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PAPER II

Agriculture Notes

The complete Agriculture section of Paper II — infrastructure and institutional factors, cropping pattern and productivity, agro and social forestry, the Green Revolution, dry farming, livestock and allied activities, and agricultural regions, with previous year questions.

Compiled by Arvind KrS

INFRASTRUCTURE | CROPPING PATTERN | GREEN REVOLUTION | LIVESTOCK AND ALLIED | AGRO-CLIMATIC REGIONS

29	7	104	202
Chapters	Units	Previous year questions	Diagrams and figures

IN THIS BOOK

01 Agricultural Infrastructure

02 Institutional Factors

03 Cropping Pattern, Productivity and Land Capability

04 Agro and Social Forestry

05 Green Revolution and Dry Farming

06 Horticulture, Livestock and Allied Activities

07 Agricultural Regions

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Geography Optional — Agriculture

Paper II · Geography of India: Agriculture

Mains 2027 Edition · Compiled November 2026

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The outline map of India on the cover and on the chapter and unit pages is decorative and not to scale.

How to read these notes

Every chapter is marked against the questions UPSC has actually asked on it, so the points that matter most stand out on the first read and are quick to find at revision.

Farm mechanisation, land reform and consolidation went furthest in the Green Revolution areas.

Yellow marker: key point. A point that carries the ideas UPSC has asked about in this chapter. Read these first, and make sure each one is in your answer.

Green Revolution is the multiple growth in crop output in developing countries that came from a joint package of high yielding varieties and inputs.

Blue marker: definition. The cleanest definition of a term, ready to open an answer with.

This is why the movement is often called a **wheat revolution**.

Saffron underline: PYQ term. A key term or phrase that appears in this chapter's previous year questions.

Gains of the Green Revolution

PYQ 2016 · 2014 · 2002 +2

PYQ tag on a heading. The years in which UPSC asked about this section. Sections without a tag are background or linking material.

PYQ RADAR **6** questions Last asked **2016**

PYQ radar. At the start of each chapter: how many times the topic has been asked, and how recently. The contents page shows the same count for every chapter.

Suggested method. First read: the whole chapter. Revision: the yellow and blue marks, the tagged headings and the PYQ list at the end of the chapter. Last week before Mains: the PYQ list alone, answering each question in your head from the marked points.

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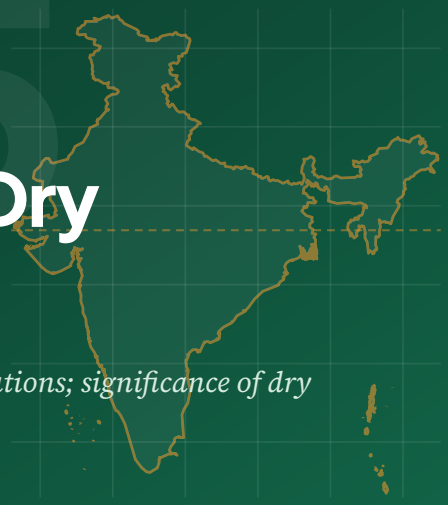
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UNIT 05 | 2 CHAPTERS

Green Revolution and Dry Farming



Green Revolution and its socio-economic and ecological implications; significance of dry farming.

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Green Revolution in India



PYQ RADAR 7 questions Last asked **2016** 2016 · 2014 ×2 · 2012 · 2002 · 1997 · 1992

CONTENTS

01 Origin and Basis
02 Phases and Spread
03 Gains of the Green Revolution
04 Repercussions
05 Second Green Revolution
06 Previous Year Questions

- The **Green Revolution** is the **multiple growth in crop output in developing countries** that came from a joint package of **high yielding varieties (HYVs), irrigation, chemical inputs, farm machinery and institutional support**.
- It reflected the condition of poor countries seeking **self-sufficiency in food** and relief from hunger, famine and the social evils tied to them.
- India turned from a **"begging bowl"** dependent on foreign grain into a food-surplus country, with foodgrain output rising from **72.35 million tonnes in 1965-66 to 357.73 million tonnes in 2024-25**.
- The gains were narrow in crop and place, and they carried **economic, social and ecological costs** that still shape farm policy.

01 Origin and Basis

The Term and the Global Background

- **Begging bowl image:** before 1966-67, India leaned heavily on American wheat under the **PL-480** programme, a state described as living **"ship to mouth"**.
- **The term: William S. Gaud**, Administrator of the United States Agency for International Development, first used "Green Revolution" on **8 March 1968** in Washington DC.
  - The occasion was his address to the **Society for International Development**, titled *The Green Revolution: Accomplishments and Apprehensions*.

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- **Mexico was the stimulus.** Its food shortage set off the wheat breeding led by **Norman Ernest Borlaug**, who received the **Nobel Peace Prize in 1970**.
  - Borlaug's team crossed the best wheat genes available by conventional **cross-breeding**, and the Japanese dwarf **Norin 10** supplied the short stem.
  - **By 1956 Mexico was feeding itself.** Yields reached 7,000 kg per hectare in 1961, some 2½ times what older wheats gave.
  - Borlaug himself called the achievement a "temporary success" when he accepted the prize.
- **Rice followed.** The work centred on the **International Rice Research Institute** in the **Philippines**, whose semi-dwarf **IR8** spread through South-East Asia in the late 1960s. Taiwan had also done early work on rice, and Japan gave the dwarf wheat parent.

How It Reached India

- **Mankombu Sambasivan Swaminathan** (1925–2023, Bharat Ratna 2024) pressed for the new wheats, and **Borlaug toured India's wheat regions from 1 to 25 March 1963**.
  - Borlaug had already forecast that India could double its wheat output within a decade.
- **Trial:** India received 100 kg each of four dwarf and semi-dwarf varieties. Grown at **Delhi, Ludhiana, Pusa and Kanpur**, they gave over 4,000 kg per hectare, about four times the local yield.
- **Scale-up: 18,000 tonnes** of Mexican seed were imported in **1966**.
- **The harvest of 1967-68** was about a quarter above that of 1966-67, a rise larger than the whole gain of the preceding 16 plan years.

PROGRAMME	BEGAN	COVERAGE	PURPOSE
Intensive Agricultural District Programme (IADP)	1960-61	**7 districts**, later 15	The "package" of credit, inputs and know-how, as a demonstration
Intensive Agricultural Area Programme (IAAP)	1964-65	**114 districts**	A lighter version of the package over a wider area
High Yielding Varieties Programme (HYVP)	**Kharif 1966**	National, in phases	The starting point of the Green Revolution proper

- **The seven IADP districts: Ludhiana** (Punjab), **Aligarh** (Uttar Pradesh), **Shahabad** (Bihar), **Raipur** (now Chhattisgarh), **West Godavari** (Andhra Pradesh), **Thanjavur** (Tamil Nadu) and **Pali** (Rajasthan).
  - Four grew mainly rice, two wheat and one millets.
  - About **64% of the extra foodgrain output** in these districts came from capital and knowledge (seed, fertilizer, pesticide) and the rest from land and labour.

Basis: The Components

- The package had **twelve parts**, and each leaned on the others. HYVs respond to fertilizer, attract pests and weeds, need assured water, and ripen fast enough to demand quick harvesting and machinery.

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AGRICULTURE · GREEN REVOLUTION

The 3 Strands of the Green Revolution

Each strand brought its own innovations and its own consequences.

Type of change	Biochemical	Mechanical	Social
Innovations	Hybrid seed selection, use of fertilizers, herbicides and pesticides	Diesel and electric pump powered irrigation, mechanisation, transport improvements	Land reforms, loans, changes in distributive system
Consequences	Increased yields, weeds and pests controlled, increased costs for farmer, possible environmental degradation	Water supply controlled, less labour needed, increase in arable area, increase in access to markets	Farm consolidation, better seeds and other inputs available to poor farmers

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- **1. High Yielding Varieties (HYVs):** the **single most important input**. Wheat HYVs came in the 1960s and rice HYVs in 1969-70.
  - These are **conventionally bred dwarf varieties**, and they yield **two to three times** a normal crop.
  - Dense canopy and broad leaves aid photosynthesis, and short stems carry a heavy fertilizer load and resist wind.
  - They are **tender**, and they need more water, fertilizer, pest and weed control, and careful soil preparation.
  - A **short growing period** frees the land for another crop, which raises **cropping intensity**.
  - A steady supply depends on the chain of breeder, foundation and certified **seeds**.
- **2. Irrigation:** the second input, since assured water stabilises as well as raises output.
  - Net irrigated area was only **24.66 million hectares in 1960-61**, and gross irrigated area 27.98 million hectares. Gross irrigated area reached about 122.29 million hectares by 2022-23.
  - **B. B. Vohra** favoured ground water and called this the **Ground Water Revolution**, because a pumpset gives the farmer push-button control.
- **3. Chemical fertilizers:** Indian soils are short of **nitrogen**, so NPK use spread quickly.
  - The recommended **N:P:K ratio is 4:2:1**. Actual use is heavily tilted to nitrogen, at **11.8:4.6:1 in 2022-23**.
  - Consumption shifted from southern India, the leader in 1970, to Punjab, Haryana and Uttar Pradesh.

