

स्वतंत्रता दिवस
की हार्दिक शुभकामनाएं

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About E-magazine

“Earth Root” is an open access e-magazine in the discipline of Environmental sciences published by Earth Root Foundation. The aim of the e-magazine is to provide information and upgradation of knowledge about environmental issues on wider scale and to share ideas and resources to the readers. Using essential knowledge people can lead a healthy life, which is more sustainable and can connect with ongoing efforts for stopping catastrophically the climate change. E-magazine caters to all related environmental aspects ranging from big issues like climate change, renewable energy and pollutants in the atmosphere to the health of human and living beings on Earth. We also take topics of water resources and efforts and measurement to provide optimum use of it; including large scale atmospheric circulation linked with oceans and ecology.

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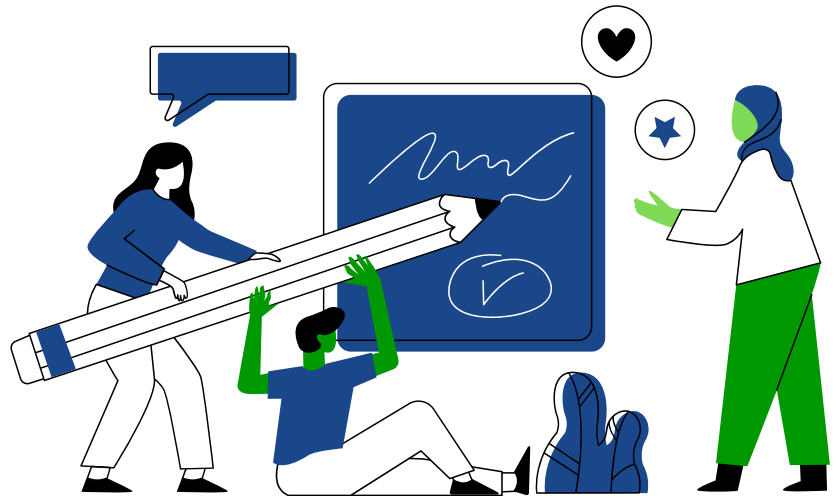
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TABLE OF CONTENTS



PG. NO.

04

"TYPHOON GAEMI'S LEGACY: THE LONG-TERM ENVIRONMENTAL IMPACT OF THE PHILIPPINES OIL SPILL" (NIKITA)

06

WAYANAD LANDSLIDE A STARK REMINDER OF CLIMATE CHANGE'S ESCALATING IMPACT(DR. VIVEK PANWAR)

08

LONG-TERM ECONOMIC IMPACTS OF THE WAYANAD LANDSLIDES: CHALLENGES AND RECOVERY (DR. SONAKSHI JAIN)

11

THE UNSEEN PERIL: HOW EXTREME HEAT WAVES IMPACT AIRCRAFT PERFORMANCE AND SAFETY (MR. ANKUR GOEL)

13

FROM DUST TO LIFE: TURNING OUR DESERTS GREEN (HANA DHAKA)

15

MOVIE RECOMMENDATION



TYPHOON GAEMI'S LEGACY: THE LONG-TERM ENVIRONMENTAL IMPACT OF THE PHILIPPINES OIL SPILL

-Nikita

Research Intern, Earth Root Foundation

Typhoon Gaemi, which struck the Philippines with unprecedented force, not only caused widespread devastation due to its powerful winds and heavy rainfall but also triggered an environmental disaster with far-reaching consequences. One of the most alarming impacts was the massive oil spill that occurred as a result of the typhoon's onslaught. This environmental catastrophe has drawn significant attention to the long-term consequences of oil spills, especially in a region as ecologically diverse and vulnerable as the Philippines.

The oil spill occurred when Typhoon Gaemi's ferocity caused several oil tankers to capsize and oil storage facilities to be compromised along the coast. The result was a substantial release of crude oil into the surrounding waters, leading to a catastrophic contamination of marine and coastal ecosystems. The immediate aftermath saw a dark, viscous layer of oil spreading across the ocean surface, suffocating marine life and disrupting the natural balance of the ecosystems.

