

gation of a wave diminishes with the depth of water. The consequence of this mechanical law is, that the first waves of the flux, being retarded in their march on their entrance into comparatively shallow water, must necessarily accumulate and be overwhelmed by the following billows, which move in deeper water ; that these, in their turn, will be driven forward by their successors ; and that this process will continue until it forms a kind of mountain which rotates upon its own axis, and pours itself in a cataract over the deeper portions.

M. Partiot, an engineer charged with the superintendence of the navigation of the Seine, addressed a paper, in 1857, to the *Académie des Sciences*, which contained an elaborate account of this phenomenon, and of his observations extending over a long series of years.*

M. Partiot had carefully studied two "mascarets ;" one in the bay of the Seine, at Saint-Jacques, the other in the embanked portion of the river, near the village of Vieux-Pont. At these two points he had fixed, close to the land, his metrical standards, and was thus enabled to measure the height of the billow which formed the "mascaret."

At Saint-Jacques he found it to be about 70 inches, and at Vieux-Pont 54 inches.

M. Partiot has also put on record a series of figures which represent the different aspects of the "bore" above and below Quillebœuf. At the points where the channel of the river is deep, the phenomenon is only perceptible on the borders along the dikes. This agrees with what has been observed by seamen navigating the Amazons river and the arms of the Gauges ; and, in fact, ships sailing in deep water, in the mid-channel of the river, do not suffer from the *prororoca* or *bore*, though it overwhelms the vessels moored in shore or stationed in shallow water.

The ingenious writer concludes from his observations that, to remove the obstacle of the "mascaret" at the mouth of rivers, we must facilitate as much as possible the entrance of the rising tide, and clear away all the obstacles which oppose it. These are, in general, mud, sand-banks, and shoals ; so that the works designed to improve the mouths of rivers and to ensure a sufficient depth, would necessarily have the effect also of diminishing the "mascaret" on their banks, and putting an end to the danger which this phenomenon presents for navigation.

However, it would be impossible to secure for a river the same depth of water from its mouth to its source. Indeed, it must not be supposed that by dredging the bed of a river at its mouth we *suppress* the "mascaret ;" we only displace it, remove it to a higher point, and turn aside its violence. The great works which have enclosed the channel of the river, above and below Quillebœuf, prevent the obstruction of the waves in that locality, but the "mascaret" is carried onward to Villequier, Caudebec, Aizier, and Tancarville. The dikes erected at Villequier, by M. Emery, have defied until now the attacks of the flood, and it is hoped they will also suffice to protect the place from the ravages of the "mascaret," which had ended in sweeping away one-half the town.

Certain rivers have no mouths. They lose themselves in vast

* Figuier, *Année Scientifique et Industrielle*, 3^e année, p. 121.