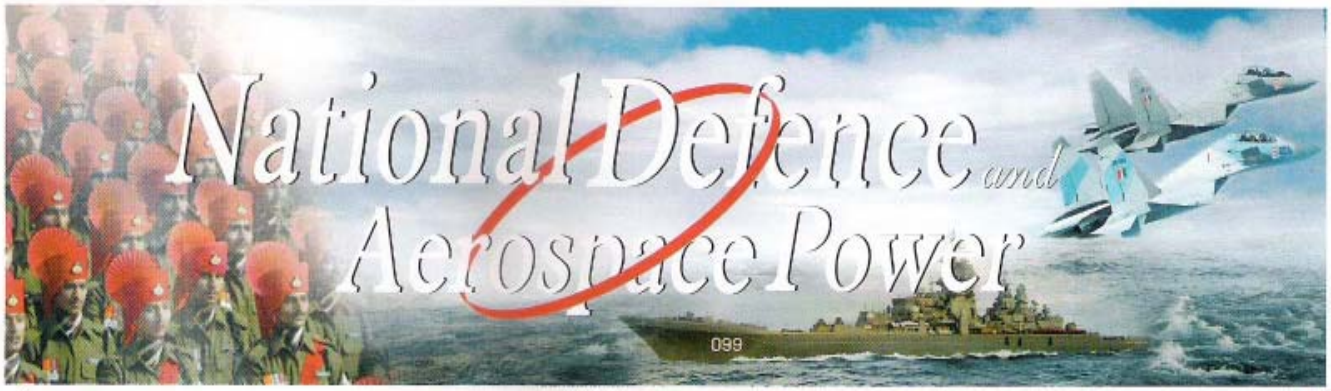

Centre for Air Power Studies ISSUE BRIEF

TIBET: COLOSSUS OF ASIA'S ENVIRONMENT

Jayadeva Ranade
Distinguished Fellow, Centre for Air Power Studies, New Delhi

Tibet occupies a unique geo-strategic space and damage to the environment, climate and waters of Tibet will compel South and South East Asia to confront a potential existential threat.

The 2.5 million square kilometers of the sparsely populated high altitude Tibetan Plateau is an area of incalculable geo-strategic importance. Its ecology, environment, climate, glaciers and rivers impact the region around it. Attempts to tinker with these will affect at least ten countries and a billion people. In this backdrop, plans to launch massive development programmes in Tibet arouse concern. Ominous are the feasibility studies and construction underway to divert the waters of Tibet to China's parched north. Adversely affected will be Pakistan, India's vast Indo-Gangetic belt, Bangladesh, Myanmar, Thailand, Laos, Cambodia and Vietnam. The flows of China's two longest rivers namely the Yangtze and the Huang Ho will also be diminished.

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The glaciers and annual snowfalls in the Himalayas and Tibetan Plateau feed rivers providing for the needs of at least 47 per cent of mankind. Four of the world's ten major rivers, the Brahmaputra (or Yarlung Tsangpo in Tibetan), the Yangtze, the Mekong and Huang Ho have their headwaters on the Tibetan Plateau. Other major rivers originating in Tibet are: the Salween, Irrawaddi, Arun, Karnali, Sutlej and the Indus. About 90 percent of their runoff flows downstream to China, India, Bangladesh, Nepal, Pakistan, Thailand, Myanmar, Laos, Cambodia and Vietnam. The Indus-Sutlej river system and Brahmaputra are also fed by these glaciers and climatic and environmental changes in Tibet will directly impact forty crore people residing in the Indo-Gangetic plains.

