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MAINS 2027 EDITION

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UPSC CSE MAINS

GEOGRAPHY OPTIONAL PAPER I

Economic Geography Notes

World economic development, resources and energy, world agriculture, food security and famine, world industries and trade, with previous year questions.

Compiled by Arvind KrS

ECONOMIC DEVELOPMENT | RESOURCES AND ENERGY | WORLD AGRICULTURE | FOOD SECURITY | INDUSTRIES AND TRADE

29	6	97	102
Chapters	Units	Previous year questions	Diagrams and figures



IN THIS BOOK

01 Nature, Concepts and Perspectives of Economic Geography

02 World Economic Development

03 World Resources, Energy Crisis and the Limits to Growth

04 World Agriculture

05 Food and Nutrition, Food Security and Famine

06 World Industries and Trade

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Geography Optional — Economic Geography

Paper I · Human Geography: Economic Geography

Mains 2027 Edition · Compiled October 2026

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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.

A small number of global cities act as command-and-control centres of the world economy and spread its culture.

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.

Agglomeration is the concentration of economic activity in a few places.

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

The oil shock of 1973 marked the start of the modern **energy crisis**.

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

Regional Variation in the Intensity of the Energy Crisis

PYQ 2026 · 2020 · 2018 +3

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 **8** questions Last asked **2026**

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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World Resources, Energy Crisis and the Limits to Growth

World resources and their distribution; energy crisis; the limits to growth.

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Energy Crisis

PYQ RADAR **6** questions Last asked **2026** 2026 · 2020 · 2018 · 2017 · 1991 · 1988

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01 Nature and Evolution of the Energy Crisis
02 Regional Variation in the Intensity of the Energy Crisis
03 India's Energy Crisis
04 Measures to Overcome the Energy Crisis
05 Previous Year Questions

- An **energy crisis** is a situation in which the **supply of energy fails to keep pace with demand**, or becomes so costly or uncertain that it disrupts economic activity, social life and international relations.
  - It can be **acute**: a sudden shock from war, embargo, accident or extreme weather.
  - It can also be **chronic**: a long-run imbalance from the **depletion of finite fossil fuels**, rising demand and slow growth of alternatives.
- The world economy still draws about **86% of its primary energy from oil, gas and coal** (2025). These **non-renewable stocks** took millions of years to form, are unevenly spread and are traded across a few vulnerable routes. A disruption anywhere therefore travels quickly through prices everywhere.
- For economic geography, the energy crisis is a problem of **spatial mismatch**: energy is produced in a few regions, consumed in others, and moved between them through chokepoints, pipelines and grids.

01 Nature and Evolution of the Energy Crisis

PYQ 2026 · 2020 · 2018 +3

Meaning and Dimensions

- Supply dimension: physical shortage of fuel or power, caused by depletion, under-investment, war or disaster.
- Price dimension: sudden or sustained price spikes that make energy **unaffordable** even when it is physically available.

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- Access dimension: **energy poverty**. In 2023 about **666 million people** still lacked electricity, most of them in Sub-Saharan Africa, and about **2.1 billion** lacked clean cooking fuels.
- Environmental dimension: the crisis of a fossil-based system whose emissions drive climate change. Energy-sector CO_2 reached a record of about **35.8 billion tonnes in 2025**.
- Geopolitical dimension: dependence on a few exporters and transit routes turns energy into a **strategic weapon**.

The Major Oil Shocks and Crises

- **First oil shock (1973–74):** during the Arab–Israeli war of October 1973, Arab members of **OPEC** placed an **embargo** on the USA and other supporters of Israel and cut output.
  - Crude prices roughly **quadrupled**, from about **$3 to nearly $12 a barrel**, by early 1974.
- **Second oil shock (1979–80):** the **Iranian Revolution** (1979) and the **Iran–Iraq War** (1980) cut supplies. Prices more than doubled to over **$35 a barrel** (annual average) by 1980.
  - Oil-importing developing countries without foreign-exchange reserves were hit hardest, through inflation, balance-of-payments crises and debt.
- Gulf War spike (1990): Iraq's invasion of Kuwait briefly doubled prices.
- **Commodity super-cycle (2003–2008):** demand from China and India outran stagnant supply. Brent peaked near **$147 a barrel in July 2008** before the global financial crisis.
- Regional power crises (2005–2008): **China** faced coal, diesel and power shortages; **South Africa's** grid failure (2008) cut mining output; **Central Asia** suffered when cold weather and low reservoirs crippled hydropower.
- **Global energy crisis (2021–2023):** post-pandemic recovery, low gas storage and the **Russia–Ukraine war (2022)** sent European gas prices to record highs. Brent rose to near **$130 a barrel** in March 2022, and Europe turned to imported LNG and rationing plans.
- **Iran war fuel crisis (2026):** the war that began on **28 February 2026** effectively closed the **Strait of Hormuz**, which normally carries about **one-fifth of world oil** and LNG trade.
  - The IEA called it the **largest supply disruption in the history of the oil market**. Brent peaked at about **$118 a barrel on 31 March 2026**, and IEA members agreed a record **400-million-barrel** emergency stock release.
  - Attacks on Qatar's **Ras Laffan** LNG complex cut gas supplies to Asia and Europe. A ceasefire on **8 April 2026** did not restore normal shipping, and renewed attacks pushed Brent back above **$110** by October 2026.

Lessons of the Oil Shocks

- **New institutions:** the **International Energy Agency (IEA)** was founded in **1974** by oil-importing OECD countries. It coordinates emergency stocks, and members must hold oil stocks equal to **90 days of net imports**.
- **New supply regions:** high prices made costlier fields worth developing. The North Sea, Alaska, Mexico and later deep-water Brazil and US shale reduced dependence on OPEC.
- **Nuclear expansion:** France's **Messmer Plan (1974)** built a large nuclear fleet that now supplies about two-thirds of its electricity. Japan also expanded nuclear power.

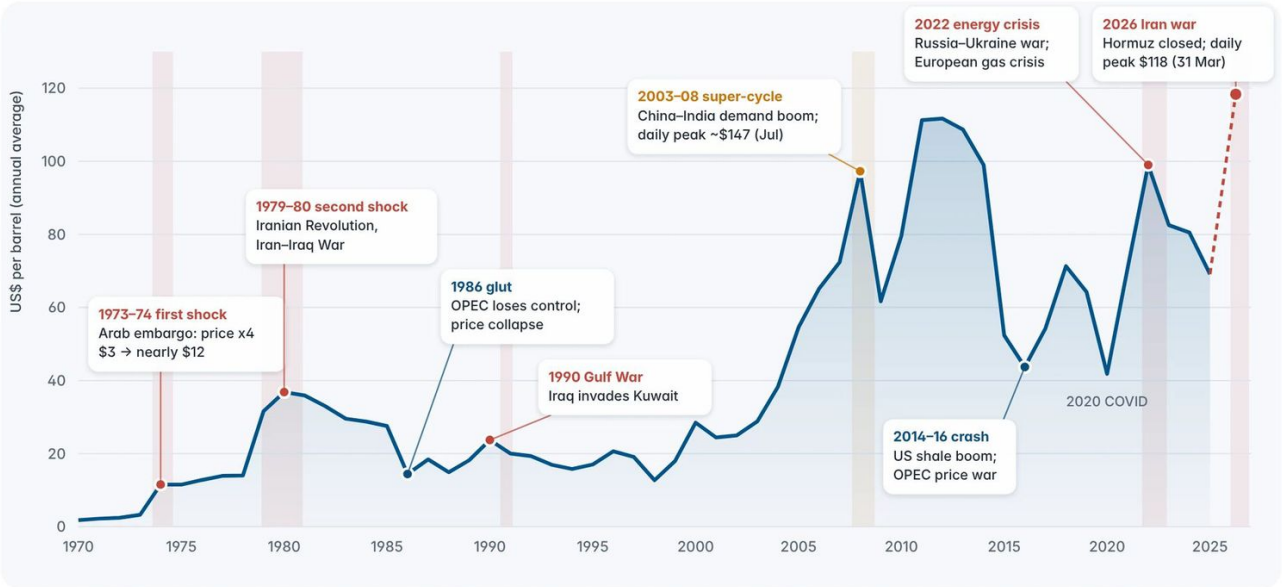
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- **Efficiency and substitution:** fuel-economy standards, smaller cars and the switch from oil to coal, gas and nuclear in power plants cut the oil intensity of rich economies.
- **Debt crisis in the developing world:** oil importers borrowed recycled **petrodollars** in the 1970s. When interest rates rose around 1980, many Latin American and African countries fell into the **debt crisis of the 1980s**.
- **India's response:** the shocks pushed the development of **Bombay High** (production from 1976), coal expansion and, later, the search for alternative energy.

ECONOMIC GEOGRAPHY · ENERGY CRISIS

Oil Price Shocks, 1970–2026

Every major energy crisis appears as a spike in crude prices; most began with war or blockade in West Asia.



