

EARTH ROOT

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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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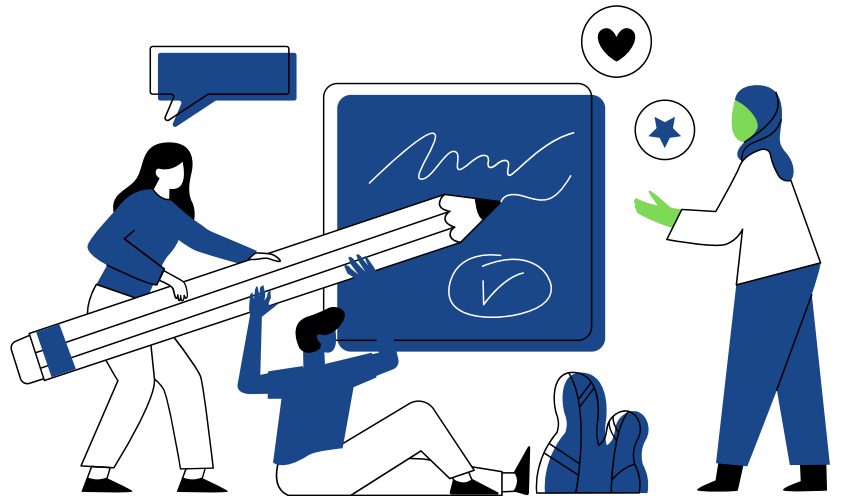
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TABLE OF CONTENTS



PG. NO.

04

INDIA'S GREEN REVOLUTION: NAVIGATING THE ENERGY TRANSITION AND THE RISE OF GREEN JOBS (DR. PALAK BALYAN)

07

THE DEVASTATING IMPACT OF TYPHOON YAGI AND ITS LESSONS IN PREPAREDNESS (DR. VIVEK PANWAR)

09

HOW MUCH DO WE KNOW ABOUT EARTH? (KAMALDEEP KUMAR)

11

UNEARTHED THREATS: THE DISCOVERY OF 1700 ANCIENT VIRUS SPECIES IN THE MELTING HIMALAYAS (MR. ANKUR GOEL)

13

MOVIE RECOMMENDATION



INDIA'S GREEN REVOLUTION: NAVIGATING THE ENERGY TRANSITION AND THE RISE OF GREEN JOBS

-Dr. Palak Balyan

Research Lead, Climate Trends

India stands at a pivotal juncture in its energy history. As one of the world's fastest-growing economies and the third-largest energy consumer, the nation faces the dual challenge of meeting its burgeoning energy demands while mitigating environmental impacts. The energy transition from fossil fuels to renewable sources is not just an environmental imperative but also an economic opportunity. Central to this transformation is the rise of green jobs, which are reshaping India's employment landscape and offering pathways to sustainable development.

The Energy Transition: A National Priority

Over the past decade, India has made significant strides in shifting towards renewable energy. The government's ambitious targets include achieving 450 GW of renewable energy capacity by 2030, a substantial increase from the current capacity. Solar and wind energy sectors have witnessed exponential growth, propelled by favorable policies, technological advancements, and decreasing costs.

This transition is driven by several factors:

1. **Environmental Concerns:** Air pollution and carbon emissions have serious health and environmental repercussions. Transitioning to cleaner energy sources is essential for improving public health and combating climate change.
2. **Energy Security:** Reducing dependence on imported fossil fuels enhances national energy security and reduces vulnerability to global market fluctuations.
3. **Economic Growth:** Renewable energy projects stimulate economic activity through investments, infrastructure development, and job creation.

The Emergence of Green Jobs

The shift towards renewable energy has catalyzed the growth of green jobs—positions that contribute to preserving or restoring the environment. These jobs span various sectors, including renewable energy, energy efficiency, environmental protection, and sustainable transportation.

