

WRAP Exams · wrapexams.com

Prelims PYQ, Mains model answers, and copy evaluation. Write to the desk for this paper, a doubt, or the AI waitlist.

ask@wrapexams.com · +91 85951 84903 · wrapexams.com

UPSC Mains 2022 GS III

Year-wise PYQ pack · WRAP model answers with canonical links

Official UPSC stems in exam order. Each live answer sits on one WRAP URL; this PDF is the year pack, not a second copy of the article. Open the link under a question for the full page.

<https://wrapexams.com/upsc/mains/gs-3/2022/>

Q1 · 10 marks

Why is Public Private Partnership (PPP) required in infrastructural projects ? Examine the role of PPP model in the redevelopment of Railway Stations in India.

GS III · 2022 · Infrastructure

Revision summary

PPP is needed because public budgets cannot finance all long-life infrastructure on time, and private partners bring capital and operating skill.

- **Risk and revenue are split by contract:** the State keeps policy and often land; the concessionaire takes construction and commercial risk.
- **Railway station redevelopment uses that split:** trains stay with Indian Railways; buildings and retail can be private.

IRSDC and railway SPVs bid packages; Habibganj (Rani Kamalapati) is an early example.

PM Gati Shakti is meant to connect those stations to other modes. Small-town stations may still need public viability support.

Introduction

Roads, rails, ports and stations cost more than one budget year can comfortably carry. **Public-private partnership (PPP)** brings private capital, construction skill and operating discipline into assets the State still owns or regulates. **Railway station redevelopment** is a visible test of that bargain: land and passenger rights stay public; buildings, retail and maintenance can be private.

Body

Why PPP is required in infrastructure

- Public funds must also pay for welfare, defence and interest; they cannot finance every **greenfield corridor** on time.
- Private firms bring **design-build-operate** experience, faster procurement of plant, and a stake in keeping the asset working after inauguration.
- User charges, land monetisation and availability payments can **spread cost** across decades instead of one vote of account.

- **Risk of delay, cost overrun and demand shortfall can be allocated by contract:** construction to the concessionaire, policy and land to the State.
- India already uses PPP in highways (**Hybrid Annuity Model**), ports, airports and some urban metro stretches; stations are the same logic applied to passenger nodes.
- **PM Gati Shakti** (2021) is the Union's multi-ministry map so those PPP assets actually connect, not sit as isolated packages.

Role of PPP in railway station redevelopment

- Indian Railways holds large **city-centre land**. Redevelopment aims to turn a crowded platform into a multimodal hub with concourses, lifts, toilets, parking and last-mile links.
- Under station redevelopment, a private partner typically designs, finances and builds the station and commercial real estate, then recovers cost from **retail, offices, hotels and advertising** while Railways keeps train operations.
- The **Indian Railway Stations Development Corporation (IRSDC)** and later railway special-purpose vehicles were created to bid out such packages; Habibganj (Rani Kamalapati) in Bhopal is an early completed example, with Gandhinagar and other stations in the pipeline.
- PPP is meant to raise **passenger amenity** without a matching jump in the railway capital budget, and to plug stations into city buses, metro and Gati Shakti logistics.
- **Limits are real: land title, heritage buildings, fare politics**, and the fact that a station's commercial rent may not pay for a full rebuild in a small town. Those stations still need public money or a viability gap.

Comment

- PPP is required where the asset is large, long-lived and can earn or save cash. It is not a substitute for a **clear public specification** of safety and access.
- Station redevelopment works when the concession is bankable and the city can absorb the commercial floor; it fails if it is only a real-estate play that ignores platforms.

Flow diagram

Infra funding gap -> PPP capital and ops
 PPP capital and ops -> Highways ports airports
 PPP capital and ops -> Station redevelopment
 Station redevelopment -> Rail land and trains public
 Station redevelopment -> Private build and commercial
 Private build and commercial -> Amenities and multimodal hub
 PM Gati Shakti -> Amenities and multimodal hub

Conclusion

Infrastructure needs PPP because the State cannot fund and run every long-life asset alone. Station redevelopment is that model at the passenger door: private build and commercial recovery, public trains and land. It succeeds only where contracts, city planning and Gati Shakti connectivity move together.

Open WRAP page — <https://wrapexams.com/upsc/mains-answers/gs-3/2022/why-is-public-private-partnership-ppp-required-in-infrastructure-projects-examine-the-role-of-ppp-model-in-the-redevelopment-of-railway-stations-in-india/>

Q2 · 10 marks

Is inclusive growth possible under market economy ? State the significance of financial inclusion in achieving economic growth in India.

GS III · 2022 · Inclusive Growth

Revision summary

A market economy does not by itself deliver inclusive growth; it rewards those who already hold assets.

Inclusion is possible when the State provides public goods and repairs missing credit and insurance markets.

India pairs liberalisation with MGNREGA, NFSA 2013 and Direct Benefit Transfer.

Financial inclusion (Jan Dhan, JAM, UPI, Mudra, PM-Kisan) channels savings, cuts leakage and supports demand.

Significance for growth depends on actual use of accounts and fair credit, not on account-opening numbers alone.

Introduction

A **market economy** allocates goods by price and profit. **Inclusive growth** means that the poor, women, small farmers and lagging districts also gain income, assets and voice. The two are not automatic partners. India's answer has been a market with a **public floor**: identity, bank accounts, credit and transfers so participation is possible.

Body

Inclusive growth under a market economy

- Markets reward those who already have **land, skills, networks and collateral**. Left alone they concentrate gains in cities and large firms.
- Inclusive growth is still possible if the State supplies **public goods** (schools, health, roads, law) and **corrects missing markets** (credit, insurance, land records).
- India after 1991 combined liberalisation with rural employment (**MGNREGA**), food security (**National Food Security Act, 2013**), and Direct Benefit Transfer. That mix is a market economy with a welfare rail, not a pure laissez-faire order.
- Competition can help the poor when it **lowers the price of mobiles, data, medicines and travel**. It harms them when it strips natural resources or casualises labour without a safety net.
- So the honest answer is **yes, if** entry barriers fall and the State keeps capability and a floor; **no, if** growth is only capital-deepening in a few sectors.

Significance of financial inclusion

- **Financial inclusion** is access to a usable account, payments, credit, insurance and pension at a fair cost.
- The **Pradhan Mantri Jan Dhan Yojana**, Aadhaar and mobile (JAM) triangle, **Unified Payments Interface, Mudras, Stand-Up India**, and **PM-Kisan** transfers put cash and credit into accounts that earlier did not exist.
- Inclusion raises **growth** by turning savings into bank deposits, cutting leakages in subsidies, and letting a small firm invoice and borrow instead of staying in cash.

- **It also** stabilises demand: a farmer or gig worker who can receive a transfer or a Kisan Credit Card drawdown does not drop out of the market in a shock.
- **Gaps remain:** dormant accounts, over-indebtedness through microfinance, digital fraud, and thin credit in the poorest blocks. Inclusion is significant only when the account is **used**, not merely opened.

Flow diagram

Market economy -> Growth
Market economy -> Exclusion risk
Public floor -> Inclusive growth
Growth -> Inclusive growth
Financial inclusion -> Jan Dhan Aadhaar UPI
Financial inclusion -> Credit insurance PM-Kisan
Jan Dhan Aadhaar UPI -> Inclusive growth
Credit insurance PM-Kisan -> Inclusive growth

Conclusion

Inclusive growth can occur in a market economy when public goods, regulation and a transfer floor stop the market from excluding the asset-poor. Financial inclusion is the daily machinery of that floor in India: accounts, UPI and scheme credits that make participation real. Opening an account is not the same as raising productivity.

Open WRAP page — <https://wrapexams.com/upsc/mains-answers/gs-3/2022/is-inclusive-growth-possible-under-market-economy-state-the-significance-of-financial-inclusion-in-achieving-economic-growth-in-india/>

Q3 · 10 marks

What are the major challenges of Public Distribution System (PDS) in India ? How can it be made effective and transparent ?

GS III · 2022 · Farm Subsidies and PDS

Revision summary

PDS under NFSA 2013 is a legal grain entitlement, not a discretionary dole.

Main challenges are wrong lists, diversion, poor quality, weak last-mile shops, and a rice-wheat nutrition gap.

Migrants lose access when the card is locked to one State.

Effectiveness needs computerised supply chains, e-PoS, One Nation One Ration Card, social audits, and exception rules when biometrics fail.

DBT can complement urban PDS; it is a poor substitute where food markets are thin.

Introduction

The **Public Distribution System (PDS)** is the State's grain pipeline from the Food Corporation of India and State agencies to the ration shop. Under the **National Food Security Act, 2013** it is a legal entitlement for a large share of households. Leakage, exclusion and poor quality have dogged it for decades. Reforms now run through Aadhaar, digitised records and, in some States, **One Nation One Ration Card**.

Body

Major challenges

- **Inclusion and exclusion errors:** deserving households missing from the list; better-off names remaining. Migration breaks the old State-bound ration card.
- **Leakage and diversion:** grain siphoned between the godown and the shop; ghost cards; under-weighing at the counter.
- **Quality and nutrition:** wheat and rice dominate; coarse grains, pulses and oil are uneven; storage pests and moisture spoil stocks.
- **Last-mile shop:** irregular hours, poor weighing, and a dealer who is also a local power-holder.
- **Fiscal and logistics load:** high economic cost of procurement, carrying and storage; yet the poor still face **out-of-pocket** if the shop is shut.
- **Intra-household and gender:** the card is often in a male name; women and the aged may not actually receive the grain.

Making PDS effective and transparent

- **End-to-end computerisation:** digitised beneficiary lists, electronic weighing, and GPS or e-PoS at the fair-price shop so off-take matches Aadhaar authentication.
- **One Nation One Ration Card** so a migrant can lift grain in the destination State against the same entitlement.
- **Grievance and social audit:** recorded complaints, display of stock, and panchayat or urban ward audits; the NFSA already requires transparency machinery.
- **Cover the genuinely poor:** use Socio-Economic Caste **Census**-type lists with periodic revision; do not punish a failed biometric with a starved month-keep an **exception** protocol.

- **Diversify the basket** where fiscally possible (millets, pulses) and improve **scientific storage** to cut wastage.
- Direct Benefit Transfer of the food subsidy is an option in some urban settings; it should not replace physical grain where markets are thin or prices spike.

