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November 2023

- The future of agriculture is climate-smart agriculture

- Shallow focus earthquakes in Nepal, damage to buildings and possible solutions

Read on to learn more.

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The future of agriculture is climate-smart agriculture

Climate change is not a distant threat; it is a stark reality. Extreme weather events, erratic rainfall, prolonged droughts, and destructive storms are all part of the new normal. Agriculture, the bedrock of our society, is under siege, with farmers facing unpredictable growing conditions threatening their livelihoods. The intricate relationship between climate change, food security, and agricultural methods cannot be overstated; and emphasizes the necessity of collaborative efforts involving farmers, policymakers, and researchers in addressing this complex challenge.

These key stakeholders are actively deploying strategies that not only reduce emissions but also enhance climate resilience, adaptability, and agricultural productivity. In this context, the adoption of climate-smart agriculture (CSA) practices has emerged as a holistic approach to simultaneously pursue these interconnected goals while considering the synergies and trade-offs involved in the process.

The relationship between the agri-food sector, climate change, and conservation is symbiotic. Food systems rely on predictable climates, stable weather patterns, clean water, and fertile soil. Consequently, agri-food not only impacts climate change and environmental degradation but is also impacted by these trends. Rising temperatures and sea levels, altered precipitation patterns, and heightened risk of more intense droughts, heatwaves, and natural disasters are all linked to climate change and pose a substantial threat to global food security.

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Climate-Smart Agriculture: A Revolution, Not an Evolution

CSA represents more than just an evolution of traditional farming practices; it's a revolutionary shift in mindset, transcending conventional farming by embracing a holistic landscape management strategy that includes cropland, livestock, forests, and fisheries. Its central goal is to effectively address the interconnected challenges of food security and climate change. While CSA can be applied worldwide, it acknowledges that regional variations may result in differing priorities and issues, whether in countries from the Global South or the Global North.

Let us look at some of the popular methods of climate-smart agriculture.

Crop Diversification: Enhancing Agricultural Resilience

The case for crop diversification is compelling. While efficient in the short term, monoculture farming is highly susceptible to pests, diseases, and climatic variations. A diverse array of crops offers protection against crop failures, ensures more stable incomes for farmers, and fosters biodiversity. Crop diversification not only helps manage risks but also enhances the overall sustainability of the agricultural system. By cultivating a variety of crops, farmers can reduce the need for excessive chemical inputs, promote healthier soils, and reduce the impact of pests and diseases. Furthermore, diversified farming practices can better utilize resources such as water and nutrients, ultimately leading to increased productivity while reducing environmental harm.

Efficient Water Management: A Prerequisite for Survival

Water is a precious resource, and responsible management is integral to the success of climate-smart agriculture. As water resources become scarcer and more unpredictable, maximizing water usage becomes paramount. Climate-smart agriculture embraces practices such as rainwater harvesting and precise irrigation to make every drop count. Advanced irrigation techniques, including drip irrigation and controlled-release systems, conserve water and ensure precise delivery to crop roots, minimizing wastage. Rainwater harvesting, on the other hand, helps capture and store rainwater for later use, reducing the reliance on unsustainable groundwater sources.

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Soil Conservation: Safeguarding the Agricultural Foundation

Soil, often an unsung hero of agriculture, faces constant threats from erosion and degradation. Soil conservation practices, including no-till farming and cover cropping, offer the best hope for preserving the foundation of our food production. Cover cropping, in which crops like clover or rye are planted during the off-season, protects the soil from erosion, enhances its structure, and reduces greenhouse gas emissions from soil degradation.

Agroforestry: Trees for a Greener Future

Integrating trees into agricultural fields is not just about aesthetics; it is a powerful tool for combating climate change. Agroforestry, the practice of integrating trees and shrubs into agricultural landscapes, offers numerous benefits. Trees act as windbreaks, reducing soil erosion, protecting crops from strong winds, providing shade to withstand extreme heat, and enhancing biodiversity. Importantly, trees capture and store carbon, mitigating greenhouse gas emissions.

Adaptive Breeding: Crops for a Changing World

Adaptive breeding is our insurance policy against crop failures due to changing climate. Adaptive breeding is a cornerstone of climate agriculture as it focuses on developing resilient crop varieties employing advanced genetic techniques like genome editing, conventional breeding, marker-assisted selection, and genomic selection. These approaches introduce traits vital for crop adaptation, boosting resilience against climate change, pests, diseases, and soil degradation.

