



Global Chemicals Outlook

**CSD Learning Center
3 May, 2011**

**Rachel Massey
Massachusetts Toxics Use Reduction Institute
University of Massachusetts Lowell**



Overview

- **Global Chemicals Outlook: Project description**
- **Topics and Preliminary Findings**
 - Pillar I. Trends and Indicators**
 - Trends in Chemical Production, Use, and Disposal
 - Consequences for Human Health and the Environment
 - Pillar II. Economic Consequences**
 - Pillar III. Instruments and Approaches**



Global Chemicals Outlook Project

- **Steering Committee**

- 12 members from government, academia, industry, and NGOs;
- IGO representatives.

- **Preliminary research**

- Conducted by 3 task forces and synthesized in a Preliminary Global Outlook;

- Final report will provide insight into the relationship between sound chemicals management and broader sustainable development goals.



Pillar I. Trends and Indicators

- Trends in Chemical Production, Use, and Disposal/Recycling
 - Industrial Chemicals
 - Toxic Metals
 - Pesticides
 - Nanomaterials
 - Products containing toxic chemicals



Trends in Production of Industrial Chemicals

- Majority of global production is in OECD countries; however,
- Increasing percentage is shifting to BRICs (Brazil, Russia, India, and China) as well as other countries with economies in transition.



Trends in Production of Industrial Chemicals

■ Petrochemicals:

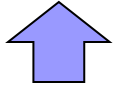
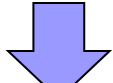
- Previously concentrated in US, Western Europe, and Japan.
- Increased production in oil/gas producing countries and in East & Southeast Asia
- Fastest growing markets are in China, Latin America, and the Middle East

Trends in Production of Industrial Chemicals

■ Specialty Chemicals

- Examples: Electronic chemicals; Construction chemicals; Coatings; Inks; Adhesives and Sealants; Textile chemicals.
- Trends: Increasing investment in production in India and China.

Trends in Toxic Metals: Lead

- Principal uses (approximately 80% of total) is in batteries for vehicles and power generators. Lead paint also continues to be a significant source of exposure.
- Global consumption has increased around 2.5%/year since 2000. However, the increase has not been uniformly distributed.
 -  17%/year in China
 -  14%/year in other transitional economies
 -  1%/year in developed countries.



Trends in Toxic Metals: Mercury

- Artisanal gold mining; vinyl chloride monomer production; battery production; & chlor-alkali processes
- Coal-fired power plants
- East and Southeast Asia account for about half of global mercury demand, with the European Union and South Asia the next largest users.



Products Containing Toxic Chemicals

- Exposure during use
- Exposure during disposal/recycling
 - Electronic waste
- Difficulties compounded by lack of information





Chemical trends: summary

- Increasing production of, and demand for, chemicals in countries with economies in transition;
- Continuing disposal/recycling of products containing hazardous chemicals in developing and transition countries

Environmental Consequences

- Atmosphere
- Water
- Soil
- Biodiversity



Example: Fisheries

- Important source of protein & economic value
- Accumulation of persistent organic pollutants
- Fish kills from industrial & agricultural run-off
- Disease in fish populations, including cancers & increased vulnerability to infectious agents.



Example: Soil Resources

- Atmospheric deposition, waste dumping, spills, contaminated water, pesticides
- Plants may concentrate toxic substances
- Crops irrigated with wastewater can contain high levels of heavy metals.
- Agricultural chemicals can deplete soil resources
 - Loss of beneficial micro-organisms





Human Health Consequences

- Acute poisonings
- Neurodevelopmental disorders
- Reproductive/developmental disorders
- Birth defects
- Cancer

Acute poisonings

- Estimates include:
 - 1 - 5 million cases of pesticide poisoning per year, with several thousand fatalities
 - Up to 25 million agricultural workers may suffer some form of occupational pesticide poisoning each year.
 - Around 300,000 suicide deaths/year from pesticide ingestion.
- A significant source of illness and death in developing and transition countries.
- In some countries, acute pesticide poisoning may be as serious a public health concern as are communicable diseases.

Human Health Consequences

■ **Neurodevelopmental disorders**

- Examples: IQ deficits, psychomotor retardation, gait & movement disorders, neurobehavioral disorders.
- Neurotoxicants include lead, mercury, PCBs, manganese, brominated flame retardants, toluene, certain pesticides, & others.

■ **Reproductive/developmental disorders**

- Examples: Effects of phthalates on sperm count & motility; male sterility associated with DBCP exposure

■ **Birth defects**

- Examples: oral cleft, heart & central nervous system defects linked to solvent exposures

Chemical Links to Cancer: Examples

Hazardous Material	Cancer Links
Arsenic	<i>Strong:</i> Bladder; Kidney; Lung; Skin; Soft- tissue sarcoma. <i>Suspect:</i> Brain/; Liver, Biliary; Prostate.
Beryllium	<i>Strong:</i> Lung
Cadmium	<i>Strong:</i> Lung. <i>Suspect:</i> Pancreatic.
Chromium	<i>Strong:</i> Lung, Nasal, Nasopharyngeal
Nickel	<i>Strong:</i> Lung, Nasal, Nasopharyngeal. <i>Suspect:</i> Laryngeal, Stomach, Pancreatic.
Metalworking fluids & mineral oils	<i>Strong:</i> Bladder. <i>Suspect:</i> Esophageal.
Asbestos (dust)	<i>Strong:</i> Laryngeal, Lung, Mesothelioma, Stomach
Silica (dust)	<i>Strong:</i> Lung
Talc (dust)	<i>Strong:</i> Lung. <i>Suspect:</i> Ovarian.
Formaldehyde	<i>Strong:</i> Nasal, Nasopharyngeal. <i>Suspect:</i> Leukemia.
Vinyl chloride	<i>Strong:</i> Liver and Biliary, Soft-tissue Sarcoma,
Benzene	<i>Strong:</i> Leukemia, NHL. <i>Suspect:</i> Brain/, Lung, Nasal, Multiple Myeloma.



Pillar II: Economic Implications

- **Costs of Inaction**

- Loss of ecosystem services
- Public health impacts

- **Economic Benefits of Sound Chemicals Management**

- Economic benefits of pollution prevention activities
- Economic benefits from sustainable agriculture
- Benefits of sound chemicals management for risk liability



Pillar III: Instruments & Approaches for Sound Chemicals Management

- Review of policy options
- Costs of implementing policy options are counterbalanced by the economic costs of inaction.
- Support for Sound Chemicals Management strategies can be integrated with economic development assistance.
- Sound Chemicals Management can also be funded through cost internalization schemes.



Thank you

Contact information:

Rachel Massey

Massachusetts Toxics Use Reduction Institute

University of Massachusetts Lowell

Tel. 978-934-3125

Email: rachel_massey@uml.edu