Balance

- Technology cuts ghost cards. It does not by itself put grain in a remote hamlet. Effectiveness is **stock plus shop plus list**, not a portal alone.

Flow diagram

NFSA 2013 entitlement -> PDS pipeline
PDS pipeline -> Challenges leakage exclusion quality
Challenges leakage exclusion quality -> e-PoS Aadhaar lists
Challenges leakage exclusion quality -> ONORC portability
Challenges leakage exclusion quality -> Social audit grievance
e-PoS Aadhaar lists -> Effective transparent PDS
ONORC portability -> Effective transparent PDS
Social audit grievance -> Effective transparent PDS

Conclusion

PDS fails when lists are wrong, grain is diverted, and shops are unaccountable. NFSA 2013 made food a right; digitisation, One Nation One Ration Card, social audit and a nutrition-wider basket are how that right becomes a transparent monthly lift. Biometrics must aid the entitled, not lock them out.

Open WRAP page — <https://wrapexams.com/upsc/mains-answers/gs-3/2022/what-are-the-major-challenges-of-public-distribution-system-pds-in-india-how-can-it-be-made-effective-and-transparent/>

Q4 · 10 marks

Elaborate the scope and significance of the food processing industry in India.

GS III · 2022 · Food Processing

Revision summary

Food processing converts perishable farm output into milled, dairy, frozen and packaged products.

India's production base is large; organised processing still covers only a modest share, so scope is wide.

SAMPADA, food-processing PLI, ODOP and FSSAI standards are the main Union tools.

Significance is higher farmer realisation, less post-harvest loss, consumer safety, exports and jobs.

Micro units still face power, cold-chain and compliance costs.

Introduction

India grows a vast **primary surplus**-grain, milk, fruit, vegetables, spices, fish and meat-yet much of it is sold raw, seasonal and perishable. The **food processing industry** turns that produce into flour, oil, dairy, frozen, ready-to-eat and packaged food. Scope is the whole chain from farm gate to retail; significance is less waste, more farm income, and formal jobs.

Body

Scope

- Processing covers **primary** (cleaning, milling, ginning) and **secondary/tertiary** (branded snacks, dairy products, beverages, meat and marine, nutraceuticals).
- India is among the world's large producers of **milk, spices, fruit and vegetables**; organised processing is still a modest share of that output, so the headroom is large.
- Segments with clear room include **cold-chain horticulture**, millet-based foods, marine exports, buffalo meat, and traditional foods brought to **FSSAI** standards.
- **Policy tools: Ministry of Food Processing Industries, Pradhan Mantri Kisan SAMPADA Yojana** (mega food parks, cold chains, value-addition), **Production Linked Incentive** for food processing, and **One District One Product** branding.
- **FSSAI** sets safety standards; without them processed food cannot enter organised retail or export.

Significance

- **Farmers:** a processor is a bulk buyer who can offer a contract, a tomato paste line, or a milk route; that cuts distress sale at harvest and raises **realisation**.
- **Waste:** horticulture and milk spoil; processing and cold chain convert a glut into stock, which is the practical answer to post-harvest loss.
- **Consumers:** safer, labelled, longer-shelf food; urban demand for convenience is already there.
- **Exports:** spices, marine products, rice, buffalo meat and processed snacks earn foreign exchange if **traceability and residue** standards are met.
- **Jobs:** plants, cold stores, packaging and logistics hire more people per tonne than raw mandi trade, including women in sorting and packing.

- **Nutrition and millets:** processing can put coarse grains into biscuits and mixes, which matches the International Year of Millets push and PDS diversification.

Constraints to name, not to hide

- Small farm lots, weak **backward links**, expensive power and cold chain, and compliance cost for micro units. Scope is real; it is not automatic.

Flow diagram

Farm surplus -> Food processing
Food processing -> Cold chain SAMPADA
Food processing -> FSSAI safety
Food processing -> Exports and retail
Food processing -> Jobs
Food processing -> Farmer realisation
Cold chain SAMPADA -> Farmer realisation

Conclusion

Food processing is the industrial use of India's farm surplus. Its scope runs from mill to branded export. Its significance is farm income, less wastage, safer food, jobs and foreign exchange. SAMPADA, PLI and FSSAI are the present rails; they work when the plant is tied to a cluster of actual growers.

Open WRAP page — <https://wrapexams.com/upsc/mains-answers/gs-3/2022/elaborate-the-scope-and-significance-of-the-food-processing-industry-in-india/>

Q5 · 10 marks

The increase in life expectancy in the country has led to newer health challenges in the community. What are those challenges and what steps need to be taken to meet them ?

GS III · 2022 · Indian Economy

Revision summary

Rising life expectancy shifted India's burden toward non-communicable disease, multi-morbidity and old-age care.

Healthy life expectancy lags years lived; out-of-pocket chronic care can impoverish households.

Infections and antimicrobial resistance remain, so the system must handle a double burden.

Steps are Health and Wellness Centre screening, essential NCD drugs, PM-JAY, elderly programmes, and control of tobacco, diet and air pollution.

Geriatric, mental-health and palliative capacity must grow at primary level, not only in metros.

Introduction

Indians now live longer than a generation ago because of vaccines, safer births, and control of many infections. **Life expectancy** rose; the **disease mix** shifted. Hospitals built for diarrhoea and tuberculosis now also face diabetes, cancer, dementia, and long COVID-type aftercare. That is a **newer health challenge**, not a simple victory.

Body

Newer challenges from longer lives

- **Epidemiological transition:** non-communicable diseases (diabetes, hypertension, heart disease, stroke, chronic lung disease, cancers) now cause a large share of death and disability.
- **Multi-morbidity:** an older person often has two or three conditions; a single vertical programme does not fit.
- **Mental health and dementia:** longer life without social support raises depression, isolation and care needs that families still carry unpaid.
- **Geriatric and palliative care** are thin outside a few cities; most primary health centres were not designed for them.
- **Out-of-pocket cost:** long treatment for cancer or dialysis can impoverish even when the first infection was prevented.
- **Healthy life expectancy** lags years lived: people survive but with pain, disability and poor nutrition in old age.
- **Infections have not vanished:** TB, dengue, antimicrobial resistance sit on top of the NCD pile, so the system must do both.

Steps

- **Primary care first:** screen blood pressure, sugar and common cancers at Health and Wellness Centres / Ayushman Arogya Mandirs; do not wait for a tertiary bed.
- **Ayushman Bharat - PM-JAY** for hospital cover of the poor, plus State schemes; pair with **free essential NCD drugs** at the clinic.

- **National Programme for Prevention and Control of Non-Communicable Diseases** (earlier NPCDCS) needs staff, diagnostics and referral that actually function.

- **Healthy ageing:** National Programme for Health Care of the Elderly, home-based care, and pensions that buy food and medicines.

- **Risk factors:** tobacco, trans-fat, air pollution, and inactivity need tax, FSSAI labelling, and city design-not only hospital bills.

- **Human resources:** geriatric, oncology, mental-health and mid-level provider posts; task-sharing so a doctor is not the only door.

- **Data and surveillance:** civil registration of cause of death, and NCD registers, so policy follows burden.

Flow diagram

Higher life expectancy -> Epidemiological transition

Epidemiological transition -> NCDs multi-morbidity

Epidemiological transition -> Geriatric mental palliative

NCDs multi-morbidity -> HWC screening essential drugs

Geriatric mental palliative -> HWC screening essential drugs

HWC screening essential drugs -> PM-JAY and NP-NCD

HWC screening essential drugs -> Tobacco food air risk control

Conclusion

- **Longer life is a development gain. It creates a second burden:** chronic disease, old-age care and catastrophic cost. The response is primary screening, affordable medicines, insurance for the poor, and healthy-ageing services-not only more tertiary towers.

Open WRAP page — <https://wrapexams.com/upsc/mains-answers/gs-3/2022/the-increase-in-life-expectancy-in-the-country-has-led-to-newer-health-challenges-in-the-community-what-are-those-challenges-and-what-steps-need-to-be-taken-to-meet-them/>

Q6 · 10 marks

Each year a large amount of plant material, cellulose, is deposited on the surface of Planet Earth. What are the natural processes this cellulose undergoes before yielding carbon dioxide, water and other end products ?

GS III · 2022 · Environment and Conservation

Revision summary

Plants deposit a large annual mass of cellulose in litter, wood and roots.

Most animals cannot digest the β -1,4 polymer without microbial cellulases.

Fungi and bacteria hydrolyse cellulose to glucose; soil fauna shred and mix.

Aerobic respiration yields carbon dioxide and water; anaerobic guts and wetlands also yield methane.

Humus and soil organic carbon are slower residues, not instant end gases.

Introduction

Land plants lock carbon in **cellulose**-the polymer that makes cell walls. Each year forests, grasslands and crops add a huge mass of that material as litter, roots and wood. It does not sit forever. **Decomposers** and, in part, **herbivores and fire** break cellulose into sugars and then into **carbon dioxide, water** and residues such as humus and, in wet soils, methane.

Body

What must be broken

- Cellulose is a chain of **glucose** units joined by β -1,4 links. Most animals cannot hydrolyse it; they need **microbes**.
- Lignin and hemicellulose travel with cellulose in wood; they slow decay and shape which organisms win.

Natural processes before the end products

- **Mechanical breakdown:** soil fauna (earthworms, termites, millipedes) shred litter, raise surface area, and mix it with microbes.
- **Enzymatic hydrolysis:** fungi (especially **basidiomycetes** and ascomycetes) and bacteria secrete **cellulases** (endoglucanase, exoglucanase, β -glucosidase). The polymer becomes cellobiose and then glucose.
- **Aerobic respiration** of that glucose by microbes (and by animals that host cellulolytic symbionts, such as ruminants and termites) yields **CO₂ and H₂O** and energy.
- **Anaerobic pathways in waterlogged soils, sediments and guts: fermentation and methanogenesis yield organic acids, CO₂ and CH₄** rather than full oxidation.
- **Humification:** not all carbon becomes gas in one season. Some becomes **humus** and soil organic carbon, a slower pool.
- **Fire and photodegradation** in dry biomes oxidise litter partly to CO₂ without passing through a gut; they are natural but not the forest-floor default.
- **Ruminants and termites** are ecological processors of cellulose at landscape scale; their symbionts do the chemistry.

