Ganga

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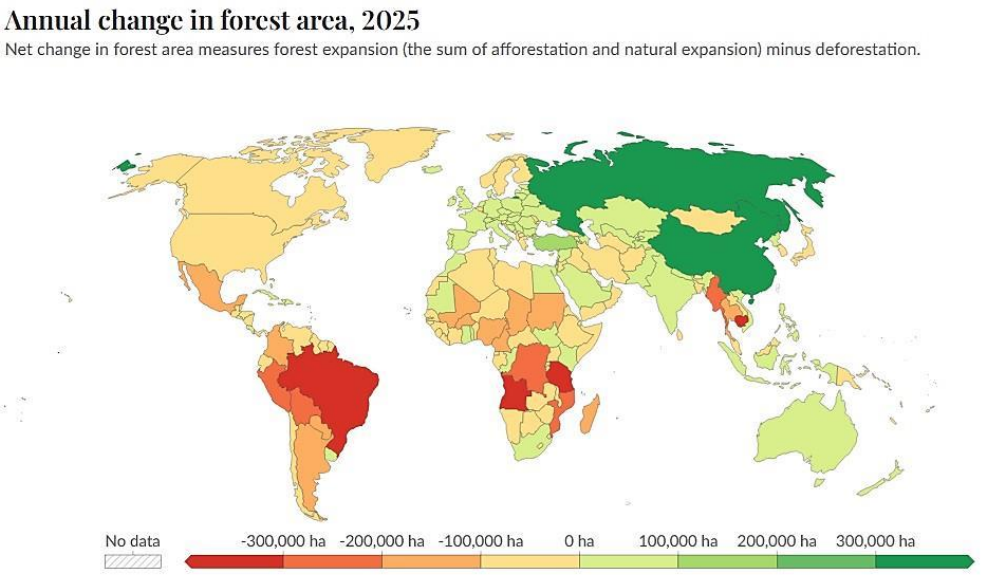


Global average annual forest cover change;
Source: Food and Agriculture Organization of the United Nations (2025)

Commentary

Every passing day, profit-driven human actions are reshaping the surface of the Earth at an unprecedented pace. Rivers are drying, glaciers are melting rapidly, aquifers are being depleted, forest cover is shrinking, and the relentless exploitation of natural resources continues unchecked. According to estimates by the United Nations Food and Agriculture Organization (FAO), nearly 10 million hectares of forest are lost every year.

The consequences are not distributed equally. Amid widening income inequality, vast populations in the Global South bear the brunt of environmental degradation. Air, water, and food pollution claim thousands of lives annually in India and other developing countries. For many environmental injustice is not an abstract concept—it is a lived reality.

The Stockholm Declaration of 1972 introduced the principle of intergenerational equity, emphasizing the ethical responsibility of the present generation to preserve natural resources—air, water, land, flora, fauna—and maintain environmental quality and social systems for future generations. This commitment was reaffirmed in the Rio Declaration of 1992, which clearly stated that the right to development must equitably meet the developmental and environmental needs of both present and future generations.

In 1995, at the first United Nations Climate Change Conference in Berlin, and in the many subsequent Conferences of Parties (COPs), nations pledged to protect the planet from climate change. Yet, there remains a disturbing gap between promises made and

actions taken on the ground. Short-term economic gains often override long-term ecological stability, eroding public trust in governance and multilateral commitments.

India presents a stark illustration of this contradiction. The pristine tropical forest ecosystem of Great Nicobar Island faces large-scale destruction, threatening the species like Giant Leatherback Turtle and jeopardizing the lives of indigenous communities. The proposal of compensatory afforestation in distant Haryana hardly replaces the complex, centuries-old ecological web of a unique island ecosystem.

On the mainland, pressures mount on the Aravalli range—one of the world's oldest fold mountain systems—stretching across four states in north-western India. Beyond its rich biodiversity, the Aravallis act as a natural barrier against desertification in North India. The recent controversy surrounding the 100-metre height criterion in defining Aravalli hills, and the subsequent judicial intervention, highlights how technical definitions and legal loopholes can undermine meaningful conservation.

These developments compel us to ask: What does sustainability truly mean? Are environmental safeguards seen as obstacles to development, or as its foundation? The choices we make today reflect not only policy priorities but also our collective ethical compass.

If intergenerational equity is to be more than a declaration, it must guide governance, corporate behaviour, and citizen action alike.

