



SAMARTHYA IAS · AHMEDABAD

DAILY UPSC COMPANION

Samarthya Current Affairs

Prelims facts · Mains frameworks · Practice MCQs

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Global Initiatives Against Child Marriage



STORY 1 **The Hindu**

India Co-Sponsors UNGA Resolution Declaring November 27 Against Child Marriage

India co-sponsored a United Nations General Assembly resolution designating November 27 as the International Day for the Elimination of Child, Early and Forced Marriage to accelerate global efforts against child marriage.

The resolution was led by Sierra Leone and adopted by consensus by the 193-member UNGA in New York, with active co-sponsorship and diplomatic endorsement from India.

The date November 27 marks the launch of India's Bal Vivah Mukht Bharat campaign, which aims to reduce child marriage prevalence by 10% by 2026 and eliminate it completely by 2030.

Early and forced marriage violates fundamental human rights, deprives young girls of education and economic opportunities, and perpetuates intergenerational poverty, gender inequality, and adverse maternal health outcomes globally.

Relevant for GS-II Social Justice and International Relations, illustrating multilateral consensus, Sustainable Development Goal 5 on gender equality, and national strategic frameworks targeting the eradication of child marriage.

UPSC RELEVANCE

Examines multilateral diplomacy, international human rights frameworks, and national targets aimed at eradicating child, early, and forced marriage.

PRELIMS FACTS

- The UNGA adopted a consensus resolution led by Sierra Leone declaring November 27 as the International Day for the Elimination of Child, Early and Forced Marriage.
- November 27 marks the national launch date of India's 'Bal Vivah Mukht Bharat' (Child Marriage Free India) campaign.
- India's national campaign aims to reduce child marriage prevalence by 10% by 2026 and achieve complete elimination by 2030.

MAINS FRAMEWORK

Intro: Child, early, and forced marriage remains a fundamental human rights violation that severely compromises health, education, and economic empowerment among young girls globally.

DIMENSIONS

- **Socio-Economic Impacts:** Deprives adolescent girls of schooling, exacerbates gender disparity, and perpetuates intergenerational cycles of poverty and malnutrition.
- **Health & Demographic Consequences:** Increases risks of adolescent pregnancy, maternal mortality, infant morbidity, and severe reproductive health complications.
- **Multilateral & Legal Diplomacy:** Aligning national campaigns like Bal Vivah Mukht Bharat with UNGA mandates strengthens global norm-building and enforcement mechanisms.

Way forward: Strengthen grassroots enforcement of prohibition laws, integrate conditional cash transfers with secondary education for girls, and leverage community-led monitoring systems.

PYQ LINK

Examines how international conventions and national legislative initiatives align to safeguard vulnerable sections, specifically women and children, under GS-II Mains.

KEY TERMS

Child Marriage

UNGA Resolution

Bal Vivah Mukht Bharat

Sustainable Development Goal 5

Maternal Health

ACTS & ARTICLES

Prohibition of Child Marriage Act, 2006

Article 15 (Special provisions for women and children)

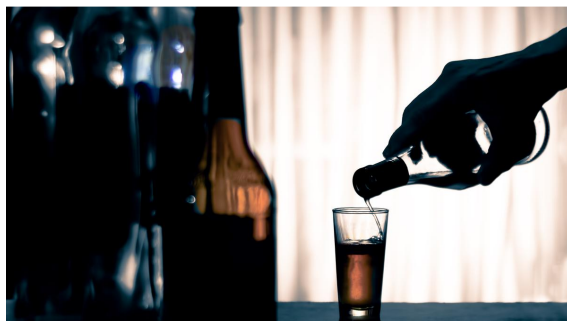
Article 21A (Right to Free and Compulsory Education)

UN Sustainable Development Goal 5.3

02

GS-II: GOVERNANCE & PUBLIC HEALTH

Public Health and Governance: Tackling Spurious Liquor and Hooch Tragedies



STORY 1

The Hindu

Nine Dead in Madhya Pradesh Hooch Tragedy Highlighting Regulatory Gaps

Nine people died and several others were hospitalized after consuming toxic spurious liquor across two villages in Banda tehsil of Madhya Pradesh's Sagar district, prompting local administrative screening.

District Collector Pratibha Pal confirmed the deaths in Sagar district, where affected individuals complained of severe headache and vomiting before being shifted to Bundelkhand Medical College and Hospital.

The tragedy resulted in nine fatalities, with four to five survivors undergoing urgent medical treatment, highlighting recurring public health hazards associated with illicit methanol-contaminated alcohol manufacturing.

Hooch tragedies frequently occur due to illegal distillation using industrial methyl alcohol, revealing persistent gaps in state excise enforcement, local police surveillance, and rural public health emergency response.