Renewable Energy Sector

The solar and wind industries are at the forefront of green job creation. Roles range from manufacturing solar panels and wind turbines to installation, maintenance, and operation of renewable energy facilities. According to the Council on Energy, Environment and Water (CEEW), India's renewable energy sector could employ over one million people by 2030.

Energy Efficiency and Conservation

Jobs in energy auditing, retrofitting buildings, and developing energy-efficient appliances are gaining traction. Professionals in this domain help industries and consumers reduce energy consumption, leading to cost savings and environmental benefits.

Sustainable Transportation

The push for electric vehicles (EVs) has opened avenues in manufacturing, battery technology, charging infrastructure, and maintenance services. The government's incentives for EV adoption aim to reduce oil imports and lower urban pollution levels.

Challenges in the Green Job Market

While the prospects are promising, several challenges need addressing to realize the full potential of green jobs in India.

Skill Gap

A significant hurdle is the mismatch between the skills required by green industries and those possessed by the workforce. Technical expertise in renewable technologies, data analytics, and sustainable practices is in short supply.

Education and Training

Integrating sustainability and renewable energy topics into educational curricula is essential. Vocational training and specialized courses can equip individuals with the necessary skills. Initiatives like the Skill Council for Green Jobs have been established to bridge this gap.

Policy and Regulatory Framework

Consistent and supportive policies are crucial for industry confidence and investment. Regulatory hurdles, land acquisition issues, and

bureaucratic delays can impede project implementation and job creation.

Opportunities and the Way Forward

Economic Empowerment

Green jobs offer opportunities for economic empowerment, particularly in rural areas where renewable energy projects can provide stable employment. Community-based initiatives can enhance local engagement and ownership.

Innovation and Entrepreneurship

The green sector encourages innovation and entrepreneurship. Start-ups focusing on clean technologies, sustainable products, and environmental services contribute to economic diversification and competitiveness.

International Collaboration

Global partnerships can facilitate knowledge exchange, technology transfer, and investment. Collaborative efforts can accelerate India's transition and integrate it into global supply chains.

Government Initiatives

The Indian government has launched several programs to promote green jobs and support the energy transition:

- **National Solar Mission:** Aims to establish India as a global leader in solar energy through large-scale deployment and innovation.
- **Skill India Mission:** Includes training programs tailored to the renewable energy sector to enhance employability.
- **Electric Mobility Mission Plan 2020:** Promotes electric and hybrid vehicles through incentives and infrastructure development.

The Socio-Economic Impact

The rise of green jobs has broader socio-economic implications:

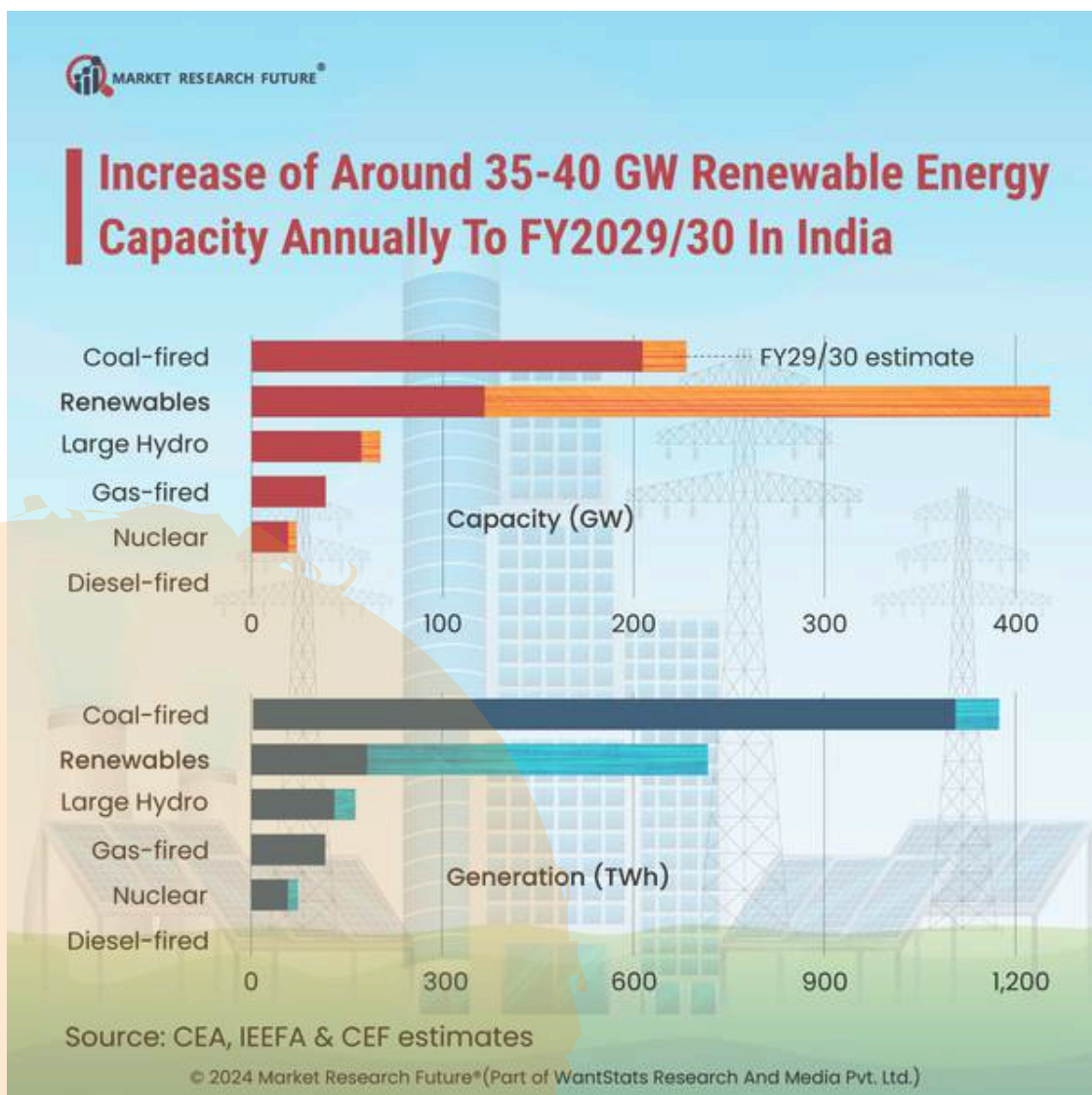
- **Poverty Alleviation:** Access to clean energy and employment opportunities can improve living standards, especially in underdeveloped regions.

- **Gender Equality:** Encouraging women's participation in the green economy can promote gender equality and harness a wider talent pool.
- **Health Benefits:** Reducing pollution through clean energy diminishes health risks, leading to lower healthcare costs and improved productivity.

Conclusion

India's energy transition is more than a shift in power sources; it's a comprehensive transformation that encompasses economic, social, and environmental dimensions. The expansion of green jobs is a testament to the opportunities that sustainable practices offer. However, to fully harness these benefits, concerted efforts are required from the government, industry, educational institutions, and civil society.

Investing in education and training, streamlining policies, and fostering innovation will be key to overcoming challenges. As India navigates this transition, it sets an example for other developing nations striving for sustainable growth. The journey towards a greener future is complex, but with strategic action, it holds the promise of a more resilient and prosperous India.



HINDUSTAN TIMES

THE DEVASTATING IMPACT OF TYPHOON YAGI AND ITS LESSONS IN PREPAREDNESS

-Dr. Vivek Panwar

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In the annals of tropical storms, Typhoon Yagi stands as a significant reminder of the power and unpredictability of nature. Formed in the warm waters of the Pacific, Yagi, named after the Japanese word for "goat," made headlines for its relentless progression across the region, leaving a trail of destruction in its wake. Though not the strongest typhoon to hit East Asia, Yagi's course and impact were a lesson in the importance of preparedness, resilience, and international cooperation in the face of natural disasters.