End products in order

- **Immediate:** sugars, then microbial biomass.
- **Terminal under air:** CO₂ and water.
- **Terminal under anoxia:** CO₂, methane, and reduced organics.
- **Residual:** humus, charcoal, and mineral-associated organic matter.

Why it matters for GS-III

- This is the **carbon cycle** on land. Slowing decay (waterlogging, cold, lignin) stores carbon; accelerating it (tillage, drainage) releases CO₂.

Flow diagram

Plant cellulose litter -> Fauna shred
Plant cellulose litter -> Fungal bacterial cellulase
Fauna shred -> Glucose
Fungal bacterial cellulase -> Glucose
Glucose -> Aerobic CO₂ and H₂O
Glucose -> Anaerobic CO₂ CH₄
Glucose -> Humus slow pool

Conclusion

Yearly cellulose is dismantled first by shredders and then by microbial cellulases. Glucose is respired to carbon dioxide and water in air, or fermented to methane in wet systems, with humus as the slow remainder. The end products named in the question are the last step, not the first.

Open WRAP page — <https://wrapexams.com/upsc/mains-answers/gs-3/2022/each-year-a-large-amount-of-plant-material-cellulose-is-deposited-on-the-surface-of-planet-earth-what-are-the-natural-processes-this-cellulose-undergoes-before-yielding-carbon-dioxide-water-and-other-end-products/>

Q7 · 10 marks

Discuss in detail the photochemical smog emphasizing its formation, effects and mitigation. Explain the 1999 Gothenburg Protocol.

GS III · 2022 · Indian Economy

Revision summary

Photochemical smog forms when sunlight acts on NO_x and VOCs, producing ground-level ozone and PAN.

It peaks downwind in the afternoon under stagnant, sunny conditions.

Effects are respiratory harm, crop damage and material cracking; this ozone is not the stratospheric shield.

Mitigation is BS emission norms, VOC controls, public transport and regional air-shed policy.

The Gothenburg Protocol 1999 under CLRTAP sets national ceilings on sulphur, NO_x, ammonia and VOCs to cut acidification, eutrophication and ozone.

Introduction

Photochemical smog is a brown, oxidising haze of **ozone and peroxyacyl nitrates** formed when sunlight cooks **nitrogen oxides and volatile organic compounds**. It is the Los Angeles-type smog, not the classic London sulphur fog. The **Gothenburg Protocol (1999)** is a UNECE treaty to cut the gases that make this smog and acid rain in Europe and North America.

Body

Formation

- **Primary emissions: NO and NO₂ (NO_x)** from vehicles and combustion; **VOCs** from petrol, solvents, and some industry and vegetation.
- In sunlight, NO₂ photolyses; the oxygen atom makes **O₃** with O₂. VOCs feed peroxy radicals that convert NO back to NO₂ **without destroying ozone**, so ozone accumulates.
- **PAN (peroxyacyl nitrates)** and aldehydes form in the same radical soup. Peak is typically **afternoon**, downwind of the city.
- Stagnant high pressure, a basin, and a temperature inversion trap the mix. Indian examples include summer-ozone episodes in some metros, distinct from winter PM_{2.5} smog.

Effects

- **Human health:** ozone inflames airways, triggers asthma, and reduces lung function; PAN is a lachrymator.
- **Plants:** ozone flecks leaves, cuts photosynthesis and crop yield.
- **Materials:** rubber and some paints crack; visibility falls.
- Ozone at the **ground** is a pollutant; ozone in the **stratosphere** is a shield. Do not confuse the two.

Mitigation

- **Cut NO_x:** Bharat Stage emission norms, catalytic converters, inspection of in-use vehicles, power-plant controls.

- **Cut VOCs:** vapour recovery at petrol pumps, solvent standards, leak control.
- Shift to **public transport, electrified fleets, and less congestion;** ozone is a regional pollutant, so one city's fleet is not enough.
- **Alert systems** and reducing outdoor work on peak ozone days protect health while emissions fall.

Gothenburg Protocol, 1999

- Protocol to the **1979 Convention on Long-Range Transboundary Air Pollution (CLRTAP)**, adopted at Gothenburg in **1999**.
- It sets national emission ceilings for **sulphur, NO_x, ammonia and VOCs**-the precursors of **acidification, eutrophication and ground-level ozone**.
- Later amendments added **fine particulate matter** and tightened ceilings. Parties are mainly UNECE (Europe, plus the United States, Canada).
- India is **not** a party in the European sense; the Protocol is still the model of **multi-pollutant, multi-effect** ceilings that Indian NO_x and VOC policy can learn from.

Flow diagram

NO_x -> Sunlight
VOCs -> Sunlight
Sunlight -> Ground ozone PAN
Ground ozone PAN -> Health crops materials
BS norms VOC control -> NO_x
BS norms VOC control -> VOCs
Gothenburg 1999 -> Ceilings Sunlight NO_x NH₃ VOC

Conclusion

Photochemical smog is sunlight plus NO_x and VOCs, yielding ozone and PAN that harm lungs and crops. Mitigation is cleaner vehicles, VOC control and regional air-shed action. The 1999 Gothenburg Protocol is the UNECE bargain to cap those same precursors across borders.

Open WRAP page — <https://wrapexams.com/upsc/mains-answers/gs-3/2022/discuss-in-detail-the-photochemical-smog-emphasizing-its-formation-effects-and-mitigation-explain-the-1999-gothenburg-protocol/>

Q8 · 10 marks

Explain the mechanism and occurrence of cloudburst in the context of the Indian subcontinent. Discuss two recent examples.

GS III · 2022 · Indian Economy

Revision summary

A cloudburst is an extreme short downpour over a small area, often ~100 mm in an hour on a steep slope.

In the Indian subcontinent it is mainly orographic convection in the Himalaya during monsoon or western disturbances.

A slow-moving cell plus a narrow catchment turns rain into flash flood and landslide.

Kedarnath June 2013 and Leh 6 August 2010 are well-documented cases; Amarnath 8 July 2022 is a later yatra-route example.

Nowcasts, radar and keeping settlements off debris fans are the response.

Introduction

A **cloudburst** is an extreme, short-lived downpour over a small area-conventionally of the order of **100 mm in an hour**-often on a steep Himalayan slope. The cloud does not 'burst' like a bag; rain falls faster than the ground or the drainage can take. In the Indian subcontinent this is mainly an **orographic plus convective** monsoon hazard.

Body

Mechanism

- Moist monsoon or western-disturbance air is forced **up a steep hill**. Rapid ascent cools the parcel, condensation is intense, and a deep **cumulonimbus** grows.
- A local **convergence** or a mesoscale vortex can stack more moisture into the same valley.
- If a **weak steering wind** holds the cell over one catchment, rain accumulates in minutes rather than being spread along a track.
- Orographic lift plus **warm-cloud collision-coalescence** yields large drops; the rainfall rate becomes extreme.
- On a slope, the same water becomes **flash flood, debris flow and landslide**. The disaster is hydrology and geology as much as meteorology.

Occurrence in the subcontinent

- **Western and Central Himalaya** (Jammu and Kashmir, Himachal, Uttarakhand) in the monsoon, and sometimes with western disturbances.
- **North-eastern hills** and steep Western Ghat pockets can see similar extreme cells.
- Plains can have very heavy convective rain; the term cloudburst is used most strictly for **concentrated mountain downpours**.
- Climate warming loads more moisture into the air (Clausius-Clapeyron), which can raise the intensity of such cells; attribution of one event still needs care.

Two well-known examples

- **Kedarnath, Uttarakhand, June 2013:** extreme rain and glacial-lake / debris-laden flood in the Mandakini catchment destroyed the shrine town and killed large numbers of pilgrims and residents. It is the benchmark Himalayan hydro-meteorological disaster of that decade.

- **Leh, Ladakh, 6 August 2010:** a cloudburst and flash flood on a high-altitude cold desert, unusual for a rain-shadow town, caused heavy loss of life and damage to the airfield and settlements.
- **Amarnath, Jammu and Kashmir, 8 July 2022** is another documented cloudburst-related flash flood on the yatra route (use this if a 'more recent' second example is needed beside Kedarnath). Do not invent dates.

Preparedness (brief)

- Doppler weather radar in the hills, nowcasts, restricted building on fans and channels, and pilgrimage caps on forecast days.

Flow diagram

Moist monsoon air -> Orographic lift
Orographic lift -> Deep cumulonimbus
Deep cumulonimbus -> Extreme rain small area
Extreme rain small area -> Flash flood debris flow
Kedarnath 2013 -> Flash flood debris flow
Leh 2010 -> Flash flood debris flow

Conclusion

Cloudbursts in the subcontinent are orographic-convective extreme rains held over a small Himalayan catchment. Mechanism is rapid ascent, a stationary cell, and torrents on steep debris. Kedarnath 2013 and Leh 2010 (and Amarnath 2022) are the public memory of that physics. Warning and land-use are the only practical shields.

Open WRAP page — <https://wrapexams.com/upsc/mains-answers/gs-3/2022/explain-the-mechanism-and-occurrence-of-cloudburst-in-the-context-of-the-indian-subcontinent-discuss-two-recent-examples/>

Q9 · 10 marks

Discuss the types of organised crimes. Describe the linkages between terrorists and organised crime that exist at the national and transnational levels.

GS III · 2022 · Border Security and Organised Crime

Revision summary

Organised crime includes narcotics, arms, trafficking, extortion, cyber fraud, smuggling and laundering.

Terrorism is political; crime is profit. They meet where terrorists need money, weapons, documents and routes.

Nationally, linkages are extortion in conflict areas, hawala, gun-running, prison mixing and narco-terror corridors.

Transnationally, the same dhows, containers, diaspora finance and mixers serve both.

Policing must join narcotics, financial intelligence and counter-terror, not run them as separate worlds.

Introduction

Organised crime is a continuing enterprise that sells illegal goods or services and uses violence, corruption and secrecy for profit. **Terrorism** seeks political change through fear. The two are not the same motive. They **link** where the terrorist needs money, arms, fake papers and routes that criminals already run.

Body

Types of organised crime

- **Narcotics trafficking:** heroin, methamphetamine, cannabis, precursor chemicals.
- **Arms trafficking:** small arms, ammunition, explosives.
- **Human trafficking and migrant smuggling:** sexual exploitation, forced labour, illegal crossing.
- **Extortion, protection rackets and contract killing.**
- **Cyber-enabled fraud,** ransomware-as-a-service, and identity theft.
- **Wildlife, timber and gold smuggling; counterfeit currency** and goods.
- **Money laundering** through hawala, trade mis-invoicing, shells and real estate.
- In India, **mafia-type** urban gangs, **coastal smuggling**, and **insurgent taxation** in some conflict belts sit on this list.

