International Regulations and Supply Chains: The Case of Mercury

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Why is mercury a problem?

Atmospheric transport and deposition leads to high fish methylmercury

Health risks to consumers of fish (neurological effects, particularly in offspring of exposed pregnant women, and cardiovascular impacts)

Particular concern in the Arctic environment due to contamination of traditional foods

Local impacts in gold mining communities

300,000+ newborns in the US each year at risk of learning disabilities due to elevated mercury exposure

Arctic mercury levels have increased by an order of magnitude

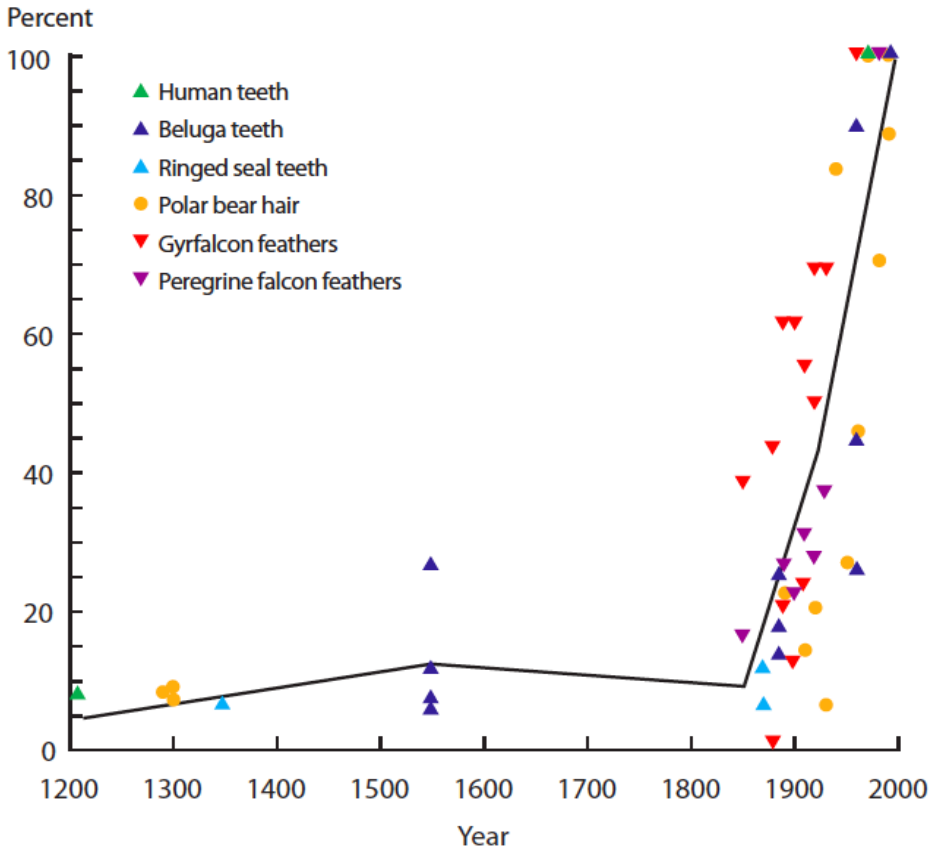
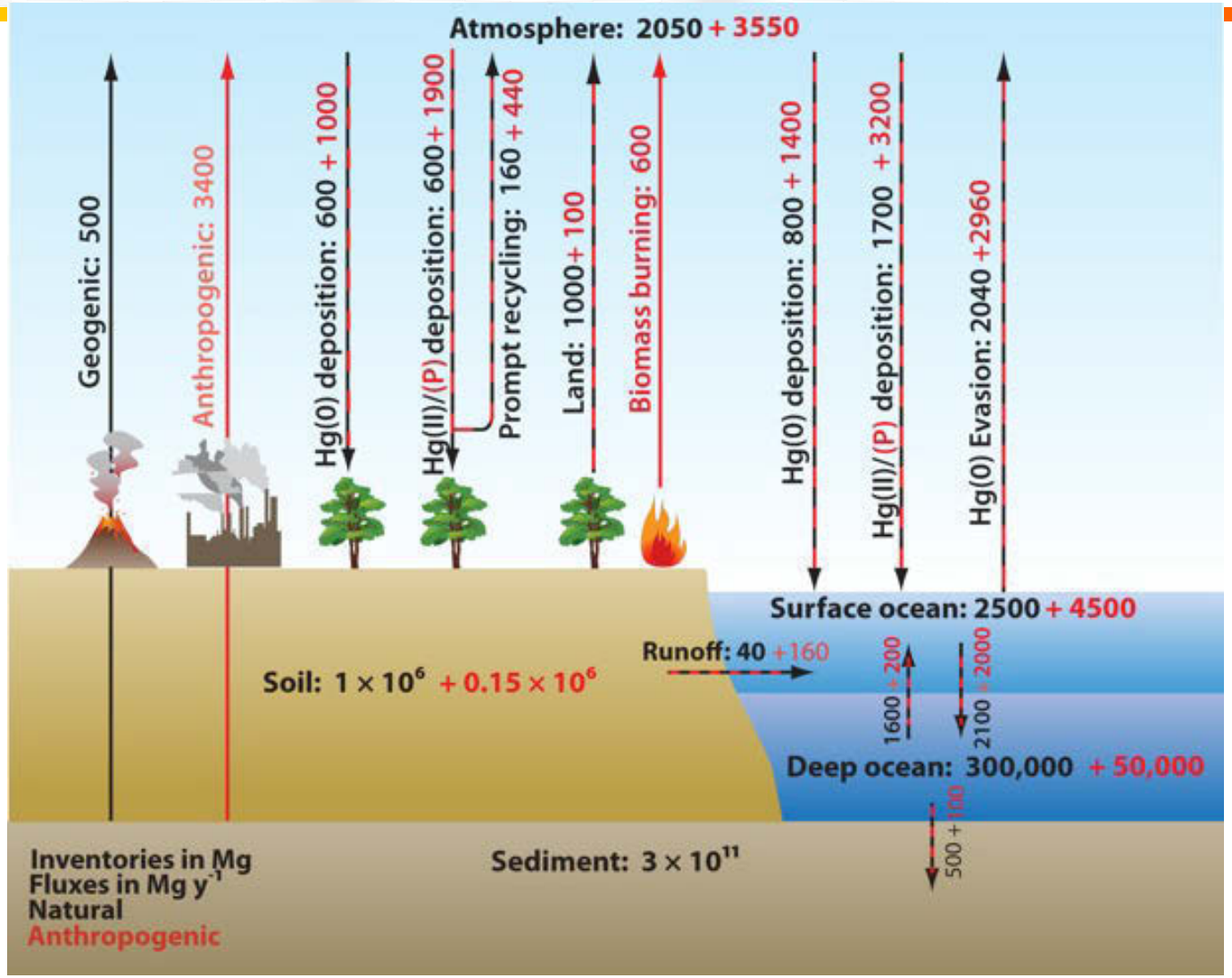