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- **4. Insecticides, pesticides and weedicides:** monoculture invites pests, so surveillance became part of crop production, beginning with wheat diseases in 1966-67.
  - Older ministry figures put **over 30 million hectares** under pest and disease attack, with an annual loss of 5–25% of output.
  - Punjab, Haryana, Andhra Pradesh and Tamil Nadu used over 60% of the country's pesticides in 2013-14.
- **5. Command Area Development Programme (CADP):** launched in **1974-75** to close the gap between irrigation potential created and used.
  - **On-farm development:** field channels, ploughing, levelling, bunding, soil survey, land shaping, field drains, farm roads and **warabandi**, the rotation that gives each holding its turn of water.
  - **Off-farm development:** roads, rural connectivity, marketing, transport and communication.
  - It began with **60 projects and a culturable command of about 15 million hectares**, reached 149 projects, and was renamed **Command Area Development and Water Management** from 1 April 2004.
  - Since 2015-16 it has run under **Pradhan Mantri Krishi Sinchayee Yojana**. A modernisation sub-scheme for piped delivery to the farm gate was approved in **April 2025**, with an initial outlay of ₹1,600 crore for 2025-26.
- **6. Consolidation of holdings:** scattered plots were pooled so that machinery and tube wells could pay.
- **7. Land reforms:** abolition of intermediaries and zamindari, tenancy reform and ceilings.
  - Half of India was under zamindari in 1947, with 80% of that land held by absentee landlords. Secure owners invest more.
- **8. Rural credit and micro-finance:** small farmers cannot buy the package from savings. Banks and cooperatives, including Regional Rural Banks, took over much of the moneylender's business.
- **9. Rural electrification:** the precondition for tube wells and farm machinery.
  - India had about 1,300 electrified villages and 6,400 energised pumpsets at Independence. **Haryana** electrified all its villages in **1970**.
  - All inhabited census villages stood electrified by **28 April 2018**, the last being **Leisang** in Manipur.
- **10. Rural roads and regulated markets:** these link the village to inputs and buyers, ideally with a market within 5 km.
- **11. Farm mechanisation:** required to turn land round between crops, and it saves labour at peak seasons.
- **12. Agricultural universities:** they carried research to the field, with Punjab, Haryana and Uttar Pradesh as the strongest cases.
- **Commercialisation:** the **Agricultural Prices Commission (January 1965)** and the first **Minimum Support Price, for wheat in 1966-67**, gave farmers a reason to grow more.

02 Phases and Spread

Phase I (1965–66 to 1980): Wheat in the North-West

- India urgently needed food, and the wheat success in Mexico and other countries, such as Egypt, offered a model.

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- The phase was **crop-specific and region-specific**. **Punjab** already had the infrastructure, and **Haryana and western Uttar Pradesh** could extend irrigation from next door. The tract was also fairly free of natural hazards.
- It began with IADP and IAAP as experiments, and its main thrust was the **HYVP**, launched in the first of the Annual Plans (1966–69).
- The **Command Area Development Programme** of 1974-75 gave it fresh emphasis.
- Output: foodgrains stood at **50.83 million tonnes in 1950-51, 72.35 in 1965-66 and 129.59 in 1980-81**.
  - Wheat rose from **10.40 million tonnes in 1965-66 to 23.83 in 1970-71**, about 2.3 times in five years. This is why the movement is often called a **wheat revolution**.
- India gained self-sufficiency in foodgrains, and it left the begging-bowl image behind. Malnutrition, famine, poverty and starvation eased.

Phase II (1980 to 1991): Rice in the Wet East and South

- The **Sixth and Seventh Plans** targeted **wet agriculture, mainly rice**, since rice had grown only about 1.75 times in Phase I (30.59 to 53.63 million tonnes).
- Target regions had **over 100 cm of rainfall**: West Bengal, Bihar, eastern Uttar Pradesh, Assam and the coastal plains.
- Success was partial.
  - The **Krishna–Godavari delta and the Cauvery basin** did best.
  - West Bengal raised its productivity, and **Bhojpur** in Bihar also gained.
- **Institutional factors** held rice back, such as tenancy and land reforms that came too late in Uttar Pradesh, West Bengal and Bihar.
  - A **traditional outlook among farmers** was a further limit.

Phase III (1991 to 2003): Dry Land

- The **Eighth and Ninth Plans** turned to **dry-land farming**, with HYVs in cotton, oilseeds, pulses and millets. The result was again partial.
- **Watershed** work was meant to lift the sub-humid and semi-arid regions, a line later consolidated in the **Integrated Watershed Management Programme (2009-10)**.
  - Results stood out only in the **Narmada–Tapi doab, the Tungabhadra basin and the Bhima–Krishna basin**.

From Rainbow Revolution to Inclusive Growth PYQ 2012

- After the Ninth Plan, the ecological damage in the core areas forced a shift towards **balanced growth based on agro-ecology, conservation and sustainability** (Tenth Plan).
- The **Rainbow Revolution** names this drive across the whole farm sector. The National Agriculture Policy of July 2000 is closely tied to the idea.

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REVOLUTION	SECTOR	TIMING IN THE OLDER ACCOUNT
White	Milk	1970s
Yellow	Oilseeds	1980s
Blue	Fish	1980s
Grey	Fertilizers	1980s
Silver	Eggs and poultry	1980s

- The **Eleventh Plan** raised the idea to sustainable farming with **inclusive growth**.

Diffusion and Core Areas

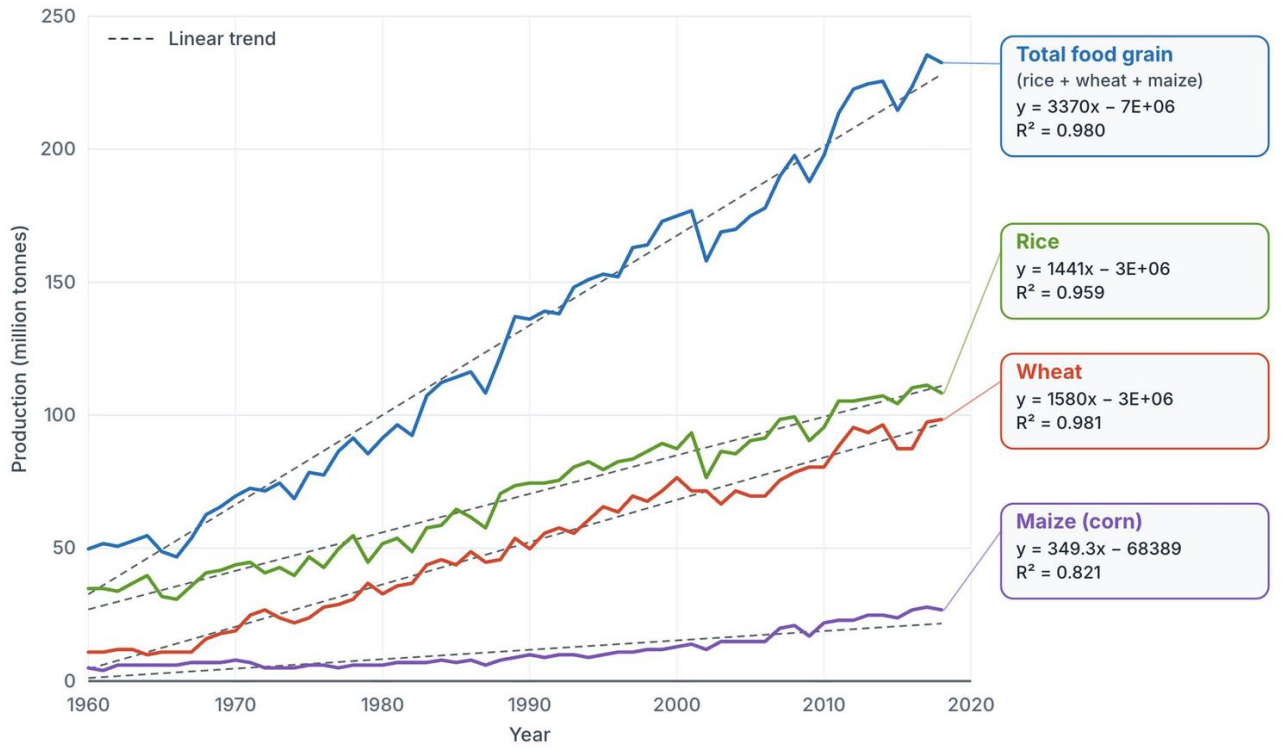
- **Rice** spread from its old heartland in West Bengal and Bihar into **semi-arid Punjab, Haryana and western Uttar Pradesh**, on the strength of irrigation, and into large parts of South India.
- **Wheat** spread to eastern Uttar Pradesh, Madhya Pradesh, Rajasthan, Gujarat, Bihar and West Bengal, mostly in the **1970s**.
- **Most benefited:** Punjab, Haryana and western Uttar Pradesh for wheat, and the coastal rice tracts of Andhra Pradesh, Telangana and Tamil Nadu.
- **Least touched:** Assam, Bihar, West Bengal and Odisha, along with the arid and semi-arid west and south.