Essential for GS-II Governance and Ethics, highlighting constitutional duties under Article 47 of the Directive Principles, regulatory enforcement failures, and policy measures needed to curb illegal liquor trade.

UPSC RELEVANCE

Analyzes regulatory failures in excise management, toxicological risks of illicit alcohol, and constitutional mandates regarding public health.

PRELIMS FACTS

- Ingestion of spurious liquor containing toxic industrial chemicals like methanol frequently leads to metabolic acidosis, blindness, and rapid multi-organ failure.
- Article 47 of the Constitution directs the State to endeavor to bring about prohibition of the consumption of intoxicating drinks except for medicinal purposes.
- District administration and police conduct screening and emergency medical evacuations to specialized centers like Bundelkhand Medical College during hooch outbreaks.

MAINS FRAMEWORK

Intro: Recurring spurious liquor tragedies underscore systemic enforcement gaps in state excise administration and critical deficits in rural emergency health infrastructure.

DIMENSIONS

- **Regulatory & Administrative Lapses:** Illegal diversion of industrial alcohol and weak local intelligence networks permit unauthorized illicit distillation hubs to thrive.
- **Socio-Economic Vulnerability:** Low-income rural populations often fall victim to cheap, unregulated illicit alcohol due to lack of awareness and economic distress.
- **Public Health Infrastructure:** Immediate medical response requires rapid administration of antidotes like fomepizole or ethanol alongside hemodialysis facilities.

Way forward: Implement chemical denaturing tracking using chemical markers, streamline inter-state excise intelligence sharing, and strengthen grassroots primary healthcare response.

PYQ LINK

Evaluates public health governance, regulatory enforcement failures in law enforcement, and state obligations under Directive Principles of State Policy.

ACTS & ARTICLES

Article 47 of the Constitution of India

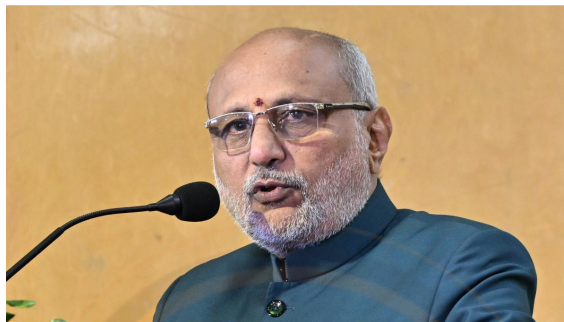
State Excise Acts & Poison Act, 1919

Section 304 of the Indian Penal Code / Bharatiya Nyaya Sanhita

03

GS-II: GOVERNANCE & HEALTH POLICY

Cardiovascular Healthcare and Clinical Data Registries in India



STORY 1

The Hindu

Vice-President Launches 'India Valve Registry' for Heart Disease Research

Vice-President C. P. Radhakrishnan launched the India Valve Registry, a clinician-led, multicentre research platform dedicated to tracking and analyzing longitudinal patient outcomes in valvular and structural heart diseases.

The registry was officially unveiled during the India Valves 2026 national conference in Chennai, organized to address the escalating burden of non-communicable cardiovascular diseases across the country.

Non-communicable diseases contribute significantly to India's morbidity burden, necessitating localized clinical evidence gathered from patient registries to optimize treatment protocols and structural heart interventions nationwide.

The initiative establishes a standardized national database to reduce reliance on Western clinical trial data, fostering indigenous cardiovascular research, evidence-based clinical practices, and targeted public health interventions.

Directly connects to GS-II Governance and Public Health, highlighting technological applications in medical research, policy responses to non-communicable diseases, and self-reliance in clinical evidence generation.

UPSC RELEVANCE

Examines the role of indigenous clinical registries, data-driven medical policy, and managing non-communicable disease (NCD) burdens.

PRELIMS FACTS

- The Vice-President launched the 'India Valve Registry', a clinician-led multi-center patient registry for valvular and structural heart diseases.
- The launch took place during the 'India Valves 2026' national conference held in Chennai.
- Clinical registries generate longitudinal real-world evidence essential for understanding disease burden and refining treatment protocols tailored to Indian demographics.

MAINS FRAMEWORK

Intro: The escalating burden of non-communicable diseases (NCDs) in India demands indigenous epidemiological research and longitudinal patient data to guide clinical decision-making.

DIMENSIONS

- **Indigenous Evidence Generation:** Overcomes reliance on Western clinical trial data by capturing unique Indian genetic, demographic, and clinical realities.
- **Quality of Care & Standardization:** Standardizes cardiac procedures across tertiary centers, tracking long-term durability and intervention outcomes.
- **Health Policy & Resource Allocation:** Enables evidence-based allocation of health budgets, medical device pricing, and national cardiovascular health strategies.