Figure 5.1 in AMAP Assessment 2011: Mercury in the Arctic. Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway. pp. xiv + 193. Courtesy of AMAP. Used with permission.

Arctic Monitoring and Assessment Programme, 2011

Mercury cycles in the environment for decades to centuries

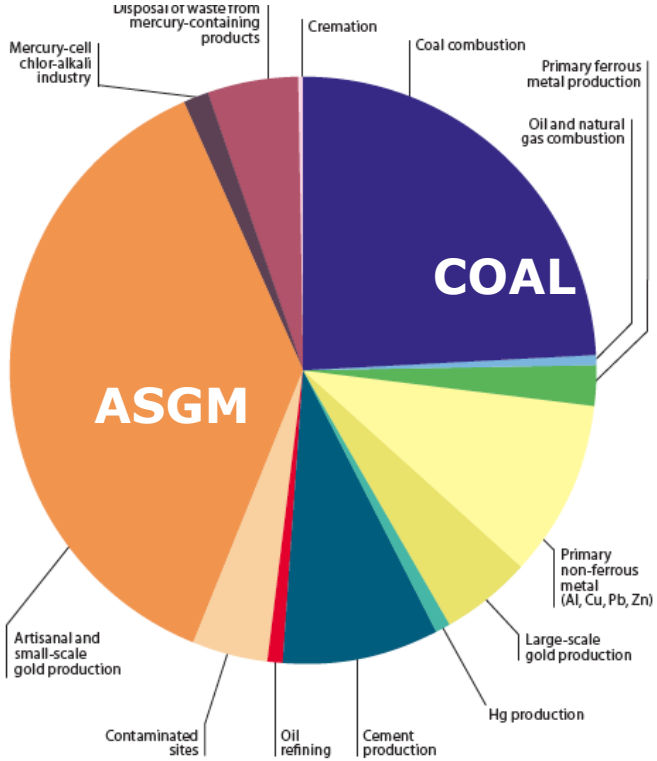


[*Selin, Ann. Rev. Env. Res., 2009*]

Why global negotiations?