The immediate effects of the oil spill were devastating. Mangrove forests, which act as natural

buffers against storms and serve as crucial breeding grounds for many marine species, were heavily coated in oil. This not only killed numerous plants and animals but also severely damaged the intricate root systems that stabilize these coastal areas. Coral reefs, already under threat from climate change and human activities, suffered further degradation. The oil smothered corals, cutting off their oxygen supply and leading to large-scale coral bleaching and death.

Marine wildlife was profoundly affected. Sea birds, fish, and marine mammals were among the most visible victims. Oil-coated birds were rendered unable to fly, leading to mass fatalities from hypothermia and starvation. Fish populations plummeted as the toxic oil infiltrated their habitats, disrupting breeding grounds and food chains. Marine mammals, such as dolphins and whales, faced suffocation and poisoning as they surfaced through oil-covered waters.

The economic implications for coastal communities were immediate and severe. Many of these communities rely heavily on fishing and tourism for their livelihoods. The oil spill rendered

large areas of the ocean unusable for fishing, leading to a significant decline in fish catches and thus income for fishermen. Tourism also took a major hit as beaches and dive spots, which are major attractions, were contaminated with oil. This double blow further exacerbated the economic challenges already posed by the typhoon's destruction.

As the immediate crisis began to stabilize, attention turned to the long-term environmental effects of the oil spill. One of the most insidious impacts is the persistent contamination of the marine environment. Oil residues can remain in the water and sediments for years, continuously releasing toxic substances. These substances can accumulate in the tissues of marine organisms, leading to long-term health issues and affecting the entire food web, from plankton to apex predators.

The degradation of mangroves and coral reefs has long-term implications for coastal protection and biodiversity. Mangroves, once damaged, can take decades to recover, leaving coastal areas more vulnerable to future storms and erosion. Coral reefs, essential for marine biodiversity, might never fully recover if the foundational structures are destroyed. This loss of biodiversity not only affects the ecological balance but also the resilience of the ecosystem to future environmental stresses.

The spill also highlights the critical need for better disaster preparedness and response mechanisms. The Philippines, situated in a typhoon-prone region, must enhance its infrastructure and response strategies to mitigate the risks of such environmental disasters. This includes better regulation and safety measures for oil storage and transportation facilities, as well as rapid response teams specifically trained to handle oil spills.

The long-term health of local communities is another concern. The consumption of contaminated fish can lead to serious health issues, including cancer and neurological damage.

Continuous exposure to contaminated water and soil can also pose chronic health risks to the population. Therefore, ongoing monitoring and health assessments are crucial to address and mitigate these risks.

Moreover, the oil spill underscores the broader issue of environmental sustainability and the need for a transition to cleaner energy sources. The reliance on fossil fuels not only contributes to climate change but also increases the risk of such environmental disasters. Investing in renewable energy and sustainable practices can reduce the dependency on oil and minimize the potential for future spills.

In conclusion, the oil spill caused by Typhoon Gaemi in the Philippines is a stark reminder of the long-term environmental and socio-economic impacts of such disasters. While the immediate effects are visible and devastating, the lingering consequences pose a significant threat to the environment, biodiversity, and human health. Addressing these challenges requires a multifaceted approach, including better preparedness, stricter regulations, and a commitment to sustainable energy solutions. Only through comprehensive efforts can the long-term impacts of such environmental catastrophes be mitigated and the resilience of affected communities be strengthened.



WAYANAD LANDSLIDE A STARK REMINDER OF CLIMATE CHANGE'S ESCALATING IMPACT

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The recent landslide in Wayanad, Kerala, highlights the escalating impacts of climate change. Nestled in the Western Ghats, Wayanad is celebrated for its lush greenery, biodiversity, and agricultural output. However, this natural beauty is increasingly threatened by environmental disasters, underscoring the urgent need to address climate change and its consequences.

On the night of July 30, 2024, heavy rains triggered a massive landslide in Wayanad's hilly terrain. The landslide demolished homes, uprooted trees, and buried roads under thick layers of mud and debris. Despite immediate rescue operations, the scale of the destruction made the task overwhelming. Lives were lost, and many were left homeless, their livelihoods destroyed in an instant. This disaster is not an isolated incident but part of a troubling trend of increasing frequency and intensity of such events in the region.

