



# **Mercury pollution in India: Emissions, current data and future plans**

September 10, 2013

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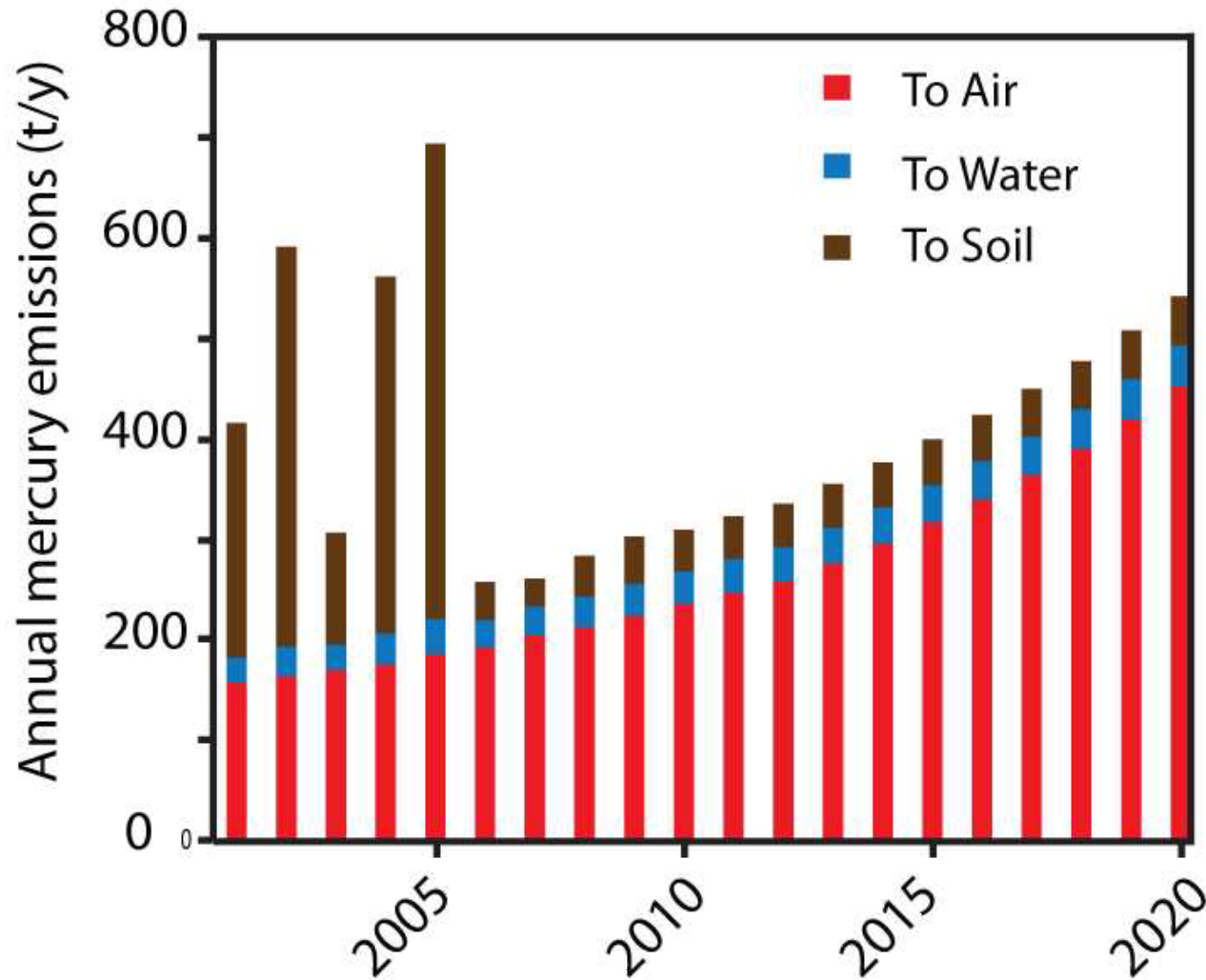
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# India

- Major mercury emitter
  - Increased energy demands. = more coal
  - Increased metal production
  - Consumer products: health care, personal, household and electronic goods