Typhoon Yagi began as a tropical depression in early August, gaining strength as it traveled westward. Meteorological agencies across Asia closely monitored its progress as it approached the coastlines of China, Japan, and the Philippines. The storm, at its peak, reached typhoon status with winds surpassing 120 kilometers per hour, accompanied by torrential rain and significant storm surges. Yagi's impact was felt most acutely in China, where it made landfall in Zhejiang province, causing widespread flooding and displacement of

thousands of people. In Japan, the typhoon brought heavy rains and strong winds, particularly affecting areas already vulnerable to landslides and flooding due to the geography of the region.

One of the most remarkable aspects of Typhoon Yagi was the sheer volume of rain it brought. As it moved across the East China Sea and approached the coasts, its slow movement allowed for heavy rainfall to accumulate over a prolonged period. In some areas, this resulted in up to 200 millimeters of rain in just 24 hours, causing rivers to swell and overwhelm flood defenses. Low-lying areas were particularly hard hit, with flash floods damaging homes, infrastructure, and agricultural lands. In Zhejiang, emergency services were deployed to rescue those trapped by rising waters, while entire communities were evacuated as a precautionary measure.

While the immediate impact of Yagi was devastating, it was the aftermath that underscored the long-term challenges posed by such natural events. Floodwaters remained for

days, hampering recovery efforts and making the affected areas vulnerable to disease outbreaks and water contamination. Local governments and humanitarian organizations quickly mobilized to provide aid, including food, clean water, and medical supplies. However, the scale of the disaster stretched resources thin, revealing vulnerabilities in the region's disaster response capabilities.

China, in particular, faced significant economic losses due to Typhoon Yagi. The region hit by the storm is home to key agricultural and industrial hubs, and the damage to crops and factories was extensive. Rice paddies and vegetable farms, already strained by unpredictable weather patterns linked to climate change, were inundated by floodwaters, wiping out months of labor. Manufacturing plants, vital to the regional economy, were forced to halt operations, further disrupting supply chains. The financial toll of Yagi was a stark reminder of the economic fragility of regions prone to natural disasters, especially in an era where climate change is intensifying the frequency and severity of such events.

Japan, although spared the worst of Yagi's impact, still faced significant challenges. Landslides triggered by the heavy rains added to the difficulties, particularly in rural areas where infrastructure was less developed. The storm also disrupted transportation networks, with flights canceled, trains delayed, and roads closed due to flooding and debris. The Japanese government, known for its rigorous disaster preparedness measures, was quick to respond, but Yagi highlighted the limits of even the most advanced planning in the face of extreme weather.

The story of Typhoon Yagi is not just one of destruction, however. It also showcased the resilience and adaptability of the affected populations. In China, local communities came together to rebuild and recover. Volunteer groups played a crucial role in helping those displaced by the storm, providing temporary shelters, organizing relief efforts, and assisting with the cleanup. The Chinese government, too, responded swiftly, mobilizing the military to aid

in rescue and recovery operations. Early warning systems, although imperfect, helped mitigate what could have been an even higher death toll, as millions were evacuated ahead of the storm's landfall.

Japan's response, while different in scale, was similarly impressive. Authorities, familiar with the regular occurrence of typhoons, relied on established emergency protocols to minimize casualties and economic losses. Citizens heeded evacuation orders, and local governments efficiently coordinated disaster response efforts. Despite the disruption, the swift return to normalcy in many areas highlighted the importance of strong infrastructure and disaster preparedness in minimizing the long-term effects of such storms.

Typhoon Yagi, like many tropical storms before it, raises important questions about the future of disaster management in a world increasingly affected by climate change. While the storm itself was not unprecedented in its intensity, its impact was magnified by factors such as urbanization, population density, and environmental degradation. Coastal regions, particularly in East and Southeast Asia, are becoming increasingly vulnerable to typhoons as rising sea levels, coupled with higher temperatures, make storms more powerful and destructive.

