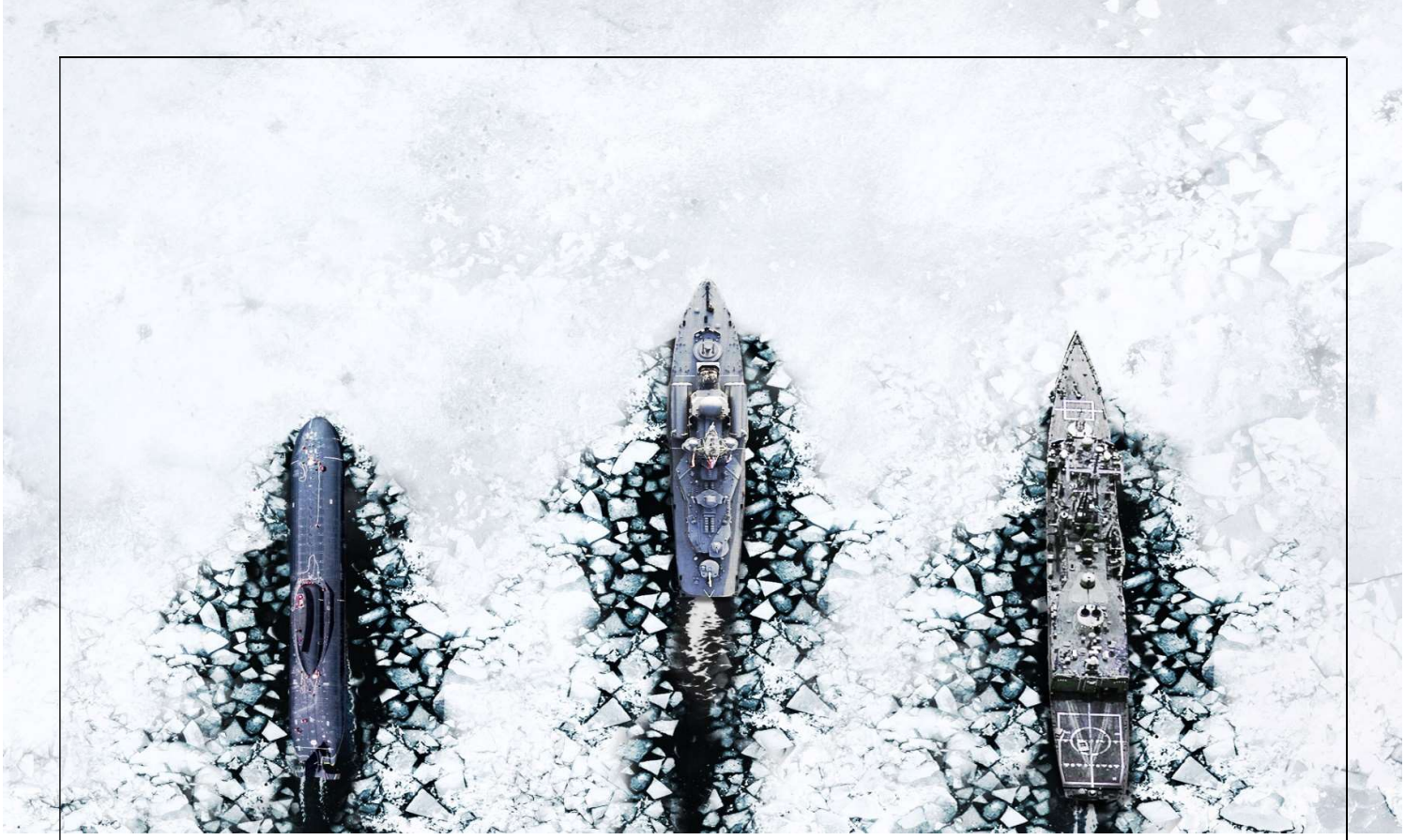

## ISSUE BRIEF III

# India and China in the Arctic

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## Introduction

The Arctic has been witnessing changes in its environment due to global warming of atmosphere and oceans. The continuing melting of ice sheets and ice caps contribute to sea-level-rise globally and affect the global thermo-haline circulation in oceans (Petrunin et al. 2013; Thornnalley et al. 2018; Weaver et al. 2012). The significant reduction of sea-ice, icesheets and ice caps has introduced large amount of freshwater in the Arctic Ocean and likely produce changes in biogeochemical and socioeconomic systems of regional and global consequences. The decrease in sea ice have reduced the surface albedo and affected the energy balance (Riihela et al. 2013), which impacts marine and terrestrial ecological dynamics, including fish productivity (Post et al. 2013). The East Siberian Arctic shelf has been emitting 17 million tons of methane from the permafrost region to atmosphere due to warming (Shakhova et al. 2013) and will further warm the earth. All these changes occurring in the Arctic are yet to be fully understood but have been impacting global weather, climate, and ecosystems. Apart of their impact on environment, they have opened possibilities of access to newer energy resources, critical and strategic metals, rare earth, new fishery grounds, shipping routes, etc. Thus, the Arctic has been drawing global attention due to scientific, economic, and geopolitical reasons.

It has been estimated that the Arctic has about 30 % and 13 % of the World's undiscovered gas and oil reserves, respectively (Gautier et al. 2009). Many oil companies have been actively engaged in exploration related activities. The exploration of critical and rare earth elements - Uranium, Niobium, Platinum group of metals, Tantalum, Molybdenum, Vanadium, etc. - has been initiated and in some cases, mining also has begun (Bortnikov et al. 2015). The opening of Arctic shipping routes, North-west Passage (North America) and North-east Passage (Russia), are shorter by about 25 % and 40 %, respectively than the traditional routes, and are being actively pursued by many countries. The need for ice-class and ice-breaker vessels is steadily increasing and ship-building industry is likely to flourish. The investments in these developmental activities likely to lead to hazards of oil spill, methane release, ecosystem loss, etc. The environmental cost of such degradation in terms of extreme weather, lower agricultural production, etc. likely to be borne by mainly by developing countries.