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AGRICULTURE · GREEN REVOLUTION

Total Food Grain, Wheat, Rice and Maize Production of India (1960-2017)

The total line here adds the three cereals shown, so it runs below the full foodgrain series, which also counts other coarse cereals and pulses.



In each trend equation, x is the year and y is output in thousand tonnes.

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- This chart stops at 2017, so the table below carries the record forward. Its total line adds only rice, wheat and maize, so it runs below the total foodgrains in the table, which also counts other coarse cereals and pulses.

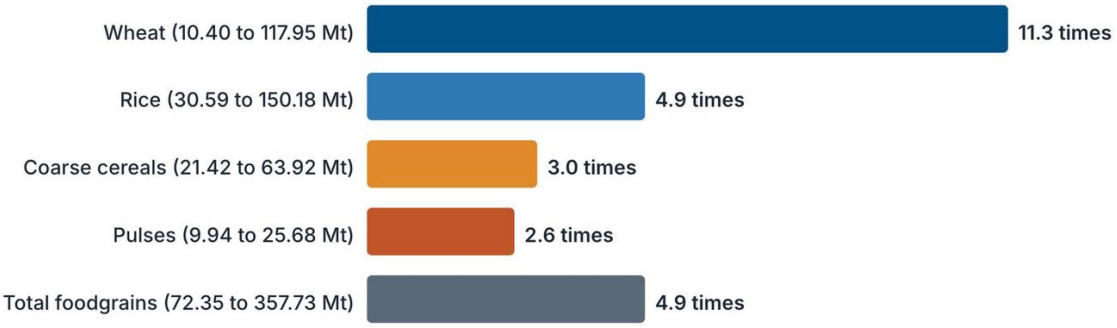
CROP (MILLION TONNES)	1950-51	1965-66	1980-81	2015-16	2024-25	2025-26 (THIRD ESTIMATE)
Rice	20.58	30.59	53.63	104.41	150.18	154.02
Wheat	6.46	10.40	36.31	92.29	117.95	120.66
Coarse cereals	15.38	21.42	29.02	38.52	63.92	74.47
Pulses	8.41	9.94	10.63	16.32	25.68	27.41
Total foodgrains	**50.83**	**72.35**	**129.59**	**251.54**	**357.73**	**376.56**

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AGRICULTURE · GREEN REVOLUTION

Growth in Output by Crop, 1965-66 to 2024-25

Wheat grew far faster than any other foodgrain, while pulses and coarse cereals lagged.



Output in 2024-25 as a multiple of 1965-66. Mt is million tonnes. Sources: Ministry of Agriculture and Farmers Welfare; Reserve Bank of India Handbook.

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03 Gains of the Green Revolution

PYQ 2016 · 2014 · 2002 +2

- **Food security:** it answered a **perennial food crisis and a population explosion**, and it removed the threat of mass famine.
  - India's population rose from **43.92 crore in 1961 to 68.33 crore in 1981**, and only a jump in yield could feed it. The older round figure was a doubling from 33 to 66 crore in about 25 years.
  - **Net foodgrain availability** rose from about 408 grams per head per day in 1966 to about 511 grams in 2013. The revised financial-year series gives 568.8 grams for 2022-23.
- **Less import, more saving:** the foreign exchange spent on grain could go to anti-poverty work, such as the **Backward Area Development Programme, the Integrated Rural Development Programme (IRDP) and the Tribal Area Development Programme**.
- **Yield and area (1965-66 to 2013-14):** foodgrain yield rose from 629 to 2,095 kg per hectare, rice from 862 to 2,419 kg, and wheat from 827 to 3,059 kg.
  - Wheat area grew from 12.57 to 31.3 million hectares.
- **Commercial surplus:** a marketable surplus appeared, and it commercialised farming and brought in **capitalistic farming**, chiefly among holders of over 10 hectares.
- **Ploughing back:** a Punjab Agricultural University study found Ludhiana farmers reinvesting about 55% of their income.
- **Rural infrastructure:** roads, power and markets, first a precondition, then spread as a result.
- **Wages and employment:** multiple cropping raised labour demand, and higher wages put cash in rural hands.
  - About **15 lakh workers** from Bihar, eastern Uttar Pradesh and Odisha found work in Punjab, and by the 2010s many were returning as jobs grew at home.
  - G. S. Bhalla and G. K. Chadha traced Punjab's mechanisation to scarce, costly labour at peak seasons.

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- **Linkages with industry:**
  - **Forward linkage:** farms supply raw material to textile, sugar, vanaspati and other agro-based industries.
  - **Backward linkage:** farms demand tractors, harvesters, threshers, combines, pumpsets, fertilizers and pesticides from industry.
  - Agro-processing and food-processing units industrialised tier II and III towns and quickened **urbanisation**.
- **Farm mechanisation, land reform and consolidation** went furthest in the Green Revolution areas.
- **Changed attitudes:** the farmer proved quick to adopt, which ended the myth of tradition-bound cultivators. **Wolf Ladejinsky** reported that no farmer denied the new methods once the means were at hand.
- **Land saved:** M. S. Swaminathan counted the sparing of forest and land through higher yields among the largest gains.
- **Sudhir Sen** defended the name itself, holding the Green Revolution to be a reality and a breathing space for setting the economy in order.

04 Repercussions

- **Vandana Shiva** (*The Violence of the Green Revolution*, 1991) argued that it stayed **area-specific and crop-specific**, and that the resulting disparities fed **ethnic regionalism and consciousness**.
  - She held "high yielding" to be a misnomer for **highly responsive varieties**, and held that better mixed cropping and indigenous seed were neglected options.
  - The loss of diversity, in her view, bred new pests and diseases.
- Critics answer the case for its gains by pointing out that the **social costs outweigh the economic gains** for many rural households.
- North-western India's **environment, soil, land and water** suffered from chemicals, which makes the model neither far-sighted nor sustainable.
- **Fatigue:** yields of wheat and rice in Punjab and Haryana have flattened while fertilizer costs climbed.

Economic Repercussions

- **Inter-personal disparity:** earnings pulled apart, mainly in favour of farmers with 10 hectares or more.
  - **Francine R. Frankel** found this in Ludhiana, West Godavari, Thanjavur, Palghat and Bardhaman, and **G. R. Saini** in Ferozepur and Muzaffarnagar.
  - Bhalla and Chadha found many Punjab holders of under 2 hectares still below the poverty line.
  - Only 0.7% of India's 13.78 crore holdings exceeded 10 hectares in 2010-11.
- **Inter-regional disparity:** western against eastern Uttar Pradesh is the standard case.
  - **G. S. Bhalla and Y. K. Alagh (1979):** 69 high-productivity districts had 20% of the cultivated area and 36% of output, using 44% of fertilizers, 50% of tractors and 45% of irrigation pumps, with 38% of gross irrigated area.