As Yagi recedes into history, it leaves behind a sobering reminder of the need for greater resilience in the face of natural disasters. Governments, local communities, and international organizations must continue to work together to improve early warning systems, strengthen infrastructure, and ensure that vulnerable populations are adequately protected. Typhoon Yagi may not have been the deadliest or most powerful storm to hit East Asia, but its impact underscores the reality that even "average" typhoons can wreak havoc on societies that are unprepared.

Typhoon Yagi serves as both a warning and a call to action, urging us to apply the lessons learned to strengthen disaster preparedness as extreme weather events become more frequent.



HOW MUCH DO WE KNOW ABOUT EARTH?

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Earth, our home for about 4.5 billion years, is a dynamic and complex planet that has constantly evolved. Although scientific advances have expanded our understanding, we are still far from unlocking all its secrets. From Earth's atmosphere to the depths of its oceans, new discoveries continue to reshape our perception of this unique planet.

The Atmosphere and Its Complex Role

Earth's atmosphere, a delicate mix of nitrogen, oxygen, and trace gases, plays a crucial role in maintaining life. It acts as a protective shield against harmful ultraviolet rays and helps regulate the planet's climate. However, despite centuries of study, we are only beginning to grasp the intricacies of atmospheric dynamics. As our understanding of climate patterns evolves, so too does our recognition of how human activity impacts this vital layer of gases. Climate models show that increased carbon dioxide levels are warming the planet, raising concerns about long-term sustainability(1)(2).

The Hydrosphere: Oceans and Water Cycles

Water covers about 70% of Earth's surface, mostly in oceans, and drives weather and climate systems. While the basics of the water cycle—evaporation, condensation, and precipitation—are well understood, the deeper mysteries of our oceans remain largely unexplored. According to estimates, only 5% of the ocean floor has been mapped. The ocean not only absorbs carbon but also acts as a thermal regulator, mitigating temperature extremes on Earth(3)(2). Recent research focuses on how ocean currents, ice melt, and water vapor contribute to climate change, yet vast parts of the deep ocean are still uncharted.

Earth's Structure: Lithosphere and Plate Tectonics

Beneath our feet, Earth's solid crust forms the lithosphere, extending about 31 to 174 miles below the surface. This shell is broken into tectonic plates, whose movements give rise to earthquakes, volcanoes, and mountain

formation. Although plate tectonics has been well-studied since the 20th century, much remains unknown about the processes occurring in Earth's deeper layers, particularly the mantle and core(1). Advanced imaging and computer models are being used to simulate Earth's early conditions, which could provide further insights into how our planet's geology shaped its capacity to support life(2).

The Origin of Life: Still a Puzzle

One of the most profound questions we face is how life first emerged. Several theories suggest life could have originated from simple molecules formed in Earth's primordial oceans or even been delivered by meteorites. Recent discoveries of ancient rock formations and meteorite samples have provided new clues, but the exact conditions that led to life's emergence remain elusive(3). Scientists are still exploring whether life on Earth was a unique event or part of a larger cosmic story, as more exoplanets are discovered and studied for their potential to harbor life.

Comparing Our Knowledge of Earth and the Solar System

Our understanding of Earth has evolved significantly through centuries of scientific inquiry, yet it remains a complex and largely incomplete picture. When comparing this knowledge to what we know about the solar system, it's clear that while we have extensive data about both, there are still vast gaps in each domain.

Knowledge of Earth: Depth and Complexity

Earth, as our home planet, is the most studied object in the solar system. We have detailed knowledge of its atmosphere, oceans, and geology, but many mysteries remain. For instance, despite advances in mapping the planet's surface and investigating its geological processes, over 95% of the ocean floor remains unmapped. Similarly, the dynamics of Earth's interior are still being explored, with questions about the mantle and core largely unanswered due to the difficulty in accessing and studying

these layers directly(3).

Earth's biological history also holds significant unknowns. We are still investigating how life first emerged on the planet, and new discoveries of ancient microbes and geological formations continuously reshape our understanding of early Earth(3)(2).

