

## Agriculture

We still grow crops that our ancestors selected thousands of years back. In the beginning, humans mostly grew food crops. Over time, they began cultivating cotton, jute etc. Today, agriculture is no longer a subsistence activity but a commercial activity. Farmers give priority to crops that bring them more money income. The commercial approach and growing human needs have changed the nature of agriculture. This change can be seen over both time and space.



*Figure 3.1 Modern farming*

### Agricultural seasons in India

In India, farming is done throughout the year in some places while it is limited to the monsoon season in other places. The climate varies across the country during the year. Different crops are grown in different seasons. For example, in the irrigated areas of Chhattisgarh, paddy is cultivated during the monsoon season, while wheat and vegetables are grown in winter and vegetables are grown in summer. In India, we have three main agriculture seasons.

**1. Kharif:** This season starts with the onset of the monsoon. During the monsoon, it rains across almost the whole of India so there is enough water for farming. That is why almost all the agriculture land in the country is cultivated during the kharif season. Kharif crops require high humidity and high temperature so the main crops are paddy, maize, *jowar*, *bajra*, *mandua*, *tuar*, *moong*, *urad*, *til*, groundnut, soybean etc.

**2. Rabi:** The rabi season starts immediately after kharif and continues through the winter. There is limited rain during this season, so farming is done only on irrigated land or land that has a high moisture content. Hence, the area sown in rabi is much lower compared to kharif. The crops grown in this season are frost resistant. They include wheat, barley, rapeseed (*toria*), mustard, flaxseed (*alsi*), *masoor*, *chana*, etc. In places where irrigation is available or where there is some rain during rabi, paddy is also cultivated. One example is rabi paddy in West Bengal.

**3. Zaid:** This agricultural season begins when winter ends. It is the season of summer crops when there is no rainfall, so most of the land is left uncultivated. Hence, irrigation is needed to grow zaid crops, which are known by different names like *garma*, *dalwa* and *boro* in different parts of India. The area sown in zaid is much lower than in rabi. Usually, zaid farming is done on river beds, land around lakes and the lower plains where irrigation is available. The crops must be able to tolerate the severe summer heat. Cucumber, watermelon, vegetables, etc are the main crops. In some places, such as parts of the Chhattisgarh plains, irrigated paddy is also cultivated during this season.

**Make a table of the crops grown in different seasons in your area.**

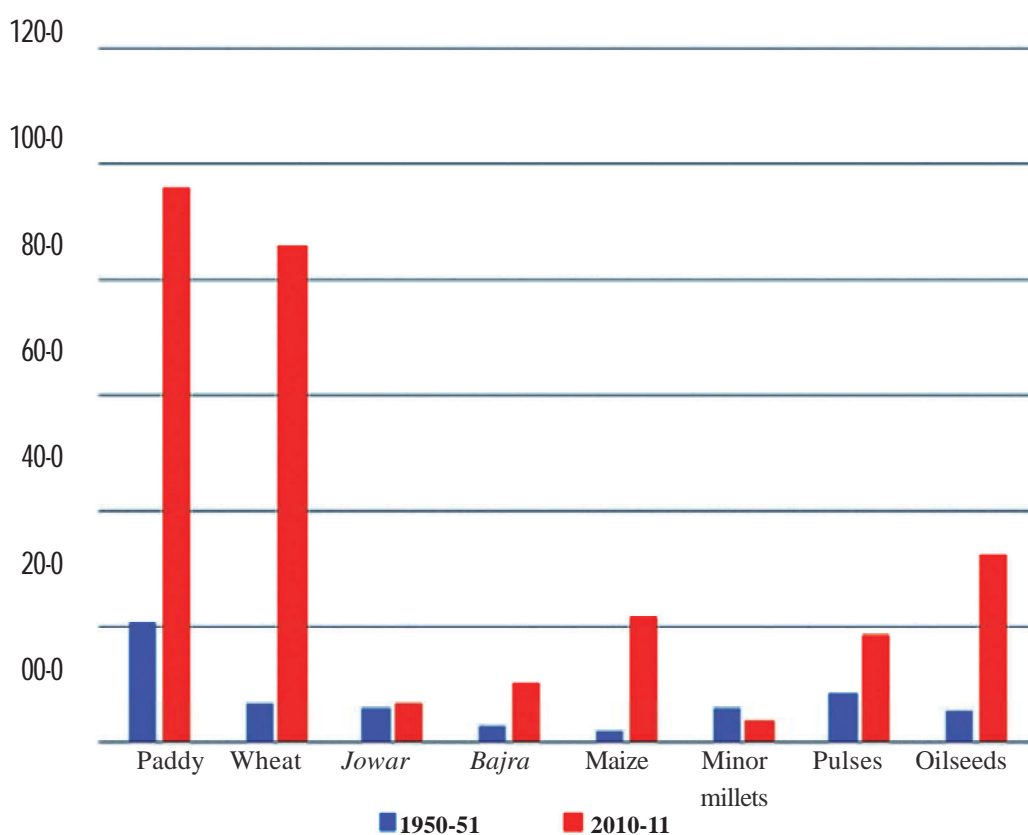
**Which crops are grown in more than one season in your area?**