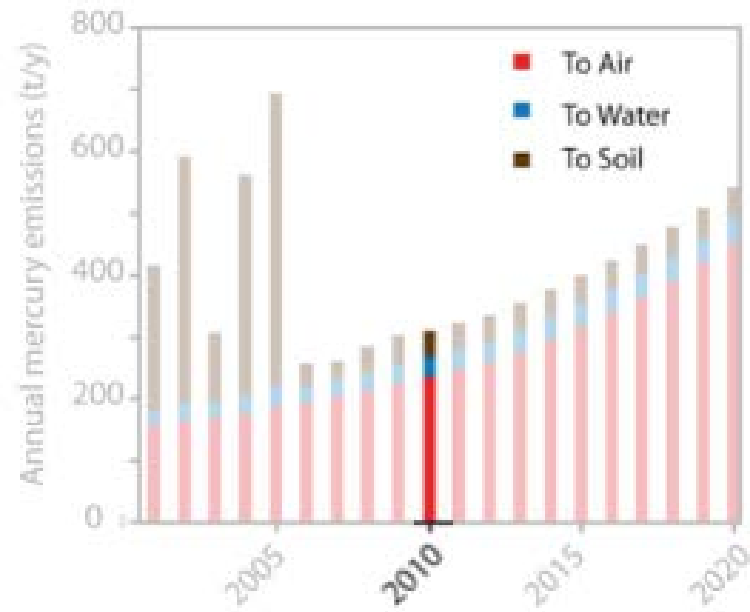
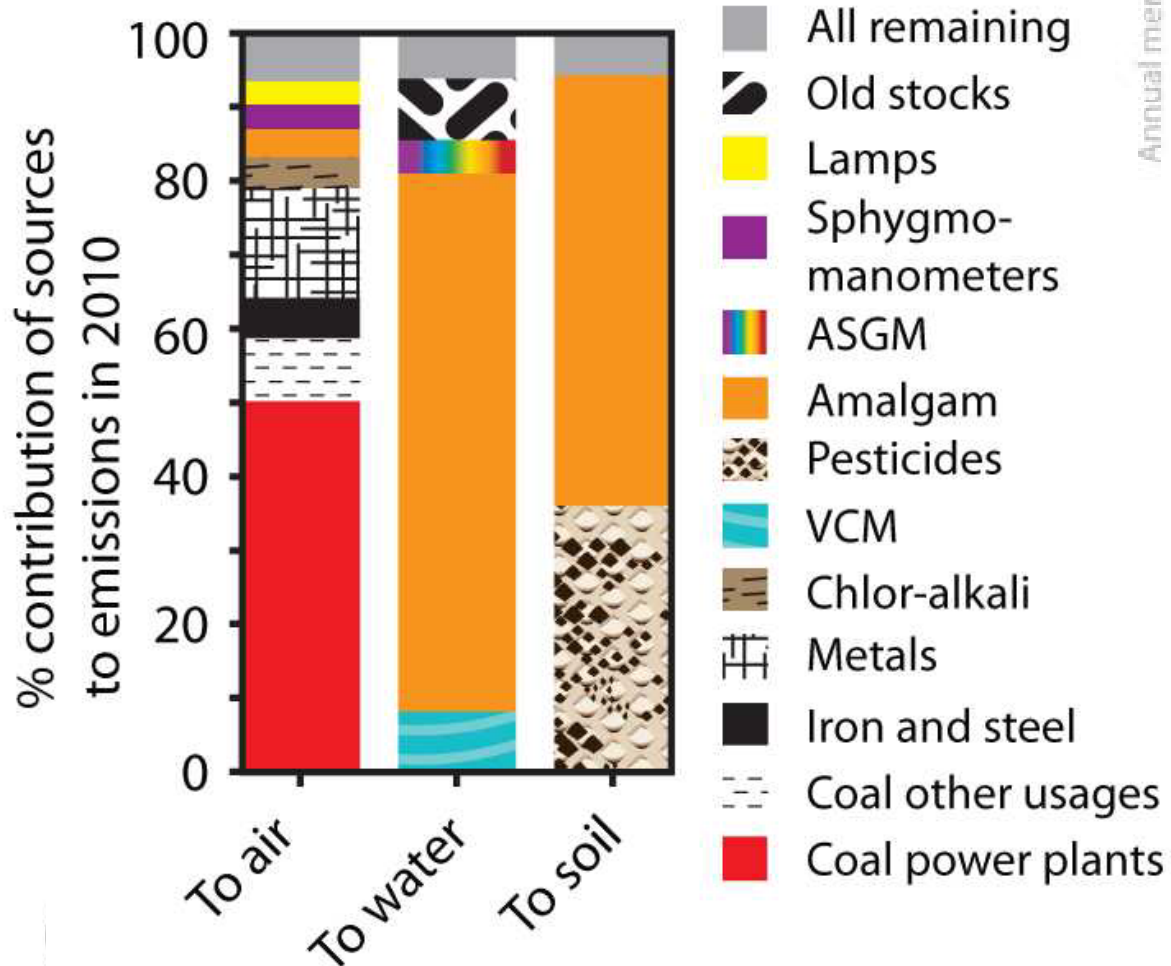
# Emissions projections