Knowledge of the Solar System: Broad but Incomplete

In contrast, our knowledge of the solar system has expanded dramatically in recent decades thanks to space missions, telescopes, and probes. We've successfully explored all the planets, landed on the Moon and Mars, and sent probes to the outer reaches of the solar system, such as Voyager 1, which has entered interstellar space. Missions like NASA's Cassini, Juno, and New Horizons have provided detailed data on Saturn, Jupiter, and Pluto. We now know more about the composition of planets, moons, and even distant objects like asteroids and comets(2). However, despite these advances, much of the solar system remains a mystery. For example, the atmospheres of gas giants like Jupiter and Saturn are still poorly understood, as are the subsurface oceans of moons like Europa and Enceladus. In addition, we've only just begun to explore the potential for life on other planets or moons, with missions like Mars rovers or future missions planned for the icy moons of Jupiter and Saturn(2).

Conclusion: A Work in Progress

While we've made significant progress in understanding Earth's systems—from its atmosphere to its geology—many mysteries remain. As we face challenges like climate change and biodiversity loss, ongoing research is essential to safeguarding the planet's future. Interdisciplinary efforts combining geology, oceanography, and atmospheric science will be crucial in further unlocking Earth's secrets.

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UNEARTHED THREATS: THE DISCOVERY OF 1700 ANCIENT VIRUS SPECIES IN THE MELTING HIMALAYAS

-Ankur Goel

Director, Copper Cross Solutions

As the world grapples with the immediate impacts of climate change, from rising sea levels to extreme weather events, a hidden threat is emerging from the melting glaciers of the Himalayas. Buried under thick ice for thousands of years, scientists have recently discovered 1,700 previously unknown species of ancient viruses in this fragile, high-altitude ecosystem. These revelations have sparked not only intrigue but also significant concerns about the potential risks these viruses could pose in a world unprepared for their resurgence.

The Melting Glaciers of the Himalayas: A Climate Change Crisis

The Himalayas, often referred to as the "Third Pole" due to their vast frozen expanse, are home to the largest reservoir of ice outside the polar regions. They provide critical water resources for nearly two billion people living in the surrounding regions. However, the effects of global warming have led to a rapid retreat of these glaciers, exposing ancient biological material that has been entombed in ice for millennia.

Scientific studies have shown that glaciers in the Himalayas have been shrinking at an unprecedented rate, losing hundreds of square kilometers of ice every year. This melting, while alarming for its impact on freshwater supplies and the risk of catastrophic floods, has also opened a window into the distant past. Ice cores extracted from these glaciers have preserved ancient microorganisms and genetic material, providing researchers with invaluable insights into prehistoric life. However, with this discovery comes the unsettling possibility that dormant pathogens, including viruses, could be released into the modern environment.

The Discovery of Ancient Viruses: What We Know So Far

In recent years, research teams from around the world have turned their attention to the microbiomes of glacial ice. In one groundbreaking study, scientists uncovered a staggering 1,700 virus species that had never been seen before, many of which were completely unknown to modern science. These viruses, trapped in ice for at least 15,000 years, offer a glimpse into a time when Earth's

ecosystems and climate were vastly different from what they are today.

Using advanced genomic techniques, scientists were able to extract and sequence the DNA and RNA of these ancient viruses. What they found was a treasure trove of genetic diversity, with viruses that bear no resemblance to any modern counterparts. These findings raise significant questions about the evolution of viruses and their potential roles in ancient ecosystems.

Most of these newly discovered viruses are believed to have infected bacteria and single-celled organisms, which were abundant in prehistoric ecosystems. However, the discovery of this vast number of ancient viruses has raised concerns about the potential for some of these pathogens to infect more complex organisms, including humans, should they become active again.

The Risk of Ancient Pathogens in the Modern World

While the discovery of these ancient viruses is scientifically fascinating, it also presents a potential risk. As the Himalayas and other glacier-covered regions around the world continue to melt, these ancient pathogens could be reintroduced into environments that have not seen them for tens of thousands of years. This raises several important questions: Could these viruses be capable of infecting modern species, including humans? And if so, do we have the tools and knowledge to counter such threats?