The future will judge us not by the scale of our economic growth, but by the wisdom with which we safeguarded the Earth for generations yet to come.

NEWS

IRBMS team visited Kalahandi for Geo-hydrological Study

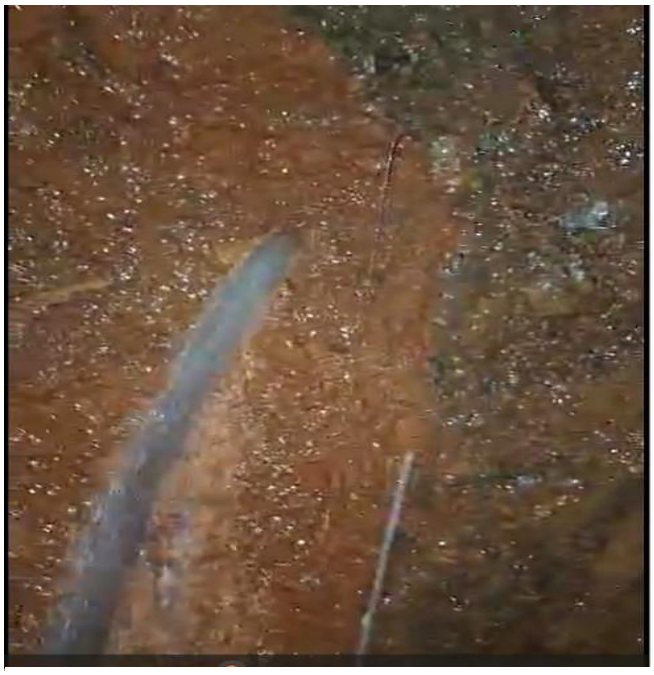
The *Swastha Swaraj Health Centre* at in Thuamul Rampur Block of Kalahandi District, Odisha, is a charitable institution providing lifesaving healthcare services to both tribal and non-tribal communities. The region is home primarily to the *Kondh* tribal population.

The Health Centre is situated on the lower flank of a hill slope in Kaniguma village, part of the Eastern Ghats, surrounded by dense forests and intersected by numerous small streams. The site is about 55 km from

Bhawanipatna. A small east–west-trending stream channel runs parallel to the road, the moisture from which supports local cultivation

in the channel. This stream eventually joins the Sagraha Nala to the west, which merges with the Tel River further north.

In the first week of October 2025, the area experienced intense rainfall—reportedly a cloudburst. Following this event, water began spurting out in jet form through the red-soil



Water sprouts during heavy rain

slope below the retaining wall behind the Doctors' quarters. Notably, there were no signs of soil collapse, caving, or slippage.

Swastha Swaraj Director requested IRBMS to resolve this unusual phenomenon observed on the hill slope behind the Centre and IRBMS conducted a field investigation in the month of October - November 2025 (30thOctober to 2nd November 2025) in and around the hill where the Health Centre stands.

Geologically, the area belongs to the Eastern Ghat Supergroup, comprising Charnockite and Khondalite rock formations. The hospital hill mainly consists of highly weathered Khondalitic rocks—quartz-garnet-sillimanite schist, gneiss, and calc-silicate granulites. These are traversed by **numerous joints and fractures**, which enhance infiltration but also act as preferential runoff pathways. Intense chemical weathering of Khondalite has produced lateritic soils rich in alumina, often capped with bauxite at higher elevations.

After analyzing the entire issue, it is found that during monsoon rainfall, the impermeable retaining wall without weep holes obstructs both surface runoff and subsurface flow. Water trapped behind the wall exerts hydrostatic pressure on the soil and structure. The accumulated water seeks alternative pathways through weathered, foliated Khondalite rocks, moving along fine-grained, lateritic, and granular zones.

The Retaining Wall

The granular red soil on the slope exhibits moderate bearing capacity and low permeability, containing clay minerals such as *kaolinite*, *montmorillonite*, and *diaspore*. These conditions allowed pressurized water jets to emerge without soil collapse. In more granular soils, such pressure could have caused caving or slippage.

Hence, the water spouting observed was not due to structural failure but a hydrological response to subsurface water confinement.

