The rapid development of industrialization, urbanization, and agricultural intensification in China are impeding water environmental quality in many aspects (Zhou et al. 2017). Among them, the receptor model method is especially popular in recent studies, which can identify and quantify possible pollution sources based on the chemical composition ofreceptorsites (Haji Gholizadehet al. 2016). As an important receptor model, the multiple linear regression of absolute principal component scores (MLR–APCS) has been successfully applied to quantify trace metal sources in various environmental medium including road dusts, soils, and sediments (Zhou et al. 2007; Luo et al. 2015; Shi and Lu 2018). By using multivariate statistical analyses, such as principal component analysis, correlation matrix, and cluster analysis, certain studies further revealed that the accumulation of trace metals in river sediments often had a close association with watershed agricultural development (Tang et al. 2010; Islam et al. 2018). This is particularly true for a hilly agricultural watershed, where the soil erosion is serious due to frequent tillage, and the river sediment components can be considered on average as representative of trace metals in watershed soils they originate from (Jiao et al. 2015). To some extent, the anthropogenic sources identification can be more reliable from evaluating the excessive or incremental concentrations of trace metals compared with the total concentrations of them (Yang et al. 2017; Huang et al. 2018). Finally, anthropogenic source samples were collected and subjected to Pb isotopic analysis, which could verify the results obtained by EF and MLR–APCS mode ChinaFirstly, EF values were calculated to determine the excessive concentrations of trace metals in the river sediments, and their overall anthropogenic contributions were obtained. In general, it is a challenging work to identify the various anthropogenic sources of trace metals in environment since they may vary greatly at different spatial scales (Lv and Wang 2018). In terms of quantitative source identification, existing methods include enrichment factor (EF), Pb stable isotopes and receptor models. River sediments are considered to be good indictors for watershed monitoring purpose, which could help to assess possible environmental changes and anthropogenic impacts at the watershed scale (Resongles et al. 2014).