**What are the sources of irrigation in your area? Write a report.**

## Agricultural production in India

Agricultural production is the total volume or quantity of the harvested crops. In India, agricultural production has increased almost five-fold over the last 60 years. In 1950-51, our total food-grain production was 51 million tonnes. It increased to 244 million tonnes in 2010-11. During this period, India's population increased three-fold – from 36 crores in 1951 to 121 crores in 2011. Hence, food grain production increased more rapidly than the increase in population. Oilseeds production rose six-fold from 5 million tonnes in 1950-51 to 32 million tonnes in 2010-11. But pulse production only doubled from 8 million tonnes 1950-51 to 18 million tonnes in 2010-11. So the growth in pulse production has been much lower than that of some other crops.

The growth in production has varied from crop to crop. We can understand the trend by filling in the blanks in the following paragraph:

**Graph 3.1: Crop production in India (in million tonnes)**

Source: Agricultural Statistics at a glance, Directorate of Economics & Statistics

**Table 3.1: Crop production in India**  
(million tonnes)

The maximum increase in food-grain production in the country has been in wheat. In 1950-51, wheat production was ..... million tonnes, which increased to ..... million tonnes in 2010-11. In the last 60 years, wheat production has increased ..... times. Similarly, maize production increased ..... times from ..... million tonnes to ..... million tonnes. In contrast, the production of minor millets has ..... from ..... million tonnes in 1950-51, the production came down to ..... million tonnes in 2010-11. Thus, while there have been

| Crop          | 1950-51<br>Production<br>million tonnes | 2010-11<br>Production<br>million tonnes |
|---------------|---|---|
| Paddy         | 21                                      | 96                                      |
| Wheat         | 6                                       | 86                                      |
| Jowar         | 6                                       | 7                                       |
| Bajra         | 3                                       | 10                                      |
| Maize         | 2                                       | 21                                      |
| Minor millets | 6                                       | 3                                       |
| Pulses        | 8                                       | 18                                      |
| Oilseeds      | 5                                       | 32                                      |

substantial increases in the production of paddy, wheat and maize, the increase in ..... and ..... has been much lower.

List the crops whose production has increased more than three-fold and those whose production has increased less than three times.

Why is it important to compare the increase in agricultural production with population growth?

What could be the reasons for the decline in production of minor millets? Discuss in class.

The main reasons for the increase in agricultural production in India over the last 60 years are the following:

1. Increase in net sown area.
2. Increase in area under irrigation.
3. Increase in productivity.

**Increase in net sown area:** Sown area refers to the total land on which crops are sown. If this area increases, then production increases. India has a fixed land mass. This fixed area has different features and uses – forest, desert, agricultural land etc. If we want to increase the area under agriculture, we will have to clear forests or irrigate the desert. In the last 60 years, the area under agriculture has expanded, with the major expansion taking place in the 1950s. The area has remained more or less the same since then. Small changes in area can be accounted for by more land left fallow during an agricultural season or agricultural land put to other uses.