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- **Inter-state disparity:** Punjab and Bihar drew sharply apart between 1960 and 1990. About 60% of the cropped area stayed largely outside the movement in older estimates, including rainfed, hilly, coastal and dry zones.
- **Inter-crop imbalance:** wheat took land from coarse cereals, pulses and oilseeds, and cotton, jute, tea and sugarcane gained little. Output of the two main cereals ran into surplus while others stayed short.
- **Debt trap:** dependence on informal credit pulled labourers and cultivators into a vicious circle of debt.

Social Repercussions

- **Rural landlessness:** marginal farmers sold land to large farmers at high prices and became **agricultural labourers**, adding to rural distress and ill-health.
- **Unemployment:** except in Punjab and partly Haryana, mechanisation displaced labour, and the poor and landless were hit hardest.
- **Patriarchy:** many accounts link the new prosperity to stronger male dominance, with **female discrimination, female foeticide and rising dowry**.

Ecological Repercussions

- **Soil degradation:** unscientific farming caused **salinisation and alkalisation**, with the white crusts of **reh and kallar** on the **saline and alkaline soils** of the plains.
- **Waterlogging:** over-irrigation left wet tracts in Punjab, Haryana, Rajasthan and western Uttar Pradesh, which also breed the mosquitoes behind malaria, dengue and chikungunya.
- **Toxicity:** excess chemicals poison the soil and kill the micro-organisms that keep it fertile.
- **Water pollution:** run-off degrades rivers, tanks, reservoirs and ground water.
- **Eutrophication:** enrichment of a water body by **nutrients such as nitrogen and phosphorus** produces a bloom of a few plants.
  - **Water hyacinth** in tanks and ponds is the familiar case. It shuts out sunlight and oxygen from the lower layers, and the pond ecosystem dies.
- **Deforestation:** forests were cleared in **Punjab, the Tarai and the Bhabar** for farmland.
  - Punjab's **forest cover** is about 3.7% of its area, and Haryana's about 3.65% (2023). Uttar Pradesh stood just above 5% in older counts.
- **Disrupted farm ecology: monoculture** (wheat above all), pesticides, fertilizers and weedicides upset natural pest control.
- **Ground water depletion:** rice in semi-arid tracts leans on tube wells, and water tables in the north-west have fallen by up to a metre a year.
  - The **ground water** **stage of extraction in 2025** was **156.36% in Punjab, 136.75% in Haryana and 70.00% in Uttar Pradesh**.
  - M. K. Sekhon and Manjeet Kaur warned of this, and of soil damage, in a study of Punjab.
- **Noise:** tractors, harvesters, threshers and crushers disturb rural quiet.
- **Health hazards:** residues enter food through fruit and vegetables. The Indian Council of Medical Research reported traces of lead, zinc and copper in milk and vegetables.

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AGRICULTURE · GREEN REVOLUTION

Evaluation of the Green Revolution

The two sides of the debate.



Argument Against	Argument in Favour
Limited area	Increase in production
Benefits to rich farmers only	Increase in area of cultivation
Unemployment	Economic & social balance
Pollution of drinking water	High standard of living
Destruction of soil	More employment
Increase in economic inequality	Benefit to all

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- On this chart, "Benefit To All" and "Economic & Social Balance" are claims of the movement's supporters. The evidence above shows gains going mainly to large farmers in irrigated tracts.

05 Second Green Revolution

PYQ 2016 · 2014 · 2012 +3

- **Why it is needed:** the first revolution has reached a plateau, while population, nutrition needs and soil damage press harder.
  - It also left out pulses, oilseeds, fruit and vegetables, poultry, meat and fish, and rainfed, hilly, coastal and arid zones.
- **What differs:** the first wave chased foodgrain output, often at ecological cost. The second aims at **sustainable agriculture**, in the sense of the **Brundtland Commission (1987)**: meeting today's needs while leaving later generations free to meet their own.
- **Constraint:** almost all cultivable land is already in use, so growth must come from **productivity on existing fields**, new technology, and better soil and water care.

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Strategies

STRATEGY	CORE IDEA	NOTE
Micro-irrigation	Water delivered straight to the root zone by emitters	A task force set a potential of 69 million hectares against 1.3 million then; **over 115 lakh hectares** came under the Per Drop More Crop scheme by July 2026
Organic farming	Replaces synthetic chemicals	Driven by consumer demand for safe food
Precision farming	Site-specific inputs through information technology	Higher returns, less energy, less damage
Green agriculture	Integrated pest, nutrient and natural resource management	Allows minimum essential chemicals; widespread in China
Eco-agriculture	Farm growth and biodiversity in one landscape	Joins modern science and local knowledge
White agriculture	Food made with micro-organisms, chiefly fungi	Began in China in 1986; "white" refers to the coats of the technicians

- Soil health and rainfed farming now form the core of the **National Mission for Sustainable Agriculture**.
- **Other needs:** research that reaches the field, stronger marketing, soil health, water conservation, affordable credit, crop and life insurance, and public-private partnership.
- **Food security for the poor** rests on three prongs: higher farm income and wages, more off-farm and non-farm work, and a strong public distribution system.

Government Steps

- **Eleventh Plan (2007–12)** framework:
  - Double the growth of irrigated area, and improve water management, rainwater harvesting and watershed work.
  - Reclaim degraded land and improve soil quality.
  - Close the knowledge gap through extension and information technology.
  - Diversify into fruit, vegetables, flowers, herbs, spices, medicinal plants, bamboo and biodiesel, with safeguards for food security.
  - Provide affordable credit, better markets and renewed attention to land reform.
  - Focus on pulses and hybrids, area-specific seed, and rainfed and drought-prone crops.

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- **Bringing Green Revolution to Eastern India (BGREI):** begun in **2010-11** under **Rashtriya Krishi Vikas Yojana**, for rice-based systems in **Assam, Bihar, Chhattisgarh, Jharkhand, Odisha, eastern Uttar Pradesh and West Bengal**.
  - Rice output there reached **58.4 million tonnes in 2012-13**, against a mean of 48.8 million over the five years before 2011-12.
- **PM Dhan-Dhaanya Krishi Yojana:** launched on **11 October 2025** for **100 low-performing districts**, chosen on productivity, cropping intensity and credit, with an annual outlay of ₹24,000 crore for six years.

Evergreen Revolution

- The goal of food sufficiency has been met, and the need now is a **sustainable farming pattern**.
- A much wider area can still be brought in, and the movement transformed into an **evergreen revolution**, M. S. Swaminathan's phrase for **productivity in perpetuity without ecological harm**.
  - Small holdings, neglected regions and overlooked crops form the agenda.

Previous Year Questions

2016	"India has paid heavily for the achievement of the Green Revolution in the form of economic, social and ecological cost." Discuss.
2014	"In spite of various negative impacts of the Green Revolution, there is a demand for a New Green Revolution." Elaborate.
2012	Write about Prospects of Rainbow Revolution in India.
2002	Critically evaluate the dual impacts of green revolution in India.
1997	Discuss the impact of green revolution on the agricultural production in India.
1992	What is meant by Green Revolution? Explain its successes and failures.
2014	'In spite of various negative impacts of Green Revolution, there is a demand for New Green Revolution.' Elaborate.

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UNIT 07
4 CHAPTERS

Agricultural Regions

Agricultural regionalisation; agro-climatic zones; agro-ecological regions.



CHAPTERS

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GEOGRAPHY OPTIONAL | PAPER II · AGRICULTURE

Agro Climatic Zones of India



PYQ RADAR **4** questions Last asked **2022** 2022 · 2019 · 2008 · 2001

CONTENTS

01 Agro-Climatic Zones
02 The Zones One by One
03 Previous Year Questions

- An **agro-climatic zone** is a land unit defined by its major climate, and suited to a certain range of crops and cultivars.
- **Agro-climatic conditions** mainly mean soil types, rainfall, temperature and water availability, all of which shape vegetation.
- India's standard scheme is the **15 zones of the Planning Commission (1989)**. Its purpose is to manage regional resources scientifically, meeting needs for **food, fibre, fodder and fuel wood** without harming natural resources and the environment.