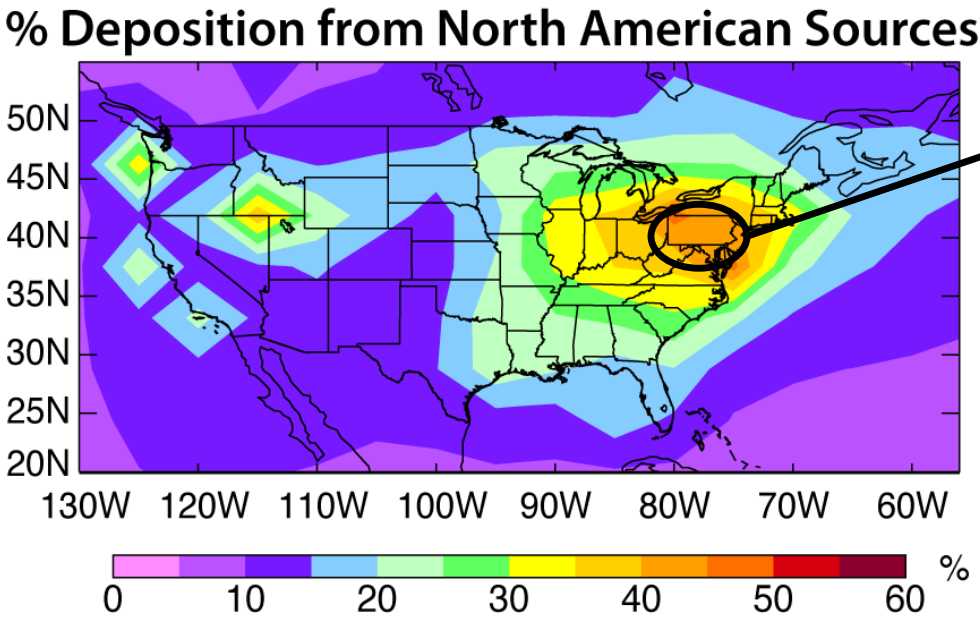
- Mercury travels globally (lifetime 6 months plus in atmosphere)
- Global trade in mercury and products
- Deposition comes from global sources

2010 Anthropogenic Emissions to air (UNEP, 2013)



Courtesy of UNEP, 2013. Global Mercury Assessment 2013: Sources, Emissions, Releases and Environmental Transport. UNEP Chemicals Branch, Geneva, Switzerland. Used with permission. For additional info, see http://geovisualist.com/2014/05/09/updated-global-mercury-pollution-viz-and-graphics/.

Why global negotiations? (from US perspective)



Up to 60% of deposition in Midwest/Northeast U.S. is from domestic sources

Source: Figure 5 in Selin, N. E., and D. J. Jacob. "Seasonal and Spatia Patterns of Mercury Wet Deposition in the United States: Constraints on the Contribution from North American anthropogenic sources." *Atmospheric Environment* 42 (2008): 5193-204.

Southeast has highest wet deposition in the U.S., but mostly from non-US sources: this is due to rainout of mercury from higher altitudes in summertime

Policy implications: *Reducing deposition in both Midwest and Southeast will require actions on multiple political scales (national and global)*

[*Selin & Jacob, Atmos. Env. 2008*]

Mercury Negotiations: History

- Global issue: long-term environmental problem
- Global scientific assessment (2002)
- Negotiating mandate from UNEP (2009)
- Five negotiating sessions (2010-2013)
- Signed 2013
- Entry into force…?

"Mascot" of global mercury negotiations, sculpture 'Pez-Peste' by Juan Garcia Uriburu, at negotiating session

