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India and China's Strategic Advances in Water Security and Climate Resilience

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Abstract

India and China are the world's most populated countries witnessing a unique set of challenges in preserving their natural resources but the challenges related to water and climate are still a cause of concern for both. The paper presents the challenges and discusses the strategic approaches of India and China aimed towards strengthening both water security and climate resilience in the light of the United Nations Sustainable Development Goals (SDGs) 06 and 13. SDG 06 is about ensuring availability and sustainable management of water and sanitation for all and SDG 13 is about combating climate change and its impacts. These two SDGs—06 and 13—are interconnected, as addressing water security is essential for adapting to climate change and ensuring sustainable development. Both SDGs require robust policy frameworks, innovative technologies, and regional cooperation to

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mitigate the adverse effects of climate change and ensure the long-term availability of water resources. Faced with worsening water scarcity, pollution, and vulnerability to the effects of climate change, both countries have begun to address these issues through policy reform, infrastructure expansion, and new technological solutions. While there has been considerable progress in the areas of water use efficiency, rainwater harvesting, and renewable energy, shortcomings remain in policy implementation, regional heterogeneity, finance, and technology adoption. It further illustrates that, to fulfill their commitments to the SDGs, both countries should strengthen institutional frameworks, bolster cross-border cooperation, and invest in climate-resilient infrastructure. This paper assesses how both countries are responding to their environmental challenges, and evaluates the effectiveness of those policies and actions, through a comparative analysis of India and China's approach to achieving water security and climate resilience. Lastly, it examines the global ramifications of these countries' contributions to the fulfilment of the 2030 Agenda for Sustainable Development by considering the strengths and weaknesses of their attempts under the SDG umbrella.

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Keywords: ASEAN, European Union, Migration, Refugee Crisis, Regional Integration

I. Introduction to SDG Goals 06 and 13: A Global Imperative

India and China have key responsibilities towards the Sustainable Development Goals (SDGs), being the most populous and fastest-growing economies of the world. The UN General Assembly in 2015 endorsed the goals as a set of 17 global goals along with 169 targets, to ensure peace and prosperity for all by 2030[1]. The SDGs are interlinked and applicable to all people and countries, regardless of their current level of development. The targets range from poverty reduction, public health, and access to clean water and air, to safeguarding the environment on land and in the ocean. The interlinked nature of the goals necessitates their holistic implementation, involving coordinating various actors. This paper examines goals 6 and 13 to establish a link between water security and climate change, with a wide array of goals, by comparing India and China's approaches to water security and climate resilience.

SDG 6, which "ensures access to water and sanitation for all," is a significant step towards achieving water security as stress and scarcity of water are still a grave concern in various regions. According to the United Nations 2.4 billion people are in water-stressed countries and the challenges are exacerbated due to

[1] "Sustainable Development Goals." United Nations Development Programme, accessed February 20, 2024.
https://www.undp.org/china/sustainable-development-goals

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climate change.[2] Uptil 2020, 2 billion people had lack of access to safe drinking water services, and 3.6 billion people lacked access to managed sanitation.[3] Even though water use efficiency has risen by 9 percent globally, water scarcity remains inadequately addressed.[4] SDG 6 targets "achieving universal and equitable access to safe and affordable drinking water, adequate and equitable sanitation and hygiene for all, improving water quality by reducing pollution, increasing water-use efficiency, implementing integrated water resources management, protecting and restoration water-related ecosystems, strengthening local community participation in water management, and expanding international cooperation and capacity-building".[5]

Simultaneously, SDG 13 aims at "taking urgent action to combat climate change and its impacts." According to the Sixth Intergovernmental Panel on Climate Change (IPCC) Assessment Report, there is unequivocal evidence of anthropogenic impact of

[2] "Water and Sanitation - United Nations Sustainable Development." United Nations, Accessed February 20, 2024. https://www.un.org/sustainabledevelopment/water-and-sanitation/

[3] United Nations. *The United Nations World Water Development Report 2023: Partnerships and Cooperation for Water*. Paris: UNESCO, (2023): 1.

[4] United Nations. *The Sustainable Development Goals Report 2023: Special edition*. (2023): 24. https://unstats.un.org/sdgs/report/2023/The-Sustainable-Development-Goals-Report-2023.pdf

[5] United Nations, "Water and Sanitation - United Nations Sustainable Development."

warming atmosphere, ocean, and land.[6] With a likely increase in the temperatures, the world is witnessing glacier melt, alteration in the water cycle, and extreme weather events.

SDG 13 acknowledges the Paris Agreement and includes targets such as "strengthening resilience and adaptive capacity to climate-related hazards, integrating climate change measures into national policies, improving education and awareness, implementing the commitment undertaken by developed countries to the United Nations Framework Convention on Climate Change (UNFCCC), and promoting mechanisms for capacity-building and inclusion of marginalized communities and countries."[7] It acknowledges the necessity of restricting temperature rise to 1.5 degrees Celsius and halving emissions by 2030.

According to the UN, China's overall SDG performance ranking is 63 out of 166 countries scoring 72. It has a status of "on track or maintaining SDG achievement" for SDG 6 and "stagnating" for SDG 13. On the other hand, India's overall

[6] IPCC. "Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I" in *Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou, eds. Cambridge University Press, Cambridge, United Kingdom and New York, (2021):3−32, doi:10.1017/9781009157896.001.

[7] "Climate Change - United Nations Sustainable Development." United Nations, Accessed February 20, 2024 https://www.un.org/sustainabledevelopment/climate-change/.

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ranking is 112 with a 63.4 score indicating "moderately improving" status for SDG 6 and "stagnating" status for SDG 13.[8] The SDG 2023 Report indicates that the world is "off track" in achieving the goals, despite having only six years to achieve the SDGs. Being the most populous countries both countries will need to play a leading role with significant and global implications, which could be detrimental to the success of SDGs.

II. India's Approach to Water Security and Climate Action

India has taken a holistic approach through national and subnational policies to achieve SDGs. Its monitoring process focuses on each state, making it easy for them to keep track on their achievements and gaps. It has made significant improved its SDG achievement, as evidenced by its improved ranking in the SDG index from 2018 onwards. India, adhering to the concept of cooperative federalism, has localized the SDGs from a global level to a national one. In 2021, the government also localized the indices to improve assessment and provide more focus to address the gaps, leading to the launch of the North-Eastern Region (NER) District SDG Index, the SDG Urban Index, and the India Climate and Energy Dashboard.

