

is the principal determining factor in its contour on plan. A sluggish stream of slight gradient will be found to follow a devious course, winding across the tract of country with many bends and pools. The degree of straightness in the course of a stream is an index of its velocity and of the tenacity of the soil through which it flows to resist the impact of water. Under normal conditions a river is perpetually subject to change of contour, due to land freshets or extreme tidal movements, which erode the banks or bed of its stream irregularly. Approximate stabilization of a river is usually brought about by the prolonged action of natural forces. The effect of such action is a mean sectional area in the river bed, which, being protected by the accretion of detrital matter, results in slopes of repose such that the banks are capable of resisting abnormal tidal impact. The curvatures in the course of a river are due to the force of gravitation acting on the inclined plane of the surface of the stream. The measure of the force is represented by the formula $g \times \sin i$, i being the inclination of the surface of the channel in degrees.

$$\sin i = \frac{h}{l} \text{ or } \frac{\text{height fallen}}{\text{length under observation}}.$$

Artificial Cuts.—From the fact that the natural course of a river is curvilinear may be deduced the inference that artificial rectilinear cuts should be avoided. Works for the amelioration of a deep river channel are, as a rule, more effective if, instead of endeavouring to cut a straight course, flat curves are employed. From London Bridge to the sea bends in the course of the Thames occur approximately every two miles. At Blackwall the river is about 1000 feet wide, and its curvature has a radius of about 1900 feet.

In the instances in which it has been attempted to abolish curvature in the channel of a river, the shoaling, which inevitably takes place, tends to become irregular and produce a tortuous waterway. The fairway of a river under such conditions oscillates, to the detriment of navigation. The art of remoulding the tidal compartment of a river presupposes float observations spread over a considerable period. From these