Examples of Hg-added Products and Processes

- To Make PVC

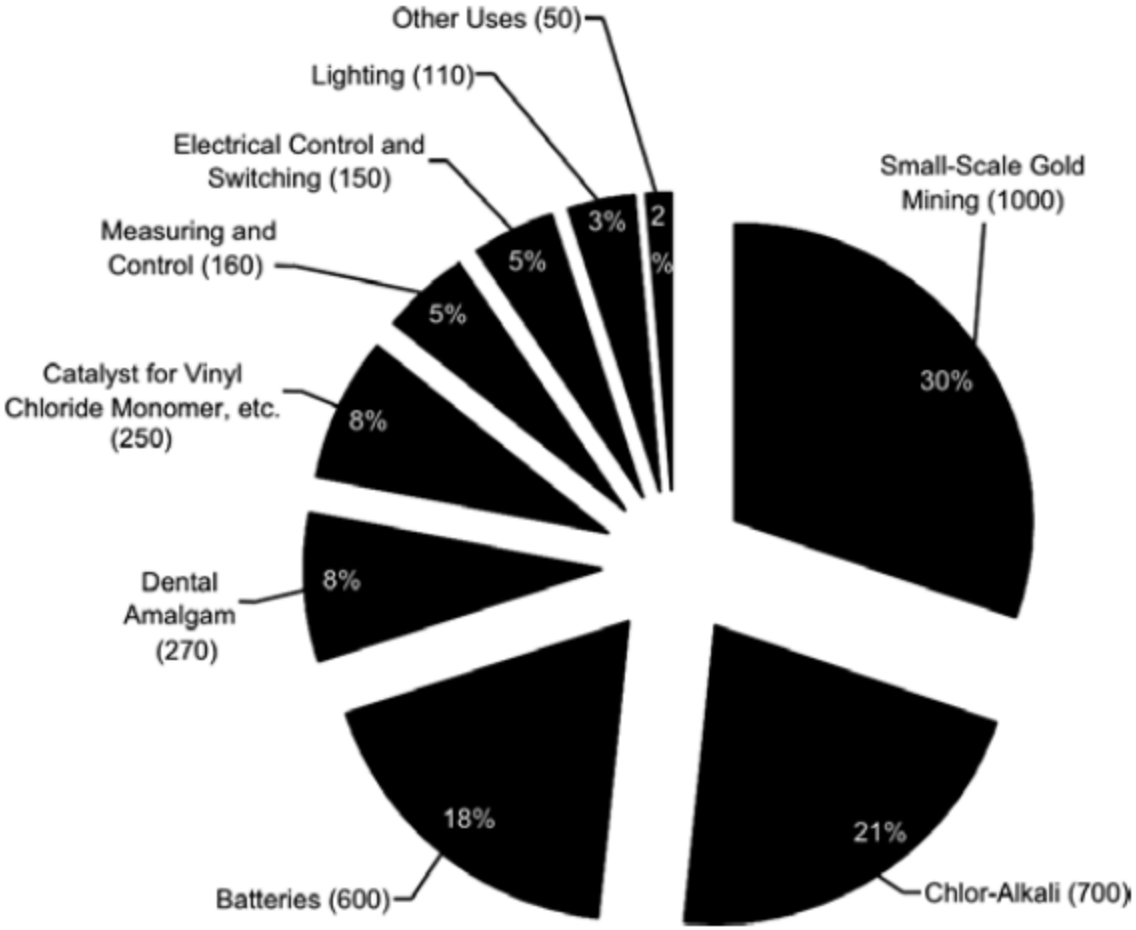
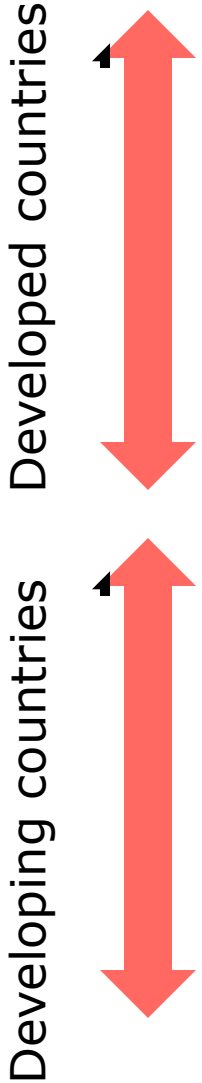


Figure 3. Estimates of global mercury consumption for 2004 (9, 36).

- Used in paper industry & others

Major Categories of Hg use

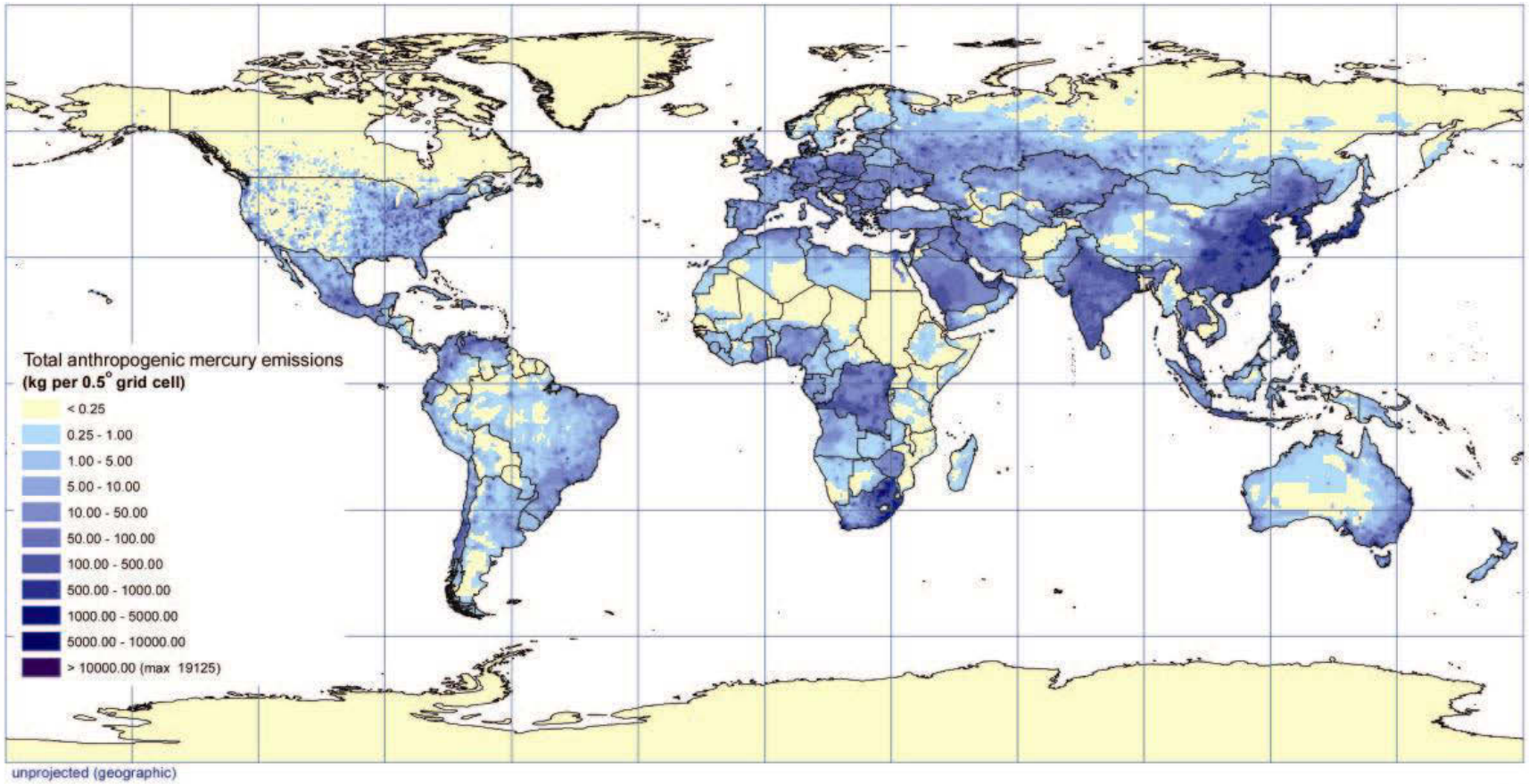
- ***Chlor-alkali production***
- ***Dental amalgams***
- ***Thermometers***
- ***Other measuring and control equipment***
- ***Energy-efficient lamps***
- ***Electrical switches, contacts, relays***
- ***Laboratory/education***
- ***Vinyl chloride monomer production***
- ***Artisanal and small-scale gold mining***
- ***Batteries***
- ***Cosmetics and skin lightening creams***
- ***Cultural uses and traditional medicine***
- ***Paints and pesticides/agricultural chemicals***