In view of such a scenario, it is critical to understand how nations, especially other than Arctic nations, are viewing various opportunities and/or challenges and are formulating their policies. The Arctic nations include Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, and USA. These nations have formed a forum called Arctic Council to address a wide range of issues related to scientific, environmental, cultural aspects as well as social issues related to indigenous people. As far as resources of the Arctic are concerned, they are

governed by the UN Convention on the Law of Sea (UNCLOS). Under this Law, the Arctic nations have exclusive economic rights over resources up to 200 nautical miles, and on over the continental shelf, up to 350 nautical miles. There are several countries, including India and China, have shown interest in the Arctic affairs and have been granted an 'Observer' status in 2013. The `Observer' status allows them to contribute at the Working Group level in generating knowledge about Arctic. A description of interests of India and China has been briefly discussed in following sections.

**Arctic and India**

India's main interest in the Arctic has been to understand role of the Arctic in the global system and its impacts on weather and climate of the Indian sub-continent (Nayak, 2008; 2016). India has been conducting scientific research in Himalayas and Antarctica for last several decades, essentially to understand interaction between snow and ice with atmosphere, water/ocean and ecosystem. Hence it was logical that India decided to leverage this experience in understanding the Arctic environment.

India's association with the Arctic is almost 100 years old. The Svalbard treaty in 1920, allowed India (as British Overseas Dominion) to engage in commercial activities, mainly exploiting coal resources in Svalbard region. The first scientific study was carried out by late Prof. Mahendra Nath Bose in association with Norwegian scientists, who collected fossil plants in 1962 to study geology of the region.