Climate scientists have long warned about the link between global warming and extreme weather events.

Rising global temperatures lead to more intense and erratic rainfall patterns, and Wayanad's landslide is a direct result of these changing climatic conditions. The region, which typically experiences heavy monsoons, is now facing unprecedented rainfall intensity, which local infrastructure cannot handle.

The Western Ghats, including Wayanad, are particularly vulnerable to climate change due to their unique topography and ecological significance. The mountains act as a barrier, trapping moisture-laden winds and resulting in heavy rainfall. However, deforestation and land-use changes have significantly weakened the soil's stability, making it more susceptible to landslides. The combination of deforestation, unsustainable agricultural practices, and unplanned urbanization has exacerbated the region's vulnerability to such disasters.

In Wayanad, the impact of climate change is not just environmental but socio-economic. The landslide has devastated agricultural lands, which are the primary source of income for many

local communities. Coffee, tea, and spices, which form the backbone of Wayanad's economy, have been severely affected. Farmers, already struggling with erratic weather patterns, now face the additional burden of landslide-related destruction. This has led to increased financial stress and uncertainty about the future.

The loss of biodiversity is another significant consequence of the landslide. Wayanad is home to several endemic species of flora and fauna, many of which are already under threat due to habitat loss. The landslide has further degraded their habitats, pushing some species closer to extinction. This loss of biodiversity has far-reaching implications for the ecological balance of the region and the services it provides to the local population.

Addressing the root causes of such disasters requires a multi-faceted approach. Firstly, there is a need for comprehensive climate adaptation and mitigation strategies. The government and local authorities must prioritize sustainable land-use practices, reforestation, and the conservation of natural habitats. These measures can help enhance the resilience of the landscape to extreme weather events.

Secondly, there must be a concerted effort to improve early warning systems and disaster preparedness. The recent landslide caught many by surprise, highlighting the gaps in the current monitoring and alert systems. Enhanced forecasting capabilities and timely dissemination of information can save lives and reduce the extent of damage during such events.

Community involvement is crucial in building resilience against climate change impacts. Local communities, who are often the first responders during disasters, need to be empowered with knowledge and resources to effectively manage and mitigate risks. Training programs on sustainable agricultural practices, water management, and soil conservation can go a long way in reducing the vulnerability of these communities.

Moreover, there is a pressing need for policy interventions that address the underlying drivers of climate change.

This includes reducing greenhouse gas emissions, transitioning to renewable energy sources, and promoting sustainable development practices. The recent landslide in Wayanad underscores the urgency of these actions. Climate change is not a distant threat but a present reality that requires immediate and sustained action.

The international community also has a role to play in supporting regions like Wayanad. Climate finance, technology transfer, and capacity-building initiatives are essential to help developing regions adapt to the impacts of climate change. Collaborative efforts can enhance the resilience of vulnerable communities and ecosystems, ensuring that they can withstand the increasing frequency of extreme weather events.

The Wayanad landslide is a tragic example of the devastating effects of climate change. It highlights the urgent need for comprehensive and coordinated efforts to address both the symptoms and root causes of climate-related disasters. As the world continues to grapple with the consequences of global warming, the experience of Wayanad serves as a poignant reminder of the need for immediate and sustained action to safeguard our planet and its inhabitants. The path forward requires a collective commitment to building a more resilient and sustainable future for all.



LONG-TERM ECONOMIC IMPACTS OF THE WAYANAD LANDSLIDES: CHALLENGES AND RECOVERY

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The Wayanad district in Kerala, India, known for its picturesque landscapes and lush greenery, experienced devastating landslides in recent years. Recent landslides, triggered by intense monsoon rains, have had profound economic impacts on the region. The immediate and long-term consequences of these natural disasters are far-reaching, affecting various sectors and livelihoods, and posing significant challenges for recovery and development.