The history of human civilization is marked by pandemics caused by emerging viruses, such as the H1N1 influenza outbreak in 1918 or the more recent COVID-19 pandemic. Both of these events demonstrated the speed at which a new virus can spread across the globe, often catching the scientific and medical communities off guard. The release of ancient viruses, especially those that have not co-evolved with modern immune systems, could introduce new and unpredictable threats.

Many experts caution that the risk of a widespread pandemic caused by an ancient virus remains low for now. Most of the viruses

found in the Himalayan glaciers are believed to be specific to microorganisms and not to vertebrates. However, the unpredictability of viral evolution means that these concerns cannot be dismissed outright.

Preparing for the Unknown: Scientific and Environmental Implications

The discovery of 1,700 ancient virus species underscores the need for greater understanding of the risks posed by ancient pathogens in the context of a warming world. The melting of glaciers and permafrost in regions like the Arctic and the Himalayas is not just an environmental crisis; it is also a biological one. Microbial life that has been dormant for millennia could re-enter ecosystems and interact with modern life in ways that we cannot yet predict.

To mitigate these risks, scientists are calling for increased research into ancient viral genomes and their potential interactions with modern organisms. This could involve developing predictive models for how these viruses might evolve if they are released into the environment, as well as exploring ways to contain potential outbreaks.

From an environmental perspective, the rapid melting of the Himalayan glaciers highlights the urgency of addressing climate change. The glaciers are retreating at an alarming rate, and the consequences extend beyond the release of ancient viruses. Communities that depend on glacial meltwater for drinking water, agriculture, and hydropower are facing an uncertain future, with the risk of severe water shortages in the coming decades.

A Global Call to Action

The discovery of 1,700 ancient viruses in the melting Himalayan glaciers reveals the hidden biological risks of climate change. This finding not only offers a glimpse into Earth's prehistoric past but also signals potential new challenges. Addressing these threats will require global cooperation, scientific research, and environmental conservation to protect both human health and the natural world in a rapidly changing climate.

MOVIE

RECOMMENDATION

2073

The movie "2073" is directed by Asif Kapadia, a British filmmaker known for his critically acclaimed documentaries such as "Amy" and "Senna". Kapadia brings his expertise in combining emotional storytelling with real-world themes to this dystopian climate change film. The production involves a collaboration between independent studios focused on environmentally-conscious storytelling. The movie blends fiction with science-backed predictions, offering a stark portrayal of the future if climate issues remain unaddressed.

Kapadia's work typically emphasizes human experiences amidst broader societal challenges, making him well-suited to tackle the themes of climate and societal collapse seen in "2073."

PLOT SYNOPSIS

2073 (2024)'s plot synopsis: "It's the year 2073, and the worst fears of modern life have been realized. Surveillance drones fill the burnt orange skies and militarized police roam the wrecked streets, while survivors hide away underground, struggling to remember a free and hopeful existence.

In this ingenious mixture of visionary science fiction & speculative nonfiction, Oscar-winning filmmaker Asif Kapadia transports us to a future foreshadowed by the terrifying realities of our present moment.

Samantha Morton plays a survivor besieged by visions of the past—a past that happens to be our present, visualized through real footage interconnecting today's global crises of authoritarianism, unchecked big tech, inequality, and global climate change. 2073 is an urgent, unshakable vision of a dystopic future that could very well be our own."