Way forward: Integrate clinical registries with the Ayushman Bharat Digital Mission (ABDM) to create seamless electronic health record networks and improve epidemiological surveillance.

PYQ LINK

Focuses on health sector reforms, public health interventions for NCDs, and technological integration in healthcare monitoring under GS-II Mains.

KEY TERMS

India Valve Registry

Non-Communicable Diseases

Valvular Heart Disease

Structural Heart Interventions

ICMR Burden Study

ACTS & ARTICLES

Article 47 (Duty of State to improve public health)

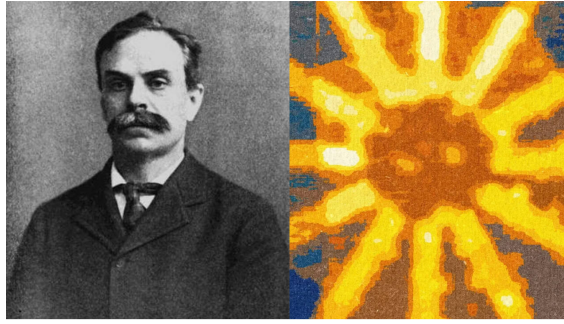
National Health Policy, 2017

Ayushman Bharat Digital Mission (ABDM)

04

GS-III: SCIENCE & TECHNOLOGY

Advances in Condensed Matter Physics: The In-Plane Hall Effect



STORY 1 Times of India

Scientists Demonstrate In-Plane Hall Effect Breaking 147-Year Physics Paradigm

Researchers demonstrated an in-plane Hall effect where an electric current subjected to an in-plane magnetic field generates a measurable transverse voltage, challenging a 147-year-old paradigm in condensed-matter physics.

Scientists at Carnegie Mellon University developed nanometer-sized devices to observe this phenomenon, publishing their breakthrough findings in the prestigious academic journal Nature Materials.

First discovered by Edwin Hall in 1879, the conventional Hall effect strictly required a perpendicular magnetic field, whereas the new discovery operates entirely within the material's two-dimensional plane.

Conventional Hall sensors require complex three-dimensional magnetic field configurations, whereas in-plane Hall devices enable compact, simplified multi-axis magnetic sensors and advanced spintronic memory architectures.

Highly relevant for GS-III Science and Technology, showcasing advancements in condensed matter physics, semiconductor material engineering, nanoscale sensor development, and next-generation electronic technologies.

UPSC RELEVANCE

Explores fundamental breakthroughs in physics, magnetic field dynamics, and potential applications in electronic sensors and spintronics.

PRELIMS FACTS

- Edwin Hall discovered the conventional Hall effect in 1879, which required a magnetic field perpendicular to the direction of electric current.
- Scientists at Carnegie Mellon University demonstrated that the Hall effect can operate with a magnetic field lying within the plane of the material.
- The discovery was published in the peer-reviewed journal Nature Materials after testing on nanometer-sized devices.

MAINS FRAMEWORK

Intro: The experimental validation of an in-plane Hall effect challenges a 147-year-old dogma in physics, opening new horizons for semiconductor device engineering.

DIMENSIONS

- **Scientific Paradigm Shift:** Demonstrates that magnetic field components parallel to current flow can deflect charge carriers under specific structural geometries.

- **Technological Applications:** Simplifies multi-axis magnetic sensors, reducing component size in robotics, aerospace navigation, and industrial electronics.
- **Spintronic & Quantum Hardware:** Facilitates non-volatile memory architectures and advanced quantum computing components without complex perpendicular magnetic setups.

Way forward: Promote indigenous nanotech R&D investments, establish semiconductor fabrication facilities capable of nano-scale material tailoring, and foster industry-academic research partnerships.

PYQ LINK

Relates to scientific discoveries and application of emerging technologies in electronics and hardware innovation under GS-III Mains.

KEY TERMS

In-Plane Hall Effect

Edwin Hall (1879)

Carnegie Mellon University

Condensed Matter Physics

Spintronics

ACTS & ARTICLES

National Quantum Mission (NQM)

Anusandhan National Research Foundation (ANRF) Act, 2023

05

GS-III: ECOLOGY & ENVIRONMENT

Forest Carbon Sequestration and Atmospheric Pollution Dynamics



STORY 1

Times of India

Aspen-FACE Experiment Reveals Ozone Offsets Forest Carbon Gains from CO2

An 11-year forest manipulation experiment demonstrated that elevated atmospheric carbon dioxide enhanced forest net primary productivity by 39%, but concurrent elevated tropospheric ozone erased a significant portion of these gains.