(estimates from a material flow analysis)



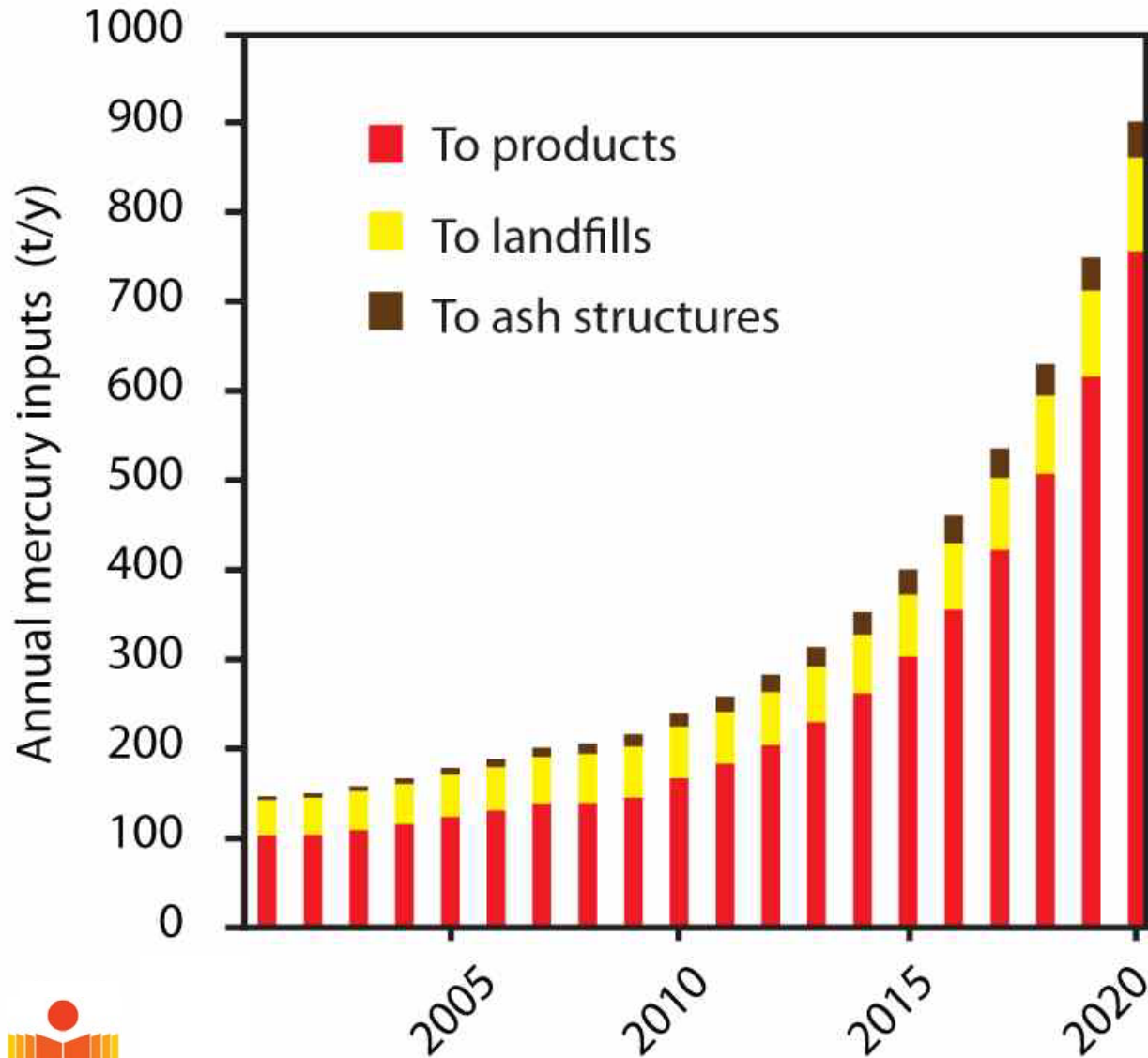
# Major sources



