China and Brahmaputra – Transport of water or electricity?

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An inadequately researched sensational article by someone interested in investigative journalism appeared recently in the blog page of a well known English daily.[1]

It alleged that China had conducted, on the sly, not one but 3-4 nuclear explosions eight years ago in 2005, for diversion of the Brahmaputra River on its side of the border.

The article was immediately noticed by the reputed Tibet specialist Claude Arpi who called it a 'strange' report and rightly so.

Many of the statements in the report conflict with certain basic facts.

The crux of the article is that Indian intelligence was aware that the explosions took place near the Great Bend in the Brahmaputra at a place called Motuo (also called variously as Medog or Metok) and had also spoken to the Chinese and the US officials. The article claims that the Chinese plan is to build a 200 km canal passing through 'Mount Namcha' for diversion of the river. The article states that according to a draft of the 10th FYP, the diversion of Brahmaputra waters from south to north was to be through three channels in the east, centre and west of China.

A little effort by the author to authenticate his statements would have helped weed out the misleading ones.

First, about diversion of water from the Brahmaputra. As far as is known the Brahmaputra River is not a part of the Chinese South to North Water Transfer Project (SNWTP) scheme at present. An earlier paper (no. 1101) by Prof Deepak of JNU published in C3S in February 2003 contained details of the SNWTP[2].

Although originally mooted by Mao in 1950, the idea of SNWTP has been the subject of discussion for many years. Three paths were considered. The Eastern Path transferring water from the lower reaches of Yangtze to Beijing, Tianjin and some provinces in the north (Jiangsu, Anhui, Shandong and Hebei), the Central Path to transfer water from the middle reaches of Yangtze also to Beijing and Tainjin as well as Henan and Hubei. The Western Path was planned for diversion of water from the upper reaches of Yangtze to the Yellow River. It did not involve the Brahmaputra. Its inclusion at a later date cannot be ruled out.

Work on the Eastern and Central Paths began in earnest about ten years ago and is nearing completion. The Western Path appears to be still in the planning stage presumably because it

[1] http://blogs.timesofindia.indiatimes.com/nandygram/entry/china-conducted-3-4-nuclear-blasts-in-tibet-in-2005-to-divert-brahmaputra
[2] China's Dams in Tibet-Qinghai Plateau: Unwarranted Indian Anxiety by B.R.Deepak, C3S Paper No: 1101 dated February 15, 2013 accessed from http://www.c3sindia.org/india/3438

involves creation of tunnels about 300 km in length through mountainous region and a terrain prone to earthquakes. It could be that presently designs are being evaluated.

But as of now, the plan seems to be to build a series of several dams in the middle reaches of the Brahmaputra to generate power ('Send Western Electricity East Campaign' (Xi Dian Dong Song). It is far easier to transport electricity than water over long distances to the energy hungry north western part of China. The Tibet-Qinghai part of the electricity grid is already in place.

The contract for the first of these dams at Zangmu was given in April 2009 after the Qinghai Tibet railway line was ready a few years before. The railway line enabled transport of construction material and heavy components for the dam. According to one report, as many as twelve dams are now being considered on the Brahmaputra River (out of a possible total of 28) besides several others on its tributaries. The total potential for hydropower generation in Tibet region is estimated to be about 114,000 MW. It includes a massive plant at the Great Bend capable of producing 38,000 MW.

If so many dams are going to be built, it is unlikely that large scale diversion of water from the Brahmaputra can also be accommodated at the same time. Perhaps one should keep a careful watch on whether at some time in the near future China decides to opt for water diversion rather than power generation.

It is the allegation that china conducted nuclear explosions – as many as three to four and as far back as the year 2005 - as part of the diversion project that seems to be based more on a desire for sensation than reality.

It is true that when Peaceful Nuclear Explosions were being promoted by the US, the aim was to utilise them for a variety of applications like stimulation of oil and gas deposits, underground storage for gas and recovery of valuable metals like copper from the ore at great depths. In these applications, the radioactive residue would remain well contained deep below. PNE was also considered as feasible for creation of artificial craters on land for storage of water and excavation of canals over land to connect the seas on either side. In the context of building dams on rivers in mountain valleys, use of nuclear explosives placed at a suitable depth on the hillside was investigated for creation or expansion of the water storage volume while confining the radioactive residue to the region down below where the explosion occurred.[3] An activity of this kind is easily detectable by satellite photography.