The immediate economic impact of the Wayanad landslides was felt most acutely by the local communities. The destruction of homes and infrastructure, including roads, bridges, and public utilities, resulted in significant financial losses. Many families lost their primary sources of income as agricultural lands were washed away or rendered unusable. Wayanad is heavily dependent on agriculture, particularly cash crops like coffee, tea, and spices. The loss of these crops due to landslides has had a cascading effect on the local economy, leading to reduced income for farmers and laborers, and a decline in agricultural productivity.

The tourism industry, a vital component of Wayanad's economy, also suffered severe setbacks. Known for its natural beauty and eco-tourism opportunities, Wayanad attracts a substantial number of domestic and international tourists. The landslides not only damaged tourist infrastructure, such as hotels and resorts, but also led to a decline in tourist arrivals due to safety concerns and negative publicity. The reduced tourist footfall has adversely affected businesses reliant on tourism, including local artisans, transport services, and hospitality providers, leading to widespread economic distress.

In addition to the direct financial losses, the landslides have strained the government's resources. The immediate response to the disaster required significant expenditure on rescue and relief operations. The rehabilitation of affected communities and the reconstruction of damaged infrastructure necessitated substantial investments, diverting funds from other developmental activities. The government's financial burden has been exacerbated by the need to implement

long-term mitigation measures to prevent future landslides, such as afforestation, slope stabilization, and improved drainage systems.

The long-term economic effects of the Wayanad landslides are equally concerning. The disruption of agricultural activities has long-lasting repercussions on food security and rural livelihoods. Farmers who lost their crops and farmlands face difficulties in re-establishing their agricultural activities. The loss of soil fertility and changes in land use patterns further hinder agricultural recovery. This, in turn, impacts the region's agricultural output and income levels, perpetuating a cycle of poverty and economic vulnerability.

The tourism sector's recovery is also slow and uncertain. Restoring the confidence of tourists and rebuilding damaged infrastructure takes time and significant investment. The loss of revenue from tourism during the recovery period has a ripple effect on the broader economy, affecting employment and income generation. The local businesses that rely on tourism continue to face economic hardships, with many struggling to stay afloat in the absence of sufficient tourist activity.

Another critical long-term impact is the psychological and social toll on the affected communities. The trauma of losing homes, livelihoods, and loved ones in the landslides leaves lasting scars. Mental health issues, such as anxiety and depression, can hinder individuals' ability to participate in economic activities effectively. The social fabric of communities is also disrupted, with displacement and loss of property leading to changes in social dynamics and relationships. Rebuilding community cohesion and social capital becomes a challenging task, further complicating the recovery process.

The environmental degradation caused by the landslides has significant economic implications as well. The loss of vegetation and soil erosion contribute to further ecological imbalances, increasing the vulnerability of the region to future natural disasters. The degradation of natural resources, such as forests and water bodies,

affects livelihoods that depend on these resources, including agriculture, forestry, and fishing. The long-term sustainability of these sectors is jeopardized, necessitating concerted efforts towards environmental conservation and restoration.

Addressing the long-term economic impacts of the Wayanad landslides requires a multi-faceted approach. Strengthening disaster preparedness and resilience is crucial to mitigate future risks. This includes investing in early warning systems, improving land use planning, and promoting sustainable agricultural practices. Providing financial support and technical assistance to affected farmers can help in rehabilitating agricultural activities and restoring livelihoods. Diversifying the local economy by promoting non-agricultural income sources, such as handicrafts and small-scale industries, can enhance economic resilience.

Reviving the tourism sector necessitates strategic marketing and infrastructure development. Promoting Wayanad as a safe and attractive tourist destination, while ensuring the safety and well-being of visitors, is essential for attracting tourists back to the region. Collaborative efforts between the government, private sector, and local communities are vital for rebuilding and revitalizing the tourism industry.

In conclusion, the economic impacts of the Wayanad landslides are profound and multifaceted, affecting various sectors and aspects of life. The immediate financial losses, coupled with the long-term challenges of recovery and resilience-building, require coordinated efforts and substantial investments. By addressing the root causes of vulnerability and promoting sustainable development practices, Wayanad can gradually overcome the economic setbacks and build a more resilient and prosperous future for its communities.



