

# Environmental impact analysis of anthropogenic mercury releases in China

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## Objective

To develop a current national anthropogenic mercury inventory to estimate the mercury input by each source category, to clarify the distribution pathway to different environmental media, also to analyze environmental impact from the releases of mercury are needed.

## Materials & Methods

By considering studies conducted by the UNEP and China, categories of mercury releases can be identified to five categories and 61 sub-source categories. The input of mercury and the potential mercury distribution into the environment and its intermediate pathways in the year 2017 can be calculated as follows:

$$I_{Hg,c} = ARD_c * IF_c, \quad (1) \quad TR_{Hg \rightarrow i} = \left\langle \sum_{i=(1)}^{(5)} \sum_{c=1}^{61} \sum_{j=0}^5 [I_{Hg,c} * \partial_j * DF_{c,j \rightarrow i}] \mid \sum_{j=0}^5 \partial_j = 100\% \right\rangle, \quad (2)$$

$I_{Hg,c}$ : the input of mercury by category  $C$ ;  $ARD$ : activity rate data;  $IF$ : input factor;  $TR_{Hg,t \rightarrow i}$ : the potential mercury distribution into different media  $i$ , including (1) Air, (2) Water, (3) Land, (4) Stock, (5) Stabilization;  $DF$ : distribution factor;  $\partial_j$  represents the different output scenario ( $OS$ )  $j$ . The  $OS$  includes six levels as from level 0 to level 5 which indicate the worst to the best treatment technologies, respectively for each sub source categories.

The distribution model which can be divided into the two steps, named initial distribution step (step 1) and re-distribution step (step 2) for the overall distribution. The SimaPro (version 9.0.0) has been used for environmental impact analysis. The ReCiPe Endpoint (H) V1.13 was applied for the explanation of results.

## Results & Discussion

The total amount of mercury releases into environmental and intermediate media is estimated to be 2,923 tons in 2017. From environmental point of view, the environmental impact on ecosystem diversity and human health from mercury releases in 2017 under step 1 is evaluated as 6.18 MPt (eco point), and those impact from mercury releases in 2017 under step 2 is evaluated as 0.059 MPt. In both steps, the impact on human health is larger than that impact on ecosystem diversity (Fig.1).

## Conclusion

In this study, a quantitative information regarding mercury releases and environmental impacts were provided as a basis for implementing strategic mercury management policies in China.

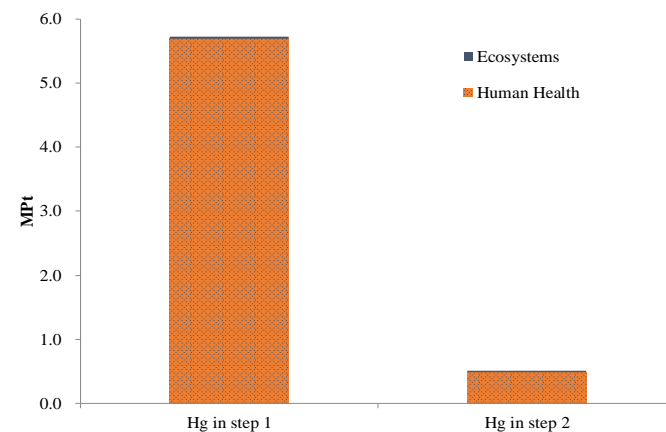


Fig. 1 Environmental impact of anthropogenic mercury releases in 2017