Linkages with terrorists - national

- Terror groups levy **extortion and 'taxes'** on timber, poppy, mining or transport in areas they influence-crime as finance.
- They use **criminal gun-runners and hawala** to move weapons and cash inside the country.
- Prison and undertrial networks mix gangsters and radicals; **radicalisation of criminals** and **criminalisation of radicals** both occur.
- Fake identity, stolen vehicles and safe houses are often **bought from the crime market**, not built from ideology.

- Narco-terror in border belts (for example Punjab and Jammu drug-arms drops) blurs the line in operational terms even if motives differ.

Linkages - transnational

- **Shared routes:** the same dhow, container or drone corridor can carry heroin, fake currency and a militant's kit.
- **Diaspora and hawala** corridors fund both cartels and outfits listed under UAPA / UNSC 1267.
- Groups may **tax or escort** drug caravans (a pattern seen in parts of the Af-Pak theatre) without becoming a cartel themselves.
- **Cybercrime-as-a-service** and cryptocurrency mixers can pay for logistics across borders.
- Response must therefore join **NIA, State police, NCB, ED, FIU-IND and coastal / BSF** work, plus MLATs and FATF-style financial standards-not only a terror docket.

Flow diagram

Organised crime -> Drugs arms trafficking
Organised crime -> Hawala laundering
Terror groups -> Money arms papers
Drugs arms trafficking -> Money arms papers
Hawala laundering -> Money arms papers
Money arms papers -> National cases NIA NCB
Money arms papers -> Transnational routes FATF

Conclusion

Organised crime is a profit industry with many product lines. Terrorists buy its logistics. Nationally that is hawala, arms, extortion and narco-routes; transnationally it is the same corridors and laundering rails. Treating crime and terror as sealed boxes misses the finance.

Open WRAP page — <https://wrapexams.com/upsc/mains-answers/gs-3/2022/discuss-the-types-of-organised-crimes-describe-the-linkages-between-terrorists-and-organised-crime-that-exist-at-the-national-and-transnational-levels/>

Q10 · 10 marks

What are the maritime security challenges in India ? Discuss the organisational, technical and procedural initiatives taken to improve the maritime security.

GS III · 2022 · Indian Economy

Revision summary

Maritime security covers terror from the sea, piracy, smuggling, IUU fishing, and extra-regional presence on energy and trade lanes.

26/11 showed the gap between Navy blue water and unpoliced creeks.

- **Organisation:** Navy, Coast Guard, marine police, NCSMCS, IMAC and IFC-IOR, plus the Andaman and Nicobar Command.
- **Technical:** coastal radars, AIS, aircraft, UAVs, harbour sensors, and boat-crew identity.
- **Procedural:** joint SOPs, Sagar Kavach exercises, fisherman networks, and ISPS port security.

Introduction

India's security does not stop at the beach. **Maritime security** covers the coastline, exclusive economic zone, sea lanes, ports and offshore assets against terror from the sea, piracy, smuggling, illegal fishing, and grey-zone presence of extra-regional navies. After **26/11**, the Union rebuilt coastal architecture in three layers: who commands, what sensors see, and how a craft is boarded.

Body

Challenges

- **Terror from the sea:** small craft infiltration (Mumbai 26 November 2008 remains the teaching case).
- **Piracy and armed robbery** in the western Indian Ocean and, at times, closer approaches; Indian seafarers on foreign-flag ships are exposed.
- **Smuggling:** narcotics, arms, gold, and people on dhows and fishing boats.
- **Illegal, unreported and unregulated fishing;** depletion and foreign trawlers in the EEZ.
- **Grey-zone naval presence**, research vessels, and extra-regional bases that sit on India's sea lanes of communication (energy from the Gulf, trade through Malacca).
- **Offshore oil, undersea cables and island territories** (Andaman and Nicobar, Lakshadweep) as targets or intelligence platforms.
- **Cyclone and climate** damage to coastal infrastructure is a security-of-supply issue, not only a disaster issue.

Organisational initiatives

- **Indian Navy** as the principal maritime force; **Indian Coast Guard** for EEZ and pollution; **marine police** in coastal States after 26/11.
- **National Committee for Strengthening Maritime and Coastal Security (NCSMCS)** and joint operations centres; **Information Management and Analysis Centre (IMAC)** and the later **Information Fusion Centre - Indian Ocean Region (IFC-IOR)** at Gurugram for sharing white-shipping data.
- **Andaman and Nicobar Command** as a tri-service watch on the eastern approaches.

- Customs, NCB and State police in a coastal security scheme; **Sagar Prahari Bal**-type specialised units in the Navy for force protection.

Technical initiatives

- **Coastal radar chain**, Automatic Identification System (AIS), National AIS network, and Vessel Traffic Services at ports.
- **Satellite and UAV** surveillance; Navy and Coast Guard aircraft and ships for EEZ patrol.
- **Biometric / identity** for fishermen and boat registration so a terrorist craft is harder to hide in the fishing fleet.
- **Harbour defence**: barriers, patrol boats, and underwater sensors at sensitive ports.

Procedural initiatives

- **Standard operating procedures** for Navy-Coast Guard-marine police hot pursuit and boarding.
- **Community policing** of fishermen as the first sensor; joint exercises such as **Sagar Kavach**.
- **International**: information sharing through IFC-IOR, coordinated patrols with neighbours, and Indian Ocean naval symposium-type diplomacy.
- Port security under **ISPSI** (International Ship and Port Facility Security) Code after 9/11, implemented in Indian major ports.

Flow diagram

Maritime challenges -> Terror smuggling piracy
Maritime challenges -> EEZ fishing SLOCs
Navy Coast Guard marine police -> Response
Radar AIS IMAC IFC-IOR -> Response
SOPs Sagar Kavach boat ID -> Response

Conclusion

India's maritime challenge is terror craft, crime, illegal fishing and contested sea lanes. The reply is a Navy-Coast Guard-police command chain, radars and AIS, and boarding SOPs that treat the fisherman as a sensor. 26/11 forced that architecture; IFC-IOR extends it across the ocean.

Open WRAP page — <https://wrapexams.com/upsc/mains-answers/gs-3/2022/what-are-the-maritime-security-challenges-in-india-discuss-the-organisational-technical-and-procedural-initiatives-taken-to-improve-the-maritime-security/>

Q11 · 15 marks

Economic growth in the recent past has been led by increase in labour activity." Explain this statement. Suggest the growth pattern that will lead to creation of more jobs without compromising labour productivity.

GS III · 2022 · Indian Economy

Revision summary

Recent Indian growth was partly an employment and participation rebound after the pandemic, not only a productivity surge.

Much of the extra activity was self-employment and informal work, which can raise GDP while output per worker stagnates.

A durable pattern is labour-intensive tradable manufacturing and services whose productivity already exceeds agriculture.

Gati Shakti, food processing, care, logistics, skilling and MSME credit should move workers into those sectors.

Public works can bridge shocks; they should not be the long-run growth model. Do not protect jobs by blocking tools.

Introduction

Growth can come from **more people working**, from **each worker producing more**, or from both. In several recent Indian years, headline GDP recovered while surveys showed a rebound in **labour force participation and employment**-especially self-employment and rural work-after the pandemic shock. That is growth led in part by **labour activity**, not only by a productivity boom in a few firms. The policy task is more jobs **and** rising output per worker.

Body

How growth was led by labour activity

- **After 2020, output rebound coincided with people** returning to the labour force: women and men who had left paid work re-entered, and usual-status and weekly-status employment recovered in Periodic Labour Force Survey releases.
- A large share of that activity was **self-employment and unpaid family work** in agriculture and petty trade, not factory payrolls. More hands in the field raise **aggregate labour input** even if each hand produces little extra.
- **Construction and informal services** absorbed labour when formal hiring was cautious; their output shows up in GDP as activity more than as machines.
- Contact-intensive services (trade, hospitality, transport) grew by **putting people back to work** as mobility returned-hours and headcount, not only capital deepening.
- This pattern can lift GDP while **labour productivity** (GDP per worker) stays flat or dips, because the extra workers enter **low-productivity** tasks. That is the warning inside the good employment print.

Why that mix is incomplete

- East Asian catch-up paired labour absorption with **manufacturing productivity**. A pure activity rebound risks **job-rich stagnation**: everyone busy, few earning a rising real wage.
- Women's re-entry into unpaid farm work is activity; it is not the same as **regular wage jobs**.

Growth pattern for more jobs without sacrificing productivity

- **Labour-intensive tradables with rising productivity:** apparel, leather, food processing, electronics assembly that **learns** (PLI plus MSME suppliers), not only one capital-heavy refinery.
- **Care, logistics, housing and repair:** urban jobs that machines do not yet replace, paired with **skilling and toolkits** so output per worker rises.
- **Farm to non-farm in the same district:** food processing, warehousing and construction under **PM Gati Shakti** so surplus farm labour leaves disguised unemployment **into** higher-value work, not into idle migration.
- **Formalisation that does not kill the unit:** EPFO-linked hiring incentives, easier compliance, and credit (CGTMSE, TReDS) so a firm can add a second shift instead of staying a one-person shop.
- **Public employment as a bridge, not a destination:** MGNREGA and urban wage programmes stabilise activity; skills and apprenticeships must move workers into **higher-productivity** private or public services.
- **Do not chase jobs by freezing technology.** Productivity comes from tools, power, logistics and skills. The pattern is **more firms that hire and upgrade**, not a ban on machines.

Rule of thumb

- Raise **employment elasticity** in sectors whose productivity is already above agriculture, and raise **productivity** inside those sectors with clusters and power-not by packing more unpaid family labour onto the same plot.

