

towards the source. It may be stated, as a general law, that the effect of the "bore" is more energetic on the margin than in the centre of rivers.

The three great rivers which pour their waters into inland seas—the Nile, the Danube, and the Volga—are not affected by this phenomenon, because the Mediterranean, the Euxine, and the Caspian have no perceptible tides. They may therefore be designated essentially *continental rivers*.

The reader will permit us, perhaps, to dwell a little more in detail on this curious phenomenon of the reflux of the tides at the embouchure of rivers, and particularly as it is manifested in the Seine.

The arrival of the ocean-tide in the lower Seine causes a tumult of waters which, picturesque as it appears to the spectator, is unfortunately attended with disastrous consequences to the farms and pastures along the river-banks, and to vessels lying at anchor where the reflux occurs. One may still see, between Quillebœuf and Villequier, the masts of numerous ships engulfed by the furious rush of the waters. To guard against these accidents, the French Government has constructed, below Quillebœuf, considerable works to check the action of the ocean-tide; but from this point to Caudebec it still exercises its ravages, although in a lesser degree than formerly. It is at Caudebec, or, better still, at Villequier, that this imposing phenomenon can now be most thoroughly investigated.

While the tides of ocean move forward by imperceptible degrees, and rise but slowly, you may see from your station on the bank the advanced-guard of the waters arrive in the bed of the Seine in the guise of a rolling wave, whose height frequently exceeds that of the dikes erected to confine it, and which instantaneously fills the vast basin of the river—a basin enlarged, at Quillebœuf, into a veritable arm of the sea. Deafening noises announce these grand crises. They are favoured by a moderate sea-breeze; but a violent wind, on the contrary, scatters abroad the billows, and diminishes their height.

The "mascaret" of the Seine was not described or studied until long after Condamine, by his impressive relation, had made known the *prororoca* of the Amazons. Bernardin de St. Pierre was the first to mention it. According to the mythological style which in his day was in vogue, he compares the Seine to a nymph pursued by Neptune.

It is at the epochs of the spring and autumnal equinoxes, and on the second day after new or full moon, that the "mascaret" displays the greatest energy. It is still more formidable a day or two before and after either of these epochs.

But what is the true cause of the extraordinary elevation of the waves which thus precipitate themselves into the basin of a river, and drive back the current towards its source? We must look for it in the law discovered by Lagrange, and recently confirmed by the experiments of Mr. Scott Russell, that the rate of propa-