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It could get hotter in Japan thanks to Three Gorges Dam

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As China pours concrete on the Three Gorges Dam across the Yangtze River, a new study suggests that diverting large amounts of water from the Yangtze and Yellow Rivers could trigger a warmer climate around the Sea of Japan, far to the north.

The change, the study projects, would result from altered circulation patterns in the Sea of Japan. The new circulation patterns would be triggered by changes in the surface layer's salt content as less fresh water from the two Chinese rivers reaches the inland sea. In the face of these changes, "we would expect to see far-reaching environmental effects" in the region, says Doron Nof, the Florida State University oceanographer who conducted the study.

The Yellow and Yangtze rivers dump an enormous amount of fresh water into the Pacific - at times, the Yangtze alone delivers 30,000 cubic meters of water each second. That water dilutes the salinity of the Pacific water it meets. Currents sweep this relatively sodium-free mix north, through the Tsushima Strait and into the Sea of Japan. There, the fresher, less-dense water circulates atop warmer, saltier, more dense water that otherwise would ride at the surface.

The layer of fresher water not only holds a lid on sea-surface temperatures, particularly in winter, it also slows and even stops a conveyor belt-like circulation pattern that feeds a vast pool of deep water at the bottom of the Sea of Japan's 3,500-meter-deep basin. Water at the bottom currently measures 50 to 100 years old. This conveyor-like current also helps pull warmer Pacific water into the Sea of Japan.

Shut the Yangtze's spigot by only 10 percent, Dr. Nof calculates, and the salinity of the water entering the Sea of Japan will rise enough to bring the warmer water to the surface, where it can give up its heat to the atmosphere. In addition, the conveyor belt will speed up, drawing more warm, saltier water into the basin. Losing the fresher-water cap "will most likely cause a warming of the atmosphere over Japan," says Nof, whose study appears in the current edition of the Bulletin of the American Meteorological Society. When the dam is finished in 2009 and the Chinese begin to fill it, for six months, the Yangtze will turn from torrent to trickle. "The effects may be dramatic," Nof says.

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