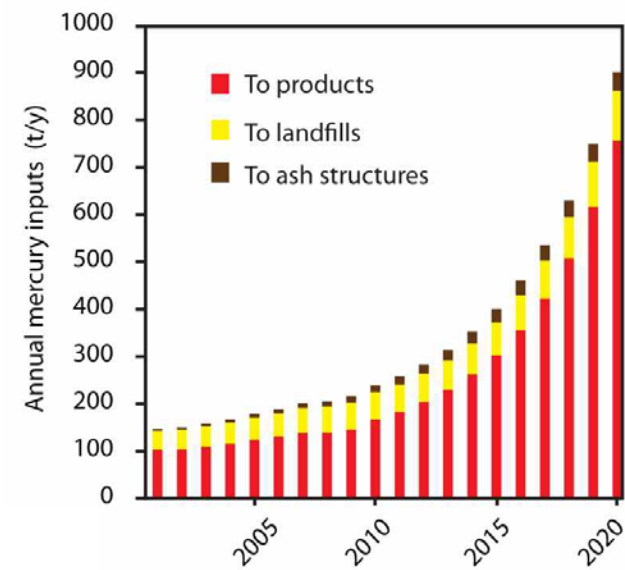
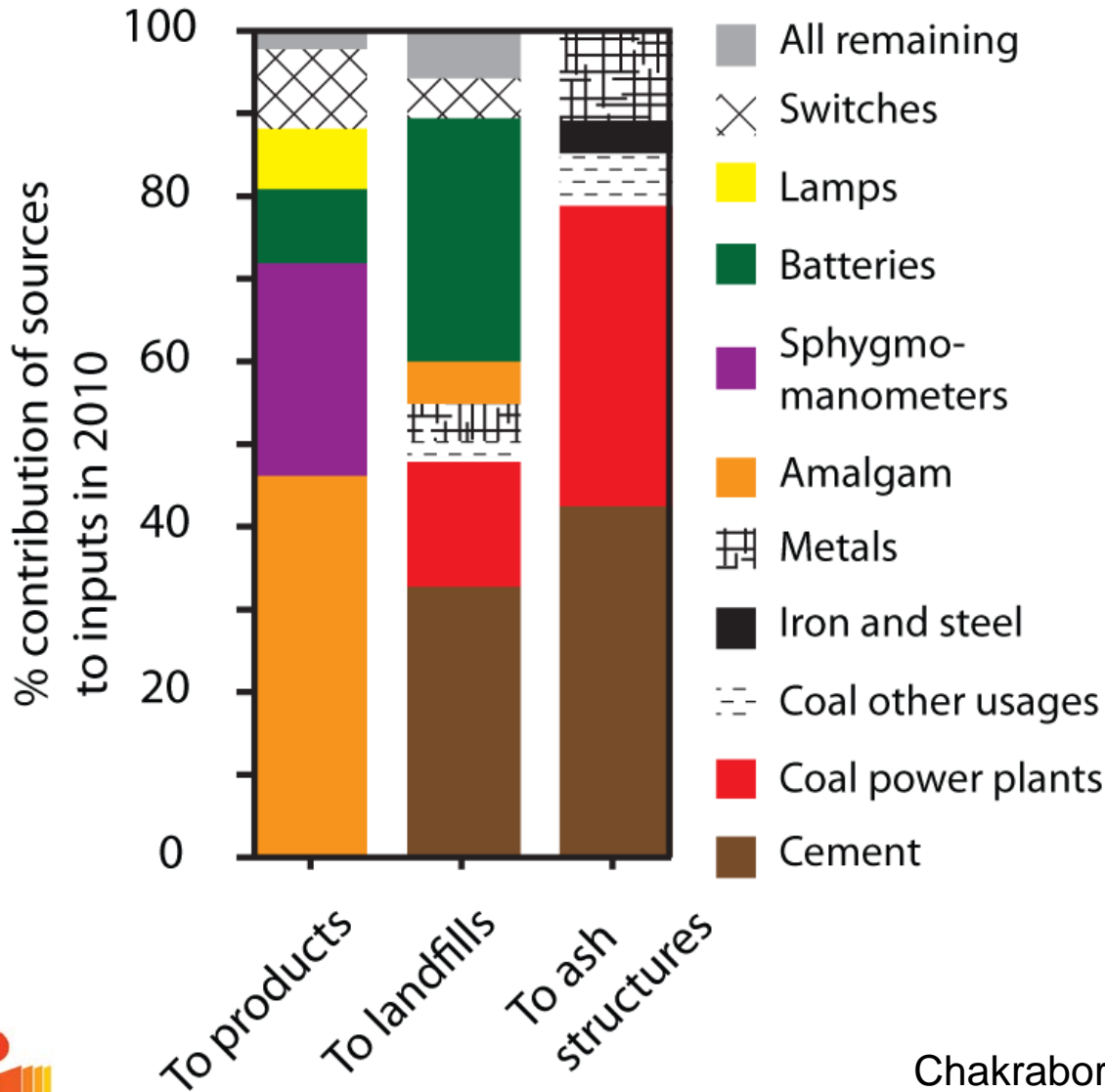
**Note: large uncertainties exist**