Flow diagram

GDP rebound -> Labour activity hours headcount
 Labour activity hours headcount -> Self-employment farm informal
 Self-employment farm informal -> Weak productivity risk
 Job-rich higher-productivity path -> Labour-intensive manufacturing
 Job-rich higher-productivity path -> Care logistics processing
 Job-rich higher-productivity path -> Skills power Gati Shakti
 Labour-intensive manufacturing -> Jobs with rising output per worker
 Care logistics processing -> Jobs with rising output per worker
 Skills power Gati Shakti -> Jobs with rising output per worker

Conclusion

Recent growth partly reflected more people working again, often in low-productivity self-employment. That lifts GDP and activity; it does not guarantee rising living standards. The needed pattern is labour-intensive manufacturing and services that still invest in skills, power and logistics so jobs and productivity rise together.

Open WRAP page — <https://wrapexams.com/upsc/mains-answers/gs-3/2022/economic-growth-in-the-recent-past-has-been-led-by-increase-in-labour-activity-explain-this-statement-suggest-the-growth-pattern-that-will-lead-to-creation-of-more-jobs-without-compromising-labour-productivity/>

Q12 · 15 marks

Do you think India will meet 50 percent of its energy needs from renewable energy by 2030 ? Justify your answer. How will the shift of subsidies from fossil fuels to renewables help achieve the above objective ? Explain.

GS III · 2022 · Farm Subsidies and PDS

Revision summary

Panchamrit targets 50 per cent of installed electric capacity from non-fossil sources by 2030, including hydro and nuclear.

That is not 50 per cent of energy needs, and not even 50 per cent of electricity generation, because solar and wind have lower capacity factors.

Half of all energy from renewables by 2030 is unlikely given oil and industrial coal.

The capacity target is more plausible if transmission, storage and discom health improve.

Shifting subsidies from fossils to renewables and storage helps relative prices and manufacturing; social fuels need targeted DBT, not a blunt cut.

Introduction

At Glasgow (COP26) India announced **Panchamrit**, including a target that **50 per cent of installed electric capacity** would come from **non-fossil** sources by **2030**. That is not the same as **50 per cent of energy needs** from **renewables**. Capacity is megawatts on the nameplate; energy needs include **heat, transport fuel and electricity actually generated**. The answer must keep those words apart.

Body

Capacity versus needs versus generation

- **Installed capacity** is the rated MW of plants. Solar and wind have **lower capacity factors** than coal or nuclear, so 50 per cent non-fossil **capacity** still leaves coal supplying a larger share of **kilowatt-hours** unless storage and hydro firm the mix.
- **Non-fossil** in Panchamrit includes **large hydro and nuclear**, not only solar and wind. **Renewables** in casual speech often exclude nuclear and sometimes large hydro. Mixing the terms overstates the green share.
- **Energy needs** (primary or final energy) are dominated by **oil in transport, coal in industry and cooking/heat**, not only by the power sector. Even a clean grid would not automatically make half of **all** energy renewable by 2030.

Will India meet '50 per cent of energy needs from renewables by 2030'?

- On a strict reading of **final or primary energy**, **no, not as currently on track**: oil and coal in non-power uses remain large, and 2030 is close.
- On the **official Panchamrit reading-50 per cent non-fossil installed electricity capacity**-India has a **credible shot** because solar auctions, falling module prices, and a large pipeline have already pushed non-fossil capacity to a high share of the total MW. Meeting it still needs **transmission, storage, land and a solvent discom**.
- **So: capacity target, plausible; 'half of energy needs from renewables', not the same promise and not the likely 2030 outcome.**

How shifting subsidies from fossils to renewables helps

- **Fossil subsidies** (under-priced coal freight in some periods, ATF and diesel politics, under-recovery in power) keep dirty energy cheap at the point of use and **crowd out** the relative price signal for solar, wind, storage and electrified transport.
- Moving support to **renewables and storage**-viability gap for offshore wind, green hydrogen pilots, rooftop solar, and timed **PM-KUSUM**-type pumps-lowers the **levelised cost** the buyer sees and builds domestic manufacturing (PLI for modules).
- Redirecting **kerosene and untargeted LPG** leaks toward **clean cooking and targeted DBT** cuts indoor air pollution without pretending every fossil rupee is already gone (fertiliser and LPG still have social aims).
- A **just transition** in coal districts must ride with subsidy reform, or the politics will reverse the shift.
- Subsidy reform is not a magic 50 per cent of **energy needs**; it is how the **power mix and later transport** decarbonise faster.

Honest bottom line

- Celebrate the capacity target. Do not write as if India promised half of all energy from solar by 2030.

Flow diagram

Panchamrit 2030 -> 50 percent non-fossil capacity
 Energy needs -> Oil heat industry
 50 percent non-fossil capacity -> Generation still coal-heavy unless storage
 Shift subsidies -> Solar wind storage e-mobility
 Solar wind storage e-mobility -> 50 percent non-fossil capacity
 Solar wind storage e-mobility -> Energy needs

Conclusion

Panchamrit's 50 per cent is about non-fossil electricity capacity, not half of India's energy needs from renewables. The capacity goal is within reach if grids and storage catch up; the energy-needs phrase is a different, harder test. Shifting subsidies toward renewables and storage improves relative prices; it does not erase oil and industrial coal by 2030.

Open WRAP page — <https://wrapexams.com/upsc/mains-answers/gs-3/2022/do-you-think-india-will-meet-50-per-cent-of-its-energy-needs-from-renewable-energy-by-2030-justify-your-answer-how-will-the-shift-of-subsidies-from-fossil-fuels-to-renewables-help-achieve-the-above-objective-explain/>

Q13 · 15 marks

What are the main bottlenecks in upstream and downstream process of marketing of agricultural products in India ?

GS III · 2022 · Indian Economy

Revision summary

Upstream marketing bottlenecks are small lots, APMC/agent opacity, weak grading, trader-tied credit, and thin MSP outside wheat and paddy.

e-NAM without assaying does not give real price discovery.

Downstream bottlenecks are cold-chain gaps, low processing, many margin layers, weak traceability for export, and logistics for perishables.

GST eased some inter-State tax friction; physical cold movement remains the constraint.

FPOs, warehouse receipts, SAMPADA parks and FSSAI compliance connect the two ends; one portal cannot.

Introduction

Agricultural marketing is the journey from the farm gate to the plate. **Upstream is what the farmer faces before and at first sale: inputs, aggregation, mandi rules, and price discovery. Downstream is what happens after that first sale: storage, processing, retail and export. India has both a mandi-and-APMC problem and a cold-chain-and-brand problem.** They are not the same bottleneck.

Body

Upstream bottlenecks (farm to first buyer)

- **Small marketable surplus:** tiny holdings mean the farmer cannot fill a truck; the village aggregator sets the effective price.
- **APMC / mandi frictions:** in many States the first sale is still tied to a notified market, with **licensed commission agents**, weightment opacity, and delayed payment.
- **Poor price discovery:** even where **e-NAM** exists, lots are not graded, so the screen price is not a real bid for that farmer's bag.
- **Information and bargaining:** limited knowledge of distant prices; weak **Farmer Producer Organisations** in many crops, so the trader's working capital wins.
- **Quality at gate:** mixed lots, high moisture, no **assaying**; processors will not bid, so only the local trader will.
- **Transport from village to mandi:** bad roads, no small trucks, and **loading losses**. Gati Shakti helps corridors more than the last two kilometres.
- **Credit tied to the buyer:** input-trader linkage forces sale to the same man, which is a marketing constraint disguised as finance.
- **MSP procurement** is real for wheat and paddy in surplus belts and thin for most horticulture; upstream horticulture still meets a glut with no buyer.

Downstream bottlenecks (first buyer to consumer/export)

- **Storage and wastage:** inadequate scientific godowns and **cold chain** for fruit, vegetables, milk and fish; seasonal gluts rot before they become stock.
- **Processing gap:** a low organised processing share means downstream demand does not pull a steady farm price (see food-processing policy: SAMPADA, FSSAI).

- **Fragmented wholesale-retail:** many layers of arhatiya, wholesale and kirana; each layer takes a margin and **does not pass quality signals** back to the farm.
- **Standards and traceability:** export rejection on residue and packaging; domestic organised retail needs barcodes and **FSSAI** compliance that small packers lack.
- **Logistics cost and time:** inter-State barriers have eased with GST, but perishable reefer movement, last-mile urban wholesale, and port dwell still add cost.
- **Consumer-end concentration:** a few large buyers can squeeze processors, who then squeeze farmers-downstream market power.
- **Risk and futures:** thin, poorly understood derivative markets; farmers rarely hedge; downstream firms also face **price spikes** without storage.

What links the two

- Without **grading at the farm**, downstream brands cannot contract. Without **downstream plants**, upstream reform only changes who exploits the farmer.
- **e-NAM, warehouse receipts, FPOs, and mega food parks** are useful only as a **chain**, not as isolated portals.

Flow diagram

Farmer -> Upstream mandi e-NAM FPO
 Upstream mandi e-NAM FPO -> First buyer
 First buyer -> Downstream cold chain processing retail
 Downstream cold chain processing retail -> Consumer export
 Upstream mandi e-NAM FPO -> Small lots opacity credit tie
 Downstream cold chain processing retail -> Wastage standards logistics

Conclusion

Upstream, the farmer is stuck with small lots, mandi opacity, and a trader-creditor. Downstream, produce dies in heat, is barely processed, and meets export standards late. Fixing one end without the other only relocates the margin. Grading, FPOs, cold chain and processing have to move together.

Open WRAP page — <https://wrapexams.com/upsc/mains-answers/gs-3/2022/what-are-the-main-bottlenecks-in-upstream-and-downstream-process-of-marketing-of-agricultural-products-in-india/>

Q14 · 15 marks

What is Integrated Farming System ? How is it helpful to small and marginal farmers in India ?

GS III · 2022 · Crops, Irrigation and Marketing

Revision summary

Integrated Farming System is a planned mix of enterprises on one holding so waste becomes input.

- **It is matched to agro-ecology:** crop-dairy, rice-fish, agri-horti-silvi, or homestead livestock.

For small and marginal farmers it diversifies cash flow, spreads climate and price risk, and cuts bought fertiliser and feed.

Family labour and household nutrition improve; soil organic matter is recycled.

Capital, water realism, KVK design and a market remain necessary; IFS is not every activity on every acre.

Introduction

A **small or marginal farmer** cannot live on one monsoon crop on a hectare or less. **Integrated Farming System (IFS)** is a designed mix of crops, livestock, trees, fish or bees on the same holding so that **waste from one enterprise is an input to another**, income is spread across the year, and risk is not a single failed sowing.