01 Agro-Climatic Zones

PYQ 2022 · 2019 · 2008 +1

The Concept

- India has great geographical diversity. Variations in terrain, temperature, rainfall and soils closely influence **cropping patterns and other farm activity**, and climate shows up directly in crop calendars and yields.
- To get the most from available resources and prevailing climate, technology must be **need-based and location-specific**.
  - Delineating zones from soil, water, rainfall, temperature and related factors is the **first essential step towards sustainable production**.
- Earlier climate-based divisions came from Mohinder Singh Randhawa (1958), P. Sengupta and Galina Sdasyuk (1967–68) and Otokar Slampa (1968), among **other agricultural regional schemes**.

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Agro-Climatic Zone and Agro-Ecological Zone PYQ 2019 · 2008

- An **agro-ecological zone** is the unit carved out of an agro-climatic zone by superimposing **landform**, which modifies climate and the length of growing period.
- The **Food and Agriculture Organization (1983)** set out this distinction: the first is a climatic frame, and the second narrows it with land and soil.

The Three Official Schemes

SCHEME	AGENCY AND DATE	UNITS	BUILT FROM	USED FOR
Agro-climatic regions	Planning Commission, 1988–89	15 zones, 73 sub-zones	Soil, climate, water, topography	Regional agricultural planning
Agro-climatic zones	Indian Council of Agricultural Research (ICAR), National Agricultural Research Project, 1979	about 127 zones	Rainfall, soils, cropping pattern, administrative units	Location-specific research
Agro-ecological regions	National Bureau of Soil Survey and Land Use Planning, 1990s	20 regions, 60 sub-regions	Soil, bioclimate, growing period	Resource and land-use planning

- **ICAR's zones** are smaller and were drawn to guide location-specific research through zonal research stations. The planning zones are broader, so that development strategy can be framed for large tracts.
- The three schemes answer different questions. The research zones ask what technology suits a locality, the planning zones ask what to develop across a tract, and the ecological regions ask what the land and climate can sustain.

Delineation by the Planning Commission

- The **Planning Commission** began **agro-climatic regional planning in 1988**, during the mid-term appraisal of the Seventh Plan. The 15-zone division is dated **1989**.
  - Its partner was the **National Remote Sensing Agency (NRSA)**, which has been the **National Remote Sensing Centre** under ISRO since 1 September 2008.
  - The scheme drew on **land, soil and agricultural surveys** of rural India.
  - **Physical attributes and socio-economic characteristics** were both considered.
  - The Commission itself gave way to **NITI Aayog in 2015**.
- **Zonal planning teams** then split each zone into **sub-zones** (73 in all) by soil type, climate, water balance and cropping.
- A zone's development profile blends **land management, crop production, livestock, orchards, forestry and farm-based processing**.
- **Main objectives** of the regions:
  - Optimising agricultural production.

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  - Raising farm income.
  - Creating more rural employment.
  - Using irrigation water judiciously.
  - Narrowing regional inequalities in agricultural development.
- The Commission also framed **four planning goals**, which show that the zones were meant for development policy and not merely for description:
  - A rough **balance of demand and supply** for the chief commodities across India, resting on what each zone can deliver.
  - The highest **net income for producers**.
  - **Additional jobs**, especially for landless labourers.
  - A framework for **scientific, sustainable use** of land, water and forests.
- **Limits of the scheme.** It leans on physiographic divisions and administrative boundaries. Water balance, the water-holding capacity of soils and land capability were not built into it, which the later ecological regions address in part.

The 15 Zones

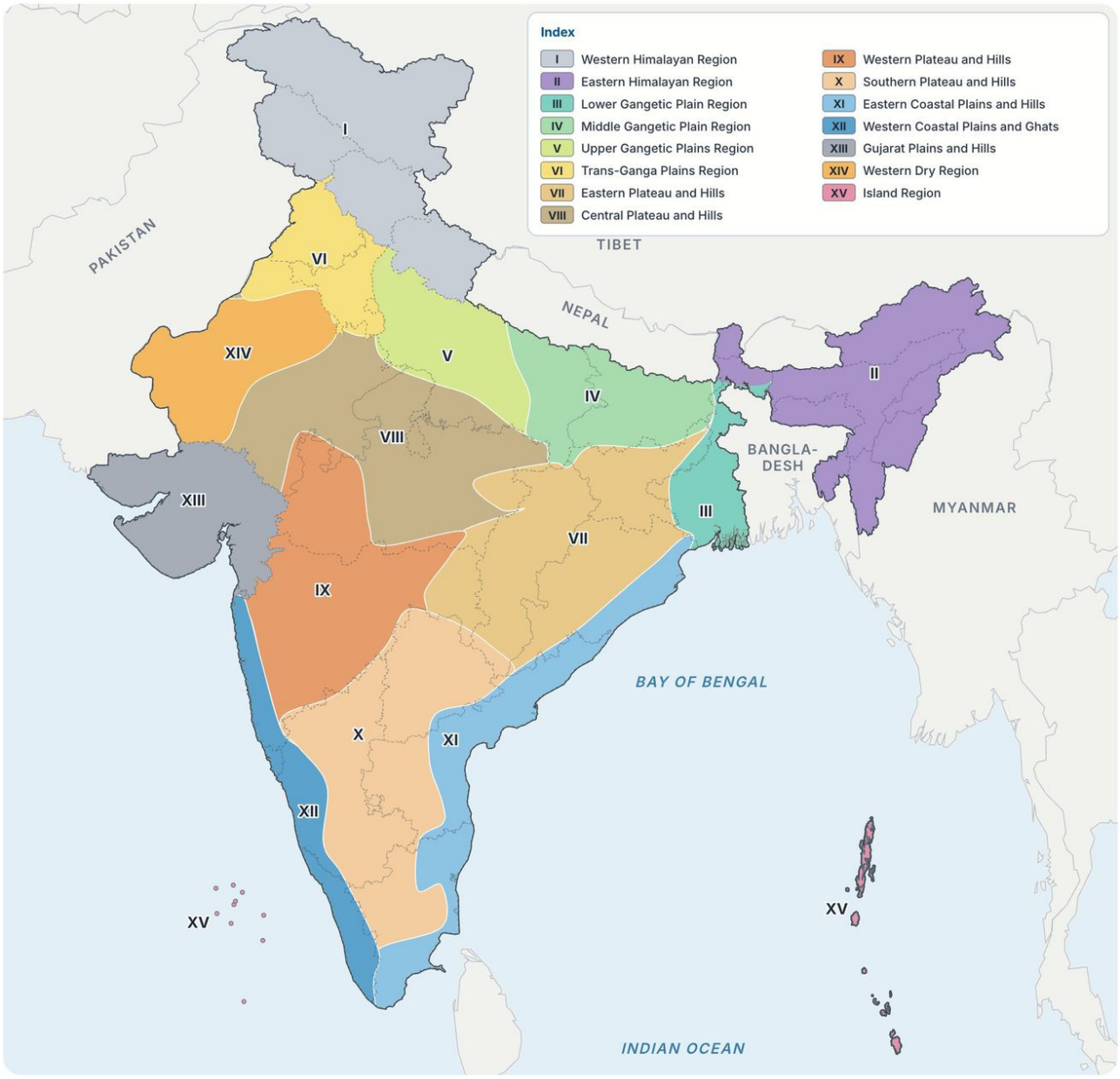
1. Western Himalayan Region
2. Eastern Himalayan Region
3. Lower Gangetic Plains Region
4. Middle Gangetic Plains Region
5. Upper Gangetic Plains Region
6. Trans-Gangetic Plains Region
7. Eastern Plateau and Hills Region
8. Central Plateau and Hills Region
9. Western Plateau and Hills Region
10. Southern Plateau and Hills Region
11. East Coast Plains and Hills Region
12. West Coast Plains and Ghats Region
13. Gujarat Plains and Hills Region
14. Western Dry Region
15. The Islands Region

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AGRICULTURE · AGRO-CLIMATIC ZONES

Agro-Climatic Regions of India

The fifteen zones used for regional agricultural planning.



Schematic: limits are generalised. Boundaries: Survey of India outline (datameet).