Supply shocks

- War, embargo or blockade in West Asia: 1973, 1979, 1990, 2026
- Russia–Ukraine war and gas cut-off: 2022

Demand shocks

- Asian industrial boom pushed prices up in 2003–08
- COVID-19 lockdowns crashed demand in 2020

Price crashes

- 1986 and 1998 gluts; 2014–16 shale and OPEC price war
- Low prices hurt exporters and stall investment

Annual averages in nominal US$ (Arabian Light to 1983, Brent from 1984); the 2026 point is a daily peak. Data: Energy Institute Statistical Review; World Bank.

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Causes of the Energy Crisis

PYQ 2026 · 2020 · 2018 +3

Depletion and Rising Demand

- **Finite fossil fuels:** oil, gas and coal are **exhaustible**. Older fields decline, and new reserves lie in deeper, costlier and more fragile settings such as deep sea, Arctic and oil sands. This is the basis of the **"peak oil"** concern.
- Population growth and urbanisation: more people and more cities mean higher demand for transport, housing, cooling and services.

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- **Industrialisation of emerging economies: China and India** account for most of the world's demand growth. Their manufacturing, infrastructure and rising consumption push up energy use per head.
- Rising living standards: vehicles, air-conditioners and digital devices raise per capita consumption. data centres and AI are a new and fast-growing source of electricity demand.

Peak Oil or Peak Demand?

- **Peak oil: M. King Hubbert (1956)** predicted that US oil output would follow a bell-shaped curve and peak around 1970, which it did for conventional oil. The idea was extended to world output.
- **Why the fear faded:** new technology (horizontal drilling, hydraulic fracturing, deep-water drilling) added huge **unconventional** supplies. US shale turned the USA into the world's largest producer.
- **Peak demand:** the debate has shifted to when **demand** will peak. The IEA expects world oil demand to plateau at about **105–106 million barrels a day around 2030** as electric vehicles spread and China's demand slows. OPEC expects demand to keep rising.
- Either way, the crisis is less about the oil "running out" than about **where it is, who controls it and how safely it moves**.

Geopolitical and Supply Disruptions

- **Concentration of reserves:** most proven oil and gas reserves lie in **West Asia, Russia and a few OPEC+ states**. Conflict, sanctions or regime change there disrupts world supply.
- **Embargoes and sanctions:** the 1973 embargo, sanctions on Iran and Venezuela, and the sanctions on Russia after 2022 restrict supply to particular markets.
- **Chokepoints:** a large share of seaborne energy passes a few narrow straits: **Hormuz, Malacca, Bab-el-Mandeb, Suez and the Turkish Straits**. Houthi attacks in the Red Sea (2023–24) and the 2026 Hormuz closure showed how fragile these routes are.
- Cartel behaviour: production quotas of **OPEC+** keep prices above competitive levels.

Infrastructure, Technology and Policy

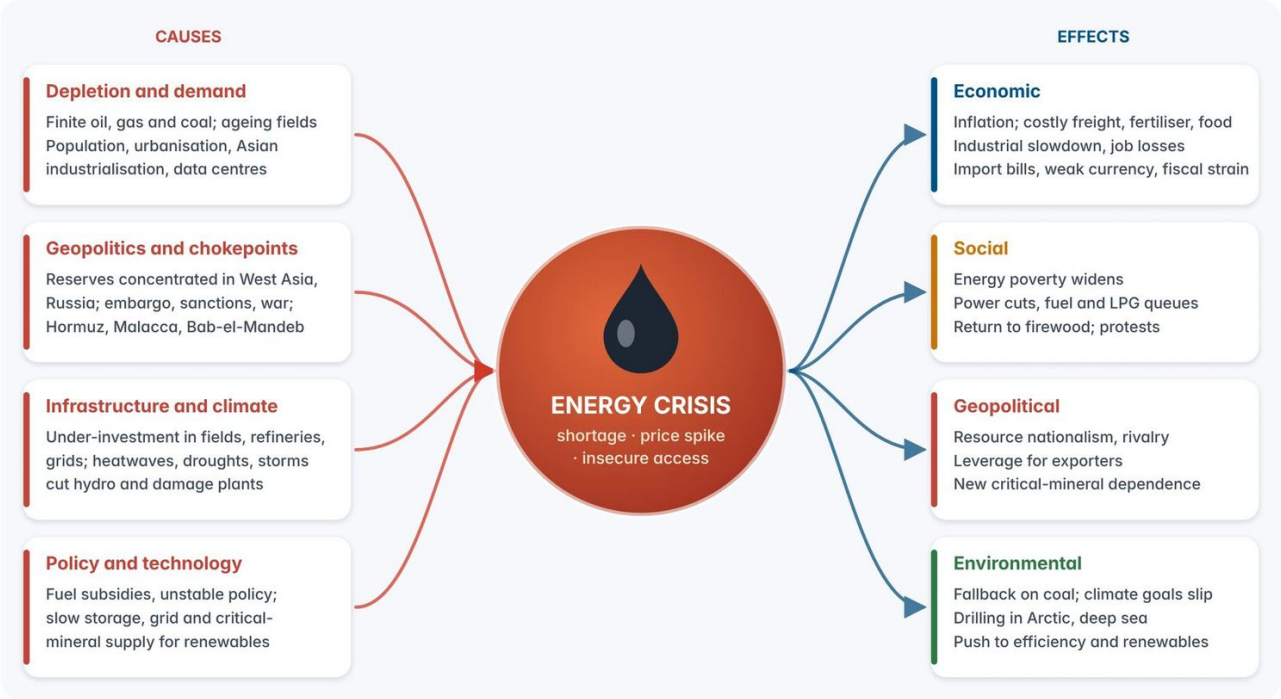
- **Under-investment** in exploration, refining, transmission and storage creates bottlenecks. Ageing power plants and grids fail under stress.
- **Extreme weather and climate change:** heatwaves raise demand, droughts reduce hydropower and cooling water for thermal plants, and storms damage refineries and grids.
- **Slow transition:** renewables are growing fast, but **storage, grid integration and critical-mineral supply** lag behind. Fossil fuels therefore remain the backbone.
- Poor policies: heavy fuel subsidies discourage conservation, while frequent policy changes deter long-term investment.
- Accidents, strikes and attacks: pipeline failures, labour strikes and attacks on infrastructure cause short but sharp disruptions.

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ECONOMIC GEOGRAPHY · ENERGY CRISIS

Causes and Effects of the Energy Crisis

Long-run depletion and demand growth meet short-run shocks; the result spreads through prices to the economy, society, geopolitics and the environment.



Bottom row: the four groups of responses.

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Impacts of the Energy Crisis

PYQ 2026 · 2020 · 2018 +3

Economic Impacts

- **Inflation:** energy enters every production chain, so higher fuel prices raise the cost of **manufacturing, freight, fertiliser and food**.
- Slower growth and job losses: energy-intensive industries such as steel, aluminium, cement, chemicals and ceramics cut output or shut down.
- **Trade imbalances:** importers face larger bills, weaker currencies and wider current-account deficits. Wealth shifts from consumers to exporters (**petrodollar** flows).
- **Agriculture and food security:** dearer diesel, irrigation power and fertiliser raise food prices. Diversion of crops to biofuels adds pressure.
- Fiscal strain: governments spend more on subsidies and relief, as in the excise cuts on fuel in many countries during 2022 and 2026.
- Investment shifts: each crisis also spurs investment in **efficiency, domestic production and renewables**.

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Social Impacts

- **Energy poverty widens:** low-income households spend a larger share of income on fuel and power.
- Disruption of daily life: load-shedding, fuel queues and cooking-gas shortages affect health, schooling and livelihoods.
- Unrest: fuel-price protests and riots have followed price hikes in many countries, from the 1970s to recent years.

Geopolitical Impacts

- **Resource nationalism** and competition for supplies, long-term contracts and overseas assets.
- **Shifts in power:** exporters gain leverage, while the **US shale revolution** turned the USA into a net petroleum exporter and changed trade flows.
- **New dependencies:** clean-energy supply chains depend on **critical minerals** (lithium, cobalt, nickel, rare earths) whose mining and refining are concentrated, especially in **China**.

Environmental Impacts

- During shortages, countries **fall back on coal**, as Europe did in 2022 and Asian importers did in 2026, slowing climate action.
- Pressure to secure supply pushes extraction into **ecologically sensitive areas** such as the Arctic, the deep sea and tropical forests.