THE UNSEEN PERIL: HOW EXTREME HEAT WAVES IMPACT AIRCRAFT PERFORMANCE AND SAFETY

-Ankur Goel

Director, Copper Cross Solutions

The aviation industry is no stranger to the challenges posed by weather phenomena. From thunderstorms to heavy fog, pilots and airlines must constantly adapt to ensure safe and timely travel. However, a relatively underexplored yet increasingly pressing issue is the effect of extreme heat waves on aircraft performance. As global temperatures rise and heat waves become more frequent and intense, understanding their impact on aviation is crucial. Aircraft performance is heavily influenced by atmospheric conditions, particularly temperature. As the temperature increases, air density decreases—a principle rooted in the ideal gas law. Lower air density means that aircraft engines produce less thrust, and wings generate less lift. This directly affects an aircraft's ability to take off, climb, and maintain altitude. During extreme heat waves, these effects are magnified. For instance, at higher temperatures, the required takeoff distance increases significantly. Airports at high altitudes or those with shorter runways face particular challenges, as aircraft need more runway length to achieve the necessary lift-off speed. In some cases, flights may need to be delayed,

canceled, or rerouted to airports with longer runways.

Reduced engine efficiency is a major concern in hot conditions. The decreased air density leads to reduced mass flow through the engine, resulting in lower thrust. This can compromise an aircraft's ability to climb rapidly, which is critical during takeoff and emergency situations. Additionally, higher temperatures require longer takeoff distances. A commercial airliner taking off at 40°C might need several hundred meters more runway compared to a standard 15°C day. This can be problematic at airports with limited runway length or in emergency scenarios where an aborted takeoff is necessary. Climbing to cruising altitude is more challenging in hot weather. Pilots may need to adjust their climb rates or alter flight paths to ensure safe ascent. In mountainous regions, this can lead to additional complications, as the terrain requires precise navigation and sufficient altitude.

Airlines may also need to reduce the payload—passengers, cargo, and fuel—to meet the performance limitations caused by high temperatures. This can result in financial losses and operational inefficiencies,

as flights may carry fewer passengers or need additional fuel stops. Extreme heat not only impacts aircraft performance but also raises several safety concerns. Overheating can affect avionics and other onboard systems critical for navigation and communication. The risk of tire blowouts also increases, as the heat can cause tires to expand beyond their optimal pressure ranges.

To mitigate these risks, airlines and airports are adopting various strategies. Revising flight schedules to cooler parts of the day, such as early morning or late evening, helps maintain optimal aircraft performance and safety. Airports in regions prone to extreme heat are investing in longer runways and improved cooling systems for critical infrastructure. This ensures that aircraft have the necessary conditions for safe operations even during heat waves. Pilots are receiving additional training to handle high-temperature conditions, including adjusting takeoff and landing techniques and managing in-flight performance issues related to heat. The aviation industry is also exploring new technologies, such as more heat-resistant materials and advanced cooling systems, to enhance aircraft performance in extreme temperatures.

Research into alternative propulsion systems, like electric or hybrid engines, also holds promise for mitigating the impact of heat waves.

As climate change continues to drive extreme weather patterns, the aviation industry must adapt to ensure safety and efficiency. While technological advancements and operational adjustments can mitigate some of the challenges posed by extreme heat waves, ongoing research and proactive planning are essential. Airlines, airports, and regulatory bodies must collaborate to develop comprehensive strategies for managing the impact of rising temperatures. By understanding the unique challenges posed by extreme heat and implementing robust solutions, the aviation industry can continue to thrive in an increasingly unpredictable climate.

Extreme heat waves present a significant challenge to aircraft performance and safety, affecting everything from takeoff distances to in-flight efficiency. As global temperatures rise, the aviation industry must adopt innovative strategies and technologies to ensure safe and reliable air travel. By doing so, it can navigate the perils of extreme heat and continue to connect the world safely and efficiently.