The Arctic has provided a unique opportunity to the global scientific community to build strategic knowledge on changes in Arctic and their consequences. The polar regions are one of the components of the Earth system and play an important role in modulating global weather and climate. The earth behaves a single, inter-linked and self-regulated system and hence changes occurring in the Arctic are bound to affect other components (hydrosphere, atmosphere, geosphere, biosphere) and vice-versa. It has been reported by many research workers that the changes in the Arctic likely to affect the Asian monsoons and vice-versa. A link between cold episodes in the North Atlantic and weakened monsoon during Holocene has been established (Hong et al. 2003). The influence of the North Atlantic Sea surface temperature on the Indian summer monsoon has been explained (Goswami, et al. 2006) and correlation between cold Atlantic North temperatures and monsoon droughts has been suggested (Borah et al. 2020). At the same time, glacial and sea ice melting have positive correlation with monsoon variability (Prabhu et al. 2017; Kumar et al. 2018). Krishnamurti and co-workers (2015) have proposed a physical link between monsoon intense convection over north-west India and melting of Arctic Sea Ice. The pathway is through Central Eurasia by means of

large-scale atmospheric waves which transport heat anomalies to Arctic and leads to melting in the Canadian Arctic. In view of such teleconnections between monsoon and the Arctic, it is imperative that India initiated scientific investigations in the Arctic.

The first Indian Expedition to the Arctic was undertaken in 2007 and the Himadri station, a research base, in Svalbard was commissioned in 2008 in order to monitor the Arctic environment. The Ministry of Earth Sciences (MoES) looks after all activities related to polar regions in India. The Earth System Science Organisation - National Centre Polar and Ocean Research (ESSO-NCPOR), Goa, an autonomous institution under MoES conducts and coordinates all research activities in Arctic, Antarctica, and Himalaya. In order to understand oceanic processes, ESSO-NCPOR and ESSO-National Institute of Ocean Technology (NIOT), have deployed, a multi-sensor moored ocean observatory, the IndARC, in the Kongsfjorden fjord in Svalbard (78°57′ N 12°01′E), about 1100 km away from the North Pole at a depth of 192 m. This system collects real-time data on seawater temperature, salinity, current etc. at discrete depths. It is expected that the data from this observatory will provide improved understanding of the response of the Arctic to climatic variability, the Arctic processes, and their influence on the Indian monsoon system. An Atmospheric Observatory, Gruvebadet, has been set-up at Ny-Alesund to study precipitation, aerosols and their characterisation as well as role in direct radiative forcing over the Arctic. ESSO-NCPOR has established a very active collaboration with Norwegian Polar Institute (NPI), Tromso. India is a member of the Asian Forum on Polar Sciences (AFOPS). The ESSO-NCPOR has also became a member of the Council of the University of Arctic (UArctic) and Svalbard Integrated Arctic Earth Observing System (SIOS). Recently, ESSO-NCPOR has made an agreement with Polar Knowledge Canada (POLAR) for initiating science activities at the Canadian High Arctic Research Station (CHARS) facilities at Cambridge Bay, Canada to advance studies related to atmospheric and cryospheric processes.

Apart from augmenting research facilities in Svalbard and Canada, it is necessary to set up such facilities in Alaska and in Greenland, along with satellite data receiving stations in Arctic region. The setting up of satellite data receiving stations will allow to capture 10-11 orbits of satellite data in real time. Along with similar station at Bharati in the Larsmann Hills, Antarctica, will provide global data required for weather and climate studies. Though India has been conducting its research in both Arctic and Antarctica, a dedicated polar research vessel is yet to be acquired. This is a critical need to further advance our knowledge about polar regions. India has initiated its investment in petroleum exploration. The Oil and Natural Gas Corporation Ltd (ONGC) has started investing in energy projects along with Russian company, Novatek.

India needs to develop its strategy and policy in view of its dependence on its monsoon for ensuring food security, developing alternate supply for oil and gas, access to critical metals and rare earths as well as developing shipping routes for access to these resources (Nayak and Suba Chandran, 2020). The draft policy has stressed on scientific research on climate change, economic development, transportation network, influencing governance in Arctic and capacity development in the country (https://arcticpolicyindia.nic.in).