Energy, Development and the Energy Ladder PYQ 2018

- Energy use rises with income. A US resident uses roughly **ten times** as much commercial energy as an Indian, and the gap with the poorest African countries is larger still.
- Poor households move up an **energy ladder** as income rises: from **firewood, dung and crop residue** to **kerosene and LPG**, and then to **electricity and piped gas**.
  - A crisis pushes households back down the ladder. In 2022 and 2026, high LPG prices led many poor families in South Asia to return to firewood, with harm to health from indoor smoke.
- The crisis is therefore also a **development problem**. Without reliable and affordable energy, industrialisation, irrigation, health services and education all stall.
- The **water–energy–food nexus** links the three: power is needed to pump irrigation water and make fertiliser, while thermal plants and hydropower need water. A shock in one spreads to the others.

02 Regional Variation in the Intensity of the Energy Crisis

PYQ 2026 · 2020 · 2018 +3

- The crisis is **global in origin but regional in impact**. Its intensity in a region depends on four things:
  - **resource endowment**;
  - **import dependence**;
  - **level of development and income**;
  - **diversity of the energy mix**.

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REGION TYPE	EXAMPLES	NATURE OF CRISIS	INTENSITY
Major exporters	Saudi Arabia, UAE, Qatar, Russia, Norway	Revenue windfall in price spikes; exposed to price crashes and transit attacks	Low for supply, high for revenue volatility
Self-sufficient diversified producers	USA, Canada, Brazil	Price pass-through, but domestic supply cushions shocks	Low to moderate
Rich importers	EU, Japan, South Korea	High import bills, gas dependence, industrial slowdown; can pay and store	Moderate to high
Emerging importers	China, India	Huge demand growth, oil and gas import dependence, coal reliance	High
Poor importers	Pakistan, Bangladesh, Sri Lanka, East African states	Cannot afford spot cargoes; load-shedding, fuel queues, debt crises	Very high
Energy-poor regions	Sub-Saharan Africa	Lack of access itself is the crisis	Chronic

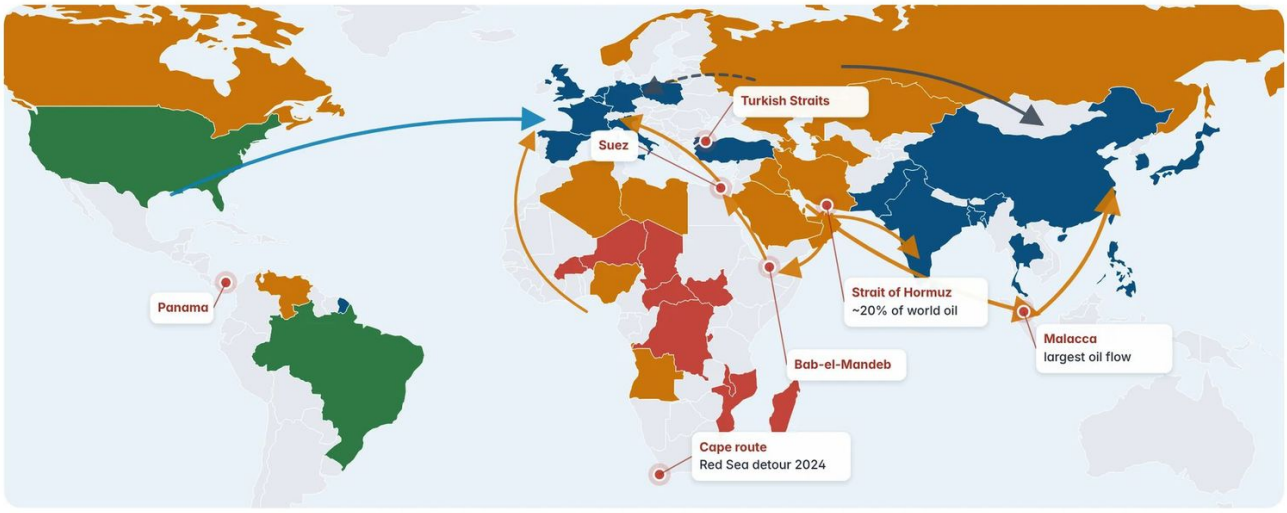
- **West Asia:** holds about half of proven oil reserves. Its conflicts set the world price, yet it gains from high prices unless its own export routes are blocked, as in 2026.
- **Europe:** its dependence on Russian pipeline gas before 2022 made it the epicentre of the 2022 crisis. It then diversified to LNG, renewables and efficiency.
- **East and South Asia:** Japan, Korea, China and India import most of their oil and much of their gas through **Hormuz and Malacca**, so they were the most exposed in 2026. **Pakistan, Bangladesh and Sri Lanka** suffered acute shortages and blackouts.
- **Sub-Saharan Africa: Nigeria and Angola** export oil, yet the region has the world's lowest electricity access. Its crisis is one of **access and investment**, not only of supply.
- **North America:** shale oil and gas made the USA the largest producer of both. Its crisis is one of **prices**, not shortages.

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ECONOMIC GEOGRAPHY · REGIONAL VARIATION

Why the Energy Crisis Hits Regions Differently

Energy is produced in a few regions, consumed in others and moved through a handful of narrow straits; import dependence and income decide how hard a shock lands.



Exporters

- West Asia, Russia, Norway, Canada, Nigeria, Angola, Venezuela
- Gain from high prices; hit when their own routes close (2026)

Importers

- Europe in 2022; Japan, Korea, China, India in 2026
- Poorer importers (Pakistan, Bangladesh, Sri Lanka) face blackouts

Access-poor

- Sub-Saharan Africa: crisis of access and investment
- Most of the 666 million people without electricity

Classes are indicative. Flows: orange = oil/LNG by sea, blue = US LNG, grey = Russian pipelines (dashed = cut after 2022).
Data: EIA, IEA, World Bank. Base map: Natural Earth.

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03 India's Energy Crisis

PYQ 2026 · 2020 · 2018 +3

- India is the world's **third-largest energy consumer** and **third-largest oil consumer**, but its per capita energy use is well below the world average.
- **Import dependence:**
  - about **86–88% of crude oil** is imported;
  - about **half of natural gas** is imported;
  - about **60% of LPG** is imported, most of it through Hormuz.
- **Coal dependence:** coal generates about **three-quarters of electricity**. Domestic coal is **high-ash and low in calorific value**, so coking coal for steel is imported.
  - Coal stock shortages at power plants in **October 2021 and April–May 2022** caused power cuts in several states.
- Rising peak demand: all-India peak demand reached a record of about **250 GW in May 2024**, driven by heatwaves and cooling.

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- 2026 shock:
  - **LPG** was the first fuel to run short, with long queues, restaurant closures and the shutdown of Gujarat's **Morbi ceramic cluster**.
  - The government cut excise duty on petrol and diesel by **₹10 a litre**.
  - Piped natural gas from domestic sources held up better.
- **Strategic reserves:** underground **Strategic Petroleum Reserves** at **Visakhapatnam, Mangaluru and Padur** hold **5.33 million tonnes**, about **9–10 days of net imports**. With company stocks, total cover is about 74 days, against the IEA norm of 90. Phase II at **Chandikhol and Padur** will add **6.5 million tonnes**.
- Distribution problems: losses of state power distribution companies, theft and poor finances weaken supply even where generation exists.
- Responses:
  - non-fossil capacity crossed **50% of installed capacity in June 2025**, five years ahead of the 2030 target;
  - ethanol blending reached **E20 in 2025**;
  - more piped gas, LNG terminals and diversified crude sources (Russia, the USA, Guyana, Brazil);
  - the **solar energy** push and the National Green Hydrogen Mission.

04 Measures to Overcome the Energy Crisis

PYQ 2026 · 2020 · 2018 +3

Energy Security Measures

PYQ 2020 · 1988

- **Strategic reserves:** stockpiles of crude and products buffer short shocks, for example the US Strategic Petroleum Reserve, Japan's large reserves and India's SPRs. Their weakness is **high cost and locked-up capital**.
- **Diversification:**
  - of **fuels**: gas, nuclear, renewables, biofuels;
  - of **suppliers and routes**: new pipelines, LNG terminals, bypass routes;
  - of **transport modes**: LNG shipping instead of fixed pipelines.
- **Long-term contracts and energy diplomacy:** equity oil abroad (ONGC Videsh), partnerships with producers, and bodies such as the **IEA**, the **International Solar Alliance** and the **Global Biofuels Alliance**.

Demand-Side Management and Efficiency

- **Energy efficiency is the "first fuel".** Japan's efficiency drive after the 1970s shocks cut the oil intensity of its economy sharply.
- **"Negawatts":** power saved through efficiency is treated as a resource that frees supply.
- Tools: appliance standards (India's **BEE star labelling**, **PAT** scheme for industry, **UJALA** LED programme), smart meters, time-of-day tariffs, public transport and efficient buildings.

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Diversification of Energy Sources PYQ 1988

- **Renewables:** solar, wind, hydro, geothermal and biomass reduce import dependence. Their growth needs storage, grids and stable policy.
- **Nuclear power:** provides stable, low-carbon base load, despite concerns over safety, waste and cost. Small modular reactors are the new frontier.
- **Green hydrogen and biofuels:** serve hard-to-electrify sectors such as steel, fertiliser, shipping and aviation.
- **Cleaner use of coal:** supercritical plants, coal gasification and **CCUS**, which remain costly and limited.
- The long-run path out of recurrent crises is the **energy transition** to a diversified, low-carbon mix.