# Mercury in stocks



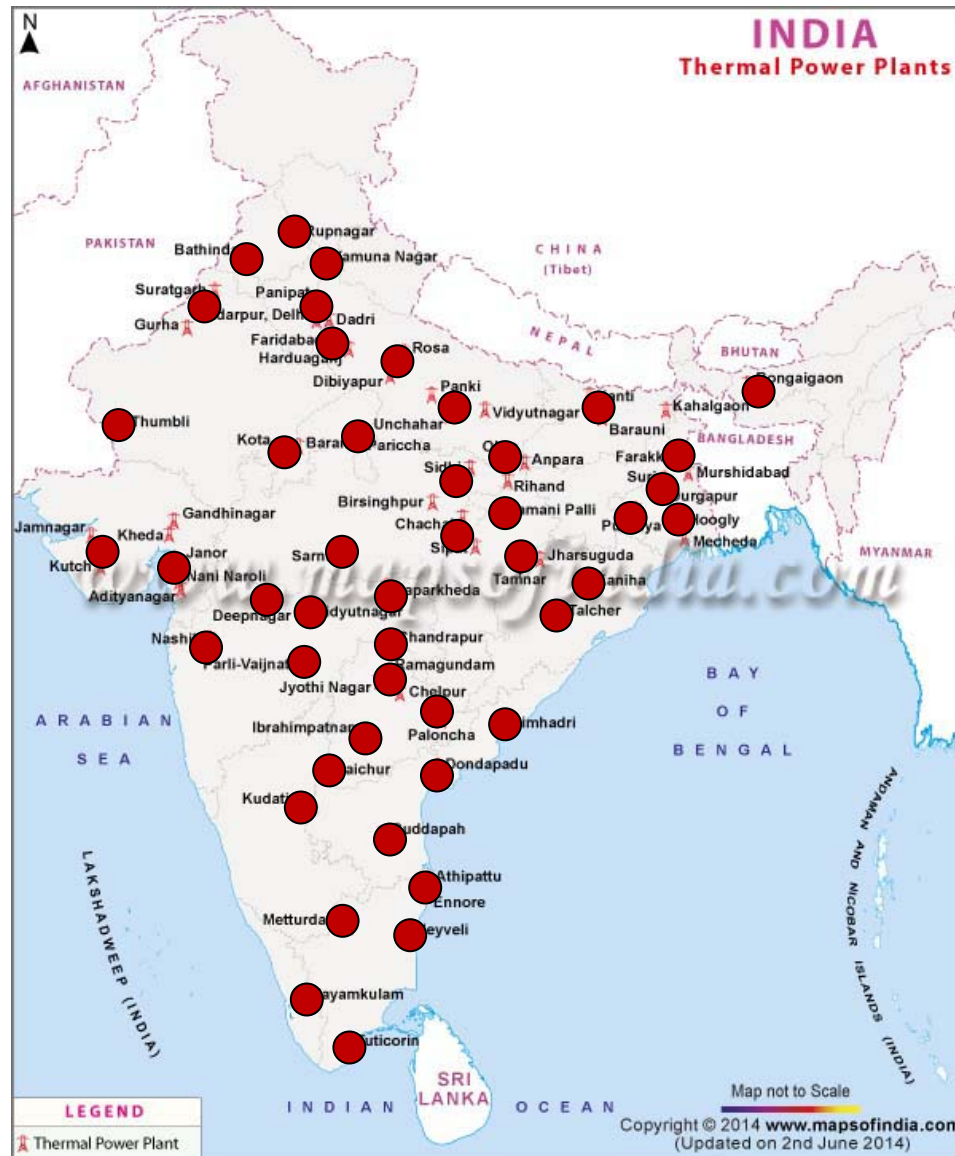
# Mercury in stocks



Chakraborty et al. (2013) *Environ. Sci. Technol.*, 47,8105-8113.