FROM DUST TO LIFE: TURNING OUR DESERTS GREEN

-HANA DHAKA

Consultant, EXL Service, New Delhi



GLOBAL INITIATIVES AND RESEARCH IN COMBATTING DESERTIFICATION

Did you know that over 75% of the land on Earth is already degraded? That's a staggering statistic from the European Commission's World Atlas of Desertification. Even more concerning, they predict that by 2050, more than 90% of our land could face degradation. Each year, an area about half the size of the European Union—around 1.61 million square miles—is affected, with Africa and Asia bearing the brunt of this crisis.

This is where the United Nations' Sustainable Development Goals (SDGs) come into play, particularly Goal 15, which focuses on life on land. The aim is to protect and restore our terrestrial ecosystems, manage forests sustainably, combat desertification, and halt biodiversity loss.

One of the hardest-hit areas is the Sahel region in Africa, where people are already feeling the harsh effects of climate change. Droughts, food shortages, and conflicts over dwindling resources are pushing many to migrate to Europe in search of a better life.

Efforts are being made to counteract these effects. Research is focusing on developing efficient tree-planting vehicles for deserts, addressing the low efficiency and high labor requirements of current methods. Genetic research aims to create crops that can thrive in harsh, arid conditions, with species such as *Hedysarum scoparium*, *Caragana korshinskii*, and *Artemisia desertorum* being suitable for desert planting.

A significant initiative in this realm is the Great Green Wall project, which aims to restore 386,000 square miles across 20 African countries by 2030. This ambitious plan seeks to plant trees from the west to the east of the continent, providing food, jobs, and a sustainable future for millions living in climate-affected regions. Drought-resistant acacia trees are being planted, creating shaded environments that help other plants thrive with less water.

Saudi Arabia is also making strides with its Vision 2030 plan, which focuses on transforming the nation while ensuring environmental sustainability.



The Saudi Green Initiative aims to plant 10 billion trees across the Kingdom, utilising recycled water to support these efforts. This will not only help combat pollution and reduce carbon emissions but also improve air quality and lower temperatures.

Israel provides another fascinating example. Back in the 1920s, 60% of its land was desert, but today, it's known for its water supply innovations. In 1939, a brilliant Polish hydraulic engineer named Simcha Blas was tasked with creating a new water distribution system. His plan involved deep boreholes, a sophisticated distribution network, and the construction of a national aqueduct to transport water from the Sea of Galilee to the rest of the country. The Israel Water Authority was established to manage this system, charging for water to promote conservation. This approach led to a 20% reduction in residential water consumption.

Thanks to these innovations, Israel's agriculture has flourished, generating \$2 billion in sales annually, primarily from fruits and vegetables. They've even pioneered a technique called 'Drip Irrigation,' which conserves water while boosting crop yields. In dealing with the saline nature of their water supply, Israel has focused on developing crops that can withstand salty conditions, rather than relying solely on costly desalination plants, instead of making huge investments to desalinate the water.

These examples highlight how countries are responding to the pressing issue of land degradation and climate change, showcasing innovative solutions and a commitment to sustainability.



