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China's Climate Vulnerabilities: Risks and countermeasures

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Introduction

China remain acutely vulnerable to the impacts of climate change. The country's 1.4 billion people mostly live in dense concrete areas prone to flash flooding. Most of China's factories and financial centers are concentrated and located mainly along its low-lying east coast. Assessments of various Chinese experts suggests that as a result of vast differences in terms of economic development in different regions of China have led to creation of gaps in capacity for disaster prevention, resistance and response. As per recently released Blue Book on Climate Change of China 2024 by China's Meteorological Administration, china particularly remains vulnerable to extreme weather conditions intensified by climate change. This report laid out various evidences such as record-breaking temperature, melting permafrost and glaciers at accelerated rate, declining trend of China's overall vegetation cover, rising global concentrations of major greenhouse gases to name a few that possess severe climate vulnerabilities to China in near future.

This issue of NTS digest highlights various climate related events which significantly impacted China's local population and took both its civil administration as well as related national government ministries by surprise. Despite significant Chinese efforts to mitigate the impacts of these sudden disasters, these extreme climate related events highlighted the potential vulnerabilities in Chinese system and emerging fault lines in China's rapidly growing industrialization and urbanization. The second section this issue of the digest, highlight several Chinese initiatives which the government is undertaking to mitigate the emerging impacts of climate change in the near future.

China evacuated over 100,000 people as a result of heavy rain continues to lash out south

China in April 2024 evacuated more than 100,000 people as a result of heavy rain in the the southern province of Guangdong. Flooding killed four people, with another 10 were reported missing. Torrential rains swelled rivers in Guangdong and flooded villages, farmland and cities. Several important bridges collapsed and vehicles were seen floating. In addition to the 110,000 people who were evacuated from

the disaster prone region, at least 25,000 were sent to emergency shelters. Home to some 127 million people, the Guangdong region usually sees heavy rains in about September. It has been experiencing more intense and more frequent rainstorms and floods in recent years. The China Meteorological Administration in its report in November, 2023 highlighted that 72 national weather stations registered record daily rainfall and 346 stations broke monthly records during the last flood season. China also suffered from drought and intense heatwaves in the previous months.

Drought, floods, typhoons imperil crops and power as extreme weather spoils China's summer

In July 2024, China highlighted that the country will see more extreme weather events in the coming years due to the impact of climate change. The China Meteorological Administration also started a new round of zoning of agricultural resources, the first time they've done this in 40 years, to help the sector adapt to the new emerging transitions. Experts have warned that the increased risk of heatwaves would reduce crop of especially cotton and rice in the coming years. The high temperatures are set to boost electricity consumption as people use air conditioners more. China's National Energy Administration has warned about the risks to China's power infrastructure and production as a result of extreme weather in near future.

Climate Crisis Has Cost China Billions Already This Year

China is counting losses totaling billions of dollars as climate change-related extreme weather events and other natural disasters hit the country in the first half of the 2024. According to government data, extreme weather related events, coupled with a 7.1 magnitude earthquake in northwestern Xinjiang and landslides in southwestern regions, caused China a direct economic loss worth 93.16 billion yuan ($12.83 billion). China's Emergency Management Ministry, pointed that this is the worst first-half disaster-related loss China has borne since 2019. Sources suggest that a total of around 856,000 people faced emergency resettlement and 23,000 houses were destroyed alone in 2024, while around 3.17 million hectares of crops were affected. However, reports also point that overall, at least 32.38 million people were affected by natural disasters during the period, including the disappearance or death of 322 people.

China faces 3% GDP loss as heatwaves intensify, hit global supply chains: climate change study

A **research** published by peer-reviewed journal Nature has highlighted that more frequent and intense global heatwaves will disrupt supply chains and trigger domino effect of GDP loss among major economies. It pointed out that warming of 4 degrees to 7 degrees Celsius might see China lose 3 to 5 per cent of GDP by 2050, lead author warns in calling for resilient trade links. It has further emphasized that even temperate countries rarely affected directly by heat stress will not be spared and are likely to face the knock-on effects as extreme heat hits production in supplier nations, posing risks to food security, energy and mineral products supply worldwide. The research further highlights that the frequency and intensity of heatwaves is forecast to increase as global temperatures rise under climate change. The impact includes higher health loss in South-Central Africa, of between two and four times above the global average, and up to 3.3 times more in terms of labour productivity loss in West Africa and Southeast Asia. It points that the supply-chain disruption effects are [likely to be] much more widespread, in manufacturing-heavy countries such as China and the US.

The lead author of this research, Guan Dabo, a professor of climate change economics at Tsinghua University, is of the view that the ripple effect of heatwaves on workers and crops would spread through global supply chains. He is of the view that, "China, under the scenario of warming of 4 degrees to 7 degrees Celsius (about 39 to 45 degrees Fahrenheit), heatwaves will cause 3 to 5 per cent GDP loss by 2050 and this loss will partly be caused by a labor productivity drop in China". Prof. Guan is of the further view that "Sectors like construction, mining and agriculture are vulnerable to heatwaves, with few countermeasures available. When raw material imports for these sectors fall, corresponding industries in China face losses".