# Possible mercury emission locations

## Thermal plants



<http://www.mapsofindia.com/maps/india/thermalpowerplants.htm>





# Possible mercury emission locations

## Zinc mines



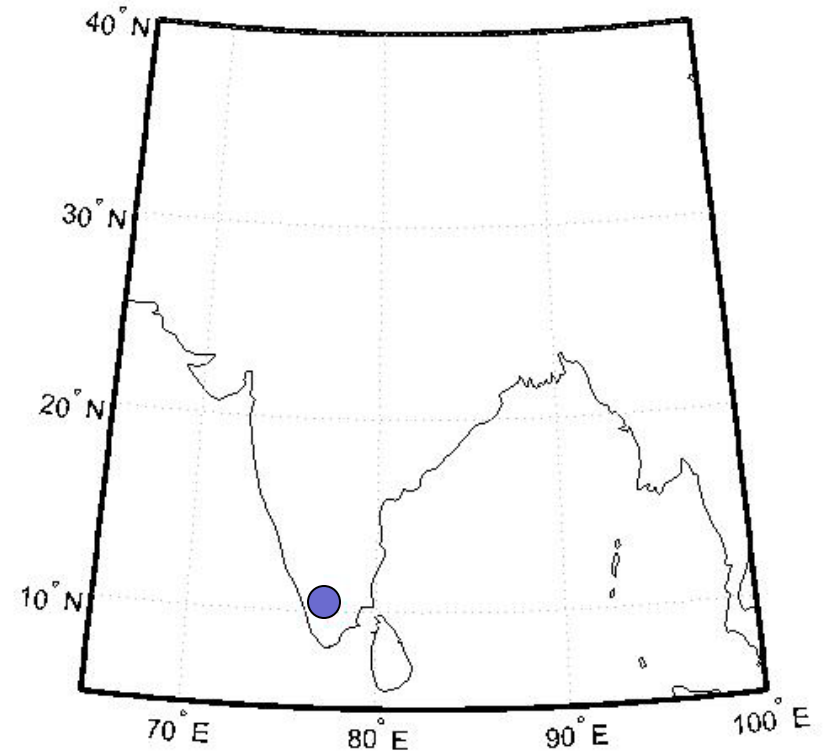
## Steel plants





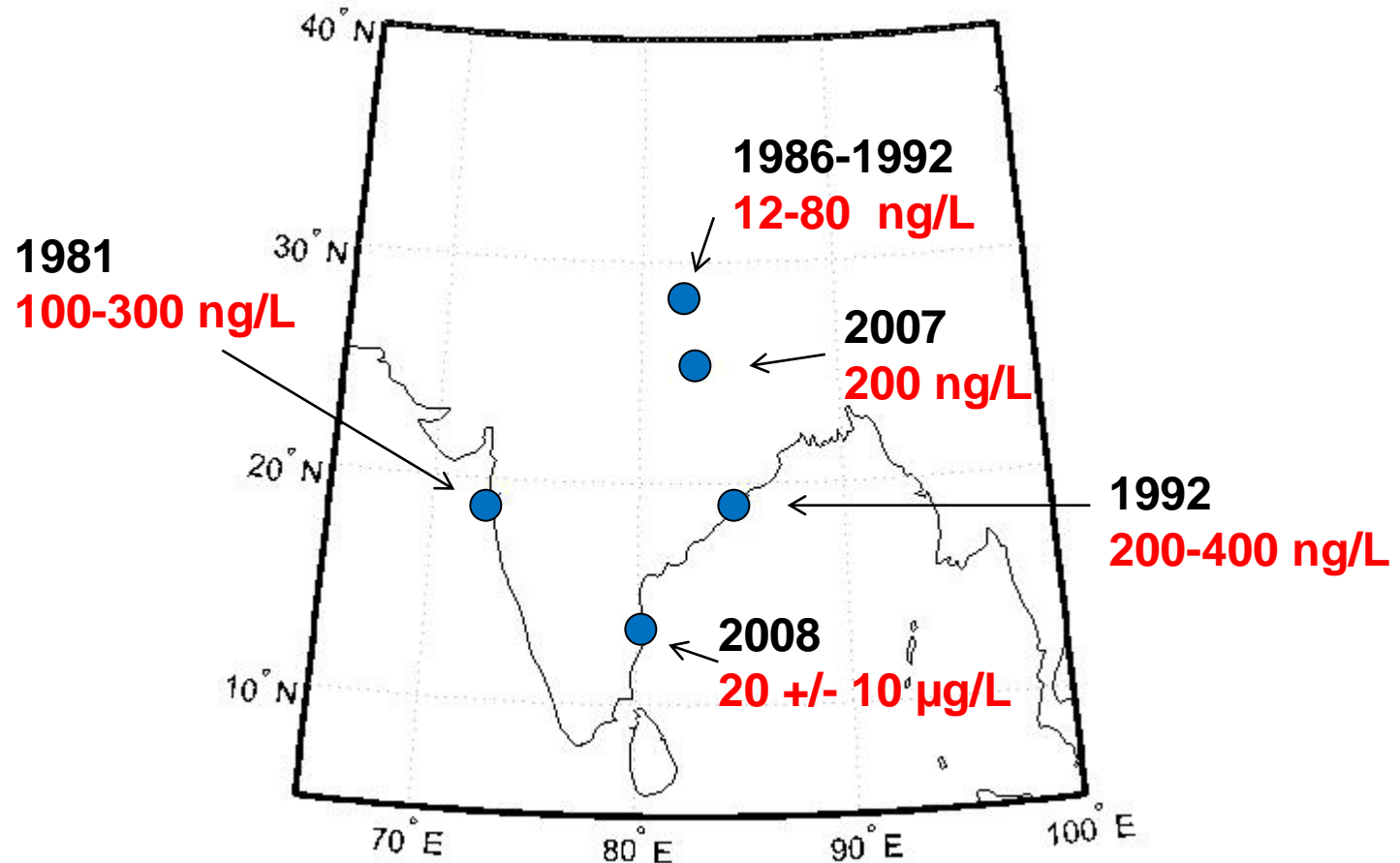
# Mercury in environmental media: current

- Air:
  - Appears one site only (GMOS) ●