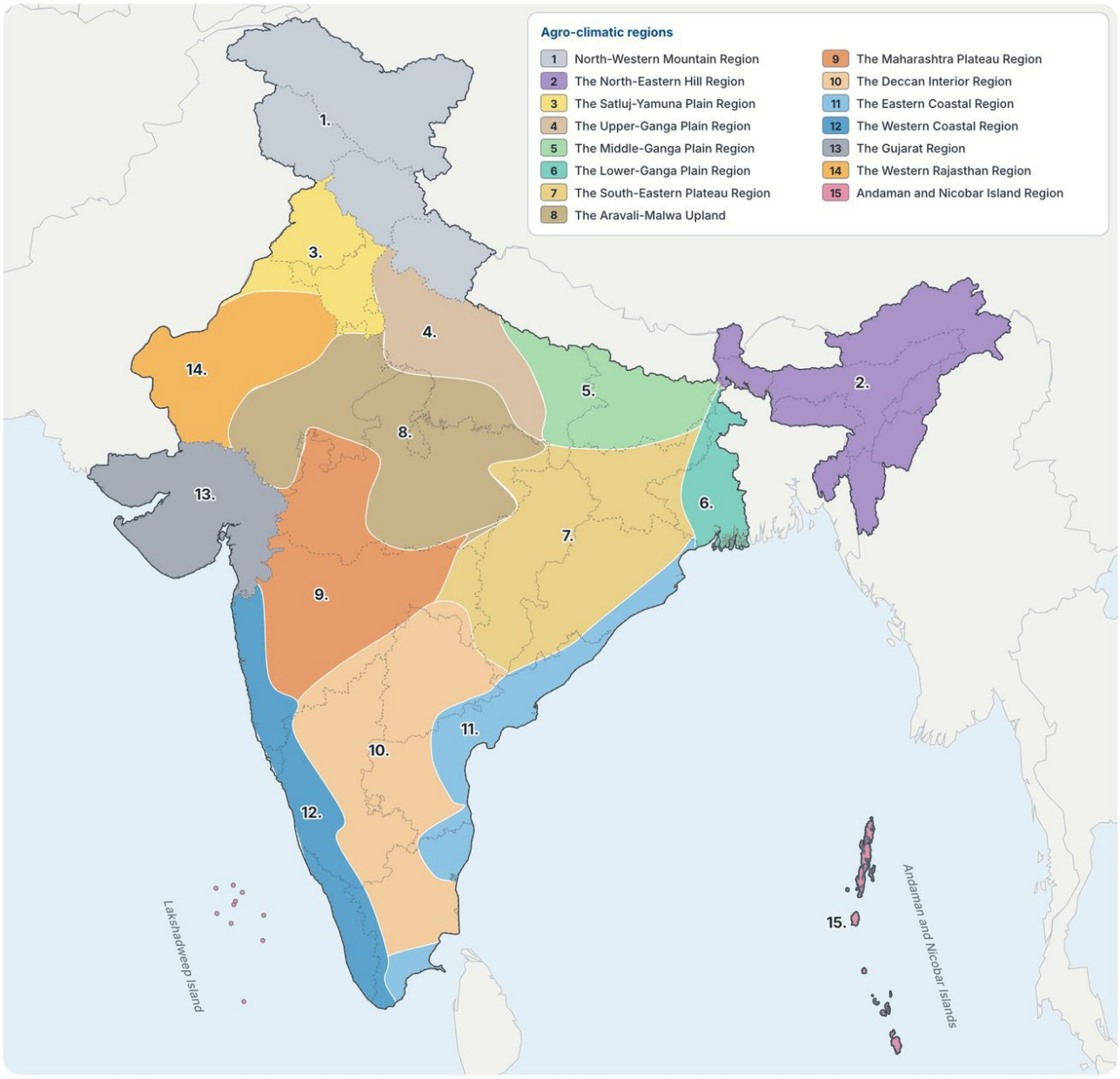
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AGRICULTURE · AGRO-CLIMATIC ZONES

Agro-Climatic Regions in India

A parallel set of geographical names for the fifteen planning zones.



Schematic: limits are generalised. Boundaries: Survey of India outline (datameet).

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- This second map uses a **parallel set of geographical names and a different numbering**. Its names match the Planning Commission zones as follows:

ON THIS MAP	PLANNING COMMISSION ZONE
1. North-Western Mountain	I. Western Himalayan

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ON THIS MAP	PLANNING COMMISSION ZONE
2. North-Eastern Hill	II. Eastern Himalayan
3. Satluj-Yamuna Plain	VI. Trans-Gangetic Plains
4. Upper-Ganga Plain	V. Upper Gangetic Plains
5. Middle-Ganga Plain	IV. Middle Gangetic Plains
6. Lower-Ganga Plain	III. Lower Gangetic Plains
7. South-Eastern Plateau	VII. Eastern Plateau and Hills
8. Aravali-Malwa Upland	VIII. Central Plateau and Hills
9. Maharashtra Plateau	IX. Western Plateau and Hills
10. Deccan Interior	X. Southern Plateau and Hills
11. Eastern Coastal	XI. East Coast Plains and Hills
12. Western Coastal	XII. West Coast Plains and Ghats
13. Gujarat	XIII. Gujarat Plains and Hills
14. Western Rajasthan	XIV. Western Dry
15. Andaman and Nicobar	XV. Islands, which also take in Lakshadweep

Zones as Development Types

- For planning, the Commission grouped the zones into **nine types**, by resources, land productivity, pressure on land and environment. The table is framed by the Planning Commission's 1990 account.

ZONE	RESOURCES	LAND PRODUCTIVITY	PRESSURE ON LAND	ADDED CONCERN
Trans-Gangetic (6)	Rich water and soil	High	Moderate	None noted
Upper Gangetic (5)	Rich soil and water	Medium	Moderate	Land quality falling
Lower and Middle Gangetic (3, 4)	Rich water and soil	Low	High	More problem soils

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ZONE	RESOURCES	LAND PRODUCTIVITY	PRESSURE ON LAND	ADDED CONCERN
Eastern and Central Plateaus (7, 8)	Large land and water	Very low	Low	Subsistence, problem soils
Western and Southern Plateaus (9, 10)	Less favourable	Low	Low to medium	Erosion, water quality
East and West Coasts, Islands (11, 12, 15)	Rich water, poor land	Medium	Medium to high	Fragile ecosystem
Himalayan (1, 2)	Less favourable	Low	Low	Fragile ecosystem
Gujarat (13)	Fairly good land, semi-arid to arid	Moderately good	Moderate	Aridity
Western Dry (14)	Large, less fertile	Very low	Low	Fragile ecosystem

- Zonal data from the same period show how uneven the zones are:

ZONE	AREA ('000 SQ KM)	DENSITY (PER SQ KM)	NET SOWN (%)	FOREST (%)
I. Western Himalaya	245	62	18.2	45.3
II. Eastern Himalaya	274	118	18.7	42.8
III. Lower Ganga Plain	69	692	63.8	11.0
IV. Middle Ganga Plain	164	526	62.8	8.7
V. Upper Ganga Plain	143	466	70.1	4.5
VI. Trans Ganga Plain	116	331	80.9	3.2
VII. Eastern Plateau	395	136	35.9	35.2
VIII. Central Plateau	370	137	45.0	14.2
IX. Western Plateau	331	170	59.7	11.8
X. Southern Plateau	395	200	48.4	17.1
XI. East Coast	197	321	43.3	18.7
XII. West Coast	117	441	37.2	29.0

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ZONE	AREA ('000 SQ KM)	DENSITY (PER SQ KM)	NET SOWN (%)	FOREST (%)
XIII. Gujarat	196	175	51.4	10.9
XIV. Western Dry	175	58	47.7	1.2
XV. Islands	8	29	4.2	88.1
India	3,195	215	47.0	19.3

- The **Trans-Ganga Plain** led in net sown area and the **Lower Ganga Plain** in crowding. Cultivable land per head stood highest in the **Western Dry Region (1.314 ha)**, against 0.260 ha nationally.
- Crops also cluster by zone, and specialisation is sharper for **sugarcane, cotton, jowar and wheat** than for widely spread rice, pulses, fruit and vegetables.