**China in Arctic**

China has defined its policy in 2018 and is articulated in a white paper titled 'China's Arctic Policy'. China considers itself as "Near Arctic state" (english.www.gov.cn/archive/white_paper/2018/01/26/content_281476026660336.htm). It states that it is "one of the continental states closest to the Arctic Circle". The Chinese Arctic and Antarctic Administration is responsible for all affairs related to the Arctic. China is an important stakeholder in Arctic Affairs and involved in scientific research, exploration of natural resources and developing shipping routes. The components of the policy are:

- Conducting scientific research to improve understanding of the Arctic.
- Protection of Arctic environment and addressing climate change
- Development of shipping routes, exploration of resources
- Participation in Cooperation and governance of Arctic
- Promoting peace and stability in the Arctic

China's main interest in the Arctic is strategic, mainly access to hydrocarbon and rare earths and developing a shipping route. It is mainly governed by domestic requirement and development, for ensuring resource and energy security and economic sustainability. China is a net importer of petroleum products and consumes 23% of global energy consumption (Mi et al. 2018) and has invested substantially in energy sector for creating an alternate source of petroleum in the Arctic, especially in Russia and Canada.

China is keen to develop northern Arctic Sea Passage as a shipping route and related infrastructure for economic considerations as evidenced by its participation in the Arctic Economic Council and Arctic Circle forum (Sun, 2014, Huang et al. 2014). China has been keen in developing a shorter & faster north-eastern shipping route, and necessary infrastructure especially for exports from China and access to hydrocarbon and products, and sea food resources to China (Bowman and Xu, 2020). The advantages of a shorter sea route are as follows.

- Shipping traffic through NE route is likely to increase in future as sea ice melts further. A shorter route to the Arctic energy resources, rare earths and food resources will save fuel and cost.
- It is relatively safer route compared to politically unstable regions such as the Gulf of Eden, the Persian Gulf, the Malacca Strait and South China Sea.
- The proposed "Polar Silk Road" through NE Sea route is a part of developing transportation infrastructure and will be more economical than traditional route through the Suez Canal (Xu et al. 2018).
- This route also provides a military advantage. In case of blockade of Indian Ocean, the Arctic route provide an accessibility to energy resources.

The second issue is the likely impacts of climate change on the availability of water and food resources. The climate change and Arctic Oscillation has caused change patterns of rainfall leading to floods and droughts (Piao, 2010; Daoyi and Shaowu, 2003). Such events have negative impact on agriculture and long-term food security. Persistent droughts can also lead to increased desertification (Wang et al. 2008) and is an area of concern.

China has increased research funding to carry out impacts on climate change on the Tibet plateau which is likely face similar changes as the Arctic. Tibet, having large ice fields, snow covered mountains, and permafrost are facing increased melting and focus of research is on interaction between ice and snow with atmosphere, water, ecosystem, land surface and anthropogenic activities (Yao, 2014).

China actively participates in International Science Committee, Inter-governmental Panel on Climate Change (IPCC), Pacific Arctic Group, cooperates with research and academic institutes such as University of Arctic (UArctic) forum and non-state Arctic networks such as Polar Early Career Scientists, to address science questions related to climate change. China has invested heavily in building scientific infrastructure, including two polar icebreakers (Snow-dragon 1 and 2), Yellow River Research Station in Svalbard, Iceland-China Arctic Science Observatory, to support scientific investigations. This infrastructure is the largest among all non-Arctic states. It also actively cooperates with Arctic nations and has set up the China-Nordic Arctic Research Centre in Shanghai, and also have joint projects with Korea and Japan and actively promotes Asian Forum on Polar Sciences. All research activities are conducted and coordinated by the Polar Research Institute of China (PRIC), Shanghai.

China is actively promoting the Arctic tourism and its sustainability and encourages Chinese enterprises to develop adventure and polar tourism in close cooperation with Arctic nations.

China has adopted bilateral and multilateral approaches to achieve these objectives, though focus is on bilateral engagements essentially using economic power, viz. direct investments in petroleum exploration in Canada, Arctic Liquified Natural Gas (LNG) projects in Russia, rare earth and uranium mining in Greenland, farmed salmon trade in Iceland, etc. Another major feature of its strategy is to engage with small Arctic states such as Denmark, Finland, Iceland and Sweden to gain influence in the Arctic as it is relatively easy to engage with small partners (Bowman and Xu, 2020). The large size of the Chinese embassy in Iceland is showcasing of friendship between China and a small state partner, Iceland (Hastings, 2014). China values such bilateral relationships and likes to deal directly with the Arctic nations. The Arctic Circle – China Forum in Shanghai supports all outreach and promotional activities.