# Mercury in environmental media: current

- Air:
- Water ●



# Mercury in environmental media: current

- Air
- Water
- Fish ●

Prevention of Food Adulteration Act (1954)

THg: 0.5  $\mu\text{g/g}$  ww

MeHg: 0.25  $\mu\text{g/g}$  ww

USEPA: 0.3  $\mu\text{g/g}$  alarming

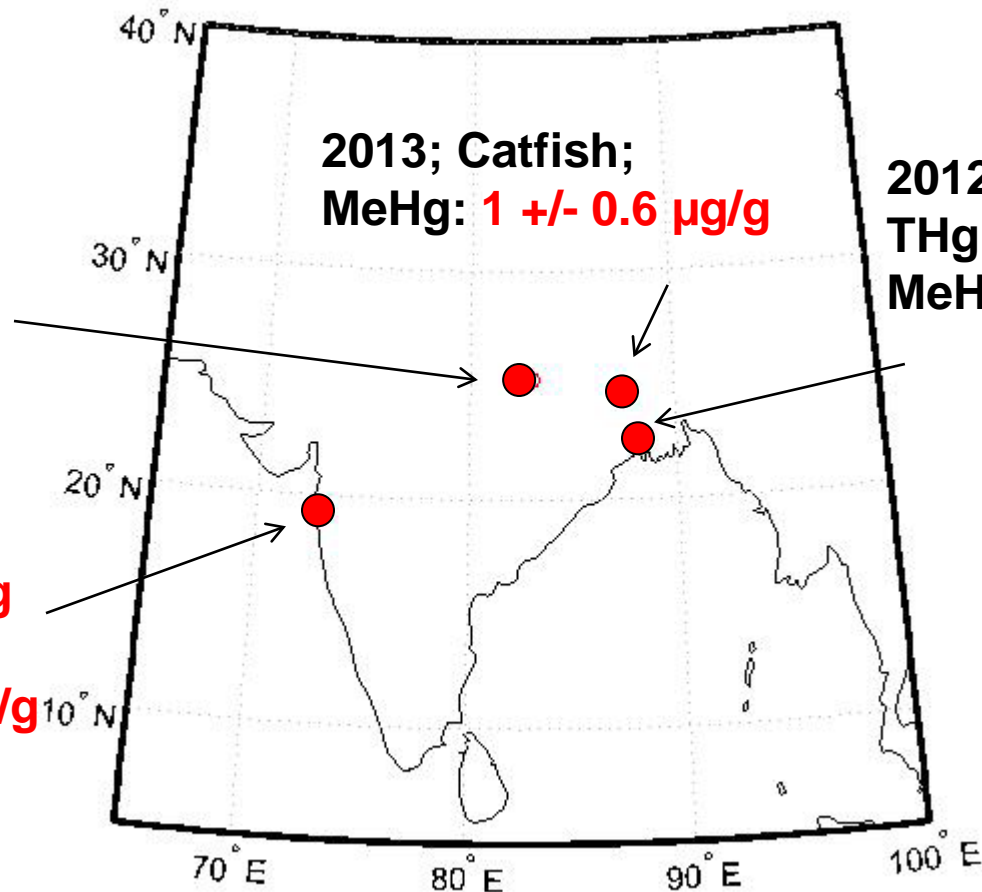
2007; Various;  
THg: 0 – 4.0  $\mu\text{g/g}$