The study concludes that the absence of weep holes in the retaining wall, trapping both surface and subsurface flow at the base of the retaining wall and to relieve hydrostatic pressure water jet phenomenon occurred through the passages of the weathered Khondalite rock. A properly designed drainage and monitoring system will prevent recurrence and ensure long-term slope stability for the Swastha Swaraj Health Centre complex.

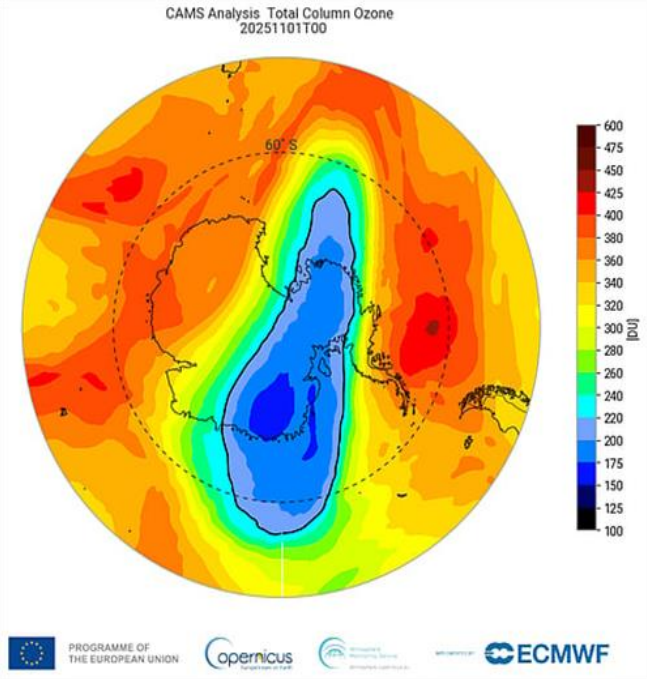
Antarctic Ozone Hole Shows Remarkable Recovery

In 2025, the Antarctic ozone hole closed earlier than usual, offering a rare positive sign for the environment amid record global temperatures and climate-related concerns. According to Copernicus, the European Earth observation agency, the ozone hole that began forming over Antarctica in August had fully recovered by December 1, weeks ahead of the typical end of the austral spring ozone season.

The 2025 ozone hole was the smallest observed in five years and marked the second consecutive year of relatively smaller and from 2020 to 2023 shorter-lived ozone holes, following a period when holes were larger and more persistent. At its peak in September, the hole covered just over 21 million square kilometres, far below the historical maximum of more than 29 million square kilometres recorded in 2006.

This recovery occurred despite October 2025 being 1.55°C warmer than pre-industrial levels, underscoring the effectiveness of long-term environmental regulation even as climate change accelerates.

Scientists credit the steady improvement to the global ban on ozone-depleting substances such as chlorofluorocarbons under international agreements, which has led to



higher ozone concentrations in the stratosphere and consistent year-on-year healing. The ozone hole, first discovered in 1985, is a seasonal thinning of the stratospheric ozone layer that forms mainly over Antarctica during the southern hemisphere's spring months of September to November, when extreme cold temperatures enable chemical reactions that destroy ozone molecules. While ozone depletion occurs worldwide, Antarctica experiences the most severe thinning due to its unique atmospheric conditions. Experts at Copernicus say the early closure and reduced size of the 2025 ozone hole are strong indicators of long-term recovery and serve as a reminder that coordinated global action can successfully reverse human-caused environmental damage, even amid ongoing climate challenges.

Source: *Down to Earth*

RIVERS OF INDIA

Godavari River
(Part - 10)
Pranhita River Sub-basin

The Pranhita River is one of the most significant tributaries of the Godavari River, contributing highest discharge among all its tributaries despite being only about 113 km long. The Pranhita sub-basin, covering approximately 109,078 km², is the seventh largest river basin in India and exceeds the individual basin areas of major rivers such as the Narmada and Kaveri. The river is formed by the confluence of the Wainganga, Wardha, and Penganga rivers near the Maharashtra–Telangana border and flows southward, forming a natural interstate boundary before joining the Godavari at Kaleshwaram in Telangana. Hydrologically and geographically, the basin drains large parts of Maharashtra, Madhya Pradesh, and Chhattisgarh, making it a vital component of the Godavari river system.