Technology, Infrastructure and Policy

- **Storage** (batteries, pumped hydro), **smart grids** and inter-regional transmission let more renewables be absorbed.
- **Carbon pricing**, removal of fossil subsidies and long-term planning give investors stable signals.
- Safety and maintenance of mines, pipelines and grids reduce accident-driven shortages.
- Funding and technology transfer from developed to developing countries help close the access gap.

Sustainable Consumption

- Each crisis has strengthened **green energy and sustainable living** movements.
- Ecologist **David Pimentel** of Cornell University argued that cheap oil allowed human numbers to overshoot the Earth's carrying capacity. Such views echo the **Limits to Growth** debate on population, resources and development.
- The balanced view is that **efficiency, diversification and lower-carbon lifestyles**, not population control alone, can make energy supply secure and sustainable.

Previous Year Questions

2026	Efficient use of energy resources can resolve the energy crisis in India. Comment.
2020	Identify the causes and effects of energy crisis, and suggest suitable measures to solve the problem.
2018	Keeping the recent developments in view, how can the energy crisis of India be circumvented by harnessing non-conventional energy resources?

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2017	"The intensity of energy crisis varies regionally." Explain.
1991	Write short note: World energy crisis.
1988	Discuss the various sources of energy and their uses. Suggest the measures to overcome the present-day energy crisis.

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UNIT 04 | 4 CHAPTERS

World Agriculture

World agriculture: typology of agricultural regions; agricultural inputs and productivity.

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World Agriculture: Typology of Agricultural Regions

PYQ RADAR **8** questions Last asked **2026** 2026 · 2024 · 2017 · 2011 · 2006 · 1998 · 1996 · 1993

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01 Agriculture and Agricultural Regions
02 Whittlesey's Classification of Agricultural Regions (1936)
03 Other Typologies of World Agriculture
04 Regional Patterns of World Agriculture
05 Previous Year Questions

- **Agriculture** is the purposeful tending of crops and livestock. It is the oldest and most widespread economic activity, and the combined outcome of **physical, economic, technical, social and cultural** factors.
- Because these factors vary from place to place, farming across the world is neither uniform nor equal. Grouping farms that work in similar ways gives **agricultural systems** and **agricultural regions**.
- An **agricultural typology** classifies these systems into types. The most widely used world typology is that of **Derwent Whittlesey (1936)**, who divided the world into **13 agricultural regions** using five functional criteria.

01 Agriculture and Agricultural Regions

PYQ 2026 · 2024 · 2017 +4

World Agriculture Today

- Agriculture uses a little over **one-third of the world's land area**, most of it as permanent meadows and pastures and the rest as cropland.
- It employed about **26% of the world's workers in 2022**, down from 40% in 2000. The share is over 50% in many sub-Saharan countries, about 46% in India (PLFS 2023–24) and under 5% in most developed countries.

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- Global **agricultural value added** reached about **US$3.8 trillion in 2022** (FAO), close to **4% of world GDP**. Its importance for food security, trade, raw materials and rural livelihoods is far greater than this share suggests.
- Agriculture is also a **cultural, ecological and geopolitical** activity. It shapes diets, landscapes and settlement patterns, and it is central to land degradation, water use and climate change.

Evolution of World Agriculture

- **Neolithic Revolution (from about 10,000 BCE):** domestication of plants and animals in several hearths: the **Fertile Crescent**, the Indus valley, China, Mesoamerica and the Andes.
- **Agricultural diffusion:** rice spread across Asia, wheat from West Asia into Europe, and maize, potato and cassava from the Americas to Europe, Asia and Africa after **1492** (the Columbian Exchange).
- **Colonial period: plantation agriculture** and cash crops (sugarcane, cotton, coffee, tea, rubber) were tied into world trade.
- **Agricultural Revolution in Europe (18th–19th centuries):** crop rotation, enclosures, selective breeding and later mechanisation laid the base of commercial mixed and dairy farming.
- **Green Revolution (from the mid-1960s):** high-yielding varieties, irrigation and chemical fertilisers raised yields sharply in Asia and Latin America, India included.
- **21st century:** biotechnology, **precision and digital farming**, protected cultivation, vertical farming and **climate-resilient agriculture**; at the same time, global value chains link small farmers to supermarkets.

Factors Shaping Agricultural Characteristics

GROUP	FACTORS	HOW THEY ACT	EXAMPLES
Physical	Climate (temperature, length of growing season, amount and season of rainfall), soil, relief, water	Set the limits of what can be grown and how	Rice in the wet tropics; winter wheat in Mediterranean lands; mechanised farming on flat plains; terraces on slopes
Demographic	Population density, labour supply	Dense populations favour labour-intensive subsistence farming; sparse ones favour extensive mechanised farming	Monsoon Asia vs the Great Plains, Pampas and Australia
Economic	Capital, markets, transport, prices	Decide intensity and market orientation	Dairy and horticulture near large cities; grain farms far inland on railways
Technological	Machinery, HYVs, fertilisers, irrigation, refrigeration	Raise productivity and extend farming into new lands	Refrigerated shipping opened New Zealand dairying and Argentine beef to Europe

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GROUP	FACTORS	HOW THEY ACT	EXAMPLES
Socio-cultural	Food habits, religion, tradition, land tenure	Affect crop and livestock choices	Cattle kept mainly for draught and milk in India; pig rearing absent in Muslim lands
Political	Colonial history, land reforms, subsidies, trade policy	Redirect farming towards particular crops and markets	Rubber in Malaya under British rule; EU Common Agricultural Policy; MSP in India

- Political and economic history often explains patterns better than climate. The **US Cotton Belt** expanded on enslaved African labour; **Southeast Asian rubber** was planted for British and Dutch industry; Australia and New Zealand became pastoral exporters to Britain.

Agricultural Region, System and Typology

PYQ 2026 · 2024 · 2017 +3

- An **agricultural region** is a continuous area with **similar functional attributes of agriculture**: crops, livestock, methods, inputs, output and the farmer's way of life, set apart from surrounding areas.
- An **agricultural system** is a broader functional term. It may be a single farm or a group of interrelated farms that work in the same way.
- **Agricultural typology** groups farms or areas into **types** on chosen criteria. **Agricultural regionalisation** draws the boundaries of those types on a map.
- Classifying world agriculture is difficult because physical and human factors vary greatly and reliable data are often missing. Every typology simplifies.

02 Whittlesey's Classification of Agricultural Regions (1936)

PYQ 2026 · 2024 · 2017 +4

The Five Functioning Forms

PYQ 2026

- **Derwent Whittlesey** (1890–1956), an American geographer at Harvard, published *Major Agricultural Regions of the Earth* in the **Annals of the Association of American Geographers (1936)**. It was the first systematic, global classification of agriculture.
- He used **five functional forms** (criteria) that can be observed on the farm and in the landscape:
  1. **Crop and livestock association:** which crops and animals are combined, and in what proportion.
  2. **Methods used to grow crops and produce stock:** hand tools, draught animals, machines; shifting or permanent fields; irrigation.
  3. **Intensity of application of labour, capital and organisation to the land**, and the resulting **output (productivity)**.
  4. **Disposal of the products for consumption:** for the family (**subsistence**) or for sale (**commercial**).
  5. **The ensemble of structures** used to house and facilitate farming: dwellings, barns, sheds, silos, fences and their layout.

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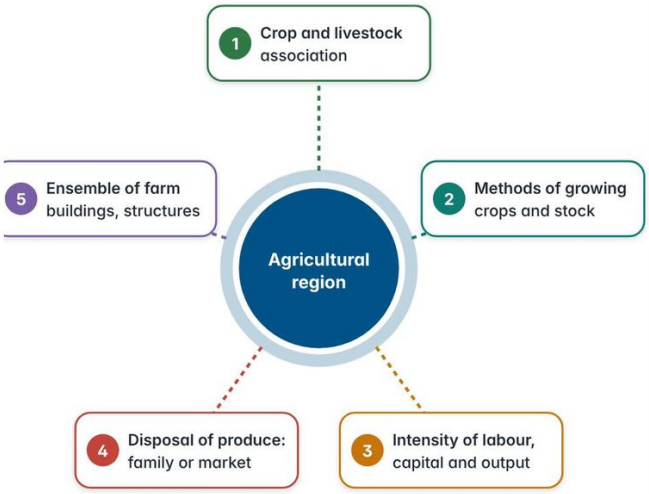
- **Significance of the five forms:**
  - They describe agriculture **as a working system**, not just as a crop map. The same crop (wheat) appears in different regions depending on method, intensity and market.
  - Each form is **observable and partly measurable**, so types can be mapped and compared across continents.
  - Together they combine **physical** (crops, livestock) and **socio-economic** (capital, labour, market) attributes.
  - The **ensemble of structures** links agriculture to settlement and landscape: the scattered farmsteads and silos of the Corn Belt, the compact villages of Monsoon Asia, the estate lines of a tea garden.
  - Their weakness is that they are **qualitative and unweighted**. Whittlesey did not say how much each form counts, so boundaries are judgemental.