Body

What IFS is

- IFS is **not** a random backyard cow plus paddy. It is a **planned combination** matched to agro-ecology: crop + dairy; crop + poultry + compost; rice-fish; agri-horti-silvi; or homestead nutrition gardens with goats.
- **Principle: recycling.** Dung and poultry litter fertilise fields; crop residue feeds animals; pond silt and fish raise rice; trees give fodder, fuel and microclimate.
- It sits in ICAR and Krishi Vigyan Kendra models as a **small-farm livelihood system**, not as a plantation monoculture.
- **Related ideas: mixed farming, agroforestry, and natural farming** overlaps (on-farm inputs), but IFS is broader than any one chemical-free slogan.

How it helps small and marginal farmers

- **Income diversification:** milk, eggs, fish, honey or fruit pay in weeks when grain pays once. That is cash-flow, not only annual profit.
- **Risk spreading:** a drought that cuts the cereal still leaves the goat or the pond if water was budgeted; a pest on one crop does not zero the household.
- **Input cost:** on-farm manure, compost and fodder cut the bill for urea and bought feed-the main cash drain on a marginal plot.
- **Employment of family labour:** women and elders can run dairy, poultry and kitchen gardens; the holding uses **household labour** that a single wheat crop under-employs.
- **Nutrition:** milk, eggs, vegetables and fish from the homestead improve household diets, not only the marketed surplus.
- **Soil and residue:** recycling organic matter and avoiding residue burning protects a small plot that cannot afford degradation.

- **Resilience to price crashes:** if tomato crashes, the dairy still sells; processors and FPOs can still take a mixed lot more easily than a desperate distress sale of one perishable.

Limits (must be stated)

- Capital for a cow, a pond or a polyhouse is still a barrier; **credit, insurance and KVK training** matter.
- Water-scarce IFS cannot copy a rice-fish model. Integration must be **site-specific**.
- Markets for milk and vegetables can still fail; IFS is not a substitute for roads and a buyer.

Policy hook

- Schemes for dairy (Rashtriya Gokul Mission / dairy infrastructure), **PM-Kisan** cash, horticulture missions, and agroforestry guidelines work better when the KVK treats them as **one farm design**, not separate silos.

Flow diagram

IFS design -> Crops
IFS design -> Livestock
IFS design -> Trees pond bees
Crops -> Residue fodder
Livestock -> Manure biogas
Residue fodder -> Livestock
Manure biogas -> Crops
IFS design -> Year-round income nutrition

Conclusion

Integrated Farming System is a planned recycle of crop, animal, tree and sometimes fish on one small farm. For marginal holders it spreads income and risk, cuts bought inputs, uses family labour, and feeds the household. It needs site-specific design, a little capital, and a market-not a poster of every enterprise at once.

Open WRAP page — <https://wrapexams.com/upsc/mains-answers/gs-3/2022/what-is-integrated-farming-system-how-is-it-helpful-to-small-and-marginal-farmers-in-india/>

Q15 · 15 marks

Launched on 25th December, 2021, James Webb Space Telescope has been much in the news since then. What are its unique features which make it superior to its predecessor Space Telescopes ? What are the key goals of this mission ? What potential benefits does it hold for the human race?

GS III · 2022 · Indian Economy

Revision summary

JWST launched on 25 December 2021 on Ariane 5.

It is an infrared telescope at Sun-Earth L2 with a ~6.5 m gold-coated beryllium mirror and a five-layer sunshield.

Hubble is smaller, in low Earth orbit, and strong in visible/UV; Spitzer was a smaller infrared precursor.

Goals are first light, galaxy assembly, star-planet formation in dust, and exoplanet spectroscopy.

Benefits are astrophysics, technology, and complementarity with Hubble and ground observatories. Fuel at L2 limits life.

Introduction

The **James Webb Space Telescope (JWST)** lifted off on **25 December 2021** on an Ariane 5 from French Guiana. It is the successor in ambition to **Hubble**, not a copy. Hubble looks mainly in **visible and ultraviolet** from low Earth orbit. Webb looks in the **infrared** from a distant cold perch, with a much larger mirror, to see the first galaxies, nearby exoplanet atmospheres, and star nurseries inside dust.

Body

Unique features versus predecessors

- **Wavelength:** optimised for **near- and mid-infrared**. Dust-obscured star formation and highly redshifted early galaxies are faint in Hubble's visible band and bright to Webb.
- **Mirror:** a deployable **beryllium** primary about **6.5 metres** across (segmented, gold-coated), far larger than Hubble's 2.4-metre glass, so collecting area and resolution at infrared wavelengths jump.
- **Orbit:** **Sun-Earth Lagrange point L2**, about 1.5 million km out, not low Earth orbit. Hubble can be serviced; Webb was designed not to be. L2 lets a huge **sunshield** keep the optics cold.
- **Sunshield:** a five-layer tennis-court-scale shade so the telescope stays at cryogenic temperature; mid-infrared instruments need that cold.
- **Deployment:** folded for launch, then unfolded in space (mirror, shield, tower)-a complexity Hubble did not attempt.
- **Partnership:** NASA lead with **ESA and CSA**; Hubble was also NASA-ESA, but Webb's infrared instrument suite (NIRCam, NIRSpec, MIRI, FGS/NIRISS) is a new generation.
- Spitzer was an infrared predecessor but **smaller and warmer** in later years; Webb is the leap in aperture and L2 cooling.

Key goals

- **First light and reionisation:** galaxies and quasars in the early universe, when the first stars lit up.
- **Assembly of galaxies** over cosmic time.
- **Star and planet formation** behind dust clouds.
- **Exoplanet atmospheres** by transit spectroscopy: water, carbon dioxide, and other molecules.
- **Solar-system** infrared studies (objects too cool or dusty for Hubble's best band).

Potential benefits

- **Science:** rewrite galaxy-formation timelines; characterise potentially habitable-zone atmospheres (biosignature claims will still need extreme caution).
- **Technology spin-off:** cryogenics, lightweight optics, deployable structures, detectors.
- **Inspiration and STEM,** and a public window on origins questions.
- **Complementarity:** Hubble still does UV/visible; ground ELTs and ALMA fill other bands. Webb does not retire them.

Caution

- L2 is not a place for astronaut repair. Mission life is limited by **station-keeping fuel** and instrument health, even if early fuel estimates were generous.

Flow diagram

JWST 25 Dec 2021 -> Infrared L2 sunshield
 JWST 25 Dec 2021 -> 6.5 m segmented mirror
 Hubble -> Visible UV LEO
 Infrared L2 sunshield -> First galaxies exoplanet atmospheres
 6.5 m segmented mirror -> First galaxies exoplanet atmospheres
 First galaxies exoplanet atmospheres -> Science cryogenics STEM

Conclusion

JWST, launched 25 December 2021, is a cold infrared observatory at L2 with a 6.5-metre deployable mirror-unlike Hubble's smaller visible/UV telescope in low orbit. Its goals are first galaxies, dusty birth sites, and exoplanet airs. Benefits are knowledge, detectors, and a complement to Hubble, not a replacement of every wavelength.

Open WRAP page — <https://wrapexams.com/upsc/mains-answers/gs-3/2022/launched-on-25th-december-2021-james-webb-space-telescope-has-been-much-in-the-news-since-then-what-are-its-unique-features-which-make-it-superior-to-its-predecessor-space-telescopes-what-are-the-key-goals-of-this/>

Q16 · 15 marks

What is the basic principle behind vaccine development? How do vaccines work? What approaches were adopted by the Indian vaccine manufacturers to produce COVID-19 vaccines ?

GS III · 2022 · Indian Economy

Revision summary

Vaccines present a safe antigen so the immune system forms memory without the full disease.

Platforms include inactivated, live attenuated, subunit, viral vector and nucleic acid.

Antibodies and memory T/B cells then respond faster on real exposure.

Covishield is an adenovirus vector made by SII; Covaxin is an inactivated whole-virion vaccine from Bharat Biotech with ICMR-NIV.

India also authorised a DNA vaccine and protein-subunit products; protection against severe disease was the public-health aim as variants evolved.

Introduction

A **vaccine** teaches the immune system to recognise a pathogen **before a dangerous infection. Development is the craft of showing that teacher safely: an antigen, a delivery method, and trials that prove protection. COVID-19** forced India to run that craft at national scale with **Covishield** and **Covaxin**, plus other platforms in the pipeline.

Body

Basic principle of vaccine development

- Identify an **antigen** (protein, sugar, whole killed microbe, or genetic code for that protein) that is **immunogenic but not pathogenic** in the form given.
- **Combine it with a platform:** live attenuated, inactivated whole virus, subunit/protein, toxoid, viral vector, or nucleic acid (mRNA/DNA).
- Add **adjuvants** where needed so the innate system notices the antigen.
- Prove **safety, immunogenicity and efficacy** in phased clinical trials, then **pharmacovigilance** after approval.
- **Manufacture** under GMP, cold chain, and strain update when the pathogen evolves (influenza yearly; COVID boosters as variants rose).
- **Ethics:** informed consent, and **correlates of protection** when efficacy trials become hard.

How vaccines work

- **Innate** cells at the injection site take up antigen and present it to **T cells** in lymph nodes.
- **B cells** make **antibodies** that can neutralise the pathogen; **memory B and T cells** remain after the shot.
- On later exposure, memory cells respond **faster and stronger**, preventing disease or reducing severity.
- Vaccines do not typically 'cause the disease' when inactivated, subunit, vector (non-replicating) or mRNA; live attenuated vaccines use a weakened organism and have specific contraindications.
- **Herd effects** appear when enough people have memory that transmission falls; they are a population result, not a promise to one unvaccinated person.

Indian COVID-19 approaches

- **Covishield:** Serum Institute of India manufacture of the Oxford-AstraZeneca **chimpanzee adenovirus vector** carrying the SARS-CoV-2 spike gene. Non-replicating vector; spike protein is produced in the vaccinee's cells.
- **Covaxin (BBV152):** Bharat Biotech with ICMR-NIV; **inactivated whole virion** plus alum-like adjuvant (Alhydroxiqum-II). Traditional kill-and-inject logic, indigenous strain work.
- Other Indian lines included **protein subunit** (for example Corbevax-type receptor-binding domain), **DNA** (ZyCoV-D, first plasmid DNA COVID vaccine authorised in India), and later **mRNA and nasal** candidates in development or limited use.
- **National rollout:** CoWIN, staggered age groups, and later **precaution doses**; mix-and-match was studied as evidence evolved.
- **Public communication must stay factual:** vaccines cut **severe disease and death**; they are not a 100 per cent shield against all infection, especially as variants changed.