A coherent ecosystem is necessary to achieve the highly interconnected SDGs. Hence, all the actors should be highly

[8] United Nation, *"Sustainable Development Report 2023."*

coordinated and coherent. Most of the country's policies are in coherence with the SDGs, and the government has made this a multistakeholder process by engaging state governments, local governments, and civil society as a part of planning and implementing the goals. As a result, the government's developmental policies, from economics to infrastructure to the environment, have sustainable development as the driving force. The government has implemented an effective bottom-up approach to strategies and actions within the framework of cooperative federalism. The districts, blocks, and panchayats (lowest levels of government) have been instrumental in the implementation and monitoring of goals.[9] It is anticipated that climate change will have a negative impact on the water balance in many regions of India, as stated in India's Nationally Determined Contribution (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC). When it comes to the water sector, the Nationally Determined Contribution (NDC) has developed adaptation plans with the goal of promoting the efficient use of water, providing access to water, and combating the negative effects of climate change. Water is

[9] Sachin Chaturvedi and UNESCAP "Evolving Indian strategy on SDGs and scope for regional cooperation," *Institutional Repository* (2024). https://hdl.handle.net/20.500.12870/4537

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essential in agriculture and food production, as well as in many industrial operations.[10]

As stated in India's INDC, "Given the development agenda in a democratic polity, the infrastructure deficit represented by different indicators, the pressures of urbanization and industrialization, and the imperative of sustainable growth, India faces a formidable and complex challenge in working for economic progress towards a secure future for its citizens," There are a number of factors that contribute to India's current predicament. According to the 2021 Global Climate Risk Index, India is the seventh most affected country. Additionally, a different study reveals that 17 out of 20 people in India are in danger of experiencing severe hydrological and meteorological disasters along with extreme weather events triggered by climate change.[11]

The NITI Aayog is the nodal institution to oversee the implementation of SDGs, and the Ministry of Statistics and Programme Implementation (MoSPI) is the nodal institution for

[10] "India's Updated First Nationally Determined Contribution Under Paris Agreement (2021-2030)", *UNFCCC*, Accessed February 20, 2024. https://unfccc.int/sites/default/files/NDC/2022-08/India%20Updated%20First%20Nationally%20Determined%20Contrib.pdf.

[11] Rajiv Kumar, Amitabh Kant, Durga Shanker Mishra, Amit Khare, Sunil Kumar, K. Rajeswara Rao, D.P. Singh, et al. *Reforms in Urban Planning Capacity in India 2021*, (2021). https://www.niti.gov.in/sites/default/files/2021-09/UrbanPlanningCapacity-in-India-16092021.pdf.

facilitating coordination with line ministries and departments.[12] Local governments are tasked with planning and implementing various aspects of SDG policies. However, the country faces challenges in terms of financial requirements to meet the targets discussed in detail in subsequent sections of the paper.

In the SDG India report for SDG 6, India scores between 54 and 100 for States and between 61 and 100 for UTs, most of which are in the front-runner category (Telangana, Gujarat, Andhra Pradesh, Bihar, Maharashtra, Chhattisgarh, Kerala, Sikkim, Madhya Pradesh, Manipur, Nagaland, Tamil Nadu, Odisha, Himachal Pradesh, Karnataka, Mizoram, Uttarakhand, Haryana, Jharkhand, Tripura, Uttar Pradesh, West Bengal, Meghalaya, Arunachal Pradesh, Ladakh, Dadra and Nagar Haveli, Puducherry, Punjab, Jammu and Kashmir, Chandigarh, Daman and Diu, and Andaman and Nicobar) with Goa and Lakshadweep as achievers. India includes 18 percent of the world's population, but only 4 percent of the global water resources resulting in the most water-stressed countries. The World Resource Institute predicts that India will face significant water stress by 2050.[13]

Climate change has exacerbated this situation by altering seasonal rainfall patterns, causing frequent floods and droughts,

[12] Rajiv Kumar et al., *Reforms in Urban Planning Capacity in India* 2021.

[13] "2023 Aqueduct Global Maps 4.0 Data," World Resources Institute (WRI) https://www.wri.org/research/aqueduct-40-updated-decision-relevant-global-water-risk-indicators?auHash=74cRjEQPsH0NDpgT1NqIfNpqV-QpYNR4oiPo1HRhpGs

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and forcing farmers to rely on groundwater, leading to the depletion of groundwater resources. Projections indicate that climate change will significantly worsen the country's water insecurity. High population density and urbanization will also put pressure on the country's water resources. However, SDG 6 has made significant progress and is on an upward trajectory. Water is a state (federal) subject in India, with power devolving to the local government. However, the central government has implemented various policies to address the issues discussed in the next section of the paper. India's approach to water was more focused on the water supply and less on sanitation, which relied on government subsidies.[14]

Through the year 2030, Asia and the Pacific will require an annual investment of 53 billion dollars in water, as stated in the Strategy 2030 by the Asian Development Bank (ADB). According to the estimations provided by the ADB, approximately one-third of this sum will be required to be provided by the private sector. In light of this, effective governance of the water industry is necessary in order to attract both public and private funding. It places an emphasis on the responsibilities that public institutions have to be able to plan, monitor, and supervise projects, as well as

[14] S. K. Sarkar, and Girija K. Bharat. "Achieving Sustainable Development Goals in water and sanitation sectors in India." *Journal of Water, Sanitation and Hygiene for Development*, 11.5 (2021): 693-705.

guarantee that transparent subsidies and efficient fiscal management will provide money that is sustainable.[15]

India is one of the most climate-vulnerable countries witnessing impacts like glacier retreats, floods, heatwaves, and droughts. India's diverse geography and varying climate conditions make it susceptible to climate change impacts. Extreme weather anomalies are rapidly increasing and intensifying due to climate change, posing a challenge for the country.[16] As the fastest and most populated economy in the world, India ranks among the top emitters of greenhouse gas emissions. India is home to many major rivers, such as the Ganges, Brahmaputra, and Indus, which provide water for irrigation, transportation, and other essential services. However, they are also prone to frequent flooding, which can result in the loss of lives, displacement, infrastructure damage, and crop failure. Climate change exacerbates this risk by causing more intense and frequent precipitation events.[17]

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[15] "Strategy Achieving a Prosperous, Inclusive, Resilient, and Sustainable Asia and the Pacific", Asian Development Bank, (2018). https://www.adb.org/sites/default/files/institutional-document/435391/strategy-2030-main-document.pdf.