**Table 3.2: Net sown area in India**

| Year    | Net sown area (In million hectares) |
|---------|-------------------------------------|
| 1950-51 | 119                                 |
| 1990-91 | 143                                 |
| 2000-01 | 141                                 |
| 2010-11 | 142                                 |

(Net sown area = Area under all crops sown during the year. Some areas have more than one crop in the year)

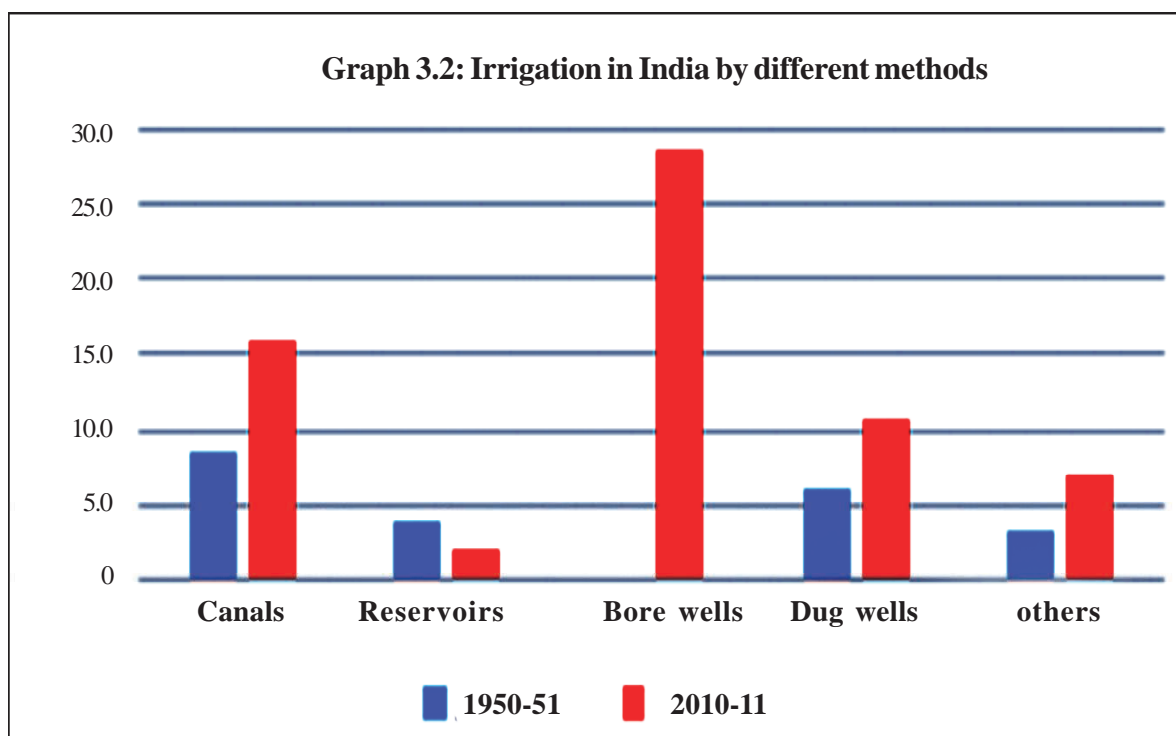
What is net sown area? Explain with an example.

Is it possible to increase the area under cultivation in India?

Should forests be cleared to expand agriculture?

**Increase in area under irrigation:** As we have seen earlier, it is not always feasible to bring more land under cultivation. But production can be increased to some extent by growing multiple crops in a

year on the available land. Irrigation helps us to grow multiple crops on the same land. Irrigation facilities have been expanded to boost agricultural production by making it possible to cultivate the land after the monsoon. In 1950-51, 16 percent of India's agriculture land was irrigated. By 2010-11, the irrigated area doubled to 32 percent of the available land.



*Source: Pocket Book on Agricultural Statistics, Directorate of Economics & Statistics*

Irrigation made it possible to sow improved varieties of seeds that give higher yields. It also made it possible to grow crops on the same land during the rabi and kharif seasons.