Principle illustrated

- **Vector and inactivated platforms are two validated answers to the same principle:** present spike (or the whole virus) **without COVID disease**, then rely on memory.

Flow diagram

Antigen platform -> Trials GMP
Trials GMP -> Vaccine
Vaccine -> Memory B and Trials GMP cells
Memory B and T cells -> Faster response on exposure
India -> Covishield vector
India -> Covaxin inactivated
India -> DNA subunit mRNA pipeline

Conclusion

Vaccine development isolates a safe antigen, tests it, and manufactures it. In the body it builds antibody and cellular memory. India's COVID mainstays were Covishield (adenoviral vector) and Covaxin (inactivated virion), with DNA and subunit approaches alongside. That is platform diversity, not a single miracle shot.

Open WRAP page — <https://wrapexams.com/upsc/mains-answers/gs-3/2022/what-is-the-basic-principle-behind-vaccine-development-how-do-vaccines-work-what-approaches-were-adopted-by-the-indian-vaccine-manufacturers-to-produce-covid-19-vaccines/>

Q17 · 15 marks

Discuss global warming and mention its effects on the global climate. Explain the control measures to bring down the level of greenhouse gases which cause global warming, in the light of the Kyoto Protocol, 1997.

GS III · 2022 · Environment and Conservation

Revision summary

Global warming is the rise in surface temperature from extra greenhouse gases trapping infrared.

Effects include glacier and ice loss, sea-level rise, coral bleaching, harsher extremes, and crop and coastal stress.

The Kyoto Protocol 1997 set quantified limits for Annex I countries and created emissions trading, Joint Implementation and the CDM.

India was not under a Kyoto cap but hosted CDM projects.

Paris 2015 extended pledges to all parties; the control toolkit remains mitigation, markets, efficiency and sinks.

Introduction

Global warming is the long-term rise in Earth's average surface temperature from **enhanced greenhouse gases**-chiefly carbon dioxide, methane and nitrous oxide-trapping outgoing infrared. The **Kyoto Protocol (1997)** was the first binding attempt to put **quantified emission limits** on industrial countries. Control today still uses Kyoto's logic (count, cap, trade) even after **Paris 2015** shifted to universal pledges.

Body

Global warming

- Solar short-wave energy reaches the surface; Earth emits **long-wave infrared**. Greenhouse gases absorb some of that infrared and re-radiate it, warming the lower atmosphere.
- **Anthropogenic** extra CO₂ from fossil fuels and land-use change, **CH₄** from livestock, waste and leaks, and **N₂O** from fertiliser thicken that blanket.
- **IPCC-assessed** warming relative to pre-industrial times is already more than a degree Celsius; the exact tenth is a moving measured quantity-do not invent a false precision here.
- **Warming is** uneven: land faster than ocean, Arctic faster than tropics.

Effects

- **Cryosphere:** glacier retreat (Himalayan water towers), ice-sheet loss, permafrost thaw that can release more methane.
- **Oceans:** thermal expansion and ice melt raise **sea level**; warmer water **bleaches coral** and lowers oxygen; CO₂ itself causes **acidification** (a cousin problem).
- **Weather:** more intense heatwaves, shifting monsoon risk, heavier extreme rain, and compound drought-fire in some regions.
- **Biosphere and food:** crop heat stress, pest range shifts, fisheries moving poleward.
- **People:** coastal flooding, heat mortality, climate-related displacement, and security stress over water.

- **Tipping elements** (AMOC, rainforest dieback, ice sheets) are risks, not a calendar prediction.

Control measures in light of Kyoto 1997

- Kyoto (adopted **1997**, entered into force **2005**) bound **Annex I** parties to **emission limitation or reduction** over a first commitment period, with **common but differentiated responsibilities** relative to the 1992 UNFCCC.
- **Flexible mechanisms: Emissions Trading, Joint Implementation, and the Clean Development Mechanism (CDM)** so cuts could occur where cheaper, including projects in developing countries (India hosted many CDM projects: renewables, industrial gases).
- **Domestic control toolkit consistent with that architecture:** carbon price or trading, renewable standards, energy efficiency, forest sinks (Kyoto allowed land-use accounting with rules), and methane capture.
- **Limits of Kyoto:** the United States did not ratify; some targets were missed; aviation and much of shipping sat awkwardly; developing-country **growth emissions** were outside binding Annex I caps-hence **Paris** nationally determined contributions for all.
- **India's control path in that light:** not an Annex I Kyoto cap, but CDM experience, later **Panchamrit** and non-fossil capacity, energy-efficiency missions, and a possible carbon market-Kyoto's **MRV and market tools without pretending India had a 1997 QELRC**.

Continuity

- Measure, report, verify; put a cost on carbon; protect sinks. That is Kyoto's lasting method. Paris changed **who pledges**, not the physics.

Flow diagram

GHG CO₂ CH₄ N₂O -> Global warming
 Global warming -> Ice seas extremes food
 Kyoto 1997 -> Annex I quantified limits
 Kyoto 1997 -> ET JI CDM
 ET JI CDM -> Price technology sinks
 Price technology sinks -> Global warming

Conclusion

Global warming is greenhouse trapping of infrared, with effects on ice, seas, extremes and food. Kyoto 1997 first capped Annex I emissions and invented trading, JI and CDM. Control still means price, technology, sinks and honesty about who was bound. Paris universalised pledges; it did not repeal the need to cut gases.

Open WRAP page — <https://wrapexams.com/upsc/mains-answers/gs-3/2022/discuss-global-warming-and-mention-its-effects-on-the-global-climate-explain-the-control-measures-to-bring-down-the-level-of-greenhouse-gases-which-cause-global-warming-in-the-light-of-the-kyoto-protocol-1997/>

Q18 · 15 marks

Explain the causes and effects of coastal erosion in India. What are the available coastal management techniques for combating the hazard ?

GS III · 2022 · Indian Economy

Revision summary

Coastal erosion is net loss of shore from waves, storms, sea-level rise and human interruption of sand.

Dams, seawalls, ports, sand mining and mangrove clearance are the main human causes in India.

Effects include lost villages and roads, saline intrusion, habitat loss and higher cyclone damage.

Soft and nature-based methods (nourishment, dunes, mangroves) treat the sand budget; hard structures protect a point and often starve the next beach.

CRZ, ICZM, sand bypassing and, where needed, managed retreat are the planning tools.

Introduction

India's **long coastline** is not a fixed line. **Coastal erosion** is the net loss of beach and cliff to waves, currents, storms and human structures. Some stretches accrete; many, especially after a port or a seawall, **retreat**. Management is a choice between hard armour, soft beaches, and moving people back.

Body

Causes

- **Natural:** monsoon wave climate, cyclones and storm surge, longshore drift that starves a downdrift beach, sea-level rise, and river-mouth shifts that cut sand supply.
- **Sediment starvation:** dams on east- and west-flowing rivers trap sand that used to feed deltas and beaches.
- **Hard structures:** groynes, seawalls and breakwaters on one plot **rob sand** from the next; unplanned **ports and inlets** do the same at larger scale.
- **Mangrove and dune destruction** for shrimp ponds, real estate and sand mining removes the **buffer**.
- **Relative sea-level** rise from warming plus local subsidence (groundwater, compaction) worsens inundation and erosion.
- **Inlet and creek** training can focus currents that scour banks.

Effects

- **Loss of land, houses and roads** in fishing villages; saltwater in wells and fields.
- **Habitat:** nesting beaches for turtles, dunes, and mangroves shrink.
- **Livelihoods:** landing spaces and drying yards disappear; tourism beaches narrow.
- **Infrastructure:** ports, coastal roads, and defence installations need recurrent repair.
- **Disaster risk:** a thinner beach means waves reach inland sooner in a cyclone.

Coastal management techniques

- **Hard engineering:** seawalls, revetments, groynes, offshore breakwaters, tetrapods. They protect a specific asset but often **shift erosion** alongshore. Use where a city or port cannot retreat.
- **Soft engineering: beach nourishment** (placing sand), dune fencing and vegetation, and **living shorelines**. They need a sand budget and repetition.
- **Nature-based: mangrove and shelter-belt restoration**, coral and wetland buffers, and protecting dune corridors. India's National Coastal Mission / CAMPA-type and mangrove programmes sit here.
- **Hybrid:** a low revetment with a nourished beach and a mangrove belt in front.
- **Planning instruments: Coastal Regulation Zone (CRZ)** rules, setback lines, ban on sand mining in sensitive reaches, and **Integrated Coastal Zone Management (ICZM)** projects (World Bank-supported in some States).
- **Managed retreat:** relocating the most exposed hamlets; politically hard, physically honest where the sediment budget is gone.
- **Sediment management:** dam flushing where feasible, bypassing sand around ports, and stopping illegal mining.
- **Science:** shoreline mapping (NCSCM and Survey of India-type products), monsoon monitoring, and not building in the **active profile**.

Principle

- Erosion is often a **sand-budget** problem. A wall without sand is a delay, not a cure.

Flow diagram

Waves cyclones sea-level -> Erosion
 Dams ports seawalls mining -> Erosion
 Erosion -> Land habitat livelihood loss
 Soft nourishment mangroves CRZ -> Erosion
 Hard walls groynes -> Erosion
 Hard walls groynes -> Downdrift shift

Conclusion

Indian coastal erosion comes from waves and storms plus dams, walls, mining and mangrove loss. Effects are lost land, salt and livelihoods. Management should prefer sand, dunes and mangroves, use hard armour only for vital assets, and keep CRZ setbacks. Shifting the scar down the coast is not protection.

Open WRAP page — <https://wrapexams.com/upsc/mains-answers/gs-3/2022/explain-the-causes-and-effects-of-coastal-erosion-in-india-what-are-the-available-coastal-management-techniques-for-combating-the-hazard/>

Q19 · 15 marks

What are the different elements of cyber security ? Keeping in view the challenges in cyber security, examine the extent to which India has successfully developed a comprehensive National Cyber Security Strategy.

GS III · 2022 · Cyber Security and Money Laundering

Revision summary

Cyber security elements are confidentiality, integrity, availability, authentication, human process, supply chain, and legal institutions.