Growth of coal power in China

In China, exports of electric vehicles (EVs) hit a new high, of more than 1.2 million units, up 77% year-on-year. On the other hand, the continued expansion of coal power investment is troubling. Energy security concerns had come to the fore following power rationing in Sichuan and

Chongqing in 2022, which was a consequence of high temperatures, drought and a shortage of hydropower. As a result, new coal plants had to be added to provide energy security. The number of hours that coal-fired generators were in operation increased in 2023, and in some parts of the country, energy emissions have been rising faster than GDP growth. Given China's drive to meet its dual-carbon goals – of peaking emissions by 2030 and reaching carbon neutrality by 2060 – there is a real risk of coal plants becoming stranded assets in the future.

China released its new air pollution control plan

On 30 November 2023, China published its third air pollution control plan, aiming to further cut airborne pollutants and to transition toward clean industry. The plan emphasizes reducing emissions of nitrogen oxides (NOx) and volatile organic compounds (VOCs), setting emission caps for both pollutants. The plan mentions methods including using fewer materials containing high VOCs in products such as paint and detergent, and upgrading boilers that emit high NOx. Specific targets in this plan include include: by 2025, cities at the prefecture level and above should reduce their fine particulate matter pollution (PM2.5) levels by 10% compared to 2020, and heavily polluted days should account for less than 1% of the year. (Levels may have fallen a little bit lower in 2020 than the prevailing trend due to reduced industrial output caused by the pandemic.) Moreover, the PM2.5 levels of Beijing-Tianjin-Hebei region should decrease by 20%, and by 2025 the Fenwei Plain area should be 15% lower, again compared to 2020. Beijing's PM2.5 level should be controlled below 32 micrograms per cubic metre by 2025. This is a little lower than the national standard, but remains much higher than the World Health Organisation (WHO) guideline. China's first national air pollution control plan was released in 2013. It was succeeded in 2018 by another on "defending the blue sky", which put more cities under air quality management targets. Between 2013 and 2021, China's air pollution levels fell 42.3%, according to this year's Air Quality Life Index from the University of Chicago's Energy Policy Institute. Despite significant efforts to this regard, at the end of 2022 nearly a third of China's cities fell short of the national air quality standard. This year's situation has worsened due to economic activity rebounding, climate change, and other factors.

China's Billion-Ton Coal Expansion Plan Sparks Methane Fears

A new study has revealed that China has more than 1 billion tons' worth of coal production in the pipeline with its mine expansion plans set to see output surge in three to five years. A report by US-based Global Energy Monitor (GEM) has highlighted that in stark contrast to its stated net zero ambitions, China will account for more than half of the world's new coal mines, risking a significant increase in methane emissions. The report highlights that 35% of what will be its additional 1.28 billion metric tons of annual capacity is already under construction, with production set to increase significantly from 2027. GEM project manager Dorothy Mei further points that "Expanding coal production capacity is currently a national policy priority and a political task. State-owned enterprises, which dominate the sector, are often mandated to fulfil this objective". The report points out that China's existing mines have made it responsible for 70% of global coal mine methane emissions from similar sized large mines, and if all the proposed projects are completed, this would rise to 75%.

This surge in new production starkly contrasts with China's dual carbon neutrality targets. Methane emissions come from activities such as energy production, agriculture, and landfill and are short-lived in the atmosphere but much more potent than carbon dioxide as a greenhouse gas. They have driven about a third of the rise in global temperatures since the Industrial Revolution.

China's pipeline accounts for more than half of mines under development globally, and includes projects under all stages of development, including those proposed, permitted as well as already under construction. This report has found out that by comparison, China's existing current large-scale coal mine capacity is 3.88 billion tons per year which is nearly half the global total. Data from statistics bureau showed that China, the world's largest producer and consumer of the fossil fuel, mined a total 4.66 billion tons of coal in 2023.

China building twice as much wind and solar as rest of the world combined

China is cementing its position as the global leader in renewables development with 180 GW of utility-scale solar and 159 GW of

wind power already under construction. This is twice as much as the rest of the world combined and enough to power all of South Korea, according to new data from Global Energy Monitor (GEM). The 339 GW of utility-scale solar and wind that have reached the construction stage accounts for one-third of all proposed wind and solar capacity in China, far surpassing the global construction rate of just 7%, according to GEM's latest Global Solar Power Tracker and Global Wind Power Tracker updates. China is home to almost two-thirds (64%) of the world's utility scale solar and wind power in construction, with 339 GW. The US has 40 GW, Brazil 13 GW, the UK 10 GW and Spain 9 GW. One-third of planned utility-scale solar and wind in China is under construction, far exceeding the global average of 7%. By the first quarter of 2024, China's total utility-scale solar and wind capacity reached 758 GW, though data from China Electricity Council put the total capacity, including distributed solar, at 1,120 GW.