Source: UNEP, 2006.

Global Mercury Emissions Map

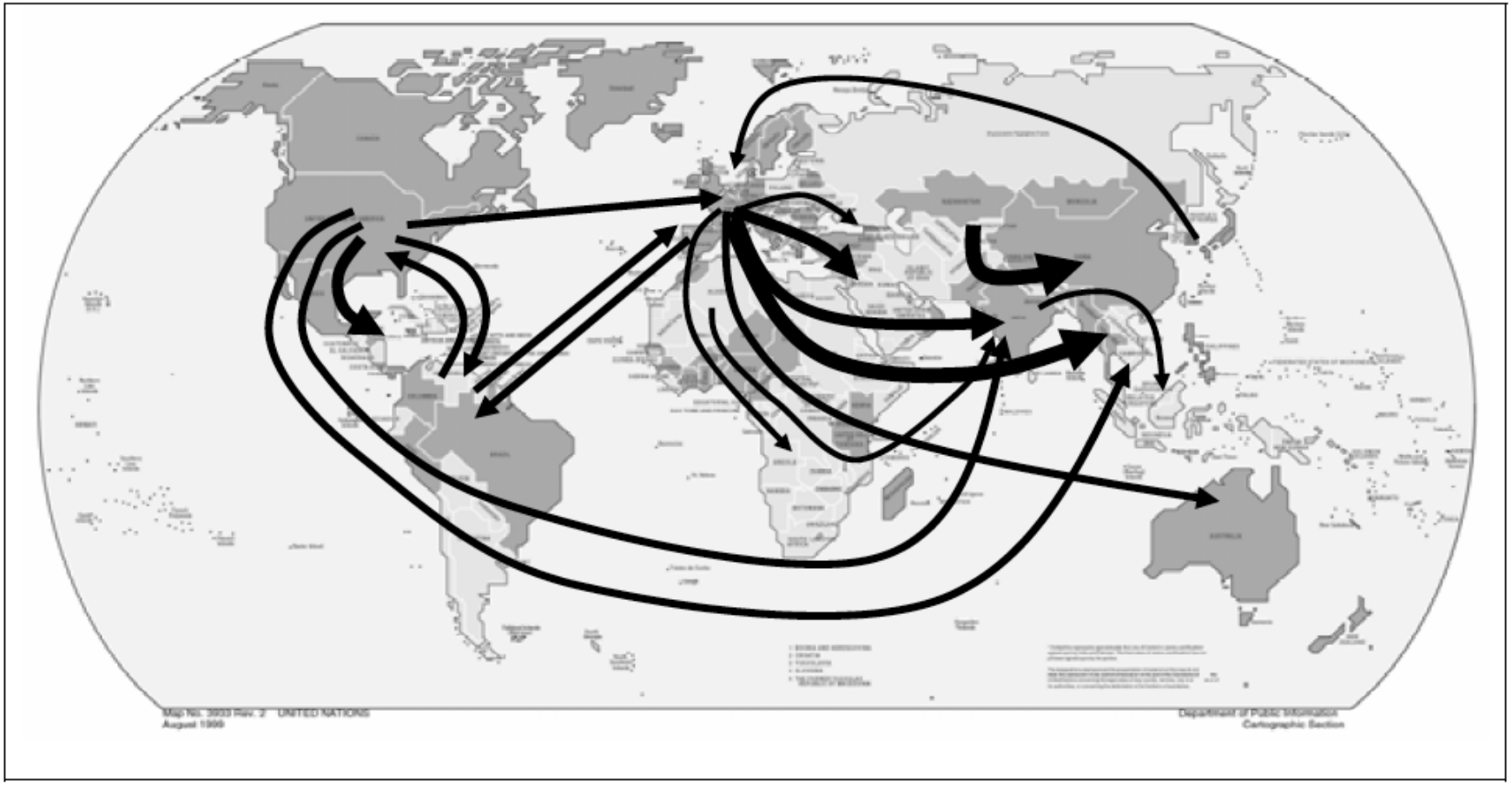
Selin NE. 2009. Annu. Rev. Environ. Resour. 34:43–63