Rising temperatures in the Tibetan Plateau threaten the glaciers. Official data confirms that temperatures are rising and that the past winter was the fifteenth warmer-than-average winter in Qinghai since 1986. The average temperature from December to February was minus 7.4 degrees Celsius, almost 2 degrees Celsius higher than the average of the past decade, according to the Provincial Climate Center. A researcher of the Institute of Geographic Sciences and Natural Resources Research of the Chinese Academy of Sciences, noted that 'annual precipitation has decreased by 13.99 millimeters every 10 years'. Significantly, except for its western-most section, the headwaters area has been generally getting warmer and drier in recent decades. Reduced precipitation means less snowfall, or less ice and less water in the rivers. Indirect admission of reduced precipitation was contained in an official Chinese news agency, Xinhua report of July 12, 2010. It disclosed that drought conditions have existed since last October in the areas along the Yarlung Tsangpo (Brahmaputra) where the main farmlands are located. It is estimated that the warming of Tibet will be at twice the average global rate in the twenty first century and this warming will directly affect the extent of glaciers covering the surface and their rate of retreat. Retreat of the glaciers will mean a reduced flow of water into the rivers.

The Himalayas have the world's third largest glacier reserve of 1 trillion cubic meters in an area of 11,000 square kilometers. Data released by the China Meteorological Administration reveals that 82 percent of glacial surfaces on the plateau have retreated and the glacier area has decreased by 4.5 percent in the past 20 years. Some estimates claim that in the past 50

years, 82 percent of the Tibetan plateau's glacier ice has melted. The plateau has lost 10 percent of its permafrost layer in the past decade. More than 15,000 glaciers in the Himalayas show evidence of shrinkage. Some 2,000 Himalayan glaciers have disappeared since 1900. The Asia Society in July 2010 released photographs of Mt Everest taken in 1921 and at the same spot in 2010, which show that the ice mass is 'disappearing' fast. The main Rongbuk Glacier has shrunk and withered.

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Human and construction activity is a major cause of warming. In the past fifteen years the Chinese authorities have focussed on the development of Tibet. This includes operations to exploit the estimated US$ 106.5 billion of mineral deposits, construction projects and building of modern all-weather road and rail networks with the ensuant increase in vehicular traffic and emissions. Construction of the Qinghai-Lhasa railway contributed to warming of the Tibetan Plateau. Rail and road construction activity has damaged the permafrost layer, which protects the underground lakes, in Tibet. Professor Wu Chenghu of the Chinese Academy of Sciences has warned that by 2050 the Tibet Railway could be confronted with major problems due to warming of the Tibetan Plateau. Another official Chinese team reported that some sources of the Yangtze are drying up and the area is turning to desert. Tibet's wetlands and grasslands have already shrunk affecting livestock herders. China's plans envision the construction of 59 airports in and around the Tibet Autonomous Region (TAR). That means there will be dozens of aircraft flying into Tibet, which will release large quantities of nitrogen oxides etc in addition to carbon dioxide into the atmosphere. Carbon dioxide is known to stay aloft keeping heat captured for decades. After the terrorist strike of 9/11 in the US in 2001, when all aircraft throughout the country were grounded for three days, scientists confirmed that the difference in day-time and night-time temperatures had expanded by an entire one degree centigrade. Studies show that temperatures in the vicinity of airports are almost one degree celsius higher than elsewhere. Airports are also proven sources of ground water pollution with hydrocarbons in solution permeating hundreds of metres. Aviation fuel was found to migrate over 700 metres within five months through fissure systems in sandstones. Official Chinese reports publicise that each airport expects to handle at least a million visitors a year. The adverse impact of these millions of visitors on the temperatures and resources of Tibet will be immense. Concerns are accentuated with China's announcement in June 2010 that it will invest US$ 100 billion in twenty three new infrastructure projects in the western regions including Tibet. Investments will be in railways, roads, airports, coal mines, nuclear power stations and power grids, all of which will accelerate warming and impose further stress on Tibet's water sources.

The warming of the Tibetan Plateau and accelerated glacial melt will impact adversely on food production. For each degree celsius rise in temperature above the norm during the growing season, farmers can expect a 10% decline in wheat, rice, and corn yields. Since 1970, the earth's average surface temperature has increased by 0.6 degrees celsius, or roughly 1 degree fahrenheit. And the Intergovernmental Panel on Climate Change (IPCC) projects that the temperature will rise by up to 6 degrees celsius during this century!