The Pranhita basin is characterized by undulating plateau topography developed over crystalline basement rocks and thick Gondwana sedimentary sequences. The landscape includes forested hills, broad valleys, and fertile alluvial plains along the river course. Soils vary from black cotton soils in the plains to red, yellow, lateritic, and alluvial soils in upland and floodplain areas. These physiographic and soil conditions support extensive agriculture and influence land-use patterns across the basin. The basin is part of the Gondwana Basins, which is subdivided into the Godavari, Kothagudem, Chintalapudi, and Krishna–Godavari coastal sub-basins, with well-preserved Talchir, Barakar, and Kamthi formations.

Climatically, the basin receives annual rainfall ranging from 900 to 1500 mm, primarily from the Southwest Monsoon between June and October. River discharge peaks during the monsoon season and declines sharply during summer months. Temperatures range from 7–13°C (minimum) in winter to 39–47°C (Maximum) in extreme summer. The basin frequently experiences hydrological extremes, with major flood events recorded in 1986 and 2022, while recent years have seen increasing drought conditions affecting agricultural productivity and rural livelihoods.

Agriculture remains the dominant land use in the Pranhita basin, supported by fertile soils, seasonal flooding, and groundwater recharge. Paddy, cotton, and pulses are the principal crops cultivated in the region, particularly in Telangana districts. Significant land-use and land-cover changes have occurred over the past two decades. Between 2001 and 2021, mining areas expanded by nearly 298%, while built-up areas increased by about 151%, reflecting industrial growth and population expansion. Improved farming practices, including mechanization, intercropping, and mixed cropping, contributed to a 44% decline in barren land as it was converted into agricultural fields. However, forest cover declined by approximately 31%, indicating widespread deforestation, while scrub and

barren lands were reduced due to mining and settlement expansion. Alternative sandy and water-covered alluvium areas became pronounced after 2016 following the construction of the Sundilla (Parwati) Barrage, which modified sediment and flow dynamics.

(to be continued)

Source:

- *Ministry of water Resources, Govt. of India,*
- *Godavari Basin. - Watershed Atlas of India.*
- *https://www.ndrdgh.gov.in/*
- *PWD, Maharashtra*

Special Feature

The Aravallis: India's Ancient Guardian at Risk

The Aravalli mountain range, among the oldest geological features on Earth, dates back Paleoproterozoic era(2,500 to 1,600 million years). Stretching across Gujarat, Rajasthan, Haryana, and Delhi, this range has shaped the landscape and history of northwestern India. Formed by the collision of the pre-Indian subcontinental plate with the Eurasian plate, the Aravallis are a classic fold mountain system. Archaeological evidence shows copper and other metals extracted here as early as the 5th century BCE, confirmed through carbon dating.

Today, the Aravallis survive as residual mountains, rising between 300 and 900 meters. Two major ranges dominate Rajasthan—the Sambhar Sirohi Range and the Sambhar Khetri Range. Extending nearly 800 km, the Aravallis run from Himmatnagar in Gujarat to Delhi, with hidden extensions toward Haridwar that form a crucial drainage divide between the Ganga and Indus river systems. Yet, relentless legal and illegal mining, quarrying, and urban expansion have fragmented and degraded this once-continuous chain.

Why the Aravallis Matter

The Aravallis are far more than ancient rocks; they are ecological and climatic lifelines for north-western India:

- ***Physical Barrier:*** Through centuries they prevent the eastward advance of the Thar Desert, shielding the fertile Indo-Gangetic plains.
- ***Climatic Influence:*** Acting as a wall for monsoon clouds, they redirect rainfall eastward, feeding Himalayan Rivers. In winter, they block cold winds from Central Asia, moderating temperatures in the plains.
- ***Hydrological Role:*** The range is a vital groundwater recharge zone and the source of rivers like the Sabarmati, Luni, Banas, and Sahibi, sustaining agriculture and drinking water supplies.
- ***Biodiversity Hotspot:*** Home to 300 native plant species, 120 bird species, and animals such as leopards, striped hyenas, golden jackals, nilgais, civets, and wild boars.
- ***Wildlife Corridor:*** They connect protected areas like Sariska and Ranthambhore, enabling tiger and other wildlife movement.
- ***Pollution Buffer:*** Often called the "lungs" of Delhi-NCR, the Aravallis trap dust, reduce heat, and mitigate air pollution in one of the world's most polluted regions.