1981; Various;  
THg: 0.5 – 3.0  $\mu\text{g/g}$

1997; Various;  
THg: 0.02 – 0.3  $\mu\text{g/g}$

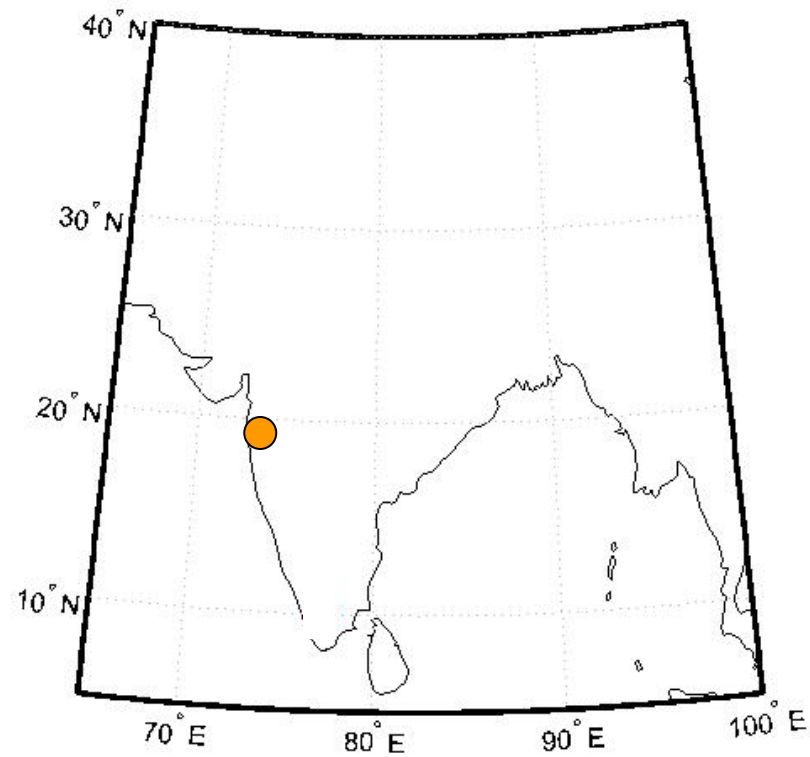
2013; Catfish;  
MeHg: 1 +/- 0.6  $\mu\text{g/g}$

2012; Various;  
THg: BDL – 2.5  $\mu\text{g/g}$   
MeHg: BDL – 1.5  $\mu\text{g/g}$



# Mercury in humans

- Air:
- Water
- Fish
- Human ●



- ❖ 6-12 fish meals per week
- ❖ THg in Hair: **5 – 9  $\mu\text{g/g}$  on average**
- ❖ 20-30% people in some areas have **> 10  $\mu\text{g/g}$**



# Next: Measure and Model

- Air monitoring: urban & rural ● TGM only
- Biota: coastal ●
- Human ●
  - Priority groups
- Environment: soil, sediments, water ●
- Obtain system understanding