[16] Rakesh Kumar Maurya, *National Implementation of the SDG Monitoring India 2015*. Available from https://unstats.un.org/sdgs/files/meetings/sdg-seminar-xian-2015/Presentation--4.3-Implementation-of-SDG-Monitoring--India.pdf

[17] Matthew Cohen. "A systematic review of urban sustainability assessment literature". Sustainability, no. 9, (2017):2048. https://www.mdpi.com/2071-1050/9/11/2048

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Droughts are another climate-induced risk that affects India, particularly in the western and central parts. They impact agriculture, livestock, and rural livelihoods, leading to food insecurity and migration. The reduction in rainfall and rise in evaporation rates are exacerbating climate change.[18] India's coastal regions are at high risk of impacts of climate change, including an increase in cyclones, tsunamis, sea-level rise, and storms. These natural events can cause severe damage to infrastructure, natural resources, and homes, particularly in low-lying areas. India has an extensive coastline of over 7,500 km, and more than 70 percent of its population inhabits coastal regions, amplifying its vulnerability to these hazards.[19]

At first, people viewed India's approach to climate action as conflicting with its developmental requirements (i.e., prioritizing climate action over economic growth). In 2009, India undertook a shift in its approach to climate change, recognizing its significant role in achieving the Paris Agreement targets. Its approach is based on the fundamental principle of shared but differentiated responsibilities (CBDR) rooted in equity and justice. After the

[18] Rita Vasconcellos Oliveira. "Back to the Future: The potential of intergenerational justice for the achievement of the sustainable development goals." *Sustainability*. no. 7, (2018): 427. https://www.mdpi.com/2071-1050/10/2/427

[19] Siming Yu, Muhammad Safdar Sial, Dang Khoa Tran, Alina Badulescu, Phung Anh Thu, and Mariana Sehleanu. "Adoption and implementation of sustainable development goals (SDGs) in China—Agenda 2030." *Sustainability* 12, no. 15 (2020): 6288. Doi: https://doi.org/10.3390/su12156288

UNFCCC period, it has been instrumental in advocating for the priorities of the Global South, particularly in holding developing countries accountable for their historical emissions. It has formed various alliances, such as the G77 and BASIC, to advocate for the position of developing and least developed countries, who are unable to undertake climate action due to their developmental needs. At the international level, it has manifested in the formation of robust multilateral institutions like the International Solar Alliance, Global Biofuel Alliance, and Coalition for Disaster Reduction.[20]

At the domestic level, the National Action Plan on Climate Change (NAPCC) is the policy to prevent climate change and increase the country's preparedness.[21] The NAPCC defines eight missions that focus on climate change mitigation, adaptation, sustainable habitats, efficiency, water, and research and development. This to some extent could be considered as an optimal solution to climate change challenges as the package relies on state-of-the-art technologies. The plan has eight national

[20] Neha Sami, Chandani Singh, and Amir Bazaz. "Climate Change Policy in India and Goal 13." , (2019). https://iihs.co.in/knowledge-gateway/wp-content/uploads/2017/10/Climate-Change-Policy-in-India-and-Goal-13.pdf

[21] Shiladitya Chatterjee, Matthew Hammill, Nagesh Kumar, and Swayamsiddha Panda. "Assessing India's Progress in Achieving the Millennium Development Goals: Key Drivers of Inter-state Variations." United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) South and South-West Asia Office. (2015). https://repository.unescap.org/handle/20.500.12870/928

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missions including the National Solar Mission, National Mission on Sustainable Habitats, National Water Mission, National Mission for Sustainable Himalayan Ecosystems, National Mission for Green India, National Mission for Sustainable Agriculture and National Mission on Strategic Knowledge for Climate Change.

These missions focus on various issues of climate change, such as reducing emissions, water use efficiency, sustainable agriculture, and the advancement of climate change knowledge. The plan recognizes the importance of raising the level of adaptative capacity to climatic risks and impacts with emphasis on sectors and the populace that are highly susceptible to climate change. It also looks into the impossibility of utilizing conventional top-down planning and traditional management approaches in addressing climate change, thus the need to embrace bottom-up planning and community-based measures.[22] The NAPCC is pursuing these frame objectives and strategies in improving adaptive capacity to climate-related hazards and promoting sustainable development. However, more efforts have

[22] Yonglong Lu, Nebojsa Nakicenovic, Martin Visbeck & Anne-Sophie Stevance. "Policy: Five priorities for the UN Sustainable Development Goals." Nature. (2015):432.
https://www.nature.com/articles/520432a

to be tipped in to deal with various impacts of climate change, especially on the most affected groups.[23]

III. China's Path to Achieving Water Security and Climate Resilience

The economic growth in China has raised serious environmental concerns, such as the overexploitation of natural resources. Although the country's GDP has been steadily increasing, the environment has suffered due to the lack of conservation of resources. China has ensured national economic growth three times the global average, with only 60 percent of the world's average per capita water resources.[24] Its economic growth trajectory has put further pressure on water demand. The water withdrawal rate is among the highest in the world. In 2014, the withdrawal rate was 600 BCM per year, which is significantly higher than the 480–490 BCM each year in the United States.[25]

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[23] Bengang Li, Thomas Gasser, Philippe Ciais, et al. "The contribution of China's emissions to global climate forcing."Nature.(2016):357-361. doi:10.1038/nature17165

[24] "Water Resources In China", Ministry of Water Resources, People's Republic of China., Accessed February 24, 2024 http://www.mwr.gov.cn/english/mainsubjects/201604/P020160406508110938538.pdf.