## Concluding Remarks

The Arctic has long history of joint collaborative initiatives due to its remoteness and environmental conditions. India should continue to focus on scientific research for global good and developing appropriate environmental policy for the Arctic as the impact of changing Arctic on the developing countries likely to be severe. The collaboration with the Arctic and Asian countries viz. China, South Korea, Japan and Singapore should be enhanced through research projects to build strategic knowledge on conservation and protection of environment of Arctic (Nayak, 2016, 2019). Norway and India have been cooperating to carry out joint research projects. Bilateral strategies for Canada, Russia, USA as well as Denmark (Greenland), Iceland have to be worked out based on mutual interests (Nayak and Suba Chandra, 2020). A partnership with the academic institutions to build capacity in the country should be a priority. The regional collaboration, including China, should be structured in a way to address scientific issues of Asian weather and climate as well as impact of climate change on developing countries. India needs to effectively contribute to International Arctic Science Committee (IASC) and Asian Forum on Polar Sciences (AFOPS).

China has focused its studies considering strategic aspects, economic and social development of the Arctic as well as climate change and its impacts on weather and climate. China has significantly increased its participation in the Arctic affairs and participates very actively in many institutions of the Arctic, including the Arctic Circle. The Chinese scientists and professionals actively participate in all conferences related to Arctic and hold conferences in China

and thus influence regional affairs. India's presence in such fora is comparatively limited and a low-key affair.

The question is how Arctic should be governed in view of energy and mineral resources and their development and unique geographical location vis-s-vis an environment policy. India can contribute towards Arctic cooperation and governance by effective participation in the Arctic Council and Arctic Circle. As the Arctic region influence the global environment, the focus of research should be on environment and climate change. The development of Arctic should be for a global good keeping environment in focus.

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## References


1. Bortnikov, N.S., Lobanov, K.V., Volkov, A.V. et al. (2015). Strategic metal deposits of the Arctic Zone. Geol. Ore Deposits, 57: 433–453. https://doi.org/10.1134/S1075701515060021

2. Borah, P.J., Venugopal, V., Sukhatme, J., Muddebihal, P. and Goswami, B.N. 2020. Indian monsoon derailed by a North Atlantic wavetrain. Science, 370(6522): 1335-1338. DOI: 10.1126/science.aay6043.

3. Bowman, L. and Xu, Q. 2020. China in the Arctic Policies, Strategies and Opportunities for Alaska. Centre for Arctic Policy Studies, University of Alaska, Fairbanks, 22 p.

4. Daoyi, G. and Shaowu, W. 2003. Influence of Arctic Oscillation on winter climate over China. Journal of Geographical Sciences, 13 (2): 208-216. https://doi.org/10.1007/BF02837460.

5. Gautier, D. L., Bird, K. J., Charpentier, R. R. et al. 2009. Assessment of Undiscovered Oil and Gas in the Arctic. Science, 324:1175-1179. DOI:10.1126/science.1169467

6. Goswami, B. N., Madhusoodanan, M.S., Neema, C.P. and Sengupta, D. 2006. A physical mechanism for north Atlantic SST influence on the Indian summer monsoon. Geophysical Research Letters, 33 (2), DOI: 10.1029/2005GL024803.

7. Hastings, J. G. 2014. The rise of Asia in a changing Arctic: a view from Iceland. Polar Geography, 37 (3): 215-233. https://doi.org/10.1080/1088937X.2014.934315.

8. Hong, Y., Hong, B., Lin, Q. H. et al. 2003. Correlation between Indian Ocean summer monsoon and North Atlantic climate during Holocene. Earth and Planetary Science Letters, 211 (3-4), 371-380. DOI:10.1016/S0012-821X(03)00207-3.

9. Huang, L., Lasserre, F. and Alexeeva, O. 2014. Is China's interest for the Arctic driven by Arctic shipping potential? Asian Geographer, DOI: 10.1080/10225706.2014.928785.