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Precision Farming: A Pivotal Shift in Modern Agriculture

Precision farming, a part of climate-smart agriculture, deploys advanced technology and data for efficient crop management and eco-friendly practices. It optimizes input use, adapts to varying conditions, promotes productivity, resilience, and mitigation. Key technologies include GPS for precise mapping, drones and satellites for imagery analysis, sensors and the Internet of Things (IoT) for real-time data, and variable rate technology for input adjustments based on field variability. Moreover, by furnishing accurate, timely data on critical factors such as crop development, soil health, pest and disease risks, and yield projections, it equips farmers to make informed decisions, bolstering their resilience in the face of climate uncertainties.

The Way Forward

While CSA is an essential step towards a sustainable future, its implementation can present financial hurdles for farmers. It often involves substantial upfront expenses for new technologies and infrastructure. Precision farming, in particular, demands investments in specialized equipment and training. Despite these initial costs, it is crucial to promote climate-smart agriculture due to its long-term benefits, including increased crop yields and environmental sustainability. Addressing the limited awareness among farmers regarding the environmental impacts of traditional agricultural methods and the potential advantage of CSA is essential. In marginalized areas with limited connectivity, access to real-time data, weather forecasts, and market information is a significant obstacle. Bridging the information divide is vital for the broader adoption of CSA practices.

The time to embrace climate-smart agriculture is now, not tomorrow, not next year. Our survival depends on it. By adopting these practices, we can build a resilient, environmentally conscious agricultural sector that can thrive in the face of climate change, ensuring a healthier planet for generations to come. Anything less would be a disservice to our planet and future generations.

Source - https://www.croplife.com

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Shallow focus earthquakes in Nepal, damage to buildings and possible solutions

Situated in one of the most seismically active continental collision orogenic belts of the world, Nepal has witnessed a series of devastating earthquakes in the past. The persistent collision and consequent under thrusting of Indian plate to Eurasian plate have caused tremendous stress accumulation along the major thrust faults in the Himalayan region including Nepal.

The below image shows past events occurred in Nepal since 1960 till Nov 3, 2023.

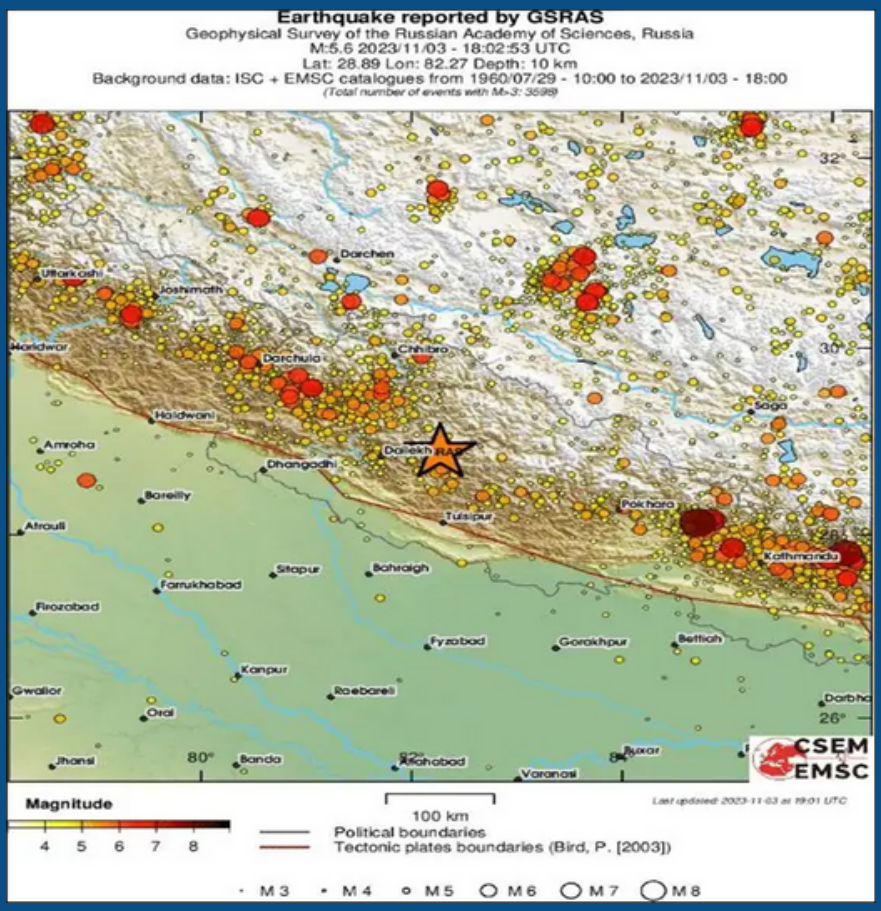

Image Source: EMSC

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Shallow M5.6 earthquake hits western Nepal

Most recently, a shallow earthquake of magnitude 5.6 with focal depth of 16.5 km (10.2 miles) hit western Nepal at 18:02 UTC (23:47 local time) on Friday, November 3, 2023. Prior to this, two major shallow focus earthquakes M6.2, focal depth 10 kilometer (6.2 miles) and M 5.6 focal depth 10 kilometer (6.2 miles) in October 2023 and January 2023 respectively.