[25] "Clear Waters and Lush Mountains: The Value of Water in the Construction of China's Ecological Civilization - A Synthesis Report", World Bank and the Development Research Center. (2022).https://www.nlp4dev.org/document/wb_099405010132227342

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One of the major problems that China faces is water scarcity. China's freshwater resources are 2.8 trillion cubic meters, or 6 percent of the global freshwater. However, China's per capita water resource is 2,100 cubic metres which accounts for 28 percent of the global average, making it one of the world's most water-scarce countries. [26] Furthermore, water resource distribution is uneven, with the south having abundant water resources and the north lacking them. Only about 15 percent of the water resources are available to the population in the northern part of the country, where 44 percent of the population lives.[27]

Another issue in China concerns water pollution. According to 2014 data, WHO monitored river water quality. Water quality results for total river length (2,16,000 km) revealed that 72.8 percent fell in Grade I-III, and the remaining 27.2 percent was in Grade IV or worse.[28] In 2022, the monitoring of 3629 surface water sections in China revealed that around 12 percent of them

[26] World Bank and the Development Research Center, "Clear Waters and Lush Mountains: The Value of Water in the Construction of China's Ecological Civilization - A Synthesis Report".

[27] Yuxi Wang, Yong Wang, Xuelian Su, Lin Qi, and Min Liu. "Evaluation of the comprehensive carrying capacity of interprovincial water resources in China and the spatial effect." *Journal of Hydrology*, no. 575, (2019): 794–809. https://doi.org/10.1016/j.jhydrol.2019.05.076

[28] "Water Resources Management And Protection In China", Ministry of Water Resources, People's Republic of China, Accessed February 24, 2024. http://www.mwr.gov.cn/english/mainsubjects/201604/P020160406507020464665.pdf.

failed to meet basic quality standards (Grade I-III).[29] Urban sewage and industrial wastewater discharge, particularly in areas near large cities, are the main causes of this classification, which indicates heavy pollution. Additionally, the water-use efficiency is low, with an irrigation efficiency of only 0.43 and industrial water efficiency of 0.55 in 2000, compared to developed industrial wastewater, particularly in areas near large cities.

Additionally, the water-use efficiency in China is low, with an irrigation water use efficiency of only 0.43 and industrial water use efficiency of 0.55 in 2000, compared to developed countries where the ratios are higher.[30] This gap between water supply and demand in China is expected to widen further with continued development and urbanization. Moreover, most of the rivers in China flow eastward and drain into the coastal marine environment, resulting in poor water quality. This pollution has led to an increase in red tides or harmful algal blooms, covering a total area of about 15,000 square kilometers.[31] Climate change is

[29] "Report on the State of Ecology and the Environment in China", Ministry of Ecology and Environment, PRC, Accessed February 25, 2024. https://english.mee.gov.cn/Resources/Reports/soe/SOEE2019/202312/P020231206607194894058.pdf

[30] Rongrong Xu, Yongxiang Wu , Gaoxu Wang, Xuan Zhang, Wei Wu, Zan Xu. "Evaluation of industrial water use efficiency considering pollutant discharge in China". PLoS ONE, no.14(8). (2019). https://doi.org/10.1371/journal.pone.0221363

[31] Chao Bao and Chuang-lin Fang. "Water Resources Flows Related to Urbanization in China: Challenges and Perspectives for Water Management and Urban Development." Water Resources Management, no.26(2), (2011):531–552. https://doi.org/10.1007/s11269-011-9930-y

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likely to exacerbate China's existing water problem. River runoff has declined by 60 percent from 1961 to 2011 in large river basins, mostly in the northern region.[32]

China is the world's largest greenhouse gas emitter and is experiencing the adverse effects of climate change. From 1908–2007, the average temperature rise in China was 1.1 degrees Celsius. Changes in the precipitation have been observed, in turn altering the water security. It has been experiencing extreme weather events, including droughts, floods, and storms, causing economic losses of USD 25-37.5 billion every year. China's coastal regions, known for their economic achievement, are highly vulnerable to storms, floods, and sea-level rise. From 1980 to 2021, sea level rise on China's coasts was 3.4 mm per year, above the global average.[33]

China has signed the Paris Agreement and announced the peak of its carbon emissions by 2030 and simultaneously achieving carbon neutrality by 2060 in response to the impacts.[34]

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[32] Jinxia Wang, Yanrong Li, Jikun Huang, Tingting Yan, Tianhe Sun. "Growing Water Scarcity, Food Security and Government Responses in China." *Global Food Security.* No.14,
(2017). https://doi.org/10.1016/j. gfs.2017.01.003.

[33] "The Carbon Brief Profile: China." Carbon Brief, Accessed November 29, 2023,
https://interactive.carbonbrief.org/the-carbon-brief-profile-china/#climate-policies-and-laws

[34] "China's Policies and Actions for Addressing Climate Change." Ministry of Ecology and Environment, Accessed February 25, 2024.

Simultaneously, it is home to half of the world's coal plants and world's fifth-largest oil producer and second-largest oil consumer.[35] It has often faced criticism for its lack of climate action, given its high reliance on fossil fuels and unprecedented economic rise. According to the Climate Change Performance Index 2024, it ranks 51, with a low rating and score of 45.6.[36] The index criticizes China for not updating its NDCs. Its oil and gas production does not meet the 1.5 degrees Celsius target. However, its renewable energy potential is among the highest in the world, and aims at producing 1500 GW of solar energy by 2025.

Since 2000, China's focus has been more on adaptation than mitigation, such as having a strategy for the cities to collect and recycle rainwater and a national strategy for climate adaptation. However, its mitigation strategy is not "terribly ambitious." The company has made significant investments in clean energy, driven not by mitigation goals but by its geopolitical interests in leading the clean energy industry.[37] Domestically, it adheres to an

https://english.mee.gov.cn/Resources/Reports/reports/202211/P020221110605466439270.pdf

[35] "What countries are the top producers and consumers of oil?" U.S. Energy Information Administration. EIA. Accessed February 25, 2024. https://www.eia.gov/tools/faqs/faq.php?id=709&t=6

[36] Climate Change Performance Index (CCPI), https://ccpi.org/. Accessed 25 February 2024.