Answer the following based on Graph 3.1:

**What was the main source of irrigation in 1950-51?**

**What was the main source of irrigation in 2000-1?**

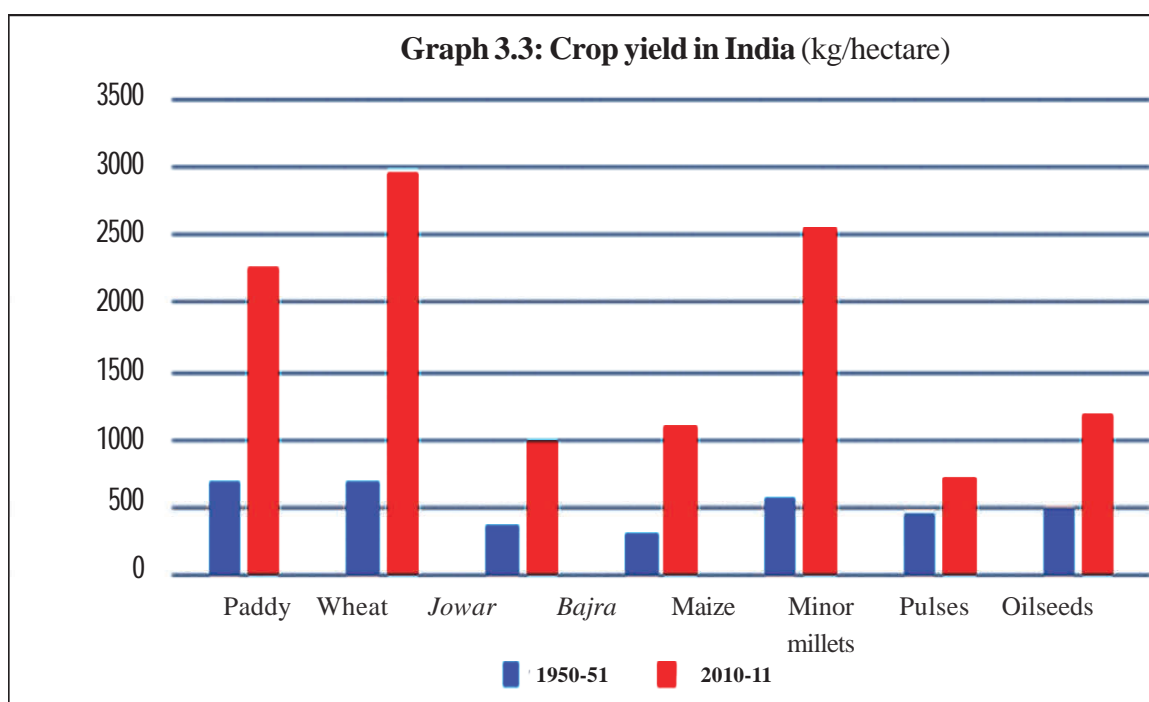
**Find out from your village *patwari* how much agricultural land in your village is irrigated?**

Our irrigation needs are largely being met by dams and sub-surface water. But over exploitation of groundwater has led to rapid depletion in the water table. In Punjab and Haryana, the water table has fallen by 4 to 6 metres. This has led to bore wells drying up. If groundwater continues to be exploited at this rate, it is possible that all the bore wells will dry up in the near future. That is why it is important to use only as much groundwater as can be recharged.

**Increase in productivity:** Productivity means increasing agricultural production from the same plot of land. As we saw earlier, the available land is more or less fixed. Expanding irrigation is also possible only up to a limit. That's why humans have always tried to increase productivity per unit of land and

have succeeded to some extent. Productivity increased the most in the case of wheat and maize. In 1950-51, the average yield per hectare for wheat was 663 kg. This increased to 2,938 kg per hectare in 2010-2011. The increase in maize was from 547 kg per hectare to 2,540 kg per hectare for the same period. But the increase in yield was much lower for pulses, rising from 663 kg per hectare in 1950-51 to just 689 kg per hectare in 2010-2011.

Many factors were responsible for increasing productivity, including experimenting with high yielding seeds, using chemical fertilizers and pesticides etc. Earlier, traditional seeds were sown. Research with these seeds helped to develop higher yielding varieties. The new seeds yielded more per unit of land compared to traditional seeds, leading to higher agricultural production. Improved seeds and chemical fertilizers were the base of the green revolution, with fertilizers giving immediate increases in production. In 1950-51, the consumption of chemical fertilizers was 7.6 lakh tonnes. It rose to 174 lakh tonnes in 2010-2011.