ECONOMIC GEOGRAPHY · AGRICULTURAL TYPOLOGY

Whittlesey's Five Functioning Forms

Five observable criteria define each agricultural region; together they separate subsistence from commercial and extensive from intensive farming.

THE FIVE FUNCTIONING FORMS



WHERE THE THIRTEEN TYPES SIT



Why the forms matter

- Describe agriculture as a working system
- Observable on the farm and in the landscape
- Same crop, different system: wheat in Punjab vs Kansas

Their weakness

- Qualitative and unweighted
- Ignore tenure, farm size and policy
- A 1930s snapshot

Positions on the chart are indicative.

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The Thirteen Agricultural Regions

PYQ 2026 · 2024 · 2017 +2

NO.	TYPE	ORIENTATION	INTENSITY	MAIN REGIONS
1	Nomadic herding	Subsistence	Extensive	Sahara and Sahel, Arabia, Central Asia, Mongolia, Tibet, Horn of Africa, Arctic tundra
2	Livestock ranching	Commercial	Extensive	Western US, northern Mexico, Patagonia, interior Australia, New Zealand, South Africa
3	Shifting cultivation	Subsistence	Extensive	Amazon basin, Congo basin, West Africa, Southeast Asian islands, north-east India
4	Rudimentary sedentary tillage	Subsistence	Low	Tropical Africa, Central and South America, Southeast Asia
5	Intensive subsistence tillage, rice dominant	Subsistence	Very intensive	South and South-east China, Bengal, eastern and coastal India, Indochina deltas, Japan, Korea, Java
6	Intensive subsistence tillage, without rice	Subsistence	Intensive	North China Plain, Manchuria, interior and north-west India, Pakistan
7	Commercial plantation	Commercial	Intensive (capital)	Tropical coasts of Asia, Africa, Latin America and the Caribbean
8	Mediterranean agriculture	Commercial	Intensive	Mediterranean basin, California, central Chile, South Africa's Cape, south-west and south Australia
9	Commercial grain farming	Commercial	Extensive	Great Plains of the US and Canada, Pampas, Eurasian steppes, Australian wheat belt
10	Commercial livestock and crop (mixed) farming	Commercial	Intensive	Western and central Europe, eastern US Corn Belt, Pampas, south-east Australia, South Africa
11	Subsistence crop and stock farming	Subsistence	Moderate	Eastern Europe and Russia (as mapped in 1936), parts of West Asia and highland Mexico
12	Commercial dairy farming	Commercial	Very intensive	North-western Europe, the US Great Lakes and north-east, south-east Canada, south-east Australia, New Zealand

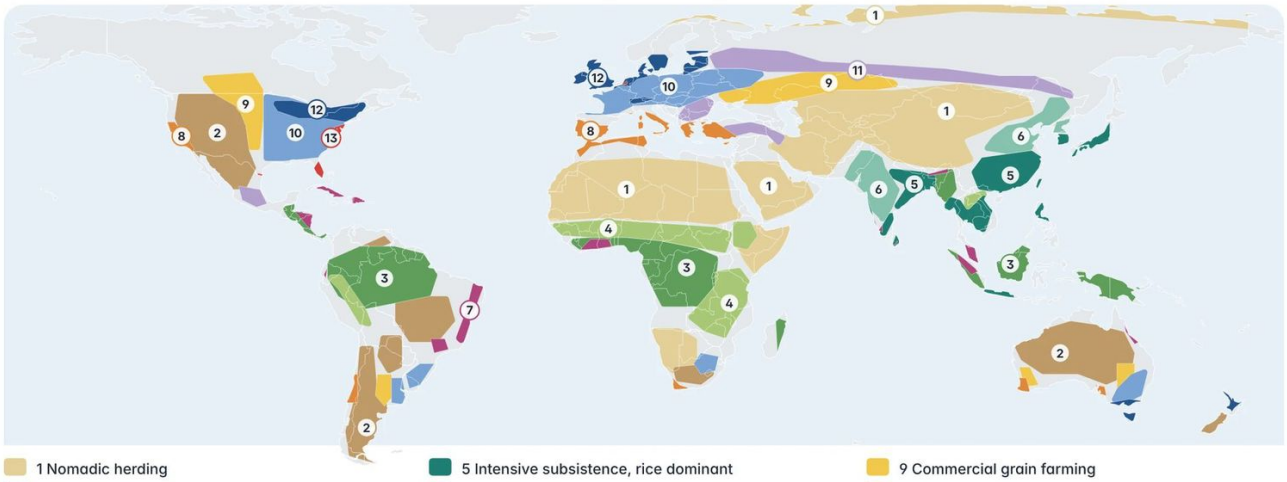
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NO.	TYPE	ORIENTATION	INTENSITY	MAIN REGIONS
13	Specialised horticulture	Commercial	Very intensive	US Atlantic and Gulf coasts, California, north-western Europe; patches near large cities

ECONOMIC GEOGRAPHY · AGRICULTURAL TYPOLOGY

Whittlesey's Agricultural Regions of the World (1936)

Thirteen types of agriculture defined by crop–livestock association, methods, intensity, disposal of produce and farm structures.



1 Nomadic herding
2 Livestock ranching
3 Shifting cultivation
4 Rudimentary sedentary tillage
11 Subsistence crop and stock farming
5 Intensive subsistence, rice dominant
6 Intensive subsistence, without rice
7 Commercial plantation
8 Mediterranean agriculture
9 Commercial grain farming
10 Commercial livestock and crop (mixed)
12 Commercial dairy farming
13 Specialised horticulture
Unproductive or little used

Subsistence types (1, 3, 4, 5, 6, 11)
Tropical forests, drylands and Monsoon Asia; labour-intensive or extensive, for the family.

Commercial types (2, 7, 8, 9, 10, 12, 13)
Mid-latitude Europe, the Americas, Australia and colonial tropical coasts; capital-intensive, for markets.

Reading the map today
Core regions still hold, but nomadism and shifting cultivation have shrunk and Asia has commercialised.

Generalised after Whittlesey (1936); boundaries simplified. Base map: Natural Earth. lotusarise.com

1. Nomadic Herding

- An **extensive, subsistence** system of grazing animals on **natural pastures**, with herders moving seasonally in search of water and grass.
- **Regions:** the Sahara and its Sahel margins (Mauritania, Mali, Niger, Chad, Sudan), Arabia, Iran–Afghanistan, Central Asia, Mongolia, the **Tibetan Plateau**, the Horn of Africa, and the **Arctic tundra** (reindeer herding by the **Sami** of northern Scandinavia and herders of northern Russia).
- **Characteristics:**
  - Closely tied to the natural environment; animals supply food, clothing, shelter and transport.
  - Mixed herds suit local conditions: camels and goats in deserts, yaks in Tibet, reindeer in the tundra, cattle among the **Maasai** of East Africa.

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  - **Transhumance** in mountains: herds move to high pastures in summer and down to valleys in winter, as the **Gujjars and Bakarwals** of Jammu and Kashmir and the **Gaddis** of Himachal Pradesh do.
- **Examples:** the **Bedouin** of Arabia, the **Tuareg** of the Sahara, Mongol herders, Tibetan yak herders.
- **Present status:** shrinking, as states settle nomads, borders cut migration routes, ranches and irrigation take over grazing lands, and droughts hit the Sahel and Horn of Africa.

2. Livestock Ranching

- **Extensive commercial grazing** on permanent, fenced ranches in **semi-arid grasslands** of the New World and the Southern Hemisphere. Cattle, sheep and goats are raised **for the market**.
- **Regions:** western US and Canada, northern Mexico, the **Pampas** and **Patagonia** (Argentina), Uruguay, interior Brazil, the Australian **Outback**, New Zealand, the **Karoo** and Highveld of South Africa.
- **Characteristics:**
  - Settled ranchers working individually, with **scientific management**: fencing, water bores, veterinary care, selective breeding.
  - Specialisation in animal products (beef, wool, mutton, hides); little cropping.
  - Ranching opened up new lands and drove the growth of railways, meat-packing towns and refrigerated ports.
- **Examples:** cattle ranching in the Pampas and the US high plains; **sheep stations** for **Merino wool** in Australia.
- **Present status:** expanding cattle ranching in the **Brazilian Amazon and Cerrado** is a leading driver of deforestation.