S. Wilson (AMAP), F. Steenhuisen (Arctic Centre, RuG), J. Pacyna (NILU)

Mercury Trade

Figure 4 Commodity mercury shipments among world regions, 2004



Current Hg mining in: China, Kyrgyzstan

Source: UNEP

Artisanal & Small-scale Gold Mining

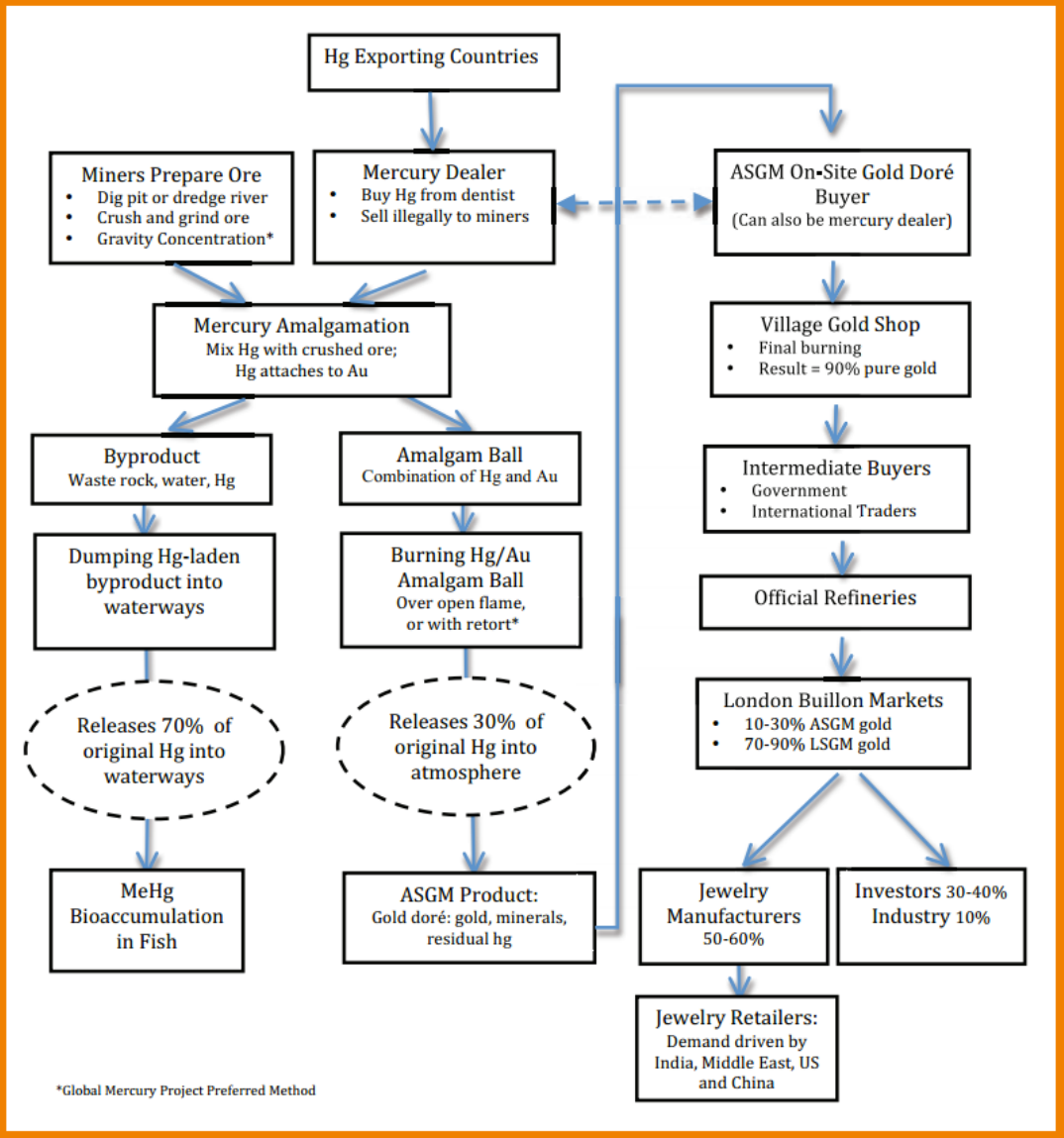
Involves >20 million people in 70+ countries