*Source: Directorate of Economics and Statistics*

But the quest for higher yields led to the rampant use of chemical fertilizers and pesticides. Today, we are seeing the negative impact of such excessive use. These chemicals have severely compromised soil fertility in the long term, with agricultural fields turning barren. Punjab saw the maximum use of chemical fertilizers and pesticides so it suffered the most. Our food today contains high levels of toxic substances, adversely affecting our health. We need to find alternative ways to increase yields and raise productivity to overcome these problems.

Improved seeds, chemical fertilizers and pesticides are expensive. So they raise the cost of cultivation. Most farmers in India are marginal farmers. They find it difficult to afford these inputs. If a farmer uses these expensive inputs and her crop fails due to natural calamities or pest attacks, she incurs huge

losses. Even if he gets a good crop, he often does not get a good price in the market, which again leads to losses. In such a situation, she/he is forced to take a loan to sow a crop in the next season. If he faces losses again, he has no money left to repay his debt. Indebtedness has led to many farmers committing suicides in our country.

**What impact does an increase in productivity have on agricultural production?**

**Which crop has seen the maximum increase in yield and which has seen the lowest increase in yield?**

**What are the negative impacts of modern agriculture?**

**Can organic farming be an alternative to modern agriculture? Discuss?**

### **Change in Cropping Pattern: the story of Sankara village**

There are many reasons why cropping patterns change in a region. Let us look at the case of Sankara village to understand how and why this change occurs. There are many villages named Sankara in Chhattisgarh. The Sankara of our story is a village in Nagri tehsil of Dhamtari district. It is the largest village in the district. Its inhabitants are engaged in many different occupations but the majority are farmers. The chief crop is paddy. In the past, people cultivated paddy during the kharif season and grew Bengal gram, *khesari*, wheat, linseed, etc during the rabi season.

A little over 25 years ago, a dam was constructed across the Sondur River in the district. Canals from the Sondur dam brought water to the village. Farmers now didn't have to wait for the monsoon to irrigate their kharif paddy crop. With irrigation, they also began cultivating paddy in rabi as well. The flood irrigation from the canals suited paddy cultivation but did not suit crops such as gram, *khesari* and linseed that require very little water and cannot grow in water-logged fields. So the farmers gradually stopped growing these crops. The government also launched a paddy procurement scheme to encourage more and more farmers to grow paddy during the rabi season.

