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CES'S PARVATIBAI CHOWGULE COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS), MARGAO - GOA.

The 2026 Super El Niño: Climate Mechanics and The Vulnerabilities of the Indian Monsoon

As the global ocean surface registers unprecedented thermal anomalies in early 2026, atmospheric scientists have confirmed the maturation of a "Super El Niño" event. With Sea Surface Temperature (SST) anomalies in the Niño 3.4 region breaching the critical +2.2°C threshold, this rare, ultrahigh intensity phenomenon is set to rewrite regional hydrometeorological realities, casting a long, destabilizing shadow over the impending 2026 Indian Southwest Monsoon.

The El Niño-Southern Oscillation (ENSO) has long been understood as a primary driver of global inter-annual climate variability. However, the event unfolding in the equatorial Pacific throughout January and February 2026 represents a severe amplification of standard parameters. In a typical El Niño, the relaxation of the easterly trade winds permits warm surface waters from the western Pacific to migrate eastward, depressing the thermocline along the South American coast.

In the current 2026 cycle, this oceanic migration has been supercharged. Subsurface temperature profiles reveal a massive reservoir of anomalous heat—locally up to 6°C above baseline averages—at depths between 50 and 150 meters in the central eastern Pacific. This profound thermal feedback has led to a near total collapse, and periodic reversal, of the Walker Circulation trade winds across the equatorial belt. ……. Continued on pg.3

The International Dimension: Maritime Choke Points and Commodity Shocks

Modern warfare instantly ripples across integrated global supply networks. The recent escalation of hostilities has destabilized the **Bab-el-Mandeb Strait, the Red Sea corridor, and Black Sea agricultural routes**, triggering severe macroeconomic friction through two main channels:

The Maritime Crisis: The Red Sea handles over 12% of global trade, but commercial transit plunged by **65%** in early 2026. Shipping fleets are bypassing the Suez Canal to circumnavigate Africa via the Cape of Good Hope. This detour adds 3,500 to 4,000 nautical miles (**10 to 14 days of transit time**) between Asia and Europe. Consequently, ocean freight rates have surged by **150–200%** due to rising insurance, fuel, and crew costs, stranding container capacity and causing immediate inventory shortages in Western Europe. ……. Continued on page 2

Dr Nandkumar Sawant Planery Speaker At National Conference

Dr Nandkumar Sawant , Professor and Head , Department of Geography was invited as the planery speaker for the ICSSR-Sponsored National Conference On "Multidisciplinary Approaches to Environmental Sustainability, Spatial Transformation and Inclusive Development" on January, 9-10 2026 organized by the IIS university , Jaipur Professor Sawant spoke on From Population Explosion to Demographic Dividend - India's Demographic Transition and the Road to Vikshit Bharat 2027: Insights and Challenges where in the emphasis was Progress of the nation's depends on the Quality of human resource and opportunities.

Prof Sawant along with other Speaker , Prof . Vinod Bhardwaj and Prof Dev Sharma

Faculty Participation In Vidnyan Dhara 2026

Dr. Sanjay Gaikwad delivered an insightful lecture series titled "Geography: Emerging Science and Technology for Everyday Life" at P M SHRI Government High School, Mangor-Hill on 15th Dec. 2025, Damodar Higher Secondary School, Gudi Paroda, Quepem on 5th Jan.2026, and Smt. Anandibai M Naik Highschool Gaunem on 4th Feb.2026. Organized by the Directorate of Higher Education, Goa, ……Continued on page 3

Dr Sanjay Delivering Session at Smt. Anandibai M Naik Highschool Gaunem on 4th Feb.2026

Dr Nandkumar Sawant Key Note Speaker at the International Conference

Dr Nandkumar Sawant , Professor and Head , Department of Geography was invited as the Key note speaker at the International Conference On **Water, Land And Life: Geographical Perspectives On Sustainability** Organized by Department of Geography , Post Graduate Teaching and Research Centre of Sir Parashurambhau College (Empowered Autonomous), Pune on 30th and 31st Jan, 2026.2.12.

Prof Sawant at the conference with Prof Dharmashri, Keliniya University, Sri Lanka

The International Dimension

Commodity Price Volatility: Driven by anxieties surrounding the Strait of Hormuz, **Brent Crude surged past $95 per barrel** in February 2026. Simultaneously, conflict-driven export restrictions on Eastern European and Middle Eastern fertilizer components (nitrogenous and phosphatic compounds) have constrained global supplies. Combined with the ongoing Super El Niño, this shortage poses an immediate threat to global food security.

The Domestic Dimension: Transmission Channels into the Indian Economy

While the UN's *World Economic Situation and Prospects 2026* report projects India to remain a global growth engine with a **6.6% expansion rate**—anchored by robust public infrastructure investment and resilient domestic consumption—external shocks present severe fiscal and monetary headwinds.

