2.9	1.9	3.1	-	4.0	-

Source: (i) Economic Survey, 2010-11, Table A-17 and the Report on 'State of Indian Agriculture: 2011-12 (Table 4.1; p-90);

Notes: (i) Growth rates are based on point-to-point values and are average annual;

(ii) 2009-10 was a drought year with major dip in production figures.

horticulture. By ensuring the forward and backward linkages with a cluster approach, the scheme has focused on an end-to-end approach covering production, post-harvest management, processing and marketing to assure appropriate returns to growers.

The MMA scheme was launched in 2000-01 with the objective of ensuring focused spending of central assistance through specific interventions for agricultural development in the states. The scheme allocated funds based on a new criteria in which 'gross cropped area' and 'area under small and marginal holdings' were considered for 100 percent grants to states. In 2008-09, the MMA was revised to make it: (i) more relevant to the agricultural scenario in the states; and (ii) achieve the basic objective of 'food security' for which many new sub-schemes relating to crop production and natural resource management were included.

Credit, Insurance and Public Investment: The introduction of the Kisan Credit Cards (KCC) scheme in the year 1999 has resulted in an increased flow of credit to the sector marking for a substantial reduction in the borrowing from the informal sector to meet the short term needs of finance. The availability of institutional agricultural credit (as a percentage of GDP) has increased from 11.5 percent in 2000-01 to 32.2 percent in 2010-11. Further, under the NAIS-scheme launched in 1999, till 2010-11, a total of 176 million farmers have been extended insurance cover. However, while studies on credit advanced show that the system of institutional credit to farmers continues to suffer from factors like: (i) non-farmer friendly practices; (ii) delays in credit delivery; and (iii) collateral problems, studies on the insurance reveal that there is a heavy regional and crop bias in its coverage. The public investment in agriculture, as a percentage of GDP, which had sunk to a low level of 1.8 percent in 2000-01, rose to 3.7 percent in 2006-07.

It is thus clear from the above that the special schemes implemented right through the year 2000, but intensified further around the middle of the first decade of 2000s, have accorded a major thrust to boost production. Notwithstanding this, critical evaluation of these efforts has revealed that the mission mode efforts have lacked the component

relating to ‘strategic and adaptive research’ considered vital to meet the site-specific requirements of low producing districts. To address the lacunae on this front, the government had constituted a special Working Group to suggest measures on ‘Agricultural Research and Education’ for the 12th five year plan (2012-17). The report of the Group has suggested a research strategy on four lines: (i) strengthening the basic and strategic research to feed into applied research for accelerating technology flow by addressing anticipated challenges; (ii) launching of specific programs for research integration to achieve enhanced technology generation; (iii) up-scaling of technologies for larger adoption to facilitate the transformation of agriculture in a partnership mode; and (iv) strengthening the outreach of frontline extension programs by specific efforts.

Check Your Progress 3 [answer questions 2-7 in about 50 words using the space given]

- 1) Fill in the blanks:
 - a) The growth rate in the agricultural sector during the 8th plan period (1992-97) was percent which to percent during the 9th plan period (1997-2002).
 - b) The growth rate in the agricultural sector during the 10th plan period (2002-07) was percent which to percent during the 11th plan period (2007-12).
 - c) The highest growth rate registered in the Indian agricultural sector was in the year and the growth rate recorded was percent.
 - d) The three states to record the highest agricultural growth rate during the period 2001-09 are,, and, The three states registered the growth rates of,, and percents respectively.
- 2) What are the three main drivers to which the relative under-performance of agricultural sector (as compared to the overall economy’s growth rate) during the period 1992-2012 is attributed?
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- 3) Mention the five major mission-mode initiatives launched to boost the crop and horticultural sectors during the post-2004 period? In particular, what were the new sub-schemes launched under RKVY in 2011-12?
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- 4) As a result of the measures taken in the years post-2006, what major growth profiles can be sketched out on the mission-mode initiatives?
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- 5) What were the two new criteria on the basis of which 100 percent central grant to the state governments was provided under the MMA scheme? What were the two objectives with which the MMA scheme was revised in 2008-09?

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- 6) What was the extent of improvement achieved in the availability of institutional credit to agriculture in the post-2000 years? Despite this, in what respects lacuna are pointed out to exist on this front?

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- 7) What was the specific initiative taken by the government to remove the lacuna in the mission-mode initiatives during the 12th plan period? What are the four lines on which a strategy is suggested in this regard?