Led by researcher Alan F. Talhelm at the Aspen-FACE facility in Rhinelander, Wisconsin, the long-term study evaluated mixed forest plots of aspen, birch, and maple under open-air conditions.

Elevated carbon dioxide increased total ecosystem carbon storage by 11%, whereas elevated ozone reduced ecosystem carbon by 9% and cumulative net primary productivity by 10% over eleven years.

Tropospheric ozone acts as a powerful phytotoxin that damages plant cellular structures and photosynthetic apparatus, undermining the carbon sink capacity expected from elevated atmospheric carbon dioxide fertilization.

Crucial for GS-III Environment and Climate Change, providing empirical evidence on forest carbon sequestration dynamics, terrestrial ecosystem feedbacks, and multi-pollutant interactions under changing climate scenarios.

UPSC RELEVANCE

Evaluates long-term ecosystem responses to elevated CO₂ and tropospheric ozone, highlighting complexities in forest carbon sink capacity.

PRELIMS FACTS

- The Aspen-FACE experiment in Wisconsin exposed forest plots to elevated CO₂ and tropospheric ozone (O₃) over an 11-year duration.
- Elevated atmospheric CO₂ increased cumulative net primary productivity (NPP) in forest plots by 39%.
- Elevated ground-level ozone reduced forest net primary productivity by 10% and overall ecosystem carbon by 9%, counteracting carbon fertilization.

MAINS FRAMEWORK

Intro: Long-term ecological experiments show that tropospheric ozone pollution acts as a powerful offset to the enhanced forest growth expected from atmospheric carbon dioxide fertilization.

DIMENSIONS

- **Carbon Sink Capacity:** Elevated CO₂ boosts photosynthesis and NPP, but ozone toxicity damages foliage and reduces stomatal efficiency, dampening carbon absorption.
- **Forest Composition & Health:** Mixed stands of aspen, birch, and maple exhibit differential sensitivity to atmospheric pollutants, altering competitive ecological dynamics.
- **Climate Mitigation Implications:** Carbon sequestration models that ignore co-pollutants like ground-level ozone overestimate the mitigation potential of terrestrial forests.

Way forward: Integrate tropospheric ozone reduction targets into air quality policies, protect natural forest ecosystems from industrial emissions, and promote ozone-tolerant afforestation.

PYQ LINK

Focuses on climate change impacts on forest ecosystems, biological carbon sequestration, and environmental pollution dynamics under GS-III Mains.

KEY TERMS

Aspen-FACE Experiment

Net Primary Productivity

Tropospheric Ozone

Carbon Sequestration

Phytotoxicity

ACTS & ARTICLES

UN Framework Convention on Climate Change (UNFCCC)

National Clean Air Programme (NCAP)

Forest Conservation Act, 1980

Cryosphere Hydrology and Sub-surface Water Storage Mechanisms



STORY 1 Times of India

Gravity Survey Uncovers One Billion Tons of Water in Utah's Rock Glaciers

Scientists utilized subtle satellite and surface gravity measurements to discover nearly one billion tons of water equivalent stored inside ice-rich rock glaciers beneath Utah's debris-covered mountain slopes.

Led by Bronson Cvijanovich at the Timpanogos Rock Glacier beneath Mount Timpanogos in Utah, the study was published in the Journal of Geophysical Research: Earth Surface.

Gravity anomaly modeling revealed approximately 0.99 gigatonnes of subterranean ice preserved under thick rock debris, insulating it against ambient thermal degradation far longer than exposed surface glaciers.

Rock glaciers serve as critical drought-resilient hydrological buffers in arid alpine environments, releasing steady meltwater during warming periods when conventional surface glaciers have completely melted away.

Fits GS-I Physical Geography and Water Resources, offering insights into cryosphere dynamics, non-traditional freshwater reservoirs, and climate adaptation strategies for arid mountain hydrological systems.

UPSC RELEVANCE

Analyzes rock glaciers, subterranean ice preservation, gravity anomaly mapping, and water resilience in warming mountain environments.

PRELIMS FACTS

- Rock glaciers are high-altitude formations where ice bodies are buried beneath thick layers of rock debris and fallen boulders.
- A gravimetric study of the Timpanogos Rock Glacier in Utah uncovered nearly 0.99 gigatonnes (1 billion tons) of water equivalent locked in subterranean ice.
- The debris cover insulates sub-surface ice from atmospheric warming, allowing rock glaciers to persist long after conventional glaciers melt.

MAINS FRAMEWORK

Intro: Subterranean rock glaciers represent vital, heat-shielded reservoirs in mountain hydrological systems, offering essential water security in drought-prone alpine regions.