The 25 April 2015 earthquake of magnitude Mw7.8 and the 12 May 2015 event were also shallow focus earthquakes with a focal depth of 8.2 km and 18.5 km respectively.

According to the USGS, earthquakes with focal depth between 0-70 km are considered shallow focus earthquakes.

Damage Caused by Shallow Focus Earthquakes

Seismologists have observed shallow focus earthquakes generally tend to be more damaging than deeper quakes. Shaking is more intense from quakes that hit close to the surface like setting off "a bomb directly under a city.

The 1934 earthquake of magnitude Mw 8.2 was also a shallow focus event with depth of 15 km. It had damaged 19% of buildings in the Kathmandu Valley, more than 100 km away from the epicentre.

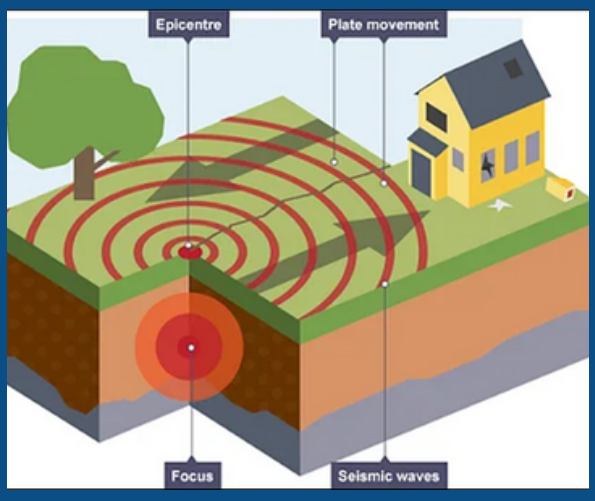

Image Source: BBC

Furthermore, shallow-focus earthquakes have a distinctive characteristic of generating numerous aftershocks. These aftershocks can continue for an extended period after the initial earthquake, adding to the overall impact and challenges faced by affected regions.

While deep quakes – focal depth between 300 km -700 km - may be less damaging, they're usually more widely felt. Seismic waves from deep quakes have to travel farther to the surface, losing energy along the way.

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Building types in Nepal and damage during 2015 event

The adobe construction and random rubble masonry constructions are more popular in villages of Nepal, however most of the urban and suburbs constitute majority fraction of masonry buildings with around 20% of reinforced concrete (RC) construction. So, it is obvious that 80% of the buildings are non-engineered construction.

The construction of RC buildings only started after 1970. However, the need of engineered construction was only felt after enforcement of building codes in 2006. Almost 70% of existing RC buildings are either owner-built constructions with the help of contractors or constructed as per the mandatory rules of thumbs (MRT). Thus, only a smaller fraction of buildings was structurally analyzed, designed and constructed.

With exception to some severe but localized damages in RC buildings, most of the damage was concentrated in masonry, random rubble and adobe constructions during 2015 Gorkha Nepal earthquake.

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Building types in Nepal and damage during 2015 event

According to the National Planning Commission of Nepal, 333,298 buildings collapsed, and another 648,063 buildings were partly damaged. In addition to the damage to residential buildings, 104 hospitals, around 9,000 schools, more than 300 bridges, and 262 micro-hydropower plants were reported to be damaged which led to a total loss of over US$7 billion.

Field surveys done after the event, found many deficiencies. About 95% damage is shared by URM, random rubble and adobe buildings, so this earthquake was more devastating towards such buildings in comparison to the performance of RC buildings in affected districts. All the damage was noticeably concentrated into non-engineered or pre-engineered buildings with major flaws in construction or structural components so it could be inferred that engineered constructions should be plausible solution for seismically active regions like Nepal.

Surveys done after 2015 observed that respondents felt the quality of housing and earthquake safety had improved. Further, respondents also thought that the awareness of earthquake risk among masses has significantly increased. But, in rural and remote areas more needs to be done in terms of technical training in earthquake resistant construction.

Earthquake insurance was mandatory in property insurance after 2015.

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