

PATTERN FORMATION OF HEAVY METAL DEPOSITION AND RELATED HYDRODYNAMICS IN A RIVER BASIN - A CASE STUDY OF THE SUBARNAREKHA RIVER, EASTERN INDIA

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A number of heavy metals are observed in the Subarnarekha river sediments. The pattern of the said metal distribution curves shows periodicity, expressed by the sinusoidal nature of the curvatures. The periodic behavior results from the Hopf bifurcation phenomenon. Hopf bifurcation, in this case, describes a sub-critical bifurcation with sudden jumps in behavior indicating instabilities in fluid flow. Such bifurcations occur where the unstable cycle shrinks to zero amplitude and engulfs the origin (the stable point when the flow dynamics is laminar) rendering it unstable. The periodic bifurcation orbits appear to be thrown off from the origin. The distribution pattern of the heavy metals in the Subarnarekha river sediments is quite similar to those in different rivers in various parts of the world (published data have been critically analyzed). Interestingly, the distribution pattern of individual metals exposes a distinctive character, which may change as the specifics of the river system change.
