

# The Global Alliance to Eliminate Lead Paint (Lead Paint Alliance)

## Health, Environment and Economic Impacts

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# Module B.ii.

## Environmental Impact of Lead



# Outline

- Sources of Lead Releases
- Environmental Transport of Lead
- Impacts on the Ecosystem
- Impacts to Organisms
- Summary

# Sources of Lead Releases

- Natural (volcanic, weathering of rocks)
- Anthropogenic Sources
  - Mobilization of lead in raw materials such as fossil fuels and other extracted and treated ores and metals
  - Releases during the manufacture, use and disposal of products using lead (e.g. paint, batteries, toys)
  - Direct releases from to soil and aquatic environments
  - Prior to removal from gasoline, previously leaded gasoline provided a significant source of lead

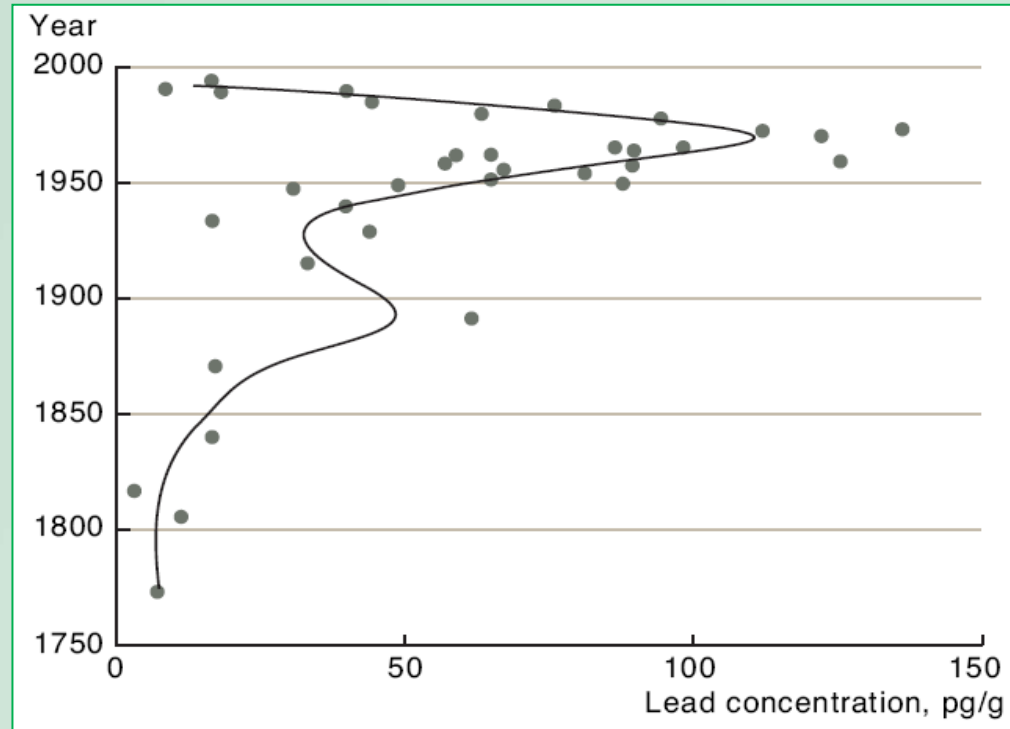
# Environmental Transport of Lead

- It is mainly emitted to the atmosphere in particle form
- Rivers and oceans are also transport media. The oceanic residence time of lead ranges from about 100 to 1,000 years
- In surface waters, residence times of biological particles containing lead have been estimated at up to two years
- Although lead is not very mobile in soil, lead may enter surface waters as a result of the erosion of lead-containing soil particles and the dumping of waste containing lead products



# Environmental Transport of Lead

- Global industrialisation has increased the release of lead
- Lead concentrations found in Greenland ice core samples increased as countries have industrialised
- Emission controls and removal of lead from gasoline in most countries have contributed to a more recent fall in lead content of Greenland ice



# Impacts on the Ecosystem

- Terrestrial exposure to lead is greatest near point sources (e.g. smelters)
- Secondary poisoning has been documented especially for predators feeding on contaminated animals
- In all studied animals, lead has been shown to cause adverse effects in several organs and organ systems (blood, central nervous, kidney, reproductive and immune)
- Plants absorb lead from the soil and retain most of the lead in their roots
- Aquatic exposure to lead is strongly dependent on environmental conditions (pH, salinity, etc.)



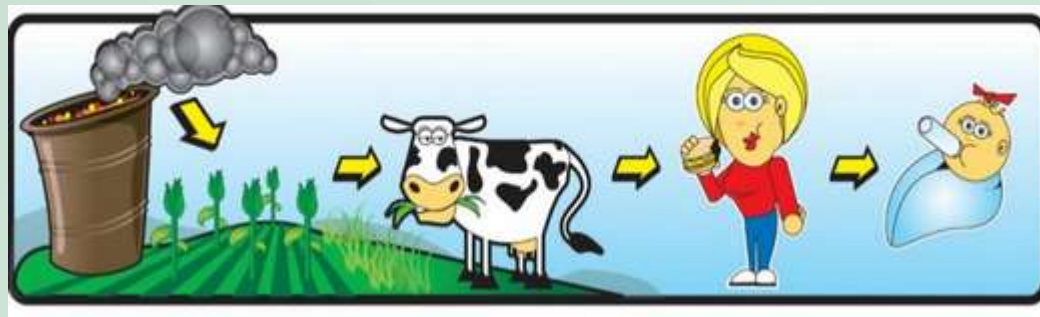
# Impacts on Organisms

- Lead contamination to birds from shots and sinkers can be toxic
- Ingestion of lead-contaminated bacteria and fungi by nematodes can cause impaired reproduction
- Effects on micro-organisms from soil with lead concentrations as low as 10 mg/kg
- Young fish are more susceptible to lead than adults. Exposure can lead to spinal deformity and blackening of the skin in the caudal region (black tail)



# Bioaccumulation

- Lead is known to bioaccumulate in organisms, in particular in biota feeding primarily on particulate matter.
- Biomagnification of inorganic lead in the aquatic food chain is not apparent, as the levels of lead, as well as the bioaccumulation factors, decrease as the trophic level rises. This is partly explained by the fact that in vertebrates, lead is mainly stored in bone, which reduces the risk of lead transmission to other organisms in the food chain.



# Summary

- Lead is released by various natural and anthropogenic sources to the atmosphere and to aquatic and terrestrial environments
- Lead can be readily transported through the air and water
- Lead is toxic and can have effects on both terrestrial and aquatic organisms

# References

B.ii.1. UNEP. Final review of scientific information on lead (2010).  
[http://www.unep.org/chemicalsandwaste/Portals/9/Lead\\_Cadmium/docs/Interim\\_reviews/UNEP\\_GC26\\_INF\\_11\\_Add\\_1\\_Final\\_UNEP\\_Lead\\_review\\_and\\_appendix\\_Dec\\_2010.pdf](http://www.unep.org/chemicalsandwaste/Portals/9/Lead_Cadmium/docs/Interim_reviews/UNEP_GC26_INF_11_Add_1_Final_UNEP_Lead_review_and_appendix_Dec_2010.pdf)



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