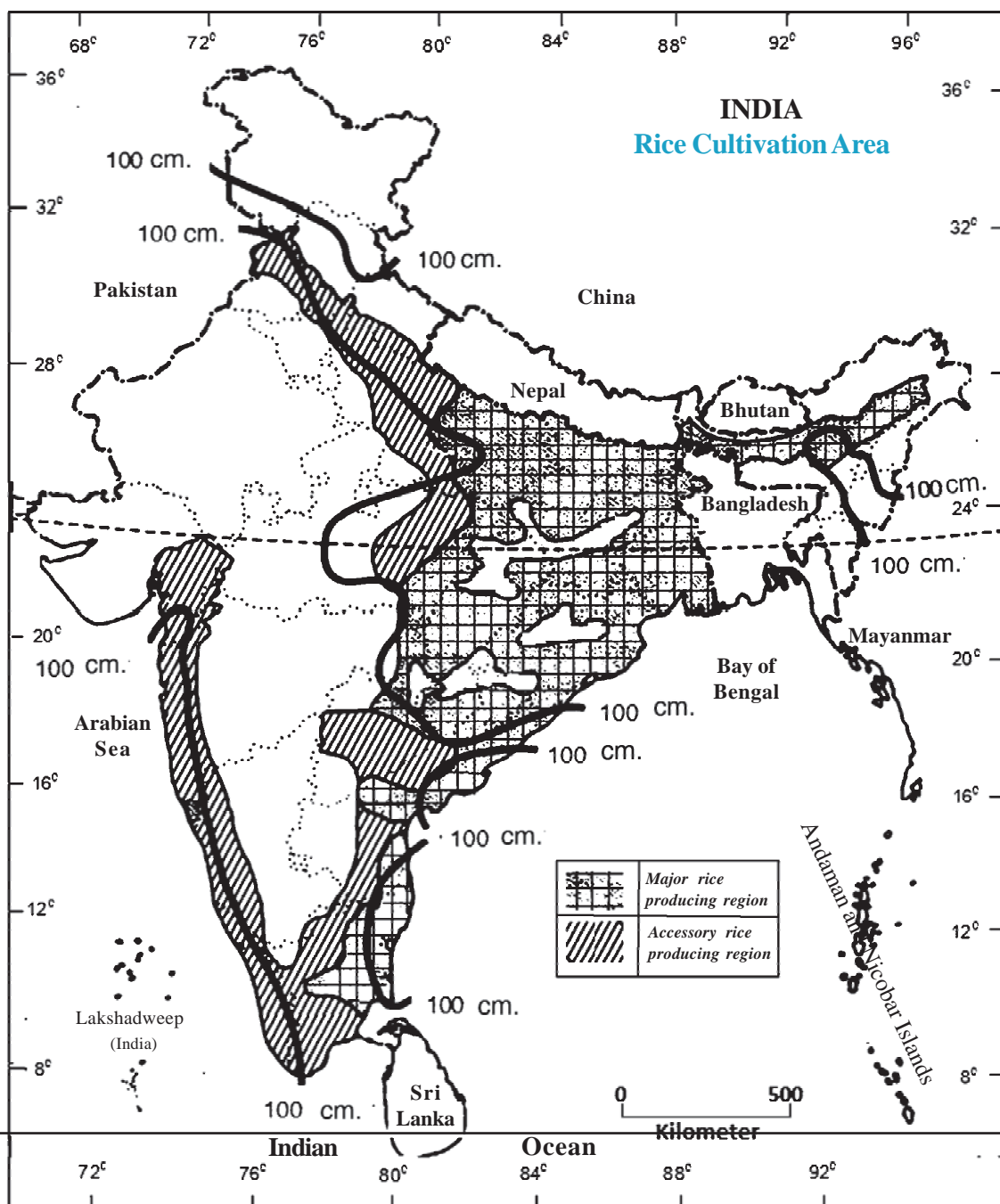
We can, thus, see how a development project such as the Sondur dam changed the cropping pattern in Sankara village by providing irrigation to farmers. It led to paddy cultivation throughout the year and a steep decline in the cultivation of traditional rabi crops such as gram, *kesari*, wheat and linseed.