Most estimates indicate that global cereal production will barely keep pace with the growth in population by 2025. By then the world's population is expected to touch eight billion. Estimates are that China and India are headed towards becoming net importers of grain. While some optimistic assessments project that both countries will be able to maintain adequate levels of cereal production, in India's case there is the important caveat that this is dependent on good monsoons. Any decline in the flow of the river waters originating in the Tibet region will adversely affect India's food production.

Since 'liberation' China's leaders have accorded importance to food security, but efforts have been hampered by perennial water scarcity. China's surface and near-surface water availability is approximately one-fourth the global average and water resources are distributed unevenly. The north and northwest, where approximately 400 million people, or 30 per cent of the population, reside has more than half the country's arable land but only 7 per cent of its surface water. Under Mao Zedong's directions large scale exploitation of ground water began in the 1960s but this is unsustainable. Underground aquifers are estimated to completely

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disappear in 30- 40 years. While China is attempting to encourage conservation and curb wastage of water, measures like commercially realistic pricing of water are not feasible as it will mean decreased agriculture output and hurt the marginal farmer. It will also undercut the policy of promoting grain production.

In this backdrop China's leadership has been exploring the feasibility of diverting southern river waters to the north and northwest. The late Chairman Mao Zedong, possibly encouraged by the 1200-mile Grand Canal completed in 610 AD, first proposed the idea of the diversion in 1952. His intention was to ease the growing water shortages in the cities of Beijing and Tianjin and the northern provinces of Hebei, Henan and Shandong. One of the possibilities was to divert waters from the Great Bend of the Yarlung Tsangpo, north of the McMahon Line, by building a mega structure. The scheme received fresh impetus with the appointment of Hu Jintao and Wen Jiabao, both hydraulic engineers, as China's President and Premier. It was formally approved by the State Council on August 23, 2002. The project is the brainchild of a senior PLA engineer, Guo Kai, who worked closely with experts from the Chinese Ministry of Water Resources and the Chinese Academy of Sciences. In November 2005, the Great Western Route project got a boost with the publication of a book entitled Save China Through Water From Tibet, written by Li Ling. Indication of high level military support was evident in the foreword of the book, which was written by Zhao Nanqi, Chief of the PLA's General Logistics Department.

Briefly, the three-part US$ 65 billion South-North Water Diversion Scheme envisages transportation across the country of 44 billion cubic metres of water from south to north. The Eastern Route will take water from the lower Yangtze in Jiangsu Province to Tianjin following roughly the route of the Grand Canal and onward to the Shandong Peninsula. The Central Route starts near the Three Gorges Dam in Sichuan and terminates at Beijing.

The Western Route directly affects India and is the most difficult. This will take water from the Yarlung Tsangpo (or Brahmaputra), Dadu, Tongtian and Jinsha rivers (all flowing into the Yangtze) across high mountains and the Qinghai-Tibet Plateau into the Yellow River which, in turn, would carry the water to north China. Work on this segment began this year and is scheduled for completion in 2050. There is talk of a mega construction at the Great Bend just north of where the Brahmaputra enters India. This is the point where the river can be tapped for the maximum hydro-electricity estimated at 40,000 MW. Plans provide for a hydropower plant (38,000 MW) at Motuo and Daduqia, both near the border with India. The alternate route to building the massive dam at Motuo is Daduqia, which does away with the need for big dams by taking advantage of the 2400 meters drop in altitude. The proximity of this location to India is the deterrent. Though Chinese President Hu Jintao officially denied plans to divert the Brahmaputra while meeting Indian Prime Minister Manmohan Singh in Delhi in 2006, there is evidence, including satellite photographs, that construction of dams at various points along the river has started.