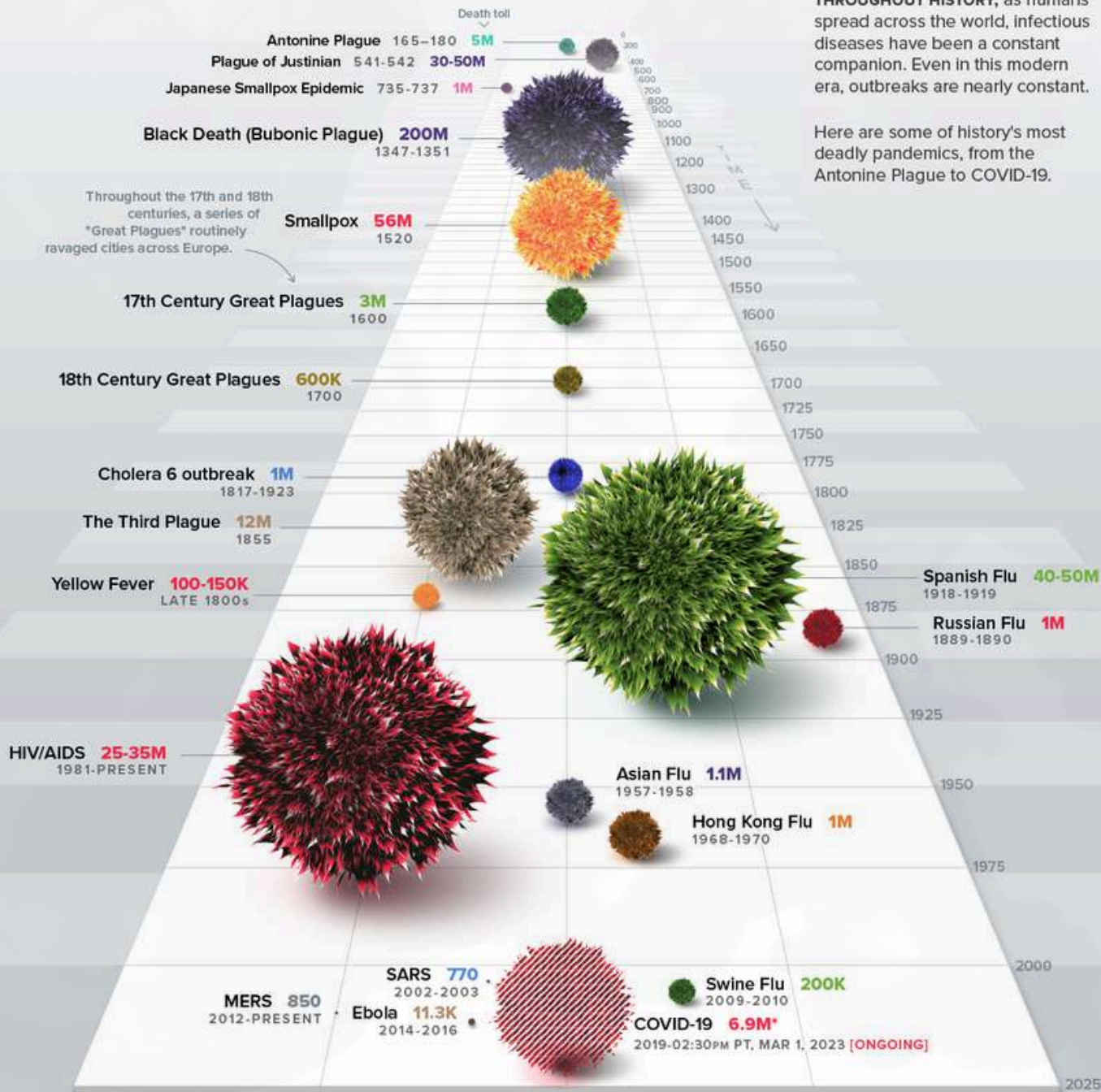


HISTORY OF PANDEMICS

PAN-DEM-IC (of a disease) prevalent over a whole country or the world.

THROUGHOUT HISTORY, as humans spread across the world, infectious diseases have been a constant companion. Even in this modern era, outbreaks are nearly constant.

Here are some of history's most deadly pandemics, from the Antonine Plague to COVID-19.



<https://www.visualcapitalist.com/history-of-pandemics-deadliest/>

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