3. Shifting Cultivation

- A **land-rotation** system, known as **slash-and-burn**: farmers clear a forest patch by cutting and burning, cultivate it for a few years until fertility falls, then move to a new patch and leave the old one to regrow.
- **Regions:** the Amazon basin, Central America, the Congo basin and West Africa, Southeast Asian islands (Borneo, Sumatra, New Guinea), the hill tracts of Myanmar and **north-east India**.
- **Regional names:**

NAME	REGION
Jhum	North-east India
Ladang	Indonesia and Malaysia
Milpa	Mexico and Central America
Kaingin	Philippines
Conuco	Venezuela
Roça	Brazil

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NAME	REGION
Masole	Congo basin
Ray	Vietnam

- **Characteristics:**
  - **Field rotation, not crop rotation**; ash fertilises the soil.
  - Short cropping (2–3 years) and, traditionally, a long fallow of 10–20 years. Population pressure has cut the jhum cycle in north-east India to as little as 3–5 years, so soils cannot recover.
  - Crops: upland rice, maize, millets, cassava, yams, vegetables; mainly for family use.
- **Present status:** declining through deforestation, population growth and government programmes for settled farming, terracing and plantations (oil palm, rubber, areca).

4. Rudimentary Sedentary Tillage

- **Subsistence farming on permanent fields** in the tropics, a step beyond shifting cultivation. Fields are used year after year, with periodic fallowing and **crop rotation**.
- **Regions:** savanna and highland tropical Africa, parts of Central and South America, Southeast Asia.
- **Characteristics:**
  - Animals are used for draught, milk and meat.
  - Crops: maize, millets, sorghum, upland rice; root crops (cassava, yams, sweet potato); tree crops (bananas, oil palm, rubber).
  - Low capital and low yields; small surpluses sold in local markets.
- **Present status:** being absorbed into commercial smallholder farming as roads, markets and cash crops spread.

5. Intensive Subsistence Tillage with Rice Dominant

- The farming system of **Monsoon Asia**. It feeds the densest rural populations on earth on very small holdings, because **wet rice** gives high yields per hectare and absorbs large amounts of labour.
- **Regions:** South and South-east China (Yangtze valley and southwards), the **Ganga–Brahmaputra delta**, eastern and coastal India, the deltas of the **Mekong, Chao Phraya, Irrawaddy and Red River**, Java, the Philippines, Japan, South Korea, Sri Lanka.
- **Characteristics:**
  - **Double or triple cropping**; rice in the wet season, with pulses, oilseeds, jute, vegetables or sugarcane in the dry season.
  - Heavily **labour-intensive**: transplanting, weeding and harvesting by hand, with buffaloes and oxen for ploughing. Machinery is spreading fast in China, Japan and India.
  - **Small, fragmented holdings**, intensive use of farmyard manure and, since the Green Revolution, HYVs, hybrid rice and fertilisers.
  - Terraced fields on slopes (Ifugao terraces of the Philippines, Bali, Yunnan).
- **Significance:** the backbone of Asian food security. Asia produces about **90%** of the world's rice.

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6. Intensive Subsistence Tillage without Rice Dominant

- The **drier counterpart** of system 5, where rainfall is too low or too seasonal for paddy. Labour-intensive and subsistence-oriented, but based on **wheat, millets, barley, sorghum (kaoliang) and soybeans**.
- **Regions:** the **North China Plain** and Manchuria, the loess plateau, north-west and interior India (Punjab–Haryana, western Uttar Pradesh, the Deccan), Pakistan.
- **Characteristics:**
  - Small, fragmented farms; human and animal labour; manure and crop rotation.
  - **Vulnerable** to erratic rainfall, droughts and crop failure; historically the zone of famines in North China and the Deccan.
  - Irrigation (canals, tube wells), HYV wheat and fertilisers have transformed Punjab–Haryana and the North China Plain into surplus regions.

WHY RICE DOMINATES IN ONE AND NOT THE OTHER

FACTOR	RICE-DOMINANT REGION	REGION WITHOUT RICE
Rainfall	Over about 150 cm, concentrated in the monsoon; standing water possible	Under about 100 cm, unreliable; long dry season
Temperature	High through the growing season (above about 20–25 °C)	Cold winters (North China, Manchuria) or hot dry summers
Relief and soil	Flat deltas and flood plains with clayey, water-retentive alluvium	Loess, black and alluvial soils on higher, better-drained plains and plateaus
Water source	Monsoon floods, tanks, canals	Wells, tube wells, canals; often rainfed
Crops	Wet rice, jute, sugarcane	Wheat, millets, sorghum, barley, soybean, gram
Population	Extremely dense deltas	Dense but somewhat lower
Examples	Bengal delta, Yangtze, Mekong	Punjab, Deccan, North China Plain

- The difference is thus essentially one of **water**: where rainfall or irrigation can keep fields flooded through a hot growing season, rice gives the highest return to land and labour. Elsewhere, drought-tolerant cereals take its place. Irrigation has blurred this line: **Punjab** now grows rice in the kharif season, at a heavy cost in groundwater.

7. Commercial Plantation Agriculture

- **Large-scale, capital-intensive, export-oriented monoculture** of tropical tree and bush crops on **estates**, developed under **European colonial rule** to supply industry and consumers in Europe.
- **Regions and crops:** tea in **Assam, Darjeeling, the Nilgiris** and Sri Lanka; rubber in Malaysia, Indonesia, Thailand; **oil palm** in Indonesia and Malaysia; cocoa in Côte d'Ivoire and Ghana; coffee in Brazil, Colombia, Vietnam; bananas in Central America and Ecuador; sugarcane in the Caribbean and Brazil.

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- **Characteristics:**
  - Large estates, often with their own **processing factory**, worker housing, roads and links to a port.
  - **Monoculture**, scientific management and heavy use of fertilisers and pesticides.
  - Historically **foreign capital and cheap migrant labour**: indentured Indian labour in Malaya, Sri Lanka, Fiji and the Caribbean.
  - Problems: price volatility, pests and diseases, soil exhaustion, deforestation and labour exploitation.
- **Present status:** many estates have been nationalised or broken up. **Smallholders** now produce much of the world's rubber, cocoa and oil palm, and the **regional specialisation of plantation crops** has shifted towards Southeast Asia and West Africa.

8. Mediterranean Agriculture

- A specialised commercial system of lands with **hot, dry summers and mild, rainy winters**, combining **winter cereals, drought-resistant tree crops, irrigated horticulture and small livestock**.
- **Regions:** lands around the **Mediterranean Sea**, **California**, **central Chile**, the **Western Cape** of South Africa, and **south-west and south Australia** (Perth, Adelaide).
- **Characteristics:**
  - **Winter wheat and barley** grown on winter rain.
  - Tree and vine crops with deep roots and waxy leaves: **olives, grapes, figs, almonds, citrus**. The region is called the **"orchard of the world"**.
  - Summer **irrigation** for fruit and vegetables; growing use of greenhouses (Almería in Spain).
  - Sheep and goats on rough hill land, with transhumance.
  - **Viticulture** and **wine-making**: France, Italy and Spain are the leading wine producers.
- **Significance:** supplies citrus, out-of-season vegetables and wine to Europe and North America; increasingly threatened by drought, heat waves and wildfires linked to climate change.

9. Commercial Grain Farming

- **Extensive, highly mechanised** cultivation of grain, chiefly **wheat**, on very large farms in the **mid-latitude grasslands**, far from markets and with low population densities.
- **Regions:** the **Great Plains** and Canadian **Prairies**, the **Pampas** of Argentina, the **steppes** of Ukraine, southern Russia and Kazakhstan, and the **wheat belts** of New South Wales and Western Australia.
- **Characteristics:**
  - Farms of hundreds to thousands of hectares; ploughing, sowing and harvesting by tractors and **combine harvesters**. Labour productivity is the highest of any system.
  - Yields per hectare are moderate; fertiliser use is lower than in intensive systems and farming depends on rainfall.
  - Produce moves by rail and through grain elevators to ports for export.
  - **Winter wheat** belt in Kansas, Oklahoma and Texas (sown in autumn); **spring wheat** belt in the Dakotas, Montana and the Canadian Prairies (sown in spring because winters are too severe).
- **Significance:** the **"granaries of the world"** that supply the international grain trade. Russia has become the world's leading wheat exporter.

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10. Commercial Livestock and Crop Farming (Mixed Farming)

- The integration of **crop cultivation and livestock rearing** on the same commercial farm, in the humid middle latitudes. It is the characteristic system of **Europe** and spread with European settlement.
- **Regions:** Europe from Ireland across central Europe to western Russia; the eastern US and Canada east of about the 98th meridian, with the **Corn Belt** (Iowa, Illinois, Indiana) as its core; the eastern Pampas; south-east Australia; New Zealand; parts of South Africa.
- **Characteristics:**
  - Crops (maize, wheat, barley, oats, potatoes, sugar beet, fodder) feed animals; manure feeds the soil. In the Corn Belt, maize and soybeans fatten cattle and pigs.
  - **Market-oriented, capital-intensive and mechanised**, run by skilled farmers close to urban markets.
  - **Risk-spreading:** losses in one enterprise are balanced by the other.
- **Significance:** one of the most productive and scientifically managed systems; its spatial arrangement around cities resembles the rings of **Von Thünen's model**.