DIMENSIONS

- **Hydrological Buffering:** Rock glaciers melt at slower rates than exposed ice sheets, releasing steady baseflow meltwater during dry seasons and heatwaves.
- **Cryospheric Resilience:** Debris mantles act as natural thermal insulators against rising ambient temperatures driven by global climate change.
- **Geophysical Mapping Techniques:** Gravity anomaly measurements enable non-invasive quantification of sub-surface ice volume beneath complex debris fields.

Way forward: Expand cryospheric research to map rock glaciers in the Indian Himalayas, integrate rock glacier hydrology into river basin management, and monitor alpine water stocks.

PYQ LINK

Examines changes in critical geographical features like glaciers and water bodies, and the impact of climate change on mountain hydrology under GS-I.

KEY TERMS

Rock Glaciers

Cryosphere

Timpanogos Rock Glacier

Sub-surface Water Storage

Gravimetric Survey

ACTS & ARTICLES

National Mission for Sustaining the Himalayan Ecosystem (NMSHE)

National Water Mission under NAPCC

07

GS-III: ENVIRONMENT & BIODIVERSITY

Biodiversity Conservation and Invasive Species Eradication Strategies



STORY 1

Times of India

Rat Eradication Leads to Seabird Recovery on Lundy Island

A two-decade conservation project successfully eradicated invasive brown rats from Lundy Island, leading to a dramatic recovery in breeding puffin populations and total nesting seabird numbers.

Managed by the Lundy Field Society and The Landmark Trust on Lundy Island off the Devon coast in southwest England, the project restored native cliff and burrow habitats.

Breeding puffin pairs surged from a low of 13 in 2000 to 1,335 individuals, while total nesting seabirds across the island rebounded to over 40,000 birds.

Introduced ship rats heavily preyed upon eggs and chicks of burrow-nesting seabirds, proving that targeted eradication of invasive alien species can successfully reverse island ecological collapse.

Aligns with GS-III Environment and Biodiversity, illustrating ecosystem restoration methodology, control of invasive alien species, and species recovery frameworks under the Convention on Biological Diversity.

UPSC RELEVANCE

Examines island ecosystem restoration, invasive alien species management, and population recovery of endangered seabird colonies.

PRELIMS FACTS

- Invasive brown rats (*Rattus norvegicus*) introduced by ships severely damaged seabird populations on Lundy Island by preying on eggs and chicks.
- A dedicated rat-eradication project launched on Lundy Island in 2002 led to a population increase of puffins from 13 in 2000 to 1,335 individuals.
- Over 40,000 seabirds, including puffins, guillemots, and Manx shearwaters, now nest on Lundy Island following eradication success.

MAINS FRAMEWORK

Intro: Island ecosystem restoration demonstrates that removing invasive alien species is one of the most effective interventions for halting biodiversity loss and recovering vulnerable wildlife.

DIMENSIONS

- **Ecosystem Threats:** Invasive predators like rats devastate ground-nesting and burrow-nesting birds that evolved without natural defenses.
- **Restoration Dynamics:** Systematic, complete eradication of invasive rodents allows native flora and fauna to recover spontaneously over two decades.
- **Global Conservation Strategy:** Offers a proven operational blueprint for ecological restoration on isolated islands and oceanic sanctuaries worldwide.

Way forward: Implement strict biosecurity protocols on island ecosystems, deploy invasive alien species management frameworks across coastal wildlife sanctuaries, and engage local communities.

PYQ LINK

Focuses on biodiversity protection, habitat restoration methodologies, and managing threats posed by invasive alien species under GS-III Mains.

KEY TERMS

Invasive Species Eradication

Lundy Island

Puffin Recovery

Rattus norvegicus

Island Restoration

08

GS-II: INTERNATIONAL RELATIONS

Global Geopolitics, US Foreign Policy, and Migration Management



STORY 1

Times of India

United States Outlines Post-Iran War Middle East Strategy Reset

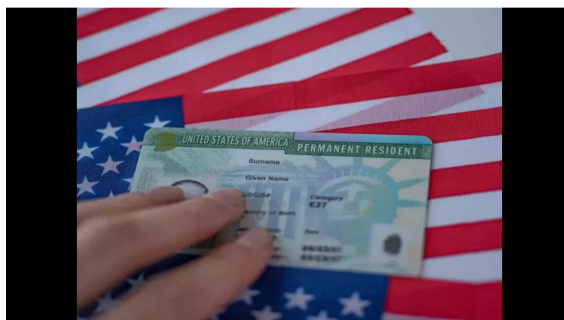
US President Donald Trump initiated high-level strategic planning for a major Middle East policy reset aimed at containing Iranian influence while expanding diplomatic normalization agreements across the region.