CROP	MAIN ZONES	% OF NATIONAL AREA	% OF NATIONAL OUTPUT
Rice	3, 4, 7, 11	62.0	55.3
Wheat	4, 5, 6, 8	80.0	86.2
Jowar	8, 9, 10	86.3	87.0
Pulses	6, 8, 9	66.6	65.5
Oilseeds	8, 9, 10, 13	70.0	70.3
Cotton	6, 9, 10, 13	92.0	85.3
Sugarcane	4, 5, 9, 10	74.3	72.6
Fruits and vegetables	3, 4, 5, 12	56.4	60.8

02 The Zones One by One

PYQ 2019 · 2008

- Each zone reads under four heads: **location and topography, climatic conditions, agricultural information, and socio-economic aspects with suggestions**.
- Across the zones, the suggestions follow a pattern:
  - **Green Revolution plains** need diversification and repair of soil and groundwater.
  - **Eastern plains and plateaus** need water control, better seed and more value from land.
  - **Dry plateaus and the desert** need water saving, hardy crops, livestock and pasture.
  - **Hills and coasts** need protection of slopes, along with plantations, fruit and fisheries.

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I. Western Himalayan Region

- **Location and topography:**
  - It covers Jammu and Kashmir, Ladakh, Himachal Pradesh and the hill region of Uttarakhand.
  - It has snow-covered peaks, dissected topography, steep slopes, perennial rivers (the Jhelum, Chenab, Satluj, Beas, Yamuna and Ganga), evergreen and deciduous forests, and thin soils on undulating slopes.
  - Valleys and duns hold thick alluvium.
- **Climate:**
  - Temperature and rainfall vary at micro level, because relief varies so greatly.
  - Summer is mild (July average 5–30°C) and winter severe (January 0 to -4°C). Mean annual rainfall is 75–150 cm, and below 30 cm in Ladakh.
  - Low temperature, snow and inclement winters hinder **intensification of farming**.
- **Agricultural information:**
  - Farming is largely confined to valleys (Kashmir, Dun, Chamba and others), river terraces and the gentle slopes of the Kandi tracts.
  - Rice on valley floors and maize in the hills dominate kharif land use.
  - Barley, wheat, oats and peas, sown in October in some areas, grow stunted through the winter, when temperatures generally fall below freezing.
  - The zone is known for orchards. Apple orchards of Sopore, Srinagar and Baramulla (Kashmir), Kullu-Manali, Shimla and Kangra (Himachal Pradesh), and Ranikhet and Almora are famous all over the country.
  - Apricot, almond, walnut, litchi, loquat, cherry, peach, pear and superior **saffron** are also grown.
  - **Alpine pastures above 2,000 m**, called dhoks or margs, serve the Gujjars, Bakarwals and Gaddis for their sheep, goats, cattle and horses.
- **Socio-economic aspects and suggestions:**
  - The economy is largely agrarian, with over 80 per cent of the workforce dependent directly or indirectly on farming.
  - Major problems: poor accessibility, soil erosion, landslides, inclement weather, and inadequate marketing and storage.
  - The farm potential has not been used judiciously.
  - Rural living standards are poor, and high-yielding varieties of wheat and rice were not widely adopted. Research and extension are badly needed for the north-west mountains.
  - Unplanned building, mining and tree-felling have raised exposure to floods, landslides and pollution, as the **Uttarakhand disaster of June 2013** showed.
  - Suggested land use by slope: **crops up to 30 per cent slope, horticulture or fodder on 30–50 per cent, and tree cover above 50 per cent**.

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II. Eastern Himalayan Region

- **Location and topography:**
  - It includes Arunachal Pradesh, the hills of Assam, Sikkim, Meghalaya, Nagaland, Manipur, Mizoram, Tripura and Darjeeling district of West Bengal.
  - The topography is rugged, with thick forest.
- **Climatic conditions:**
  - 25–30°C in July and 10–20°C in January.
  - Average rainfall is 200–400 cm.
- **Agricultural information:**
  - The red-brown soil is not highly productive.
  - **Jhuming (shifting cultivation)** prevails in the hills, on about a third of the cultivated area.
  - Main crops are rice, maize, potato and tea, with orchards of pineapple, litchi, oranges and lime.
- **Socio-economic aspects and suggestions:**
  - Infrastructure needs improvement.
  - Terrace farming should bring shifting cultivation under control.
  - Fruit above 30 per cent slopes, and side activities such as sericulture, handicrafts, poultry and piggery, can add income. A long-term seed plan is also needed.

III. Lower Gangetic Plains Region

- **Location and topography:**
  - West Bengal (except the hills), eastern Bihar and the Brahmaputra valley.
  - Groundwater storage is adequate and the water table high, so waterlogging and marshes are found. Wells and canals irrigate.
- **Climatic conditions:**
  - Average annual rainfall is 100–200 cm.
  - July temperature is 26–41°C and January 9–24°C.
- **Agricultural information:**
  - Rice is the main crop, and a field may at times give three harvests a year (**Aman, Aus and Boro**).
  - Jute, maize, potato and pulses are other important crops. The Hugli basin is known for jute, and wheat became a winter crop after the Green Revolution.
- **Socio-economic aspects and suggestions:**
  - Planning covers better rice farming, horticulture (banana, mango and citrus), pisciculture, poultry, livestock, forage production and seed supply.

IV. Middle Gangetic Plains Region

- **Location and topography:**
  - Large parts of Uttar Pradesh (the east) and Bihar.

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- A fertile alluvial plain drained by the Ganga and its tributaries, with large ground and surface water potential.

- **Climatic conditions:**
  - Average temperature is 26–41°C in July and 9–24°C in January.
  - Average annual rainfall is 100–200 cm.
- **Agricultural information:**
  - Kharif: rice, maize and millets. Paddy in this season alone holds more than two-fifths of cropped land.
  - Rabi: wheat, gram, barley, peas, mustard and potato.
  - Mango, guava, litchi and banana are the fruits.
- **Socio-economic aspects and suggestions:**
  - Alternative farming systems, and use of chaur lands for pisciculture, can raise output.
  - Usar lands, wastelands and fallows should be reclaimed for farming and allied activities (agro-forestry, silviculture, floriculture and others).

V. Upper Gangetic Plains Region

- **Location and topography:** central and western Uttar Pradesh, with Haridwar and Udham Singh Nagar districts of Uttarakhand.
- **Climatic conditions:**
  - Sub-humid continental, with July at 26–41°C and January at 7–23°C.
  - Average annual rainfall is 75–150 cm.
- **Agricultural information:**
  - The soil is sandy loam. Canals, tube wells and wells are the main irrigation sources.
  - An **intensive farming region**: wheat, rice, sugarcane, millets, maize, gram, barley, oilseeds, pulses and cotton. It gained greatly from the Green Revolution.
- **Socio-economic aspects and suggestions:**
  - Besides modernising traditional farming, it needs a focus on **dairy development and horticulture**.
  - Strategy should develop **multiple mixed cropping patterns**, line canals and reclaim saline and alkaline soils.

VI. Trans-Gangetic Plains Region

- **Location and topography:** also called the **Satluj-Yamuna Plains**, it extends over Punjab, Haryana, Chandigarh, Delhi and Ganganagar district of Rajasthan.
- **Climatic conditions:**
  - Semi-arid. July's mean monthly temperature is 25–40°C and January's 10–20°C.
  - Average annual rainfall is 65–125 cm.
  - The soil is highly productive alluvium.
  - Canals, tube wells and pumping sets have been installed by cultivators and governments.

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- **Agricultural information:**
  - **Agricultural intensity is among the highest** in the country. Crops are wheat, sugarcane, cotton, rice, gram, maize, millets, pulses and oilseeds.
  - It has the credit of introducing the **Green Revolution**, with modern methods and greater mechanisation.
  - It also faces **waterlogging, salinity, alkalinity, soil erosion and a falling water table**.
- **Socio-economic aspects and suggestions**, to make farming more sustainable and productive:
  - Diversion of some rice-wheat area, about **5 per cent**, to maize, pulses, oilseeds and fodder.
  - New genotypes of the three main cereals, bred for **built-in resistance** to pests and disease.
  - Horticulture, along with pulses such as tur and peas in upland conditions.
  - Vegetable growing close to industrial towns.
  - Good seed for vegetables, and sound planting stock for orchards.
  - Transit storage and processing units for the extra fruit and vegetables.
  - Policy to raise productivity of milk and wool.
  - High-quality fodder and animal feed, with fodder area raised by about 10 per cent.