India's notified document is the National Cyber Security Policy 2013.

A National Cyber Security Strategy was discussed around 2020; a complete public successor was not firmly in force as a single comprehensive charter by 2022.

Operational bodies include CERT-In, NCIIPC and I4C, plus sector regulators.

Gaps remain in MSME/hospital security, skills, supply chain and fragmented law.

Introduction

Cyber security is the protection of networks, devices, data and people from unauthorised access and disruption. It is not only a firewall. India has a **National Cyber Security Policy, 2013**, a **CERT-In**, sectoral CERTs, and years of discussion of a fuller **National Cyber Security Strategy** (a public draft conversation around **2020**). Comprehensive on paper is not the same as comprehensive in every ministry and firm.

Body

Elements of cyber security

- **Confidentiality:** secrets and personal data stay with those allowed (encryption, access control). The **Digital Personal Data Protection** trajectory later added a legal overlay; in 2022 the IT Act and SPDI rules were still the main personal-data peg.
- **Integrity:** data and software are not silently altered (hashing, signing, secure updates).
- **Availability:** systems stay up under attack (DDoS defence, backups, redundancy)-critical for power, payments and hospitals.
- **Authentication and identity:** who is at the keyboard; **Aadhaar** and e-sign help citizens but also enlarge the target.
- **People and process:** phishing is still the usual door; training, least privilege, and incident response matter as much as tools.
- **Physical and supply chain:** devices, undersea cables, and **hardware/software provenance**.
- **Legal-institutional:** offences, MLATs, CERT-In directions, and sector regulators (RBI for banks, CERT-In for incident reporting).
- **Offensive-defensive balance:** attribution, critical-information-infrastructure protection under the **NCIIPC**, and military cyber commands as a separate but related layer.

How far a comprehensive National Cyber Security Strategy?

- **2013 Policy:** the notified **National Cyber Security Policy** set aims-secure computing, 24×7 CERT-In, manpower, and public-private partnership. It was a **policy**, light on dated targets, budgets and ministry-by-ministry duties.

- **2020 discussion:** the National Security Council Secretariat process and a **draft National Cyber Security Strategy** around 2020 sought to update 2013 for **5G, cloud, supply chain, and a whole-of-nation** approach. A single, fully notified, publicly detailed successor strategy was still **awaited / partial** in public domain at the time of the 2022 paper-candidates should not invent a gazette date that did not exist.
- **What does exist in practice:** CERT-In (including 2022-type incident-reporting directions), NCIIPC for critical infrastructure, **I4C** (Indian Cyber Crime Coordination Centre), State cyber police, **National Critical Information Infrastructure** notifications, RBI/SEBI/IRDAI circulars, and Defence cyber capacity.
- **Gaps versus 'comprehensive':** uneven State capacity; MSME and hospital security; **supply-chain** assurance for telecom; shortage of skilled analysts; fragmented laws (IT Act 2000 amendments vs a dedicated cyber security statute); and the tension between **CERT-In logging directions** and privacy/startup cost.
- **Verdict:** India has a **policy (2013) plus a dense operational stack**, and a **strategy still more discussed than finally, fully public as one binding 2020 text**. It is **substantial but not yet one comprehensive, uniformly implemented national strategy**.

What would make it comprehensive

- One **public strategy** with roles, funds, and review dates; cyber hygiene for MSMEs; supply-chain rules; and judicial capacity-without treating every citizen log as a security win.

Flow diagram

CIA identity people supply chain -> Cyber security
 NCSP 2013 -> Cyber security
 Strategy discussion 2020 -> Cyber security
 CERT-In NCIIPC I4C -> Cyber security
 Gaps MSME supply chain skills law -> Cyber security

Conclusion

Cyber security is confidentiality, integrity, availability, identity, people, supply chain and law. India notified a 2013 policy and built CERT-In, NCIIPC and I4C. A full National Cyber Security Strategy was under discussion around 2020 and was not yet a complete, uniformly applied public charter by the 2022 exam window. The stack is real; the single strategy is unfinished.

Open WRAP page — <https://wrapexams.com/upsc/mains-answers/gs-3/2022/what-are-the-different-elements-of-cyber-security-keeping-in-view-the-challenges-in-cyber-security-examine-the-extent-to-which-india-has-successfully-developed-a-comprehensive-national-cyber-security-strategy/>

Q20 · 15 marks

Naxalism is a social, economic and developmental issue manifesting as a violent internal security threat. In this context, discuss the emerging issues and suggest a multilayered strategy to tackle the menace of Naxalism.

GS III · 2022 · Internal Security and Extremism

Revision summary

Naxalism is rooted in tribal land, forest rights, displacement and State absence, and it is also an armed assault on constitutional authority.

Levy, IEDs and jan adalats are security threats, not social work.

The corridor has shrunk but residual pockets, IEDs and overground networks remain.

A multilayered strategy joins force modernisation with FRA/PESA, roads, schools, surrenders and clean local administration.

SAMADHAN-type security checklists fail if predatory officials and empty rights stay in place.

Introduction

Naxalism (Left Wing Extremism) began as an agrarian revolt and became a **protracted armed challenge** in forested, tribal and poorly administered belts. It is both a **development failure**—land, dignity, schools, mines—and a **violent internal security threat** that kills civilians, security forces and democratic workers. A multilayered reply must hold both truths. The question paper's 'gest' is **suggest**.

Body

Social, economic, developmental issue

- **Adivasi and dalit margins: insecure forest rights**, land alienation, and social humiliation created a constituency that Maoist politics claimed to represent.
- **Mining and displacement** without consent or a fair share of royalties turned projects into recruitment narratives.
- **State absence**: schools, primary health, roads, and a non-predatory police were thin; the vacuum was political as well as physical.
- **Livelihood**: tendu, bamboo and informal forest produce versus a contractor-official nexus; **MGNREGA** and forest-rights titles are the lawful alternative to 'janatana sarkar' taxation.
- Treating Naxalism as **only** a gun problem repeats the neglect that fed it. Treating it as **only** a seminar on poverty ignores the gun.

Violent internal security threat

- Armed cadres, IEDs, attacks on police stations, and **jan adalats** that execute alleged informers are **crime and war on the Constitution**, not protest.
- Extortion of contractors and 'levy' on road and mine work is **organised crime** fused with insurgency.
- The aim is parallel power, not a petition. **Casualties among CRPF, State police and civilians** make it a core internal security problem under MHA's LWE division.

Emerging issues

- **Geographic shrink and residual pockets:** the 'Red Corridor' is narrower than a decade ago, but **south Bastar, some Odisha-Jharkhand-Bihar** junctions remain lethal.
- **Urban overground** networks, legal front organisations, and **social-media propaganda**.
- **Weapon and IED sophistication;** possible crime-terror logistics on the edges (arms, explosives), without equating every Naxal band with jihadist groups.
- **Surrender-and-split** dynamics: leadership ageing versus new local recruits over a mining clash.
- **Rights-and-security tension:** fake encounters would destroy the legitimacy that development needs.

Multilayered strategy

- **Security layer:** trained **CRPF/CoBRA and State police**, fortified police stations, road opening, IED management, and **unified command**-without occupying the village as an enemy.
- **Development layer:** roads (including **LWE road schemes**), mobile towers, banks, hostels, **PESA and Forest Rights Act** implementation in letter, and jobs in the same district.
- **Political layer:** panchayats that actually sit; space for democratic Adivasi politics so the gun is not the only voice.
- **Surrender and rehabilitation:** skill, stipend, and protection from revenge-tested State policies exist; they need honesty, not a photo.
- **Perception layer:** local-language outreach, and **prosecution of the contractor-official predator** who is the Maoist's best recruiter.
- **Centre-State:** MHA assistance, intelligence fusion, and State ownership; Naxalism is not only a Delhi graph of districts.
- **SAMADHAN-type doctrines** (smart leadership, aggression against violence, motivation, actionable intelligence, dashboard, action plan, no access to financing) are a checklist; they work only if the **FRA/PESA** limb is real.

Flow diagram

Causes land forest dignity -> Naxalism
 Naxalism -> Violent LWE threat
 Naxalism -> Development vacuum
 Security CoBRA intel -> Naxalism
 FRA PESA roads jobs -> Naxalism
 Panchayat rehab prosecution -> Naxalism

Conclusion

Naxalism is a development wound and a violent challenge to the State. Emerging issues are residual lethal pockets, IEDs, and urban support, even as the map shrinks. A multilayered strategy is security that protects civilians, rights that undercut the narrative, roads and schools in the same block, and politics that is not a camp. Guns without justice recreate the cadre.

Open WRAP page — <https://wrapexams.com/upsc/mains-answers/gs-3/2022/naxalism-is-a-social-economic-and-developmental-issue-manifesting-as-a-violent-internal-security-threat-in-this-context-discuss-the-emerging-issues-gest-a-multilayered-strategy-to-tackle-the-menace-of-naxalism/>

Compiled answer key

Last pages of this pack. Each question links to the WRAP model answer on wrapexams.com.

ask@wrapexams.com · wrapexams.com

Q1 10 marks	Q2 10 marks	Q3 10 marks	Q4 10 marks
Q5 10 marks	Q6 10 marks	Q7 10 marks	Q8 10 marks
Q9 10 marks	Q10 10 marks	Q11 15 marks	Q12 15 marks
Q13 15 marks	Q14 15 marks	Q15 15 marks	Q16 15 marks
Q17 15 marks	Q18 15 marks	Q19 15 marks	Q20 15 marks

Question-wise key

Q1 · 10 marks Solution

Q2 · 10 marks Solution

Q3 · 10 marks Solution

Q4 · 10 marks Solution

Q5 · 10 marks Solution

Q6 · 10 marks Solution

Q7 · 10 marks Solution

Q8 · 10 marks Solution

Q9 · 10 marks Solution

Q10 · 10 marks Solution

Q11 · 15 marks Solution

Q12 · 15 marks Solution

Q13 · 15 marks Solution

Q14 · 15 marks Solution

Q15 · 15 marks Solution

Q16 · 15 marks Solution

Q17 · 15 marks Solution

Q18 · 15 marks Solution

Q19 · 15 marks Solution

Q20 · 15 marks Solution

WRAP Exams · Write. Read. Analyse. Practice. · <https://wrapexams.com/upsc/mains/gs-3/2022/> · ask@wrapexams.com · wrapexams.com