[37] Unpacking China's climate priorities. Brookings. Brookings Institution, 23 August 2023,

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environmental strategy: "lucid waters and lush mountains are mountains of gold and silver," also known as the "two mountains theory," as referenced in the 19th National Congress's report, which emphasizes ecological security in its environmental policy.[38]

IV. Comparative Analysis of India and China's SDG Strategies

China and India's strategies toward the SDGs depend on the different economic growth trajectories that both have undertaken in the past few years to become the fastest-growing economies in the world. Both face challenges and opportunities in meeting the SDGs, but they are instrumental in their success. However, the path to economic growth that India and China have taken is different from each other. China's rapid economic growth stemmed from its manufacturing sector maintaining over 50 percent of the share in the GDP as compared to India, which based its growth on the service sector with over 50 percent share

https://www.brookings.edu/articles/unpacking-chinas-climate-priorities/. Accessed 26 February 2024.

[38] Y ang, Lijing, and Xiaochun Li. "Exploration and Analysis on the way of building green lifestyle." IOP Conference Series: Earth and Environmental Science. Vol. 615. No. 1. IOP Publishing, 2020.

in the GDP.[39] Economic development entails various environmental costs.[40]

The economic growth of India and China has raised various environmental concerns about development at the expense of the environment. But as rapidly growing economies, both water and natural resources are an instrumental asset to their social, economic, and environmental development trajectory. Simultaneously, climate change can cause significant economic costs for both. Heavy reliance on fossil fuels might help both meet their developmental needs in the short term, but it can also delay their transition to clean energy. However, China's manufacturing-driven economy consumes significantly more resources than India's, which is primarily driven by its service sector. China's industrial water usage is 10 times more than that of India's.[41] China's strategic focus on manufacturing as an economic asset has resulted in increased environmental degradation, including air and water pollution, in addition to high emissions. Expansion of the industrial sector has also led to land

[39] Huang, Y., Chen, C., Su, D., & Wu, S. (2020). Comparison of leading-industrialisation and crossing-industrialisation economic growth patterns in the context of sustainable development: Lessons from China and India. Sustainable Development. doi:10.1002/sd.2058

[40] Redclift, M. (2005). Sustainable development (1987–2005): An oxymoron comes of age. Sustainable Development, 13(4), 212–227. https://doi.org/10.1590/S0104-71832006000100004

[41] Ibid 37.

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degradation, soaring emissions, and pollution.[42] A divergent approach to development has resulted in separate environmental consequences for both. India's service-oriented developmental model is based on lesser environmental costs.

Having different developmental paths, India and China have shown a considerable commitment to SDGs since the United Nations adopted them in 2015. Both countries have embraced the global goals and made substantial efforts to implement them at the national and local levels. India has made significant progress in areas such as forest conservation, renewable energy use, and sanitation. In contrast, China has faced criticism for its high pollution levels but has made efforts to address this, particularly by developing renewable energy and improving air and water quality. Both nations have also developed national indicators to evaluate progress on the SDGs, with India using the National Indicator Framework (NIF) and China making strides to incorporate the SDGs into its national development goals. Both have advocated for equal participation in international policymaking and acknowledgement of "common but differentiated responsibilities" in the fight against climate change. India has embraced a "whole of society" approach to sustainable development, with participation from various stakeholders, while

[42] Zheng, Siqi; Sun, Cong; Qi, Ye; Kahn, Matthew E. (2014). The Evolving Geography Of China's Industrial Production: Implications For Pollution Dynamics And Urban Quality Of Life. Journal of Economic Surveys, 28(4), 709–724. doi:10.1111/joes.12063

the Chinese government has emphasized "innovation-driven," "coordinated," "green," "open," "shared," and "harmonious" development. However, given that the world is at a crucial point in determining the success or failure of SDGs, both countries must overcome various obstacles to drive the success of SDGs while continuing their path to development.[43]

A. India and China's Initiatives to Achieve SDGs

India and China have taken significant steps to achieve SDGs, both share transboundary waters such as lakes, aquifers, and rivers. Some examples of individual water initiatives that India and China have taken to secure their water and climate resources. India is strengthening its hydrological information system with the introduction of a Hydrological Information System (HIS) and other initiatives aimed at improving data collection and dissemination. Thus, it can be stated that, while moving forward, bureaucracy still hinders the acquisition of hydrological data. Thus, while designing new conservation projects, both the issues regarding transfer and payment have to be resolved with the help of fair agreements. Desalination is currently still a fairly limited way of providing fresh water to water-scarce areas, although the technology has indeed reached a

[43] Kumar , Krishan , and P K Anand. "Measuring the SDG Progress in India with Focus on Gap Analysis Approach," March 2023. https://www.ris.org.in/sites/default/files/Publication/DP-278-Krishan-Kumar-and-PK-Anand.pdf.

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certain level of maturity; it is, however, by and large, fossil fuel-based. Thus, to address the climate change issue, sustainable measures need to be addressed from different angles.

A holistic approach, which operates managing climate change at the national level to the reconsideration of water utilization practices in the future climate context, is needed. Enhancing the action plan on climate change is one of the objectives above and will contribute to the achievement of the targets. India initiated the NRCP National River Conservation Plan in the year 1985 as a wholesome plan to prevent or control water pollution from affecting the rivers of this country. The program covers the issues of water sanitation through the treatment of wastewater, solid waste disposal, and industrial control of pollution. The 'Namami Gange' was launched in 2014; this is the government's major program for protecting the river Ganga, which is one of the most polluted rivers in India. They include the building of the STPs, cleaning up of the river bed, and supporting the implementation of appropriate methods of agriculture. Namami Gange is an updated program that started in 2015 as an extension of the Clean Ganga Mission, the primary objective of which is to clean and develop the Ganga river system. It will consist of the provision of treatment and disposal facilities for the sewerage and the construction of related facilities to accommodate the river's developments and tourism promotion.

Prime Minister Narendra Modi gave the following statistics at the COP-28 Summit in 2023: "India is one of the very few global economies to be on the path of achieving the NDC targets." 11 years ago, we were able to accomplish our non-fossil fuel targets that were tied to the intensity of emissions. A non-fossil fuel aim has been accomplished nine years ahead of schedule by our organization. In addition, India has not yet reached this point. By the year 2030, we want to have reduced the intensity of our emissions by forty-five percent. We have collectively come to the conclusion that we will raise the proportion of non-fossil fuel to fifty percent. This demonstrated India's commitment to lowering the intensity of its emissions and making progress towards the goal of reaching net zero by the year 2070.[44]

According to a study the Stockholm Environment Institute, industry is responsible for around 30 percent of the world's carbon dioxide emissions. Consequently, to meet the Paris Agreement targets (limit the increase in global temperature to 2 degrees) major reductions in emissions are required in the industrial sector.