Figure 3.2: Bengal gram growing in a field

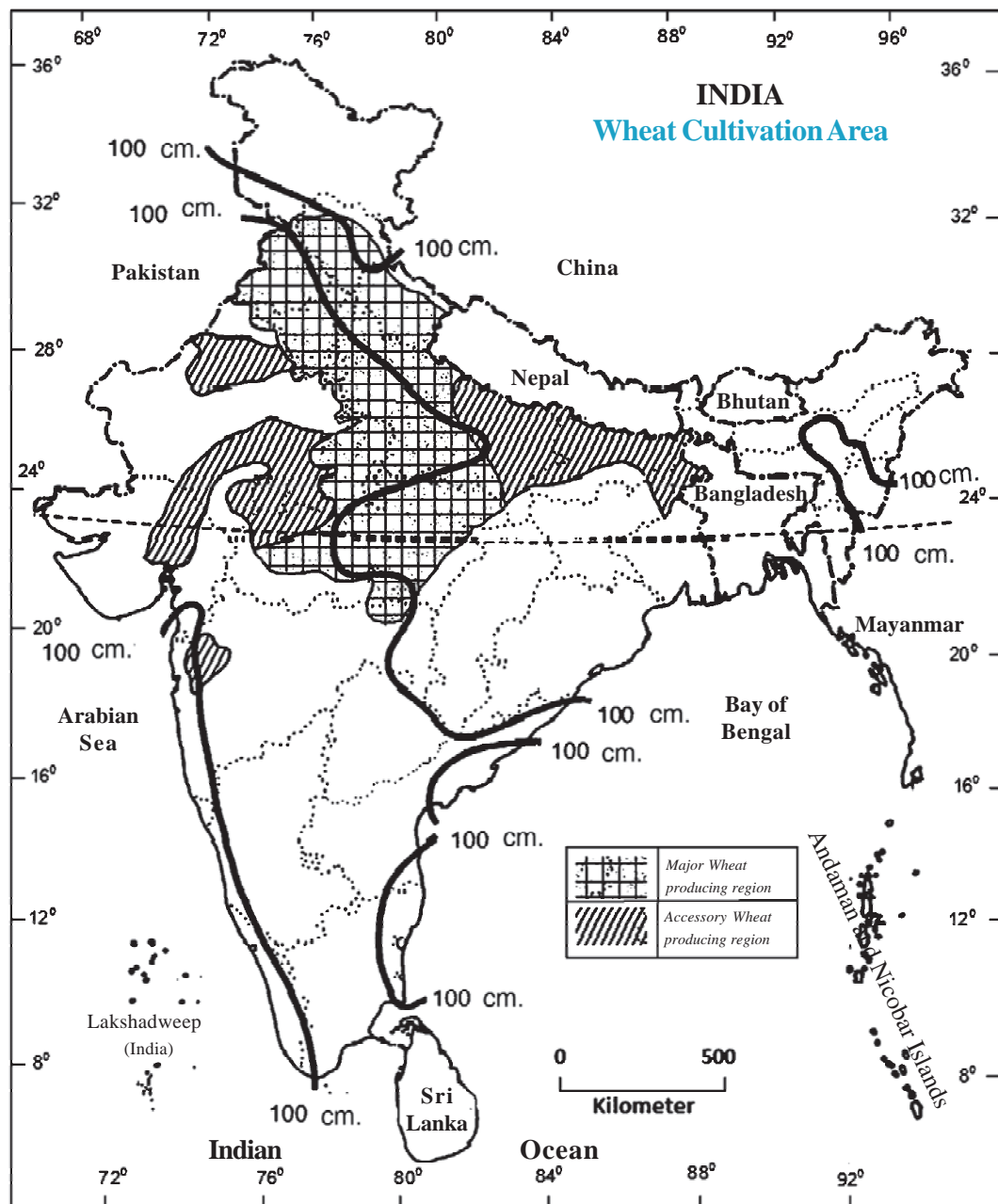
Maps 3.1 and 3.2 show the rice and wheat production areas in India. Answer the following questions on the basis of these maps:

1. Which Indian states mostly grow rice?
2. Which Indian states mostly grow wheat?



Map 3.1: Area under rice cultivation in India

3. Why is rice not cultivated in Rajasthan and why is wheat not cultivated in Tamil Nadu? Discuss with your teacher.
4. Can you identify any differences in the rice and wheat growing states? Discuss with your teacher to understand the reasons for these differences.



Map 3.2: Area under wheat cultivation in India

The change in cropping pattern has given rise to several new problems in the lives of the villagers. We saw how irrigation led to a sharp decline in the cultivation of traditional rabi crops. The farmers say they cannot grow these crops now even if they want to. So they grow only one crop throughout the



Figure 3.3: Paddy (rice) cultivation

year. This mono-cropping has depleted soil fertility because there is no crop rotation with pulse crops that fix nitrogen in the soil. The earthworm population in the soil has also declined.

In addition, the paddy fields no longer teem with fish that the villagers used to catch, dry and store to supplement their diet. They say the chemical fertilisers and pesticides do not allow fish to survive. Another change is in the use of farmyard manure. In the past, farmers applied organic manure in their fields, which, they claim, used to lower the incidence of pest attacks.

Finally, the modern farming practices that they have adopted have made them more dependent on traders. They now have to buy improved seeds, fertilizers, pesticides etc from the market. Previously, they used to store and produce whatever they needed – traditional seeds, organic produce – for farming at the household level.