What is stated in the report under discussion is that China had used the PNE technology to excavate tunnels. This does not appear to be likely for several reasons. Each underground nuclear explosion would be capable of generating a cavity of only limited dimensions. To dig even a few kilometres of a tunnel made up of overlapping cavities, several explosions would be required. The Western Path of SNWTP envisages about 300 km of tunnels. Besides, the radioactive residue from the shots would be vented to the atmosphere. What remains within the cavities would prohibit entry rendering the tunnel unfit for transporting water for human uses. Moreover, the intense shock pressure of a nuclear explosion, unlike in the chemical variety, could lead to greater geological instability in earthquake prone areas.

[3] Conf – 700101, Proceedings of the Symposium on Engineering with Nuclear Explosives, Las Vegas, USA, Jan 14-16, 1970

As Arpi had noted in his article referred above, in 1996, China may have claimed nuclear explosives as a likely tool for tunnelling through the hillside for a massive dam at the Great Bend of the Brahmaputra. Whether the Government would choose to use it in the present state of heightened public sentiment on environmental issues is a different matter.

The International Monitoring System (IMS) of the Comprehensive Test Ban Treaty Organisation (CTBTO) has established numerous stations all over the world that can detect underground nuclear explosions with considerable success. If China had conducted any for the SNWTP project, they could not have gone undetected. Vented radioactive material that is dispersed can also be detected by the Laboratories of the DAE in India as was done in the case of some Chinese atmospheric tests several decades ago. In effect, it is difficult to maintain secrecy over underground nuclear tests nowadays.

Discussions are continuing among experts about building of a massive 38,000 MW hydroelectric project in the Great Bend of the Brahmaputra. A major challenge for the project is that it entails construction of a tunnel through Mt Namcha Barwa. In all likelihood, this would be undertaken by using conventional techniques rather nuclear explosions. Many tunnels have been constructed in the world with conventional technology. Earlier this year, the 54 km long Gotthard base tunnel for railway traffic was completed after 15 years of hard work. Located 2,000 metres below the Swiss Alps at its maximum, the 10 metre diameter tunnel was excavated mainly by boring machines. Chemical explosives were used for only about 10 km length.

As recently as three years ago, China threw open a 3.3 km long Galong La tunnel to provide road access for the first time to Motuo County near the left bank of the Brahmaputra close to the Indian border[4]. The tunnel located at a height of 3,750 m is not in this County, which is at a much lower height of about 1,200 m. Using conventional engineering methods, the tunneling job was completed in about two years under difficult conditions. According to one report, the tunnel alignment passes through eleven major faults[5]. It is said to be designed to withstand an earthquake of 6.5 Richter magnitude[6]. Motuo County is the potential site for the proposed massive hydel project.

The tunneling activity by the Chinese at the Great Bend eight years ago referred to in the blog article, if true, is apparently different from the Galong La tunnel. If that activity is confirmed, it would most likely have been with chemical explosives. If the work is found to continue, that would provide an indication that China is serious about going ahead with work on the 15 km tunnel through the Mt Namcha Barwa needed for the massive hydroelectric project at this location.

In sum, China may have to choose between diversion of water from the Brahmaputra from the middle reaches and generation of electricity through a series of dams on the river. A

[4] Part of this County appears to be in Arunachal Pradesh. A search for this County in the website of China Foreigner's Guide (http://www.cfguide.com/county/Medog.htm) and a similar search for the adjacent Zayu County draws a blank unlike that for other neighbouring Counties. According to Wikipedia, the two Counties extend into Arunachal Pradesh in India that is claimed by China.

[5] http://tunnelbuilder.com/News/Galong-La-tunnel-holes-through-in-Tibet.aspx

[6] http://www.worldconstructionnetwork.com/news/tibets_medog_county_to_get_its_first_highway_and_tunnel_090429/

decision has perhaps not yet been taken. Whichever may be the option, there is no likelihood of the use of nuclear explosives in its implementation. Even if conventional engineering techniques are used, the Chinese plans would entail unacceptable environmental impact for the region including the countries across the border.