[44] India at COP-28: Highlights of 28th Conference of Parties, November 12, 2023. https://static.pib.gov.in/WriteReadData/specificdocs/documents/2023/dec/doc20231212285701.pdf.

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This is in addition to the fact that the majority of decarbonisation initiatives by industries are carried out in the developed nations.[45]

The period from 2016 to 2020 was significant for both China's development ambitions and the global implementation of the UN 2030 Agenda for Sustainable Development.[46] This was a period that was significant for both of these endeavors. During these last five years, China has focused on the implementation of the 2030 Agenda, seeking an end to poverty, safeguard the planet, and guarantee prosperity for everyone. The 13th Five-Year Plan was an essential component of China's efforts to realize these objectives and construct a society that enjoys a level of moderate prosperity across the board.[47]

The Chinese government, under President Xi Jinping, has declared a commitment to support the 2030 Agenda through a people-centered approach. This strategy was defined by using new ideas of integrated, eco-friendly, inclusive, and co-surfaces of development. China realized that for sustainable development, it

[45] Lee, Hoesung, and José Romero. "Climate Change 2023: Synthesis Report." Intergovernmental Panel on Climate Change, 2023. https://doi.org/10.59327/IPCC/AR6-9789291691647.

[46] United Nations. (2015, September 25). Transforming Our World: The 2030 Agenda for Sustainable Development. United Nations. https://sdgs.un.org/2030agenda

[47] United Nations. (2016). China .:. Sustainable Development Knowledge Platform. Un.org. https://sustainabledevelopment.un.org/memberstates/china

was crucial to have an approach that would incorporate political, social, as well as economic, and environmental ecosystems.[48]

To ensure the attainment of the SDGs, China created a coordination structure that consists of 45 government departments. This inter-ministerial mechanism is instrumental for promoting and coordinating the implementation of the SDGs across various government departments and agencies. By integrating SDG implementation into its development plans, such as the 13th Five-Year Plan, China made significant strides toward achieving various SDGs.[49] China has made significant progress on several SDGs, such as poverty reduction, environmental conservation, and technological development.[50] China has also provided support to other countries' sustainable development efforts, encouraged collaboration among Southern nations, and promoted sustainable development through initiatives like the Belt and Road Initiative.[51]

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[48] Sustainable Development Goals, U. N. (n.d.). China's VNR Report on Implementation of the 2030 Agenda for Sustainable Development. https://sustainabledevelopment.un.org/content/documents/280812021_VNR_Report_China_English.pdf

[49] Ibid.

[50] United Nations. (2018). United Nations sustainable development agenda. United Nations Sustainable Development; United Nations. https://www.un.org/sustainabledevelopment/development-agenda-retired/

[51] OECD. (2018). China's Belt and Road Initiative in the Global Trade, Investment and Finance Landscape. In OECD. https://www.oecd.org/finance/Chinas-Belt-and-Road-Initiative-in-the-global-trade-investment-and-finance-landscape.pdf

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President Xi stated in 2014 that "addressing climate change and implementation of sustainable development is not what we are asked to do, but what we really want to do and will do well." In 2017, President Xi announced China would "tak[e] the driving seat in international cooperation to respond to climate change." The Chinese leadership has no climate doubters with policy influence. In May 2020, National People's Congress, Premier Li Keqiang announced, "We will promote cleaner and more efficient use of coal." He didn't address coal overcapacity or coal's percentage of primary energy consumption, two government policy goals in recent years."[52]

China remains committed to implementing SDGs and integrating it into its national development initiatives, including the 14th Five-Year Plan and Vision 2035, despite the setbacks caused by the COVID-19 pandemic. China believes that its sustainable development efforts will have a positive impact on the world.[53] The 2021 Progress Report on China's Implementation of

[52] Sandalow, David. "China's Response to Climate Change: A Study in Contrasts and a Policy at a Crossroads," July 2020. Accessed September 1, 2024. https://asiasociety.org/policy-institute/chinas-response-climate-change-study-contrasts-and-policy-crossroads-0#:~:text=In%202014%2C%20President%20Xi%20said,to%20climate%20change."%20There%20are.

[53] Economic and Social Council Economic and Social Commission for Asia and the Pacific Ninth Asia-Pacific Forum on Sustainable Development Bangkok and online, 28-31 March 2022.Retrieved November 19, 2023, from https://www.unescap.org/sites/default/d8files/event-documents/ESCAP-RFSD2022-2-E.pdf

the 2030 Agenda for Sustainable Development provides a comprehensive assessment of the country's progress in implementing the 2030 Agenda since 2016.[54] The report, which will be published in 2021, highlights successful examples and experiences that could serve as useful lessons for the international community's post-pandemic recovery and efforts to get the global SDGs implementation process back on track. The report's goal is to share these experiences and cases to support the global implementation of SDGs.[55]

The Chinese government set out the "Ten Rivers, Ten Thousand Miles" Program in 2016 with the target of enhancing the water quality in ten large basins by 2020. It is a program of setting up of sewage treatment plants, and environmental protection has put into practice pollution control measures and the promotion of ecological agriculture, among others. Secondly, to cope with the IDB, China enacted the Water Pollution Prevention and Control Act. Second, in 2015, China introduced another ambitious program known as the Water Pollution Prevention and Control Action Plan. Following the administrative divisions in China, in 2016, China established the River Chief System to

[54] Anon. (n.d.). China's Progress Report on Implementation of the 2030 Agenda for Sustainable Development (2023) China's Progress Report. Retrieved November 19, 2023, from https://www.fmprc.gov.cn/mfa_eng/topics_665678/2030kcxfzyc/202310/P020231018367257234614.pdf

[55] United Nations. (2021). The Sustainable Development Goals Report 2021. https://unstats.un.org/sdgs/report/2021/The-Sustainable-Development-Goals-Report-2021.pdf

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improve river management and protection. The physical outputs of this system include river chiefs who have the responsibility of managing and regulating the health of the rivers in their area.

