

Biosolids Management: Acting Locally, Responding Globally

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Biosolids Management

Acting Locally, Responding Globally

Options for Biosolids

1. Landfilling – concerns about space, global warming
2. Incineration – concerns about costs, air quality
Positives: energy
3. Reclamation – creating new “soil”
4. Recycling for agriculture or forests – concerns about contamination
Positives: increases organic matter, recycles nutrients

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Global factors to consider:

- Phosphorus – essential for life - Limited phosphorus reserves – contamination with heavy metals and radionuclides
- Antimicrobial resistance and its current and potential future impact on public health
- Sustainable Food Systems – Green Revolution 2, or an agroecological approach



Phosphorus Management

- Phosphorus resources are finite
- Phosphorus fertilizers contain heavy metals and radioactivity
- Excess phosphorus impacts our waters
- Biosolids contain significant nitrogen and phosphorus
- How best do we recycle our biosolids to utilize nitrogen and phosphorus (and help sustain our planet)?

Phosphorus Resources are Finite

Phosphorus	Resources ("easily" extractable)	Reserves (more difficult and costly to extract)
	(million metric tonnes)	
USA	1,800	49,000
China	3,700	16,800
Morocco	51,000	170,000
Total	60,000	290,000

Extractable phosphate rock – at worst 60% chance of depletion by 2100
(International Fertilizer Development Center 2010)



Phosphorus Resources are Finite

Heavy Metals in Phosphate Rock

	As	Cd	Cr	Pb	Ni	V
	(mg /kg of phosphate rock)					
USA	12	11	109	12	37	82
Morocco	11	30	225	7	26	87
Avg of 91% of resources	11	25	188	10	29	88

Average Uranium content of phosphate rock – 50-200 ppm

Extractable phosphate rock – at worst 60% chance of depletion by 2100

(International Fertilizer Development Center 2010)

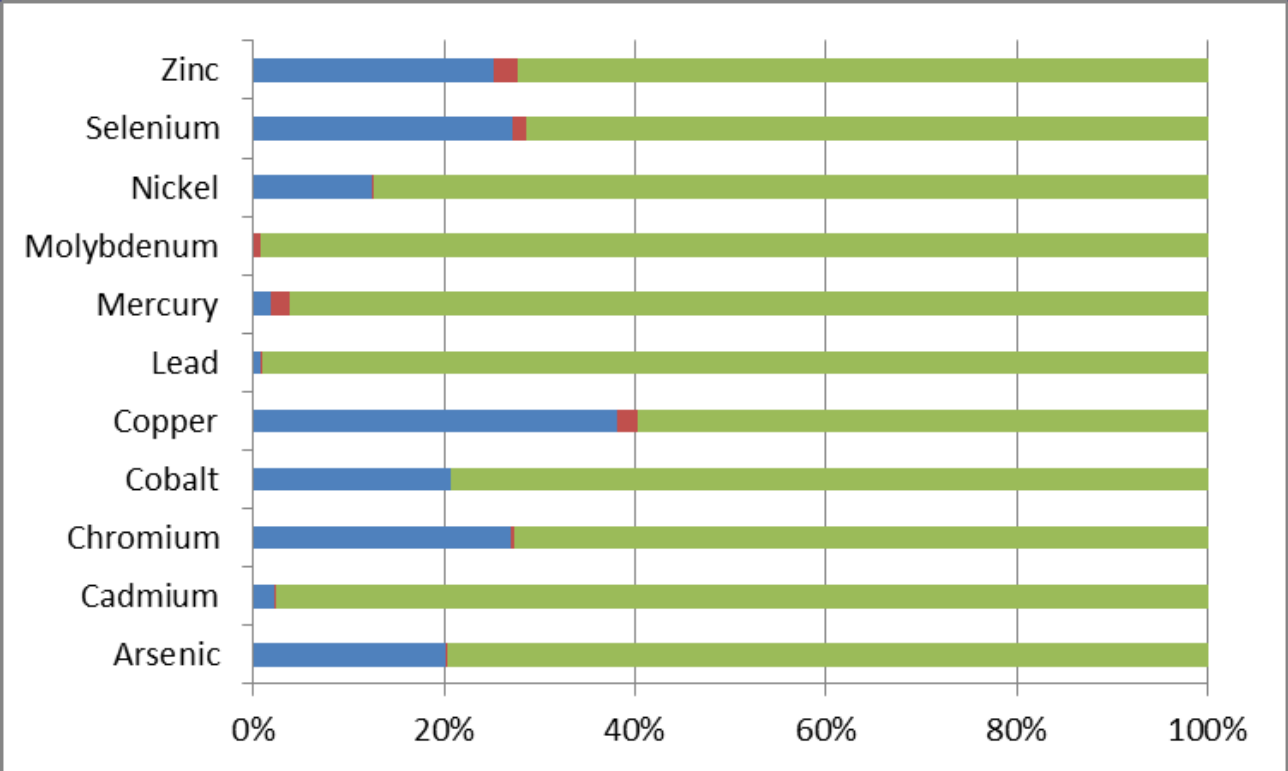
Phosphorus Resources are Finite

Cadmium concentrations in Phosphate Rock compared to Biosolids

	Cd (mg/kg)	mg Cd/kg P ₂ O ₅
USA	11	27.5
Morocco	30	75
Avg of 91% of resources	25	62.5
West Kelowna Biosolids	0.7225	14.6
Abbotsford Biosolids	1.61	24.6

Contribution of 45 tonnes/ha biosolids to soil trace element concentrations

% of total contribution where 100% is OMRR limit, and where the blue indicates the base element concentration in soil and the red is the contribution from the biosolids



Abbotsford biosolids on a Farm in Merritt

Antimicrobial Resistance – “Superbugs”

“The development of anti-microbial resistance is a natural phenomenon in microorganisms, and is accelerated by the selective pressure exerted by use and misuse of antimicrobial agents in humans and animals.”

World Health Organization 2014

Antimicrobial Resistance – “Superbugs”

“Antimicrobial resistance affects human and animal health, agriculture, the environment, and the economy. Organisms resistant to antimicrobial drugs can emerge in humans, animals, or the environment. These organisms can be transmitted from animals to humans through food or direct contact. Drug-resistant organisms in the environment can be transmitted to humans and animals through water, for example.

Overall, we found that the Public Health Agency of Canada (the Agency) has not succeeded in mobilizing all federal, provincial, and territorial partners and other stakeholders toward the development of a pan-Canadian strategy to address antimicrobial resistance.”

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Feeding Our World and Sustaining Our Environment

“Agroecology seeks ways to enhance agricultural systems by mimicking natural processes, thus creating beneficial biological interactions and synergies among the components of the agroecosystem. It provides the most favourable soil conditions for plant growth, particularly by managing organic matter and by raising soil biotic activity.”

United Nations General Assembly 2010



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Land Application of Biosolids – Europe

- 37% of biosolids produced in Europe are recycled to agriculture
- 68% of biosolids are used in agriculture in the UK
- 50% now used in Sweden
- Norway recycles 80% to farmland
- Overall 20% of the phosphorus in urban wastewater is recycled – the remainder is “squandered”
- The European Union understands the importance of recycling phosphorus – as an essential element for life

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“Using a precautionary approach, recycling biosolids for agricultural use is an important strategy for soil health and community sustainability”

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Recommendation for West Kelowna Biosolids

- Recycle into agriculture where ever possible
 - material has low trace element levels,
good source control
- Reduce fecal coliforms before land application
- Excellent fertilizer material