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22.5 LET US SUM UP

Various agricultural strategies have been adopted by the Indian government to improve the performance of the agricultural sector right since independence. The efforts during the pre-1965 years were in the areas of first stage land reforms and measures like soil conservation, irrigation, technology dissemination, etc. However, these measures were inadequate to meet the growing food needs of the country. To deal with this situation, as a strategic policy response, the government adopted the implementation of green revolution measures. Within a short span of 6-7 years, this helped the country to increase its foodgrains production substantially and the country became food self-sufficient. However, the green revolution measures introduced many environmentally unsustainable characteristics. Besides, its benefits did not reach many pockets/regions of the country. In order to deal with this situation the government, during the 1980s, adopted many market-driven policies. This helped the agriculture GDP to touch a respectable 3 percent growth during the 1980s. The succeeding decade of 1990s was

a more challenging decade for the Indian agriculture mainly due to the adoption of economic reform measures. During this period, there was a steep decline in public investment in agriculture. The shortcoming of this policy was recognised and corrected by the government during the late 1990s. Further, the government announced a comprehensive agricultural policy known as the NAP-2000. The NAP-2000, among other directives, envisaged to accord the thrust needed for the sector to grow at an annual average of 4 percent by the year 2020. In the subsequent years, many mission-mode initiatives were launched. Owing to these initiatives, the low agricultural growth rate registered during the 10th plan period was reversed in the subsequent 11th plan period (the 5-year average annual growth being close to 3.5 percent). If we exclude the terminal year of the 11th plan (i.e. 2012), the sector had achieved its second highest growth rate of 3.9 percent over 2007-11 (the highest being during the 8th plan period: 4.8 percent). The performance of the sector during this period was marked by steep inter-state differences. While this is normal to expect, what is significant is that many states succeeded in attaining agricultural growth exceeding the 7 per cent mark. A major missing link in the approach of the government is identified as 'strategic and adaptive research'. Steps have since been taken for correcting this lacunae and a four pronged strategy has been suggested to tackle this during the coming years.

22.6 KEY WORDS

Planning	: Includes the two components of setting the target for achievement and providing the required financial resources to meet it.
Strategic Planning	: Refers to a time bound action plan for achieving the stated objectives with targets. It envisages all possible obstacles in the way of achieving the targets set and provides for adequate coordination in implementation to deal with the obstacles expected. It thereby focuses on efficient spending of financial resources allocated.
New Agricultural Policy	: Refers to the response of the government for a comprehensive approach to attain the target of 4 percent average annual growth rate in agriculture by the year 2020.

22.7 SUGGESTED BOOKS/ REFERENCES FOR FURTHER READING

1. Government of India, Agricultural Strategy for the Eleventh Plan: Some Critical Issues, Planning Commission, New Delhi. [<http://planningcommission.nic.in/aboutus/speech/spemsa/AgricultureStrategy.doc>]
2. Government of India (2011), Agricultural Research and Education for the XII Five Year Plan: 2012-17, Planning Commission, New Delhi. [http://planningcommission.nic.in/aboutus/committee/wrkgrp12/agri/wgrep_research.pdf]
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22.8 ANSWERS/HINTS FOR CYP EXERCISES

Check Your Progress 1

- 1) See section 22.1 and answer.
- 2) See section 22.2 and answer.
- 3) See section 22.2.1 and answer.
- 4) See section 22.2.1 and answer.
- 5) See section 22.2.1 and answer.
- 6) See section 22.2.1 and answer.
- 7) See section 22.2.1 and answer.
- 8) See section 22.2.2 and answer.
- 9) See section 22.2.2 and answer.
- 10) See section 22.2.2 and answer.
- 11) See section 22.2.2 and answer.

Check Your Progress 2

- 1) See sections 22.3 and answer.
- 2) See section 22.3.1 and answer.
- 3) See section 22.3.2 and answer.
- 4) See section 22.3.2.1 and answer.
- 5) See section 22.3.2.2 and answer.
- 6) See section 22.3.2.5 and answer.
- 7) See section 22.3.2.6 and answer.
- 8) See section 22.3.2.7 and answer.
- 9) See section 22.3.2.8 and answer.
- 10) See section 22.3.2.8 and answer.

Check Your Progress 3

- 1) a) to d) see section 22.4 and answer.
- 2) See section 22.4.1 and answer.
- 3) See section 22.4.2 and answer.
- 4) See section 22.4.2 and Table 22.1 and answer.
- 5) See section 22.4.2 and answer.
- 6) See section 22.4.2 and answer.
- 7) See section 22.4.2 and answer.

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