Protection Efforts and Challenges

The ecological importance of the Aravallis was recognized as early as 1878, when the British declared parts of the range as Reserve Forests under the Indian Forest Act. In 1900, the Punjab Land Preservation Act (PLPA) further restricted mining and deforestation, though it applied only to portions in Haryana.

Post-independence, however, protection weakened. Mining of marble, limestone, sandstone, copper, zinc, and tungsten intensified, devastating rivers, groundwater reserves, and wildlife habitats. By the mid-1980s, NGOs such as Kalpavriksh, WWF, and Srishti began campaigns to safeguard the range. Initiatives like Gurugram's **Matri Van Urban Forest** and the **Aravalli Green Wall Programme**—aimed at creating a 5 km vegetated buffer across four states—stand out as grassroots conservation efforts.

Despite these, degradation continued.

In Rajasthan alone, 31 hill ranges—about 25% of the Aravallis—have been exhausted, leading to the disappearance of rivers like the Banas and Luni and the loss of countless species. A study by the Wildlife Institute of India (WII) reveals that between 1980 and 2016, Haryana lost a significant portion of its forest cover mostly in Aravallis. During this period, human settlements expanded from 247 sq. km to 638 sq. km (a 158% increase), while industrial areas grew from zero to 46 sq. km. According to the India State of Forest Report (FSI) 2013, Haryana retains only 3.59% forest cover—among the lowest in the country.

Alarmingly, even state administration projects have contributed to this ecological decline of Aravalli hills. In Manesar, Haryana, more than 16,000 mature trees were felled between 2011 and 2023 to construct Police Lines without permission of the concerned authorities. Similarly, over 45,000 trees were cut to build a Police Training Institute at Bhondsi village in Gurugram before approval was granted by the Forest Department. Urban expansion has also led to unnecessary road construction, often aimed at inflating land values rather than meeting genuine infrastructure needs. Continuous mining and deep excavation have ruptured aquifers, disrupting groundwater flow and drying up lakes and waterbodies—such as the once-famous Badkhal Lake in Haryana.

In Gujarat, unlawful mining in Banaskantha, Sabarkantha, and Aravalli districts has severely disturbed local ecosystems, including the Balaram Ambaji Sanctuary. Wildlife once abundant across the four states of Aravalli range due to its rich habitat—tigers, leopards,

Unauthorized stone quarries in Sonha town of Haryana - permanent damage to the Aravallis

wolves, blackbucks, Indian gazelles, desert foxes, the great Indian bustard, and migratory birds such as cranes, ducks, coots, and pelicans—now survive only in fragmented habitats like Ranthambhor, Sariska, and Kumbhalgarh in Rajasthan.

Delhi, the last extension of the Aravallis, has also witnessed rampant exploitation. University campuses, residential complexes, religious institutions, and security force facilities have transformed the natural undulating terrain into nearly flat land. Abandoned illegal mines have disrupted hydrology, altered drainage patterns, and worsened air pollution through respirable particulate matter (RPM) in NCR.

Adding to these challenges, invasive species such as the small-leaved thorny kikar have replaced indigenous broad-leaved trees that once retained moisture and facilitated rainfall on the hills. This shift has reduced both rainfall and biomass across the Aravallis. Researcher Bilal Habib of WII notes that sand dunes and desert vegetation have already encroached into parts of Sohna town in Haryana, signaling a troubling desertification trend.

A Call for Intergenerational Responsibility

In the era of climate change and series of disasters happening, continuous exploitation of the Aravallis is a dangerous blow to India's ecological security. Prioritizing short-term commercial gains over long-term sustainability jeopardizes future of coming generations. The Stockholm Declaration (1972) and the Rio Declaration (1992) emphasize intergenerational equity—the duty of the present generation to safeguard natural resources for those yet to come.

The Aravallis are not just mountains; they are guardians of climate, biodiversity, and water security. Protecting them is not optional—it is essential.

Grassroots activism eventually reached the courts.

(to be continued)

Source:

- ***ZNEWS*- Aravalli Hills Controversy**
- ***NDTV* - Explained: Why Aravalli Is In Spotlight And What Environmentalists Demand**
- ***Down to Earth*- 03 Apr 2019, 25 May 2019**

Editor- Suchandra Choudhury,
Published by Girija Sankar Chattopadhyay, IRBMS, and Advisor: Sujit Choudhury.
Assisted by Nilshikha Das, Ayan Kumar Samaddar (© Integrated River Basin Management Society)