10. Krishnamurti. T. N., Krishnamurti, R., Das, S., Vinay Kumar, Jayakumar, A. and Simon, A. 2015. A Pathway Connecting the Monsoonal Heating

to the Rapid Arctic Ice Melt. Jour. of Atmospheric Sciences, 72(1): 5-34. https://doi.org/10.1175/JAS-D-14-0004.1

11. Kumar, V., Tiwari, M. and Rengarajan, R. 2018. Warming of the Arctic captured by productivity variability at an Arctic Fjord over past two centuries. PLOS One, 13(8), e0201456.

12. Mi, Z., Zheng, J., Meng, J. et al. 2018. China's energy consumption in the new normal. Earth's Future, 6 (7). https://doi.org/10.1029/2018EF000840.

13. Nayak, S. 2008. Polar Research in India. Indian Jour. of Marine Sciences, 37(4): 352-357.

14. Nayak, S. 2016. Balancing development and environmental concerns in the Arctic. In Asia and the Arctic (V. Sakhuja and K. Narula, Eds). Springer Geology. pp.27-30. DOI:10.1007/978-981-10-2059-9_3.

15. Nayak, S. 2019. Cooperation with China to Advance Scientific and Technological Knowledge. China Reports, 55(2):145-153. https://doi.org/10.1177/0009445519834700.

16. Nayak, S. and Suba Chandran, D. 2020.Arctic: why India should pusue the North Pole from a science and technology perspective? Current Science, 119 (6): 901-904.

17. Petrunin, A. G., Rogozhina, I., Vaughan, A. P. M., Kukkonen, I. T., Kaban, M. K., Koulakov, I. and Thomas, M. 2013. Heat flux variations beneath central Greenland's ice due to anomalously thin lithosphere. Nature Geoscience 6: 746–750. https://doi.org/10.1038/ngeo1898.

18. Piao, S., Ciais, P., Huang, Y. et al. 2010. The impacts of climate change on water resources and agriculture in China. Nature, 467: 43-51. https://doi.org/10.1038/nature09364.

19. Post, E., Bhatt, U. S., Bitz, C. M. et al. 2013. Ecological consequences of sea-ice decline. Science, 341: 519-524. DOI: 10.1126/science.1235225.

20. Prabhu, A. Oh, J., Kim, I., Kriplani, R. H. and Pandithurai, G. 2017. SMMR-SSM/I derived Greenland sea ice variability: Links with Indian and Korean monsoons. Climate Dynamics, DOI 10.1007/s00382-017-3659-0.

21. Riihelä, A., Manninen, T. and Laine, V. 2013. Observed changes in the albedo of the Arctic sea-ice zone for the period 1982–2009. Nature Climate Change, 3: 895–898 https://doi.org/10.1038/nclimate1963

22. Sakhova N., Semiletov, I., Leifer, I. et al. 2013. Ebullition and storm-induced methane release from East Siberian Arctic Shelf. Nature Geoscience, DOI:10.1038/ngeo2007.

23. Sun, K. 2014. Beyond the Dragon and Panda - Understanding China's engagement in the Arctic. Asia Policy, 18.

24. Thornalley, D. J. R., Oppo, D. W., Ortega, P. et al. 2018. Anomalously weak Labrador Sea convection and Atlantic overturning during the past 150 years. Nature, 556, 227-230.

25. Wang, X., Chen, F., Hasi, E. and Li, J. 2008. Desertification in China: an assessment. Earth-Science Reviews, 88: 188-206. Doi:10.1016/j.earscirev.2008.02.001.

26. Weaver, A., Sedlácek, J., Eby, M. et al., 2012. Stability of the Atlantic meridional overturning circulation: a model intercomparison. Geophysical Research Letters, 2012, 39, L20709.

27. Yao, T. 2014. TPE international program for coping with major future environmental challenges of the Third Pole region. Progress in Geography, 33 (7): 884-892.

28. Xu, H., Yang, D., Weng, J. 2018. Economic feasibility of an NSR/SCR-combined container service on the Asia-Europe lane: a new approach dynamically considering sea ice extent. Maritime Policy & Management, 45 (4): 514-529. https://doi.org/10.1080/03088839.2018.1443521.