12% of world's gold production

Development issues including poverty, gender, biodiversity

Countries include Peru, Colombia, Mozambique, Indonesia, Zimbabwe…

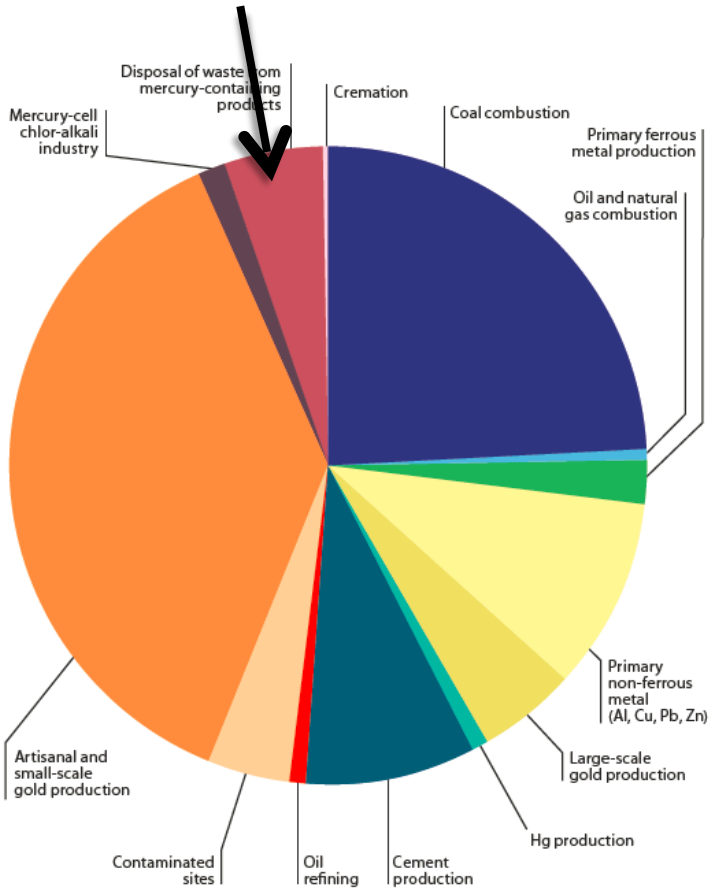
Figure 3: The ASGM Process and Gold Supply Chain



From Sippl & Selin 2012

Importance of Products & Processes

- Likely contribute to releases to land and water. More documentation needed to quantify the impact.
- Drive demand for primary mercury mining
- Used mercury can end up being sold for use in ASGM



Relative contributions to estimated emissions to air from anthropogenic sources in 2010.

Courtesy of UNEP, 2013. Global Mercury Assessment 2013: Sources, Emissions, Releases and Environmental Transport. UNEP Chemicals Branch, Geneva, Switzerland. Used with permission. For additional info, see http://geovisualist.com/2014/05/09/updated-global-mercury-pollution-viz-and-graphics/.