MOVIE

RECOMMENDATION

POLAR BEAR

Directed by

- Alastair Fothergill
- Jeff Wilson

Produced by

- Alastair Fothergill
- Keith Scholey
- Roy Conli
- Jeff Wilson
- Jason Roberts

Distributed by Disney+

Release date April 22, 2022

Running time 84 minutes

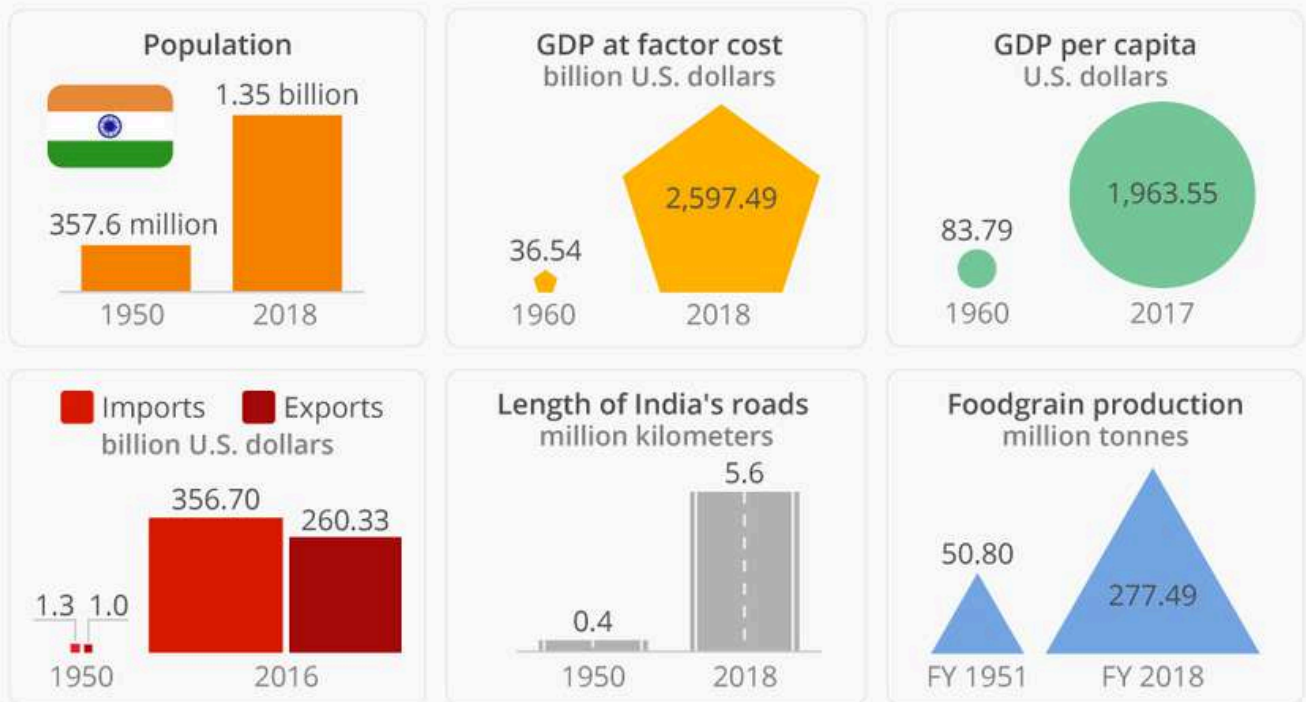
Polar Bear is a 2022 American nature documentary film about polar bears directed by Alastair Fothergill and Jeff Wilson. Narrated by Catherine Keener, it is the sixteenth nature documentary to be released under the Disneynature label. The film was released as a Disney+ exclusive on Earth Day, April 22, 2022.

PLOT

A mother polar bear and her cub swim across the waters that was once the ice of the Arctic Tundra, as the film tells us the story of how she and her family survived during her youth. She had loved playing with her twin brother as they were watched and protected by their mother, as she goes seal hunting and keeping a look out for male polar bears who threaten the cubs, they even came across a dead whale, and they, along with many other bears, feasted on it. Sadly one day, the polar bear's brother died, and it was only her and her mom left, she successfully hunted a baby walrus abandoned by a panicked mother. The bear's mother knew it's time to fend for herself again, and departs. The polar bear then spent years not seeing another ice bear, until she meets another male her age and they spend a day playing together, as he bids farewell, she realizes she was being tracked by a much bigger male. Thinking he was going to kill her, she stands her ground, but soon realizes she was being courted. As the big male and the female go their separate ways, the polar bear soon becomes a mother of one cub. In the present day, the mother and daughter spend their days surviving in the disappearing Arctic, the female knows her daughter will have what it takes to become a good ice bear, with a concerned question on what kind of world will she call home. The film ends with a message reading, "The Arctic could be ice-free by the summer of 2040, the actions we take today can positively change the future of polar bears."



How India has evolved since independence



Sources: worldometers, tradingeconomics, economic times, world bank, Ministry of Road transport and highways (India)

statista

Ref. <https://www.statista.com/chart/5512/how-india-has-evolved-since-independence/>

NOT JUST INDIA

THESE COUNTRIES ALSO GOT INDEPENDENCE ON AUG 15



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