The economic fallout transmits into the Indian economy through three specific structural channels:

1. Imported Inflation: Because India imports over **85% of its crude oil**, global benchmarks exceeding $95 per barrel instantly strain the economy. As oil marketing companies pass these costs to retail consumers, rising fuel prices inflate logistics and freight expenses nationwide, driving up the Consumer Price Index (CPI).

2. External Trade and Currency Volatility: Elevated oil import costs and spiked ocean freight rates have expanded India's merchandise import bill. Concurrently, economic slowdowns in Western Europe have softened demand for key Indian exports like engineering goods, textiles, and gems.

This widening trade imbalance expands the **Current Account Deficit (CAD)**. Amid global instability, capital flight to the US Dollar has pushed the Indian Rupee (INR) to historic lows, locking the country into a costly import-inflation feedback loop that restricts the

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Faculty Development Programme Participation

In an exciting stride toward future-ready education, Dr. Sanjay Gaikwad and Mr. Ashish Ashwini successfully completed a comprehensive, one-week Faculty Development Programme (FDP) meticulously designed for the Social Science Cluster. This immersive program, titled "Artificial Intelligence (AI) Tools for Pedagogical Enhancement in Higher Education," was held from January 19 to January 23, 2026, at the Directorate of Higher Education (DHE) in Alto Porvorim, Goa, as highlighted in the Faculty Development Programme Participation focusing heavily on the integration of cutting-edge AI tools into everyday teaching methodologies, the session empowered attendees to significantly enhance the classroom experience and

Ultimately, through their active participation in this forward-thinking initiative, both faculty members have strongly bolstered their expertise in modern educational technology, ensuring the institution effectively adopts innovative, data-driven approaches to higher education.

Workshop on Research Design

Department of Geography & Research Center organized a workshop titled "Think, Plan, Research: A Workshop on Research Design" on 19th January, 2026. The resource person in-house faculty member Prof. (Dr.) Nandkumar Sawant. The session focused on research design, including formulation of research problems, objectives, methodology, and structuring of research work. The workshop was particularly beneficial for dissertation students. A total of 09 postgraduate students attended the workshop.

Prof. (Dr.) Nandkumar Sawant in the session research design

the 2026 Super El Niño: From Pg1

The atmospheric consequences of this shift are global, but its teleconnection to the Indian subcontinent is particularly ominous. Under standard conditions, the rising limb of the equatorial Walker Cell facilitates intense atmospheric convection and low pressure over the Maritime Continent and the warm waters of the eastern Indian Ocean. This convective engine works in tandem with the regional synoptic forces that drive the Indian Southwest Monsoon, pulling moisture-laden winds from the high-pressure cell near Madagascar (the Mascarene High) across the equator toward the heated Tibetan Plateau.

When a Super El Niño matures, as witnessed in the opening months of 2026, the entire global cellular architecture shifts. The primary zone of equatorial convection moves eastward toward the International Date Line. Consequently, the corresponding descending limb of the altered Walker Circulation establishes itself squarely over the maritime continent and the Indian subcontinent. This is large-scale subsidence exerts a powerful suppressing effect on vertical motion in the atmosphere over India. The sinking air warms adiabatically, increasing atmospheric stability, drying out mid tropospheric layers, and structurally impeding the

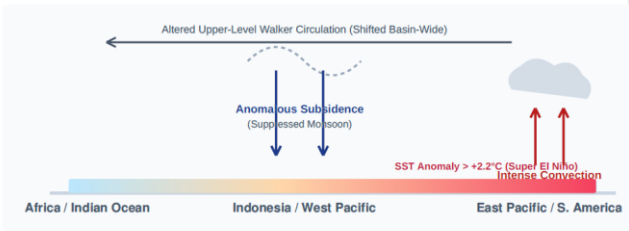

Figure 1: Synoptic schematic of the disrupted Walker Circulation during the 2026 Super El Niño. The eastward migration of core tropical convection to the Central/Eastern Pacific enforces severe atmospheric subsidence over the Indian Ocean basin.

Geographical modeling conducted in January 2026 indicates that the impacts on the Indian monsoon will manifest in two primary dimensions: a delayed, highly erratic onset and stark spatial fragmentation of rainfall. Historically, strong El Niño episodes (such as 1997-98 or 2015-16) do not result in a uniform deficit across the country; instead, they dramatically amplify spatial imbalances. For the 2026 monsoon cycle, extended dynamical models predict that central agricultural zones specifically, the rain-fed soybean, cotton, and pulse belts of Madhya Pradesh, Maharashtra, and parts of Karnataka face an elevated risk of severe seasonal drought.

Conversely, the compounding effect of climate change on ocean basin dynamics complicates this outlook. While the Pacific exhibits classic Super El Niño signs, the northern Indian Ocean is warming at an unprecedented rate. This has triggered localized thermodynamic instability, meaning that while the total volume of monsoonal moisture is suppressed by the Walker cell subsidence, the moisture that does manage to penetrate the subcontinent is vulnerable to sudden, violent releases. Hence, the paradox of the 2026 climate landscape: continued on page 4

Field Visit To Galgibaga & Agonda Beaches

The Department organized an academic field visit to Galgibaga and Agonda beaches on 20th January, 2026. The visit was coordinated by Dr. Adrian Ferro, along with postgraduate students to study coastal ecosystems and wildlife conservation practices. Students observed nesting beach characteristics and conservation practices, enhancing their understanding of coastal geography, biodiversity and conservation.