VII. Eastern Plateau and Hills

- **Location and topography:** the Chotanagpur plateau, the Rajmahal hills and the Chhattisgarh plains, extending over Jharkhand, Odisha, Chhattisgarh and Dandakaranya.
- **Climatic conditions:**
  - 26–34°C in July and 10–27°C in January, with 80–150 cm of annual rain.
  - Water is short, because of the **plateau structure and non-perennial streams**.
- **Agricultural information:**
  - Soils are red and yellow, with patches of laterite and alluvium.
  - Rainfed farming of rice, millets, maize, oilseeds, ragi, gram and potato. Fallowing is common where irrigation is absent.
- **Socio-economic aspects and suggestions**, to raise productivity and income:
  - High-value crops on uplands: pulses such as tur, groundnut and soybean.
  - Urad, castor and groundnut in kharif, with mustard and vegetables where irrigated.
  - Better indigenous breeds of cattle and buffaloes.
  - More fruit plantations.
  - Renovation and desilting of tanks, and excavation of new ones.
  - Inland fisheries in permanent water bodies, and **integrated watershed development** to conserve soil and rain water.

VIII. Central Plateau and Hills

- **Location and topography:** Bundelkhand, Baghelkhand, the Bhander plateau, the Malwa plateau and the Vindhyachal hills.

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- **Climatic conditions:**
  - Semi-arid, with July at 26–40°C, January at 7–24°C and average annual rainfall of 50–100 cm.
  - Red, yellow and black soils occur intermixed.
- **Agricultural information:** water is scarce. Crops are millets, wheat, gram, oilseeds, cotton and sunflower.
- **Socio-economic aspects and suggestions:**
  - Water conservation through sprinklers and drip systems, and dry farming.
  - Dairy development, crop diversification, groundwater development and **reclamation of ravine lands**.

IX. Western Plateau and Hills

- **Location and topography:** the southern edge of the Malwa plateau and Maharashtra's part of the Deccan, on **regur (black) soil**.
- **Climatic conditions:** July at 24–41°C, January at 6–23°C, and average annual rainfall of 25–75 cm.
- **Agricultural information:**
  - Only a little over 12 per cent of the area is irrigated.
  - Rainfed fields: wheat, gram, millets, cotton, pulses, groundnut and oilseeds.
  - Irrigated fields: sugarcane, rice and wheat. Oranges, grapes and bananas are also grown.
- **Socio-economic aspects and suggestions:**
  - Water efficiency, through sprinklers and drip systems.
  - Low-value jowar, bajra and rainfed wheat should give way to high-value oilseeds.
  - Five per cent of rainfed cotton and jowar area could shift to fruit such as ber, pomegranate, mango and guava.
  - Better milk yield through cross-breeding of cattle and buffalo, along with poultry.

X. Southern Plateau and Hills

- **Location and topography:** the interior Deccan, with southern Maharashtra, most of Karnataka, Telangana and Andhra Pradesh, and the Tamil Nadu uplands, stretching **north to Adilabad district and south to Madurai district**.
- **Climatic conditions:**
  - Mean July temperature is 25–40°C, and mean January 10–20°C.
  - Annual rainfall is 50–100 cm.
- **Agricultural information:**
  - Dry-zone farming of millets, oilseeds and pulses.
  - Coffee, tea, cardamom and spices grow on the hill slopes of the Karnataka plateau.
- **Socio-economic aspects and suggestions:**
  - Part of the coarse-cereal area can move to pulses and oilseeds.
  - Horticulture, dairying and poultry should be encouraged, and tank irrigation restored.

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XI. East Coast Plains and Hills

- **Location and topography:** the Coromandel and Northern Circar coasts of Tamil Nadu, Andhra Pradesh and Odisha, built around the deltas of the Mahanadi, Godavari, Krishna and Kaveri.
- **Climatic conditions:**
  - Mean July temperature is 25–35°C, and mean January 20–30°C.
  - Mean annual rainfall is 75–150 cm.
- **Agricultural information:**
  - Soils are alluvial, loam and clay, and troubled by **alkalinity**.
  - Crops: rice, jute, tobacco, sugarcane, maize, millets, groundnut and oilseeds.
- **Socio-economic aspects and suggestions:**
  - Better cultivation of spices (pepper and cardamom) and development of fisheries.
  - Higher cropping intensity, with water-efficient crops on residual moisture.
  - Rice to be discouraged on marginal lands, in favour of oilseeds and pulses.
  - Diversified cropping in place of mono-cropping.
  - Upland horticulture, social forestry and dairy farming.

XII. West Coast Plains and Ghats

- **Location and topography:** the Malabar and Konkan coastal plains and the Sahyadris.
- **Climatic conditions:**
  - Humid. Mean July temperature is 25–30°C, and mean January 18–30°C.
  - Mean annual rainfall is over 200 cm.
- **Agricultural information:**
  - Soils are lateritic and coastal alluvial.
  - Crops: rice, coconut, oilseeds, sugarcane, millets, pulses and cotton.
  - The Ghats' slopes carry plantations and spices.
- **Socio-economic aspects and suggestions:**
  - More land for high-value crops: pulses, spices and coconut.
  - Better infrastructure and drainage, more dug wells, and **prawn culture in brackish water**.

XIII. Gujarat Plains and Hills

- **Location and topography:** Kathiawar's hills and plains, with the rich Mahi and Sabarmati valleys. An arid and semi-arid region.
- **Climatic conditions:**
  - July temperature runs 26–42°C and January 13–29°C. Older accounts round these to means of about 30°C and 25°C.
  - Mean annual rainfall is 50–100 cm, rising from west to east.
- **Agricultural information:**
  - Soils are regur on the plateau, alluvium on the coastal plains, and red and yellow around Jamnagar.

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- Crops: groundnut, cotton, rice, millets, oilseeds, wheat and tobacco. Oilseeds give the zone its special place.

- **Socio-economic aspects and suggestions:**
  - **Canal and groundwater management**, rainwater harvesting and dryland farming.
  - Agro-forestry and wasteland development.
  - **Marine fishing and brackish or back-water aquaculture** in coastal zones and river deltas.

XIV. Western Dry Region

- **Location and topography:** Rajasthan west of the Aravallis.
- **Climatic conditions:**
  - Erratic rainfall averaging less than 25 cm a year.
  - Desert climate brings high evaporation and contrasting temperatures: 28–45°C in June and 5–22°C in January.
- **Agricultural information:**
  - Kharif: bajra, jowar and moth. Rabi: wheat and gram.
  - Livestock contributes greatly in the desert ecology, and the Indira Gandhi Canal has altered cropping where it reaches.
- **Socio-economic aspects and suggestions:**
  - **Rainwater harvesting**, and higher yields of horticultural crops such as water melon, guava and date palm.
  - High-quality germplasm in cattle, to improve the breed.
  - A **silvi-pastoral system** over wastelands.

XV. Islands Region

- **Location and topography:** Andaman-Nicobar and Lakshadweep, with a typically equatorial climate.
- **Climatic conditions:**
  - Annual rainfall is less than 300 cm.
  - Mean July and January temperatures at Port Blair are 30°C and 25°C.
- **Agricultural information:**
  - Sandy soils line the coast, giving way to clayey loam on valley floors and lower slopes.
  - Crops: rice, maize, millets, pulses, areca nut, turmeric and cassava. **Nearly half the cropped area is under coconut**.
  - Thick forest covers the land, and farming is at a **backward stage**.
- **Socio-economic aspects and suggestions:**
  - Priorities are **better crops, water control and fisheries**.
  - Improved rice seed, so that farmers can take two crops in place of one.
  - For fisheries: multi-purpose deep-sea vessels, storage and processing infrastructure, and **brackish-water prawn culture** in coastal areas.

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Previous Year Questions

2022	How do agro-climatic and land capability indicators assist in the macro-agricultural regionalisation of India? Illustrate with an appropriate map.
2019	Correlate the agro-climatic zones with agro-ecological regions of India.
2008	Discuss the bases of identifying agro-climatic zones and explain the core-strategies for agricultural development.
2001	Examine the geographical basis of agro-climatic planning regions of India.

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29	7	104	417
Chapters	Units	Previous year questions	Pages

IN THE COMPLETE BOOK

01 **Agricultural Infrastructure** 7 chapters · from page 6

02 **Institutional Factors** 1 chapter · from page 101

03 **Cropping Pattern, Productivity and Land Capability** 8 chapters · from page 115

04 **Agro and Social Forestry** 1 chapter · from page 230

05 **Green Revolution and Dry Farming** 2 chapters · from page 250

06 **Horticulture, Livestock and Allied Activities** 6 chapters · from page 277

07 **Agricultural Regions** 4 chapters · from page 360

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