Industrial pollution has been an increasing problem over recent decades and identifying the degree and extent of pollution in sediments by heavy industries has become an important subject of investigation. Environmental magnetism provides a potential approach for the rapid detection and monitoring of industrial inputs. To test the efficiency of magnetic methods for such a purpose, a Chinese city (Loudi, Hunan Province) with a fast developing steel industry has been studied. In this investigation, we have systematically collected sediment samples along the Lianshui River from the upstream section before it enters the city and on the downstream region after it exits the city area. These samples were comprehensively investigated by integrating both magnetic and non-magnetic methods (X-ray, SEM, and chemical analyses). The results are as follows:

1. Magnetic enhancement in river sediments is found to be related to the presence of spherical magnetite particles with a diameter of 9~140 µm, and some irregular non-spherical magnetic particles, originating from anthropogenic activities.

2. Elevated magnetic susceptibility and SIRM value-correlations with higher heavy metal (Fe, Pb, Zn, Cu and Cd etc) in the vicinity of the Fe-smelting plant and the city region proved to be powerful indicators of the anthropogenic contribution in the river sediments.

3. The Tomlinson pollution load index of anthropogenically-contributed heavy metals Fe, V, Cr, Mo, Zn, Pb, Cd and Cu (PLI_{anthro}) shows a straight linear correlation with Log(SIRM).

These findings demonstrate that magnetic methods have a convenient practical application for detecting and mapping pollution around modern industrial cities.