One of China's climate initiatives is the National Carbon Trading Plan, which China announced to reduce carbon emissions. China expects this market, one of the world's largest carbon markets, to play a significant role in its efforts to combat climate change. Then, the concept of ecological civilization emphasizes the importance of protecting the environment and promoting sustainable development. This is the guiding principle of China's environmental policies, including its climate change initiatives. These are just a few of the initiatives China has taken to combat water security and climate change. The country has a long road ahead, but these initiatives show determination to solve these important problems.[56]

B. Challenges and Opportunities for India and China in SDG Implementation

Each nation has made an attempt to align its strategies, policies, and planning documents with the SDGs. Numerous groups have begun programs with the intention of including local

[56] Prater, Hongqiao Liu Simon Evans, Zizhu Zhang, Wanyuan Song, Xiaoying You, Joe Goodman, Tom, and Hongqiao Liu Simon Evans Prater Zizhu Zhang, Wanyuan Song, Xiaoying You, Joe Goodman, Tom. "The Carbon Brief Profile: China." Carbon Brief, November 30, 2023. https://interactive.carbonbrief.org/the-carbon-brief-profile-china/.

government institutions into the process of mainstreaming the Sustainable Development Goals (SDGs). In spite of this, it is vital to conduct a thorough analysis of the linkages between the Goals and the evaluation of the policy interventions that have been undertaken in order to guarantee the successful implementation of the 2030 Agenda. At the regional level, there is a lack of high-quality data that is available for the SDGs that pertain to the social and economic aspects.[57] In accordance with the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP, 2019), only 50 of the 199 SDG targets are currently prepared for review of their progress. Indicators account for one-third of the overall number of indicators. The enhancement of data that has been disaggregated remains a significant focus during this discussion. It has been discovered through reviews that sex-disaggregated data are more readily available than other types of disaggregated data; nevertheless, this is only the case for a limited number of indicators.

The vast majority of Asian countries place a substantial amount of importance on the openness and accuracy of their statistical data. Bangladesh, Malaysia, the Lao People's Democratic Republic, the Philippines, and Vietnam are just some of the countries in Southeast and South Asia that have taken part

[57] Rahman, M., Khan, T. I., & Sadique, Z. (2020). SDG implementation progress: What does the Asian experience reveal? (Occasional Paper Series No. 67). Southern Voice. Retrieved from: http://southernvoice.org/ sdg-implementation-progress-what-does-the-asian-experience- reveal/

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in drills to identify data shortages. Other countries that have participated in these exercises include Vietnam. According to the findings of these gap studies, reaching Sustainable Development Goals 06 and 13 will be an incredibly challenging endeavor. Several Asian nations are already in the process of forming separate committees in order to collect data, coordinate, monitor, and report on the process of achieving the SDGs.[58]

Similarly, both India and China face numerous challenges and opportunities. Through the implementation of many initiatives aimed at enhancing water and sanitation, India has demonstrated its commitment to SDG 6. In 2014, India initiated another initiative to eradicate open defecation and enhance waste management. For instance, the Swachh Bharat Mission draws attention to the significant investments that India has made in the areas of sanitation and clean water. Everyone. By the same token, the Jal Jeevan Mission intends to supply piped water to every rural family by 2024. One of the ways that this strategy reflects India's diverse approach to addressing water and sanitation concerns is by enhancing the promotion of cleanliness.[59]

However, India faces numerous obstacles and challenges as it works towards achieving SDG 6. The root causes of major

[58] Ibid.

[59] Biswas, S., Dandapat, B., Alam, A. et al. India's achievement towards sustainable Development Goal 6 (Ensure availability and sustainable management of water and sanitation for all) in the 2030 Agenda. BMC Public Health 22, 2142 (2022). https://doi.org/10.1186/s12889-022-14316-0

problems, such as inequality in financing and differences between areas, lead to a shortage of fundamental services. One of the problems that water utilities face is not only the battle to produce enough money to pay their operating and maintenance costs, but also the challenge of ensuring their financial security. In addition, the international nature of water resources not only creates financial and organizational challenges but also presents difficulties such as political insufficiency and corruption, which further hinder the utilization of these resources.

India has made tremendous progress in climate SDG 13, including the ratification of the Paris Agreement and the approval of the National Climate Change Action Plan. All of these accomplishments are to be commended. It is a reflection of India's climate issue that the country is making attempts to minimize its energy consumption as a percentage of its GDP, as well as its commitment to measures regarding climate change and renewable energy.

But the difficulties are still very significant. The vast population and quick economic growth of India have a tremendous impact on the environment. India is the third-greatest emitter of carbon dioxide, as well as the highest emitter of greenhouse gases. Several factors have contributed to the situation, including the nation's reliance on coal as a source of energy and its susceptibility to the consequences of climate change, such as abnormally severe weather. However, India's commitment to

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lowering emissions of greenhouse gases and investments in renewable energy present major potential for the country's long-term sustainability and security.

However, China faces numerous challenges and opportunities as it implements SDGs 6 and 13. Uncertainty and financial inequality across the region drive financial inequality, one of the most significant challenges for Sustainable Development Goal 6 (SDG 6). Additionally, the cost of sanitation has increased by a factor of three, despite the fact that countries require approximately USD 28.4 billion annually to guarantee universal access to water, sanitation, and hygiene (WaSH). There is still a significant amount of financial inequality, particularly in countries in the Southern World, including certain regions of China, although development banks and other forms of development aid provide financial support. This deficiency leads to inequality and poor health outcomes.

The concentration of a disproportionate amount of income in urban areas financially disadvantages people living in rural areas. In addition, water companies are having trouble generating sufficient revenue to cover their operating and maintenance expenses, which presents another challenge to their ongoing financial sustainability. Theft, physical loss, and the fact that water bodies become unprofitable as a result of inaccurate

metering are all factors that further exacerbate the problems associated with financial sustainability.