Senior White House officials met in Washington to draft the post-conflict framework intended to guide American diplomatic and security strategy during the remaining two years of Trump's presidential term.

The administration convened two major advisory strategy meetings in recent weeks to outline post-war security architectures and expand upon the foundational Abraham Accords framework.

Following heightened military escalation involving Iran, Washington seeks to forge a new regional equilibrium by pairing containment of hostile non-state proxies with broader Arab-Israeli economic and defense integration.

Direct relevance to GS-II International Relations, highlighting evolving geopolitics in West Asia, major power strategies, security dynamics, and potential implications for India's regional energy and diaspora interests.



US Directs Immigration Judges to Restrict Visa Continuances and Expedite Deportations

US immigration authorities instructed federal judges to strictly limit continuances for undocumented immigrants awaiting visa or Green Card approvals, accelerating deportation proceedings across federal immigration courts.

Judge Keith Hunsucker led mandatory virtual training sessions for hundreds of immigration judges across the United States under directives from the Board of Immigration Appeals.

The policy targets hundreds of thousands of pending deportation cases, restricting legal delays and threatening sanctions against defense attorneys accepting excessive case volumes to enforce strict departure timelines.

Legal continuances historically provided procedural fairness for immigrants navigating concurrent administrative relief, but the new administrative mandates prioritize rapid case adjudications and enforcement over judicial discretion.

Important for GS-II International Relations and Indian Diaspora, illustrating tightening US immigration enforcement, due process concerns, procedural administrative reforms, and impacts on foreign nationals abroad.

UPSC RELEVANCE

Analyzes West Asian geopolitical shifts post-Iran conflict alongside administrative reforms and procedural due process in US immigration laws.

PRELIMS FACTS

- US strategic planning involves post-conflict normalization in the Middle East paired with containment of Iranian influence.
- 'Continuances' in US immigration courts are legal mechanisms historically used to grant temporary delays for individuals awaiting Green Cards or legal counsel.
- Recent directives to US immigration judges mandate reducing continuances to expedite deportation adjudications.

MAINS FRAMEWORK

Intro: Shifting US foreign policy strategies in West Asia and tightening domestic judicial rules on immigration reflect broader realignments in American geopolitical and domestic priorities.

DIMENSIONS

- **Geopolitical Realignment:** A post-Iran war regional reset seeks to integrate Arab-Israeli defense and economic partnerships while containing regional proxy networks.
- **Procedural Due Process:** Restricting immigration court continuances reduces administrative backlogs but raises concerns over legal representation and human rights.
- **Impact on Indian Diaspora:** Stricter deportation timelines and reduced legal flexibility heighten compliance risks for non-immigrant visa holders and Green Card applicants.

Way forward: India must maintain multi-aligned diplomacy in West Asia to protect energy security while strengthening consular assistance networks for non-resident Indians abroad.

PYQ LINK

Evaluates foreign policy shifts of major powers in West Asia and the socio-legal impact of diaspora policy changes under GS-II Mains.

KEY TERMS

Middle East Reset

Iran War Strategy

Immigration Continuances

Board of Immigration Appeals

Deportation Directives

ACTS & ARTICLES

US Immigration and Nationality Act (INA)

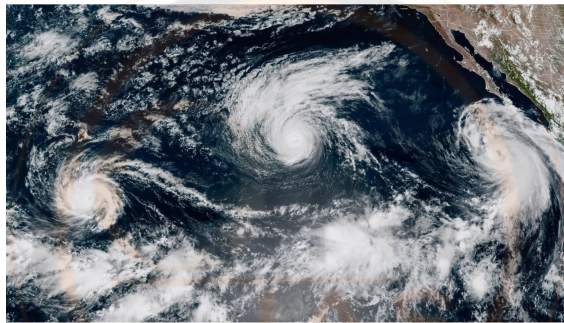
Universal Declaration of Human Rights (Article 14 on Asylum)

Article 19(1)(e) & consular protections under International Law

09

GS-III: DISASTER MANAGEMENT & CLIMATOLOGY

Hydro-Meteorological Disasters and Tropical Storm Dynamics



STORY 1

Times of India

Category 4 Hurricane Lowell Approaches Hawaii

Hurricane Lowell maintained Category 4 intensity with sustained winds of 150 mph as it tracked northward through the Pacific Ocean, posing severe weather threats to Hawaii.

The National Hurricane Center issued advisories for Hawaii's western islands, including Kauai and Niihau, as the storm's center approached within 150 to 190 miles.

Featuring maximum sustained winds of 150 mph, Hurricane Lowell fluctuated between Category 4 and Category 5 strength while maintaining dangerous hurricane-force winds over a broad radius.

