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King Canute Rules Again

In a display of arrogance that is becoming all too typical of the Bush administration, communities lining the banks of the Mississippi are being encouraged to build levees to prevent flooding. It is amusing (if you live in Cleveland and not St. Louis) to perform the back-of-the-envelope calculation that predicts an interesting consequence of this policy.

Annual rainfall in the US averages about 1 m, and the surface area approximates that of a rectangle 5000 km wide and 2000 km tall. Of this 10^{13} m^3 of water, about 40% lands in the Mississippi watershed, from which we might guess that 10% reaches the river, the rest being lost to evaporation. The flow is thus $4 \cdot 10^{11} \text{ m}^3$ per year, or 10^4 m^3 per second. In a river 10 m deep and 300 m wide the water speed is then on average about 3 m/s, or 6 mph - a reasonable number.

The problem arises when we realize that rainfall is not constant, and that a wet month may bring 0.3 m of rain, with evaporation reduced from 90% to 50%. This increases the flow rate by a factor of about 16. What an impressive sight it would be to watch the river rush through Baton Rouge at 96 miles per hour! Professional baseball pitchers could test their fastballs by trying to hit floating objects!

Unfortunately the laws of physics intervene. There is not sufficient gravitational energy in the water to achieve this speed unless the water were made superfluid, a solution that even the Army Corps of Engineers might find difficult to implement. That there will be floods is thus physically unavoidable. Where they will occur will just be a question of who cannot afford to build a levee as high as their neighbor's. What a beautifully free-market solution to an environmental problem!

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