**Make a list of the crops that used to be grown in your area 15-20 years back but are no longer cultivated. Also, find out the reasons why they are no longer cultivated.**

**Why are gram, *khesari*, linseed, etc. no longer grown by the farmers of Sankara?**

**How has the change in the cropping pattern impacted the inhabitants of Sankara? Keep in mind, their income, health and employment as well as soil fertility while explaining the impact.**

## Globalisation and Indian agriculture

Globalisation is the process in which a country's economy is integrated into the world economy. The main objective of globalization is to reduce trade barriers so that goods can move freely from one country to another. Today, agriculture has become a commercial enterprise. The developed countries have taken a number of steps to strengthen their food security and control the trade in agricultural commodities. We will now discuss how this is being done.

The developed countries heavily subsidise agriculture operations for their farmers. For example, the USA subsidises paddy and wheat cultivation by 47 percent, the EU by 48 percent and 32 percent respectively, and Japan by 89 percent and 99 percent respectively. These subsidies lower the cost of production for farmers in these countries or even completely cover them. Lower production costs allow them to export their produce at a lower cost. They are thus able to generate demand for their agricultural commodities in the international markets.

The developing countries are not in a position to subsidise their agriculture. Far from giving subsidies the government in India by various means taxes paddy by 1.17 percent and wheat by 3.83 percent. This makes our produce expensive. That is why the agricultural produce of developing countries cannot compete in the international markets. Despite the protests of the developing countries the developed countries continue to subsidise their agriculture. Now under globalisation policies developing countries like India have to allow agricultural produce of developed countries to be sold in their markets. This will have the effect of reducing the price of agricultural products when the costs of inputs are rising and make farming uneconomical.

We are now seeing unprecedented increases in agricultural productivity through biotechnological research and development. **Biotechnology helps to** change the **genetic** make-up of living organisms by introducing special characteristics or properties in their genome. Agricultural production is seeing undreamt of increases with new strains of food-grain and vegetable crops as well as new kinds of fertilisers, pesticides and plant nutrients. Technology is no longer limited to the laboratory. It is now a huge commercial enterprise. Over five billion dollars have been invested in the industry. Companies producing genetically modified seeds and other agricultural inputs spend four to five crore rupees every year on research and development alone. In the western world, there are over 300 scientific enterprises involved in such research. Many of them have been acquired by multinationals corporations such as Allied, Cyanamid, Chevron, DuPont, Ciba-Geigy etc., and have now established their monopoly in the industry. The situation today is that the firm that sells genetically modified seeds also sells the new fertilizers and pesticides that ensure their high yields. Farmers have no option but to buy all their inputs from the same company, making them totally dependent on the foreign multinational. This dependence increases the cost of production of agriculture commodities in developing nations.

## EXERCISES

**Choose the correct alternative:**

1. In India, in which agricultural season is most of the land farmed?

(a) Kharif

(b) Rabi

(c) Zaid

(d) All seasons

2. The kharif season begins:
  - (a) When the monsoon retreats
  - (b) With the onset of the monsoon
  - (c) After Makar Sankranti
  - (d) None of the above
3. What effect does prolonged use of chemical fertilizers have on soil fertility?
  - (a) Increases
  - (b) Remains constant
  - (c) Decreases
  - (d) Increases at times and remains constant at times
4. The production of which crop has increased the most over the last 60 years?
  - (a) Paddy
  - (b) Jowar
  - (c) Pulses
  - (d) Wheat
5. In India, paddy can be cultivated:
  - (a) Only on kharif
  - (b) Only in rabi
  - (c) Only in zaid
  - (d) In all seasons

**Answer the following questions:**

1. What can be done to increase agricultural production?
2. Is the farmer becoming more dependent on the industrial sector?
3. What impact does the subsidies given by developed countries to their farmers have on Indian agriculture?
4. What negative impact does the large-scale use of bore wells have on agriculture?
5. What is globalization?
6. How will your life be impacted if there is no agriculture? Discuss in class.

**Project work**

1. Tour the agricultural fields in the area where you live and fill in the following table

| Season | Crops sown | Area sown |
|--------|------------|-----------|
| Kharif |            |           |
| Rabi   |            |           |
| Zaid   |            |           |

2. Meet farmers in your area and discuss the following points with them about traditional seeds and improved seeds:

Procurement of seeds

Price of seeds

Needs for fertilisers

Needs for pesticides

Irrigation needs

Cost of cultivation

Total output

total earning after expenses