Through the UN Sustainable Development Cooperation Framework, China is working together with the United Nations to reduce the amount of time it takes to accomplish its goals. The United Nations Specially Designated Crisis Fund (UNSDCF) 2021-2025 will support China's needs, capabilities, comparative advantage, and intelligence in addressing these challenges. This collaboration is aligned with China's strategic development vision and the SDGs. It focuses on the three most important areas of people's well-being: globalization and cooperation. It demonstrates the two parties' willingness to work together to find solutions to water and sanitation issues. This represents a significant portion of the development objectives.[60]

In the context of Development Goal 13, China's national plan to implement the Development Goals includes the incorporation of National Development Cooperation (NDC) into national strategies and the utilization of climate change as a means of adapting to a new development model to promote environmental protection. This plan urges developing countries to persuade the

[60] Evaristo, J., Jameel, Y., Tortajada, C. et al. Water woes: the institutional challenges in achieving SDG 6. Sustain Earth Reviews 6, 13 (2023). https://doi.org/10.1186/s42055-023-00067-2

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international community to pledge USD 100 billion annually for code design by 2020, in order to address their climate needs.[61]

Through the adoption of this strategy, China is demonstrating its dedication to climate action and its willingness to participate in international collaboration to accomplish global climate goals.[62] Significant challenges confront China's efforts to finance and provide clean water and sanitation; however, the country's cooperation with the United Nations and international security projects demonstrate its determination to overcome these challenges. The Chinese government is committed to accomplishing SDGs Goals 6 and 13, while also making a significant contribution to the global response to water scarcity and climate change. International cooperation and investment plans in both urban and rural areas will accomplish this commitment.

V. Conclusion

India and China, as a result, encounter a unique set of challenges when it comes to preserving natural resources. These challenges remain even as the geopolitical and geoeconomic landscapes shift significantly. Both countries are actively working to address the SDGs, despite their combined population

[61] Ibid.
[62] United Nations China . "SDG 13 Climate Action ," 2024. https://china.un.org/en/sdgs/13.

accounting for over one-third of the global population. Their efforts include reducing emissions of low-level greenhouse gases and transitioning to renewable energy sources.[63] However, India and China need to collaborate on water and climate action plans rather than compete with each other.

This paper examined India and China's implementation and achievements in the United Nations' SDGs, emphasizing their significant roles as global actors. Further, it provides an understanding of the necessity of the formation of national policies and gaining credible energy profiles from international players. Finally, this paper points to the significance of future cooperation between India and China in addressing environmental issues with a view to realizing sustainable development.[64] The analysis of SDG implementation and achievements in India and China leads to the following recommendations for future actions and improvements:

Strengthen cooperation: India and China should continue with their partnership and do everything possible to attain the common SDGs, such as those found in renewable energy climate change, among others that focus on the conservation of

[63] China, India, and the Emerging Global Order. (2013). https://carnegieendowment.org/files/crux_of_asia.pdf

[64] Chopra, M., Singh, Dr. S. K., Gupta, A., Aggarwal, K., Gupta, B., & Colace, F. (2022). Analysis & Prognosis of Sustainable Development Goals using Big Data-based Approach during COVID-19 Pandemic. Sustainable Technology and Entrepreneurship, 1(2), 100012. https://doi.org/10.1016/j.stae.2022.100012

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biodiversity. Strategic collaborations may be created for the purpose of building a broader partnership with the goal of knowledge and resource sharing and learning from one another the optimal practices to employ.[65]

Enhance policy implementation: The two entities should work especially hard on the measures that would ensure that their policies and regulations embrace methods aimed at cutting greenhouse emissions and encouraging sustainable development. This includes creating and applying accurate monitors and evaluations to ascertain the efficiency and effectiveness of the policies formulated toward achieving the intended goals and objectives.[66]

Increase public awareness and participation: SDG awareness must reach the general populace, and citizens must be involved in achieving the goals. The governments of various countries can work hand in hand with civil society organizations, the private sector, and the media to ensure that sustainable practices are observed and to pass information concerning the

[65] Goodale, E., Mammides, C., Mtemi, W., Chen, Y.-F., Barthakur, R., Goodale, U. M., Jiang, A., Liu, J., Malhotra, S., Meegaskumbura, M., Pandit, M. K., Qiu, G., Xu, J., Cao, K.-F., & Bawa, K. S. (2021). Increasing collaboration between China and India in the environmental sciences to foster global sustainability. Ambio, 51(6), 1474–1484. https://doi.org/10.1007/s13280-021-01681-0

[66] Policies to Reduce Greenhouse Gas Emissions in Industry - Successful Approaches and Lessons Learned: Workshop Report. (1997). https://www.oecd.org/env/cc/2956442.pdf

conservation of the environment and sustainable development to society.[67]

Foster innovation: To accomplish the set objectives of the SDGs, innovation has been deemed central in the process. China and India should commit to enhancing research and development in technologies within sectors of water and climate to find sustainable solutions to cut down on carbon emissions.

Address regional disparities: India and China are two large countries where the economic development and environmental settings vary greatly from one region to another. It is crucial to try to redress these disparities so that the benefits of sustainable development are made available to all areas.[68]

Therefore, let it be recognized that realizing the goals in India and China will be possible through constant efforts, dedication and partnership. The Ones listed above are recommendations that, if adopted by both countries, will go a long way toward ensuring a sustainable and resilient future for its population. India and China have also progressed much overall on the targets of the SDGs that have to do with environmental

[67] United Nations. (2022). Global Partnerships - United Nations Sustainable Development. United Nations Sustainable Development. https://www.un.org/sustainabledevelopment/globalpartnerships/

[68] Department For International Development. (2008). Economic growth: the impact on poverty reduction, inequality, human development and jobs. https://www.oecd.org/derec/unitedkingdom/40700982.pdf

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conservation.[69] While both countries have embarked on measures aimed at decreasing the level of their dependency on fossil energy and increasing the utilization of renewable sources of energy, there is still room for progression. Since targeting the success of the SDGs, the initiatives of the international community should support these programs and encourage the enhancement of cooperation between India and China. Besides, each nation has to strengthen its internal policy coordination to enhance methods of sustainable development. Analyzing India and China's approach toward the resolution of various environmental problems can serve as an example for other countries and is critical for attaining sustainable growth.[70]

[69] Niti Ayog. (2019). Localising SDGs. https://www.niti.gov.in/sites/default/files/2020-07/LSDGs_July_8_Web.pdf

[70] Sridhar, K. (2023). The role of renewable energy in achieving sustainable development goals. WION. https://www.wionews.com/opinions-blogs/the-role-of-renewable-energy-in-achieving-sustainable-development-goals-633794

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