Chinese scientists develop fast breeding rice in Xinjiang desert greenhouses

Chinese scientists claimed to have successfully develop fast breeding rice in desert greenhouses in Hotan Prefecture, Northwest China's Xinjiang Uygur Autonomous Region, for the first time under the trial period, making the rice grow from planting to harvest in just 75 days. According to the Institute of Urban Agriculture (IUA), Chinese Academy of Agricultural Sciences, the technology provides provides support for the country to carry out year-round cultivation and fast breeding of crops in desert areas. The technology was developed by the IUA's chief scientist Yang Qichang and his research team after five years of research. The team leverages rich solar resources in desert areas, implementing measures such as multi-layer vertical soilless cultivation and artificial light source control, making rice grow from planting to harvest in just 75 days. The tech reduces the rice's growth cycle by around 40 percent compared to rice cultivated in traditional fields, according to the Chengdu-based IUA. The research team has also been exploring key technologies for the fast breeding of staple crops such as soybeans, corn, and wheat, as well as oilseed crops and cotton in the desert greenhouses in Hotan.

China's food security dream faces land, soil and water woes

China, has set targets to drastically reduce its reliance on overseas buying over the coming decade, in line with its push for food security. How far China succeed in this remains debatable. With limited land and water, China will have to sharply increase farming productivity through technology, including genetically modified crops, and expand the area under cultivation to meet Beijing's 10-year projections. The Chinese government envisions 92% self-sufficiency in staple grains and beans by 2033, up from 84% during 2021 to 2023, according to a document released in late April, on a path toward Chinese President Xi Jinping's goal to become an "agriculture power" by the middle of the century. Cutting the country's imports would be a blow to producers from the U.S. to Brazil and Indonesia, who have expanded capacity to meet demand from China's 1.4 billion people. Over the 10 years to 2033, the agriculture ministry projects a 75% plunge in corn imports to 6.8 million tons and a 60% drop for wheat to 4.85 million tons. For soybeans, the biggest item on a farm import bill that totaled $234 billion last year, Beijing sees imports falling 21% to 78.7 million tons in a decade. These targets defy the trends of the past decade in which grains and oilseed imports have surged 87%. However some of China's own experts are of the view that China will struggle to meet its targets mainly due to a lack of land, water and as a result of global warming and climate change.

In stark contrast to Beijing's projections, the U.S. Department of Agriculture (USDA) sees China's corn imports in 2033 and 2034 roughly in line with current levels and wheat imports declining 20%. In the biggest divergence, USDA expects soybean imports to rise 39%.

China continues to use cloud seeding drones to combat drought and extreme heat waves

Reports suggests that China, has been using drones for several years in the planting of clouds for crops that require a considerable amount of water, cities with low temperatures and also on special occasions, as happened during the 2022 Olympic Games. In October 2022, the China State Aviation Industry Corporation (AVIC) announced that the Wing Loong-2H drone had successfully executed the cloud

planting operation in the mountainous region of Qinghai in Tibet. During the test flight, the Wing Loong-2H flew for 5 hours and managed to record an increase in precipitation in an area of 15,000 km^2.

In December 2023, the Global Times portal reported that China's Wing Loong drone series was exploring a new development route due to the performance observed in foreign markets and the usefulness of rescues during domestic emergencies. Li Yidong, chief designer of AVIC has highlighted that in future these Chinese drones drones will be integrated with new technologies that would include 5G connection, industrial internet, artificial intelligence (AI) and big data which would enable highly efficient applications of these drones in scientific research, mapping and logistics.

China and US push each other on priorities for UN COP29 climate talks

John Podesta, Washington's top climate diplomat, in one of the final meetings between the world's two largest polluters ahead of the UN COP29 climate summit in November has pressed Chinese leaders to come up with ambitious plans to cut greenhouse gas emissions by 2035. Podesta visited China in the first week of September along with other US officials for meetings with his Chinese counterpart Liu Zhenmin and China's foreign minister Wang Yi, as well as other ministries involved in climate and the environment. They discussed their new targets to cut greenhouse gas emissions by 2035, as well as climate finance — both expected to be central to wider UN climate talks in Baku, Azerbaijan, this year. Chinese state media reported after the Podesta meetings that Beijing had called on Washington "to maintain consistency with policies and make concerted efforts with China to cope with global challenges". A readout from the state department said the two sides discussed their efforts to tackle methane and nitrous oxide emissions, both powerful non-CO_2 greenhouse gases, and committed to holding a summit on the topic as part of the Baku talks. Curbing these emissions is regarded as one of the cheapest and fastest ways to limit global warming in the near term. The trip to Beijing was Podesta's first since taking over as Washington's chief climate diplomat after John Kerry stepped down last year. It comes just months before countries convene for COP29, where both the US and China will be critical to any deal.

Non-Traditional Security Centre

This digest has been prepared by the Non-Traditional Security Centre, Manohar Parrikar Institute for Defence Studies and Analyses, New Delhi.

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Manohar Parrikar Institute for Defence Studies and Analyses
No.1, Development Enclave, Rao Tula Ram Marg,
Delhi Cantt., New Delhi - 110 010
Tel.: (91-11) 2671-7983 Fax: (91-11) 2615 4191
Website: http://www.idsa.in