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The scheme to either dam, or divert, these rivers emanating from Tibet, which account for 30 per cent of China's entire fresh water supply, will have adverse consequences for the lower riparian nations and possibly China too. China, which has over 90,000 dams, has unrivalled expertise in the construction of huge dams. Nevertheless, constructing dams in the fragile Himalayas and on rivers that provide livelihood and sustenance to millions of people of lower riparian countries is a threatening prospect. The dams will disturb the fragile ecology of the Himalayas and inundate vast areas of the reservoirs submerging a huge variety of vegetation which could emit poisonous methane gasses into the atmosphere. In addition, dams constructed in the Himalayan region will lead to erosion and landslides. They will contribute to silting of rivers impeding inland water transportation, reduce the rivers' water flows impacting adversely on agriculture, submerge estuaries and

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create sandbanks and, finally possibly alter the course of the river. The dams will affect the hydro potential of the lower riparian nations.

Members of the Mekong River Commission held in April 2010, to which China is not a signatory, expressed serious concern at the potentially decreasing water flows. Even Thailand, which is usually careful to avoid offending China, endorsed calls for greater cooperation from China. While the reduced flow in the Mekong, which originates in Tibet, can not all be attributed to the warming in Tibet or glacial melt, that is a major factor as are the eight dams China has planned along the river in southwestern Yunnan province. The Mekong Basin is home to approximately 60 million people and is one of the most productive inland fisheries in the world and agriculture, along with fishing and forestry, employs 85 percent of the people.

Hydropower Projects on the Yarlung Tsangpo (upper reaches of Brahmaputra) in Tibet

Name	Size(MW)				
Bayi	3.1	Jiacha	320	Sangdangla	560
Jaingzi	1.0	Jiexu	n/a	Shali	392
Manla	20	Langzhen	600	Sothang	840
Najin	7.5	Lengda	n/a	Sumdzom	320
Nimaxian	1.26	Motuo	38,000	Yiwong	640
Pulan	n/a	Palong	2760		
Qiangwang	3.2	Zhongda	n/a		
Shequanhe	6.4	Axiangbila	480		
Tanghe	6.4	Daduqia	43,800		
Woka	20	Drakke	632		
Xueka	40	Kanggong	312		
Yanghu	90	Laxiang	408		
Zanda	n/a	Lhari	340		
Zhikong	100	Nyewo	300		
Laohuzui	102	Pome	580		
Pangdou	120	Qudang	420		
Zangmu	510	Sangba	480		

The warming of the Tibetan region, south-north diversion of river waters and construction of dams on the upper reaches of the major rivers flowing down to South and South-East Asia constitute an existential threat to the lower riparian states. In addition to reduced food production and water, the consequences could include unstoppable mass illegal migration.

International law is ambiguous on the subject of the rights of lower riparian states and no treaties exist. Given China's domestic imperatives and determination of its leadership, any move towards international arbitration would be unsuccessful. The lower riparian nations are left with little option other than to raise this issue, which actually has global dimensions, with Beijing. It would be beneficial for each country to individually highlight its concerns. A hint of China's willingness to acknowledge these concerns was evident in the intervention of the Chinese Vice Minister at the Mekong River Commission talks. Another indicator is the access afforded to US academics from the Washington State University to research the Yarlung Tsangpo diversion project. China has also earmarked US$ 66 billion for an environment protection project in the Tibet-Qinghai area. A mechanism could be proposed whereby scientists, climatologists and experts from China and the affected nations together try and tackle China's water related concerns as well as the issue of warming of the Tibetan Plateau in a manner that also safeguards the interests of the lower riparian nations.

India particularly and the other lower riparian states need to simultaneously fast-track their own projects for harnessing, augmenting and conserving domestic water resources and boosting agriculture production. Expert studies need to be quickly initiated to monitor water flows at the points of entry into India of glacier-fed rivers and study data to ascertain the actual extent of damage that could potentially be caused.

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P-284, Arjan Path, Subroto Park, New Delhi 110010
Tel: +91 11 25699130/32, Fax: +91 11 25682533

Editor: Ms Shalini Chawla e-mail: shaluchawla@yahoo.com