Ocean warming and favorable atmospheric conditions enable Pacific hurricanes to maintain extreme intensity further north, disrupting seasonal climate patterns and threatening remote island infrastructure with storm surges.

Relevant for GS-I Physical Geography and GS-III Disaster Management, illustrating tropical cyclone mechanics, Saffir-Simpson intensity scale parameters, and disaster preparedness in vulnerable coastal ecosystems.



STORY 2 Times of India

Tropical Cyclone Saudel Triggers Fatal Mudslide in Southeastern China

Torrential rainfall driven by Tropical Cyclone Saudel triggered a devastating mudslide in southeastern China, causing multiple fatalities and leaving ten individuals unaccounted for amidst ongoing rescue operations.

The landslide hit a mountain village in Suichuan County, Jiangxi province, following multiple coastal landfalls by Cyclone Saudel across Zhejiang and Fujian provinces.

Authorities confirmed two fatalities, two live rescues, ten missing villagers, and the collapse of over 100 homes alongside a major dike breach in Putian city.

Successive landfalls by weakened tropical systems often deposit extreme localized rainfall on saturated mountain terrain, triggering catastrophic secondary geohazards such as mudslides, flash floods, and embankment failures.

Directly applicable to GS-III Disaster Management and Physical Geography, highlighting cascading natural hazards, tropical storm impacts on inland terrain, and emergency response protocols in slope-instability zones.

UPSC RELEVANCE

Examines tropical cyclone dynamics, severe weather forecasting, cascading landslide hazards, and disaster mitigation frameworks.

PRELIMS FACTS

- Category 4 hurricanes on the Saffir-Simpson scale feature sustained wind speeds between 130 and 156 mph.
- Tropical Cyclone Saudel made multiple landfalls across Zhejiang and Fujian before causing torrential rainfall and fatal mudslides inland in Jiangxi province.
- Secondary disaster risks from tropical storms include flash flooding, dike breaches, and saturated slope failures in mountain terrain.

MAINS FRAMEWORK

Intro: Increasing frequency and intensity of tropical storms underscore the need for integrated early warning systems and resilient infrastructure in coastal and mountain regions.

DIMENSIONS

- **Climatological Intensity:** Warmer sea surface temperatures fuel rapid intensification of severe tropical cyclones like Hurricane Lowell.
- **Cascading Geohazards:** Heavy rainfall associated with landfalling cyclones like Saudel destabilizes slopes, triggering deadly mudslides and structural collapse.

- **Disaster Mitigation Infrastructure:** Embankments, storm surge barriers, and flood retention dikes require climate-resilient engineering standards.

Way forward: Implement Doppler radar networks, enforce slope hazard zonation maps in mountainous coastal regions, and establish community-based early warning protocols.

PYQ LINK

Evaluates disaster management systems, extreme weather risk reduction, and mechanisms behind tropical storm hazards under GS-III Mains.

KEY TERMS

Hurricane Lowell

Category 4 Hurricane

Cyclone Soudel

Geohazards & Mudslides

Disaster Response

ACTS & ARTICLES

Disaster Management Act, 2005

Sendai Framework for Disaster Risk Reduction (2015-2030)

National Disaster Management Authority (NDMA) Guidelines



Practice MCQs (UPSC Prelims)

Attempt these questions on your own first. The answer key is on the next page.

GS-II: SOCIAL JUSTICE & INTERNATIONAL RELATIONS

Global Initiatives Against Child Marriage

India Co-Sponsors UNGA Resolution Declaring November 27 Against Child Marriage

Q1. With reference to international and national initiatives regarding child marriage, consider the following statements: 1. The United Nations General Assembly adopted a resolution proclaiming November 27 as the International Day for the Elimination of Child, Early and Forced Marriage. 2. The date November 27 commemorates the national launch of India's 'Bal Vivah Mukht Bharat' campaign. Which of the statements given above is/are correct?

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. Neither 1 nor 2

GS-III: SCIENCE & TECHNOLOGY

Advances in Condensed Matter Physics: The In-Plane Hall Effect

Scientists Demonstrate In-Plane Hall Effect Breaking 147-Year Physics Paradigm

Q2. How does the newly demonstrated 'in-plane Hall effect' differ from the conventional Hall effect discovered in 1879?

- A. It operates strictly at absolute zero temperature in room-temperature superconductors.
- B. It generates a transverse voltage when the magnetic field lies within the plane of the material rather than perpendicular to it.
- C. It eliminates the need for any applied electric current within the material.
- D. It functions only in non-conductive gaseous plasmas.

GS-III: ECOLOGY & ENVIRONMENT

Forest Carbon Sequestration and Atmospheric Pollution Dynamics

Aspen-FACE Experiment Reveals Ozone Offsets Forest Carbon Gains from CO₂

Q3. Based on long-term ecological experiments like Aspen-FACE, what is the combined impact of elevated CO₂ and tropospheric ozone (O₃) on forest ecosystems?