11. Subsistence Crop and Stock Farming

- Whittlesey's type for areas where crops and livestock are raised **mainly for the family**, with little marketing, low capital and traditional techniques.
- **Regions (as mapped in 1936):** much of eastern Europe and the Soviet Union, parts of West Asia (Anatolia, Iran) and the highlands of Mexico. Similar systems persist in the hill and dry regions of India (Rajasthan, parts of the peninsula).
- **Characteristics:** rye, wheat, barley, maize, millets; sheep and goats; poor seed and stock; fertility kept up with manure, compost and fallow.
- **Present status:** Soviet **collectivisation (from 1929)** was already replacing peasant farms with collective and state farms as the map appeared. This is the clearest case of how political change makes a type out of date.

12. Commercial Dairy Farming

- The most **capital- and labour-intensive** form of livestock farming: cattle are reared for **milk and milk products** (butter, cheese, milk powder, condensed milk).
- **Regions: north-western Europe** (Denmark, the Netherlands, Britain, northern Germany, France, Switzerland, southern Scandinavia), the **US Dairy Belt** (Wisconsin, Minnesota, New York) and south-east Canada, **New Zealand** and south-east Australia (Victoria, Tasmania).
- **Characteristics:**
  - Cool, moist climates with good **pastures**; fodder crops and **silage** for winter.
  - Heavy investment in **milking machines, refrigeration, silos and barns** (Whittlesey's "ensemble of structures").
  - Close to large urban markets, with fast transport and cooperatives (the Danish cooperative model, India's **Anand/Amul** model).
  - High yields from improved breeds such as **Holstein-Friesian** and Jersey: more than 10,000 kg of milk per cow a year in Denmark, against about 3,500 kg in Romania and Bulgaria (2023).
- **Significance:** New Zealand is the leading exporter of dairy products; **India** is the world's largest milk producer, but from small herds, not commercial dairy farms of the Whittlesey type.

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13. Specialised Horticulture

- **Intensive commercial cultivation of vegetables, fruits and flowers**, usually on small, high-value farms near large urban markets or along fast transport routes.
- **Regions:** the US Atlantic coast (**truck farming**), Florida, the Rio Grande valley and California; north-western Europe, especially the **Netherlands** (flowers, glasshouse vegetables); fruit valleys such as the Rhône, the Rhine and Mendoza; dates in West Asia; spices and tropical fruits in India and Southeast Asia.
- **Characteristics:**
  - High inputs of labour, capital, fertilisers, irrigation and pesticides; growing use of **glasshouses**, hydroponics and cold chains.
  - Strongly market-driven; perishable produce needs fast transport.
- **Present status:** now a **global value chain**: Kenyan and Ethiopian cut flowers, Chilean grapes and Indian grapes and mangoes are flown or shipped to distant markets, and the Netherlands is a leading exporter of food and flowers.

Merits of Whittlesey's Classification PYQ 2024 · 1996

- **First systematic world typology** of agriculture; still the standard framework in atlases and textbooks.
- **Functional basis:** the five forms describe how farming works, not only what is grown.
- **Observable and mappable:** criteria can be checked in the field and partly measured.
- **Comparative:** allows generalisation across continents and comparison of regions.
- **Integrative:** combines physical and human factors in one scheme, in the tradition of regional geography.
- **Flexible framework:** later scholars refined and updated it rather than discarding it.

Limitations

- **Qualitative and subjective:** the five forms are not weighted or quantified, so boundaries are drawn by judgement.
- **Neglect of institutional factors:** land tenure, farm size, ownership (estates, collectives, family farms) and state policy are left out, though they decide how farming works.
- **Static:** it is a snapshot of the 1930s. It could not anticipate collectivisation, decolonisation, the Green Revolution, mechanisation in Asia or globalisation.
- **Coarse scale:** each world region hides large internal variations, as in India, where several types coexist within one state.
- **Euro-American bias:** commercial types of the mid-latitudes are subdivided finely, while varied tropical systems are lumped together.
- **Unproductive lands** (forests, deserts, ice) are left out, although many have since been brought into use.

Relevance Today

- **Still valid in its broad pattern:** the core areas of rice-based subsistence farming, mid-latitude grain, mixed and dairy farming, ranching and Mediterranean agriculture remain where Whittlesey put them. The five functioning forms remain a sound way to describe any farming system.

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- **Changes since 1936:**
  - **Subsistence to commercial:** the Green Revolution and markets have made Punjab, Haryana and the North China Plain surplus-producing regions.
  - **Decline of shifting cultivation and nomadism** under population pressure, deforestation and state policy.
  - **Political transformations:** collective farms in the USSR and China came and went; China's **Household Responsibility System (1978)** restored family farming.
  - **New frontiers:** soybean and maize in the **Brazilian Cerrado**, oil palm in Indonesia and Malaysia, irrigated agriculture in Saudi Arabia and Egypt's desert margins.
  - **New systems** that do not fit his scheme: **contract farming**, organic farming, protected cultivation, vertical farming and peri-urban dairying.
  - **Climate change** is shifting crop belts poleward and upslope and increasing drought risk in the Mediterranean and semi-arid grain lands.
- Whittlesey's scheme is therefore best used as a **base map of agricultural systems**, updated with modern data on tenure, technology and markets.

03 Other Typologies of World Agriculture PYQ 1993

- **Oliver Edwin Baker (1926–1930s)** delineated the agricultural regions of North America mainly by crops and climate. This crop-based approach preceded Whittlesey's functional one.
- **Richard S. Thoman and Donald W. Fryer** modified Whittlesey's scheme for economic geography, grouping regions into broad classes such as subsistence, commercial and transitional agriculture.
- **IGU Commission on Agricultural Typology (from 1964):** led by **Jerzy Kostrowicki** of Poland, it built a typology from many measurable attributes in four groups: **social** (ownership, tenure, farm size), **organisational-technical** (labour, mechanisation, irrigation, fertiliser), **production** (land and labour productivity, commercialisation) and **structural** (crop and livestock mix). Its first-order types were **traditional, market-oriented and socialised** agriculture.
- **David Grigg (1974)**, in *The Agricultural Systems of the World: An Evolutionary Approach*, explained each system historically: how it arose, spread and changed.
- **FAO farming systems (2001):** a study led by **John Dixon** identified **72 farming systems** in the developing regions, grouped by resource base, dominant livelihood and market access. It is used to target poverty and climate-adaptation programmes.
- **Indian studies** of **agricultural regionalisation** by crop combination, **agro-climatic zones** and agro-ecological regions apply the same logic at the national scale.

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ECONOMIC GEOGRAPHY · AGRICULTURAL TYPOLOGY

How World Agriculture Has Been Classified

From crop belts to Whittlesey's functional regions, the IGU's quantitative typology and FAO farming systems.

1926–30s
O. E. Baker
Basis: Crop and climate
Agricultural regions of North America mapped by dominant crops (Corn Belt, Wheat Belts, Cotton Belt)

1936
Derwent Whittlesey
Basis: Five functioning forms
13 world agricultural regions; first systematic global typology

Mid-20th c.
Thoman and Fryer
Basis: Economic orientation
Whittlesey's regions regrouped into subsistence, commercial and transitional classes

From 1964
Kostrowicki (IGU)
Basis: Many measured attributes
Social, organisational-technical, production and structural attributes; traditional, market-oriented and socialised types

1974
David Grigg
Basis: Evolution of systems
Each system explained by its origin, spread and change over time

2001
FAO (John Dixon et al.)
Basis: Resources and livelihoods
72 farming systems in developing regions, used to target poverty and climate action

Descriptive, crop-based → Functional → Quantitative, livelihood-based

Common aim
Group farms that work alike into types that can be mapped and compared.

Main shift
From what is grown, to how farming works, to measured attributes and livelihoods.

In India
Crop combination, agro-climatic zones and agro-ecological regions apply the same logic nationally.

Simplified comparison.

