

**Science for the People Panel: Urban Soils by Salvatore Engel-Di Mauro**

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**Urban Soils:** Geology, hydrology, flooding more often if paved surfaces or compacted soils predominate. Urban soils, if not compacted and not clayey (i.e. they have high water conductivity), tend to mitigate flooding magnitude.

Urban agro is NOT urban gardening, unless the main reason for establishing crops is for mere aesthetics.

In Baltimore they have an ongoing study at U of Md to study soil and uses, as part of the Baltimore Ecosystem Study (<http://www.beslter.org/>).

Must know the soil and its former uses, so as to know what to test for.

For, e.g. gardening or agricultural purposes, must know depth, water holding capacity, infiltration capacity.

Biota

Biogeochemical cycling

Harmful pathogens may be present.

Anaerobic vs, aerobic

Soil particles and lung disease

How erodible is soil?

Must know what soil is, what soil is not.

Soil layers are interconnected “horizons”

Layers interlinked

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	/	/	/	/	/	/	/
Clay	/	/	/	/	/	/	/
/ /	/	/	/	/	/	/	/
Humus	/	/	/	/	/	/	/
Complex	/	/	/	/	/	/	/
	/	/	/	/	/	/	/

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Molecular binding of mineral with organic.

Active not passive.

Clay is smallest particle of soil.

Humus is typically darker.

## Soil vs sediment

Soils are almost like organism in that they are dynamic, not inert.

Lindane is hydrocarbon base and is a pesticide - a lipophile.

PCB's in sand/sediment.

Ask q; What kind of soils are we dealing with?

Then what is most likely?

Urban environments are complex.

Ask questions before sampling: e.g. ask municipality, ask previous owners informally about former use.

Then determine best area to test by coring. If not sure, do a cross section of an area:

[x				x	]		
[			x		]		
[	x			x	]		
[x			x		x	]	
[		x		x		x	]
[							]

Get some depth with coring.

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Get a corer, mix cored sample up, send it to lab.

Urban gardening needing elevated beds is not best, because worry about gaseous output from below (anti-freeze effect?).

Start with a model, e.g. Benning power plant project: plume effect?

Start with a model, need to approximate particle size and distance it will travel from smoke stack, taking into account precipitation and wind patterns over time of plant's functioning. e.g. Bimodal model:

Are there any archives to illuminate former use? Need a model of where to start testing.

If soil too poisoned, use as a buffer or carbon sequestration area.

Bamboo is not as good.

Good trees for sequestering dust?

Good canopy makes a difference.

Then analyze first crop for toxins.

e.g. some *Brassica* species can sequester heavy metals. There are studies developing genetically engineered *Arabidopsis thaliana*, *Brassica* (mustard), *Nicotiana tabacum* (tobacco), and *Liriodendron tulipifera* (tulip poplar) to sequester mercury. On this, see Patra, M. and A. Sharma. Mercury Toxicity in Plants. The Botanical Review. (2000).

Copper will be sequestered in some Brassica species from soils contaminated by heavy use of fungicides. For example see

<http://fcit.usf.edu/florida/teacher/science/modl/resources/phytoremediation.pdf>. If orchard was present and a lot of fungicide was applied, then high concentrations of copper are likely to occur at greater soil depth, following the main roots of fruits trees.