- A. Tropospheric ozone enhances the carbon fertilization effect caused by elevated CO₂.
- B. Elevated CO₂ increases forest productivity, but tropospheric ozone acts as a phytotoxin that significantly reduces productivity and carbon storage.
- C. Elevated ozone increases soil nitrogen fixation while elevated CO₂ suppresses root growth.
- D. Neither CO₂ nor ozone produces any measurable change in forest ecosystem carbon.

GS-I: PHYSICAL GEOGRAPHY

Cryosphere Hydrology and Sub-surface Water Storage Mechanisms

Gravity Survey Uncovers One Billion Tons of Water in Utah's Rock Glaciers

Q4. Which of the following best describes 'rock glaciers' and their significance in alpine hydrology?

- A. Surface ice sheets composed of volcanic ash and basalt fragments.
- B. Bodies of ice buried beneath thick rock debris that melt slowly and serve as drought-resilient water reservoirs.

C. Submarine glacial ice formations located along continental shelves.

D. Artificial ice reservoirs built in desert plains for agricultural irrigation.

GS-III: ENVIRONMENT & BIODIVERSITY

Biodiversity Conservation and Invasive Species Eradication Strategies

Rat Eradication Leads to Seabird Recovery on Lundy Island

Q5. What was the ecological outcome of the invasive rat eradication project conducted on Lundy Island?

A. Complete collapse of native burrow-nesting seabird species.

B. Significant recovery of breeding seabird populations, including puffins, due to the elimination of egg and chick predation.

C. Invasion of non-native predatory eagles across coastal cliffs.

D. Uncontrolled proliferation of aquatic marine algae.

GS-III: DISASTER MANAGEMENT & CLIMATOLOGY

Hydro-Meteorological Disasters and Tropical Storm Dynamics

Tropical Cyclone Soudel Triggers Fatal Mudslide in Southeastern China

Q6. Consider the following statements regarding tropical cyclone landfalls and associated geohazards: 1. Prolonged localized rainfall from landfalling tropical storms can saturate mountain soils and trigger secondary mudslides. 2. Tropical cyclones increase in wind intensity continuously as they travel further inland over landmasses. Which of the statements given above is/are correct?

A. 1 only

B. 2 only

C. Both 1 and 2

D. Neither 1 nor 2

Answer Key — Practice MCQs

Quick reference and explanations for the practice questions on the previous page.

Q1: C

Q2: B

Q3: B

Q4: B

Q5: B

Q6: A

Q1 Option C · Both 1 and 2

Both statements are correct. The 193-member UNGA adopted by consensus a resolution led by Sierra Leone and co-sponsored by India declaring November 27 as the International Day for the Elimination of Child, Early and Forced Marriage. November 27 marks the launch of India's Bal Vivah Mukh Bharat campaign.

Q2

Option B · It generates a transverse voltage when the magnetic field lies within the plane of the material rather than perpendicular to it.

In 1879, Edwin Hall discovered the Hall effect requiring a magnetic field applied perpendicular to the material. Scientists at Carnegie Mellon University demonstrated an in-plane Hall effect where a magnetic field lying within the plane of the material produces a measurable Hall response.

Q3

Option B · Elevated CO₂ increases forest productivity, but tropospheric ozone acts as a phytotoxin that significantly reduces productivity and carbon storage.

The 11-year Aspen-FACE study showed that while elevated CO₂ increased net primary productivity by 39%, elevated ozone reduced productivity by 10% and ecosystem carbon by 9%, proving that tropospheric ozone offsets carbon sink gains.

Q4

Option B · Bodies of ice buried beneath thick rock debris that melt slowly and serve as drought-resilient water reservoirs.

Rock glaciers are subterranean bodies of ice buried beneath thick layers of rock and debris. A gravity study in Utah revealed nearly 1 billion tons of subterranean water equivalent locked inside rock glaciers, which act as drought-resilient hydrological buffers.

Q5

Option B · Significant recovery of breeding seabird populations, including puffins, due to the elimination of egg and chick predation.

Following the rat-eradication project started in 2002 on Lundy Island, breeding puffins surged from 13 in 2000 to 1,335 individuals, and total nesting seabirds surpassed 40,000 as predation was successfully eliminated.

Q6 Option A - 1 only

Statement 1 is correct: As seen during Cyclone Soudel in Jiangxi, heavy rainfall saturates mountain soils and triggers deadly mudslides. Statement 2 is incorrect because tropical cyclones rapidly lose energy and wind intensity after moving inland due to friction and loss of ocean heat sources.