Dr. Adrian Ferro along with the students during field visit to Galgibaga and Agonda beaches

Vidnyan Dhara 2026 From page 1

and GSHEC under the Viksit Bharat Abhiyan, the sessions redefined geography as a tech-driven field powered by GIS, remote sensing, and drones. Dr. Gaikwad demonstrated how these innovations are essential for modern navigation, weather forecasting, and disaster management, while highlighting lucrative career paths in geospatial sciences. By bridging the gap between traditional maps and real-world problem-solving, the talk inspired students to view geography as a gateway to future innovation.

Heritage walk in Margao town

The Department organized a Heritage walk in Margao town on 21st January, 2026 for postgraduate students. The heritage walk began at the Holy Spirit Church and concluded at the New Municipal Building. The activity focused on understanding urban layout, land-use patterns, street networks and heritage structures through field-based learning. A total of 13 postgraduate students participated.

"Everything is related to everything else, but near things are more related than distant things." - **Waldo Tobler** *(Tobler's First Law of Geography—the foundational principle behind modern spatial analytics and algorithmic modeling)*

"Knowing where things are, and why, is essential to rational decision making."- **Jack Dangermond** *(On the intersection of spatial technology and data analysis)*

the 2026 Super El Niño: From Pg.3

a projected net deficit in cumulative monsoonal rainfall, interspersed with destructive, highly localized cloudbursts and flash flooding across the Western Ghats and the Himalayan foothills.

AGRICULTURAL VULNERABILITIES AND MACRO RISKS

The socio-economic implications for India are direct and acute. Over 50% of India's net sown area remains entirely dependent on monsoon precipitation for irrigation. A major failure or significant delay in the Kharif crop sowing cycle threatens to drastically cut production yields for staple crops, particularly rice, coarse cereals, and oilseeds.

Furthermore, surface water resource infrastructure across central and western India is entering this critical period with structurally low reserves. Successive heatwaves in early 2026 have accelerated evapotranspiration rates across major reservoir basins, such as the Narmada and Krishna systems. A failure of the monsoon to rapidly replenish these reservoirs by July 2026 will cripple both winter (Rabi) crop irrigation and metropolitan drinking water security well into 2027. This introduces severe downside risks to India's rural economy, threatening to trigger rural demand contractions and acute food price inflation. Mitigating this geographical shock will require highly precise, decentralized agrometeorological interventions and aggressive crop-shifting strategies implemented well before the traditional June onset.

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The International Dimension: From Page 2

..the Reserve Bank of India's policy manoeuvrability.

3. Fiscal Strain

To shield the agricultural sector from soaring international fertilizer prices, the union government has substantially increased its budgetary allocations for **food and fertilizer subsidies**. This unexpected fiscal drain diverts vital capital away from long-term asset creation and public infrastructure projects.

While India's vast domestic market and structural reforms provide a reliable buffer against full economic contraction, its economic trajectory remains deeply tied to global geographic networks. Navigating the remainder of 2026 will require a cautious fiscal approach, aggressive trade route diversification, and strategic mineral and energy stockpiling.

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Launch of IMEx-2026 (Indian Microgravity Experiments)

On **January 29, 2026**, ISRO officially announced the *Indian Microgravity Experiments (IMEx-2026)* initiative. In preparation for the Gaganyaan human spaceflight mission and the future Bharatiya Antariksh Station (BAS), ISRO invited Indian academic institutions and research labs to develop scientific payloads. This includes space agriculture and fluid physics projects that will study how earth resources react to zero gravity.

Dr Nandkumar Sawant Planery Speaker at National Conference

Dr Nandkumar Sawant , Professor and Head , Department of Geography was invited as the planery speaker for the One Day Online National Seminar" Population, Agriculture and Environmental Challenges"0n 15th January 2026 by Department of Geography of Shri Sadguru Gangangeeri Maharaj Science, Gautam Arts & Sanjivani Commerce College, Kopargaon and R. B. Narayanrao Borawake College, Shrirampur (Autonomous).

Prof Sawant, as a population geographer , spoke on the India's Demographic Perspective in the 21st Century"

The Strait of Hormuz: Located between Oman and Iran, this is the world's most critical oil transit bottleneck. It connects the Persian Gulf with the Gulf of Oman and the Arabian Sea. Over **20% of global petroleum consumption** passes through Hormuz daily, heading primarily to energy-hungry markets in Asia (India, China, Japan, and South Korea).

https://en.wikipedia.org/wiki/File:West_Asia_non_political_with_water_system.jpg

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Dr. Sanjay D. Gaikwad, Teacher In-charge, for Geographia, Jan.- Feb. 2026
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