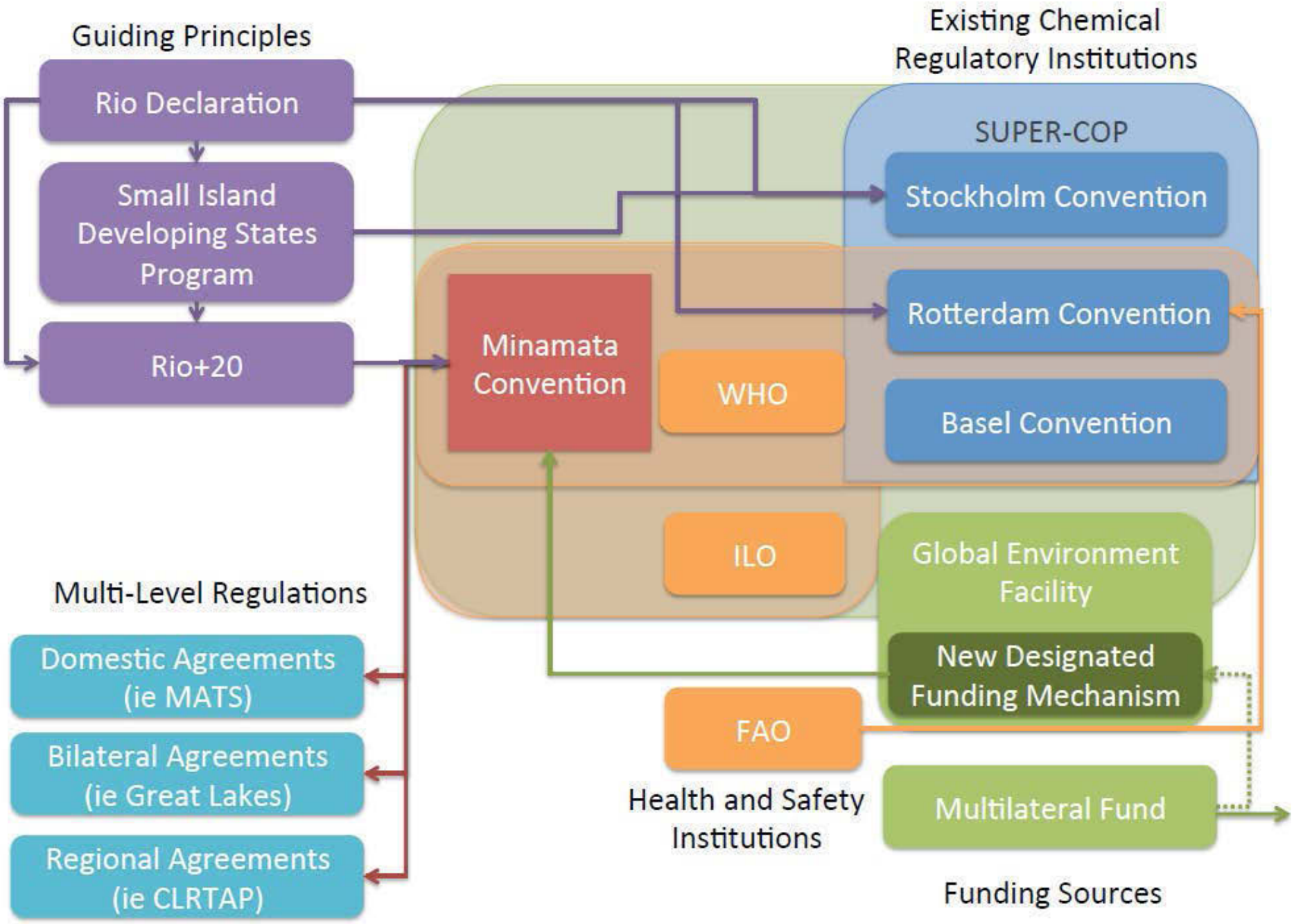
Products are a small contribution to air emissions (UNEP, 2013)

The Minamata Convention

- Minamata Convention signed in 2013 in Japan
- Provisions address supply, products/processes, emissions, trade, financial assistance
- Relatively weak requirements (esp. compared to US MATS), but a major step forward.

*The **Minamata Convention** is the first major global environmental treaty in over a decade.*

Implementation and evaluation will be critical to its success!


Guiding Principles
Rio Declaration
Small Island Developing States Program
Rio+20
Existing Chemical Regulatory Institutions
SUPER-COP
Stockholm Convention
Rotterdam Convention
Basel Convention
Minamata Convention
WHO
ILO
Global Environment Facility
New Designated Funding Mechanism
FAO
Health and Safety Institutions
Multilateral Fund
Funding Sources
Multi-Level Regulations
Domestic Agreements (ie MATS)
Bilateral Agreements (ie Great Lakes)
Regional Agreements (ie CLRTAP)

Treaty's approach to Products & Processes

- Mercury-added products
  - Prohibits manufacture, import or export
- Manufacturing processes in which Mercury or mercury compounds are used
  - Phase-outs and phase-downs
- Exemptions
  - Allowed for five years upon registration, renewable once
  - General exemptions for thimerosal in vaccines, research/scientific/defense uses, and where no alternatives are available

Mercury Product Phase-Outs by 2020

- Most Hg Batteries
- Switches and Relays (with exceptions)
- Compact flourescent lamps (CFLs) with Hg > 5 mg
- Types of linear fluorescent lamps for general lighting
- Some other types of lamps
- Cosmetics with Hg > 1 ppm
- Pesticides, biocides, topical antiseptics
- Barometers, hygrometers, manometers, thermometers'
- **Dental amalgam phase-down with no set date**

Mercury used in processes

- Chlor-alkali production: phase-out by 2025
- Acetaldehyde production: phase-out by 2018
- 50% reduction of mercury in vinyl chloride monomer production by 2020
- Reduce use in sodium/potassium methylate or ethylate, polyurethane production

Trade, Waste, and ASGM

Supply, trade, and waste in the treaty

- Regulating mining:
  - Ban on new mining
  - Phase of out existing mining over 15 years
- Identifying existing stocks—what thresholds?
  - 50 metric tons for individual stocks and 10 metric tons per year of supply-generating stocks
- Regulate "mercury compounds"?
  - YES!
- Transboundary waste regulation
  - Prior informed consent? Yes, but "standing PIC"

ASGM in the treaty

Nations must develop “strategies for managing trade and preventing diversion of mercury to ASGM”

ESD.S43 Green Supply Chain Management

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