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04 Regional Patterns of World Agriculture

REGION	DOMINANT SYSTEMS	KEY CROPS AND LIVESTOCK	DISTINCTIVE FEATURES
South and East Asia	Intensive subsistence (rice and non-rice), plantations	Rice, wheat, tea, jute, rubber, oil palm	Monsoon-dependent, small holdings, Green Revolution gains; Asia grows about 90% of world rice
West Asia and North Africa	Irrigated farming, Mediterranean agriculture, nomadic herding	Wheat, barley, dates, cotton, citrus	Aridity; Nile, Tigris–Euphrates irrigation; Israel's drip-irrigated horticulture
Europe	Mixed farming, dairy, Mediterranean, horticulture	Wheat, barley, sugar beet, grapes, olives, milk	Mechanised, subsidy-supported (Common Agricultural Policy); under 5% of workers in farming
North America	Commercial grain, mixed (Corn Belt), dairy, ranching, horticulture	Wheat, maize, soybeans, cotton, beef, milk, fruit	Specialised belts; about 2% of workers feed the continent and export a surplus

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REGION	DOMINANT SYSTEMS	KEY CROPS AND LIVESTOCK	DISTINCTIVE FEATURES
Latin America	Plantations, ranching, commercial grain and soybeans, subsistence farming	Coffee, sugarcane, soybeans, bananas, beef	Large estates beside smallholders; Brazil leads in coffee, sugar, soybeans and beef exports; Amazon deforestation
Sub-Saharan Africa	Shifting cultivation, rudimentary tillage, nomadic herding, plantation cash crops	Cassava, maize, millets, cocoa, coffee, tea	Low productivity, drought exposure; dual economy of subsistence and export crops
Australia and New Zealand	Ranching, commercial grain, dairy, Mediterranean	Wheat, wool, beef, milk, wine	Export-oriented, limited by aridity in Australia

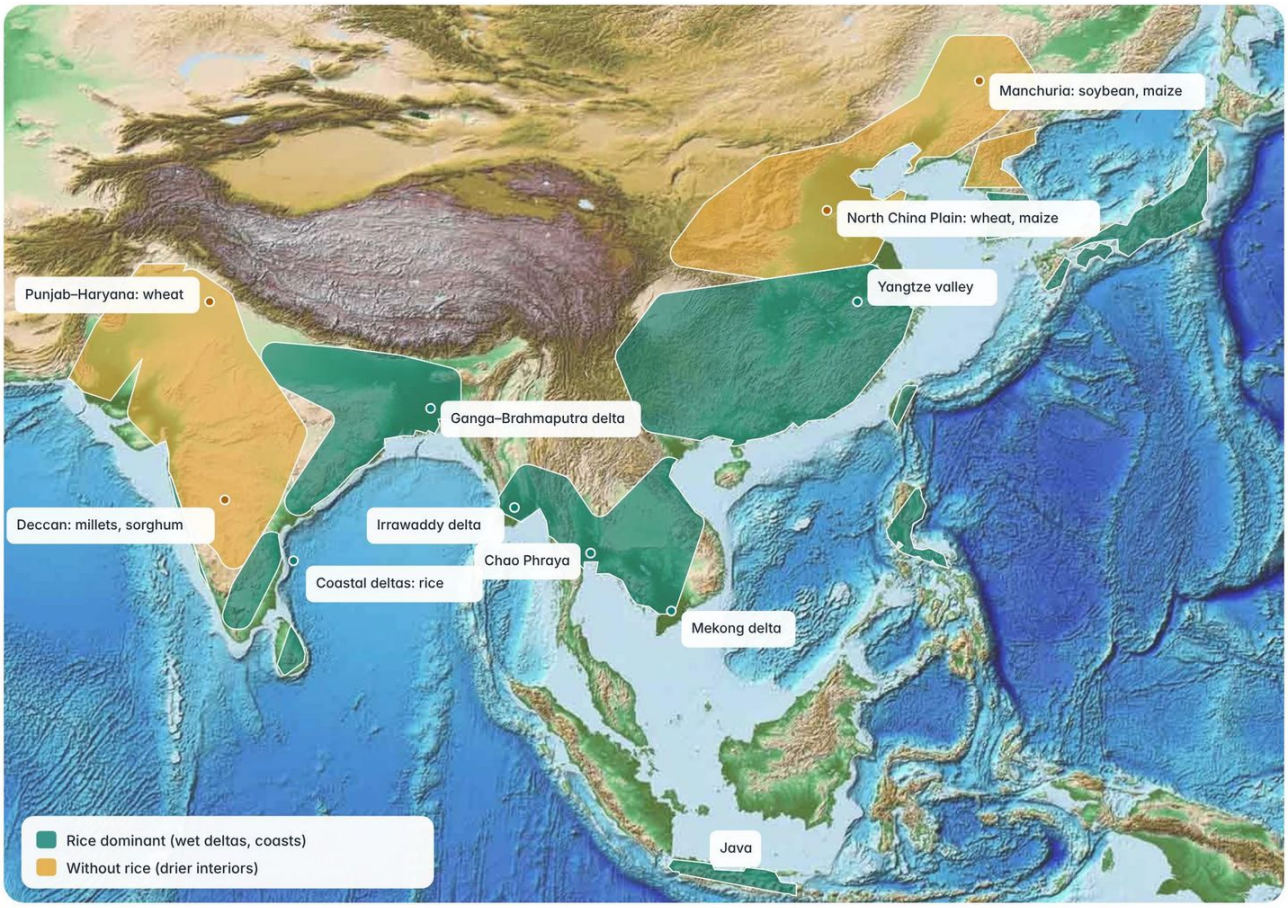
- **Regional sub-patterns:**
  - **South Asia:** rice in the Ganga plains and coastal deltas; wheat in Punjab–Haryana and the Pakistan plains; cotton in the Deccan and Gujarat; jute in Bengal and Bangladesh; tea in Assam and Sri Lanka.
  - **East Asia:** rice in the Yangtze valley and Pearl River delta; wheat and maize on the North China Plain; small-scale intensive farming and horticulture in Japan and Korea.
  - **Southeast Asia:** wet rice in the Mekong, Irrawaddy and Red River deltas; rubber and oil palm in Malaysia and Indonesia; coffee in Vietnam, the world's second-largest producer.
  - **Europe:** mixed farming with cereals, sugar beet and dairy in the west and centre; the Netherlands leads in glasshouse horticulture and flowers; olives, grapes and citrus in the south; dairying in Scandinavia; wheat, sunflower and barley in Ukraine and southern Russia, the old "granary of Europe".
  - **North America:** the **Corn Belt** (maize and soybeans), **Wheat Belts** of the Great Plains, the old **Cotton Belt** of the South, the **Dairy Belt** of the Great Lakes and California's fruit, vegetables and vineyards; wheat and canola on the Canadian Prairies.
  - **Latin America:** soybeans in Mato Grosso; wheat, maize and beef in the Pampas; terrace farming of potatoes, quinoa and maize in the Andes; sugar, bananas and cocoa in the Caribbean and Central America.
  - **Africa:** irrigated wheat, rice, cotton and sugarcane in the Nile valley; cocoa, oil palm and groundnut in West Africa; coffee, tea and cut flowers in Kenya and Ethiopia; maize and tobacco in Southern Africa; cassava and bananas in the Congo basin.
  - **Oceania:** wheat belts of New South Wales and Western Australia, sheep stations in the interior, dairying in Victoria and Tasmania, vineyards in South Australia; dairy, sheep, kiwifruit and wine in New Zealand; root crops and coconuts on the Pacific islands.
- **Common trends:** commercialisation of subsistence systems, mechanisation, shrinking farm workforces, rising yields, consolidation of value chains by agribusiness, and growing exposure to climate risk.
- **Persistent contrasts:** labour-intensive, small-farm agriculture in Asia and Africa versus capital-intensive, large-farm agriculture in the Americas, Europe and Oceania. These reflect differences in population density, capital and history.

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ECONOMIC GEOGRAPHY · INTENSIVE SUBSISTENCE TILLAGE

Rice-Dominant and Non-Rice Farming in Monsoon Asia

Wet deltas and coasts grow paddy; drier interiors of India and North China depend on wheat, millets, sorghum and soybean.



Rice dominant

- Rainfall above about 150 cm
- Flat deltas, clayey alluvium
- Fields kept flooded in a hot season

Without rice

- Rainfall below about 100 cm, unreliable
- Cold winters or long dry season
- Wheat, millets, sorghum, soybean

Blurred by irrigation

- Punjab grows kharif rice on canal and tube-well water
- Groundwater now falling fast

Generalised after Whittlesey (1936). Relief: NOAA ETOPO1.

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Previous Year Questions

2026 Critically examine the significance of five functioning forms with regard to agricultural regions of the world proposed by D. Whittlesey.

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2024	Explain the basis of D. Whittlesey's classification of agricultural regions of the world.
2017	"Whittlesey's agricultural regions are relevant even today." Discuss.
2011	Mention the agricultural regions as classified by Whittlesey and discuss their relevance.
2006	Write down main agricultural types and their associated features with special reference to Whittlesey. Show these regions on the World map provided to you.
1998	Write short note: Types of Farming.
1996	Examine the bases of classification of agricultural regions as proposed by Whittlesey and explain the causes for the essential difference between intensive subsistence tillage with rice dominant and without rice in the crop association.
1993	Give an account of the agricultural typology of the world as presented by Whittlesey and critically examine the parameters used in its delineation.

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