14th International HCH and Pesticides Forum

USTINOV, SERGEJUS

Soil Pollution consultant

Food and Agricultural Organization (FAO),
Global Soil Partnership Secretariat (GSP)

Per- and poly-fluoralkyl substances (PFAS) and the global dimension in soil pollution

International Network on Soil Pollution (INSO)

Naidu, Ravi (University of Newcastle & INSOP Chairman) (Ravi.Naidu@crccare.com)

Sergejus, Ustinov (NSLD) (Sergejus.Ustinov@fao.org)

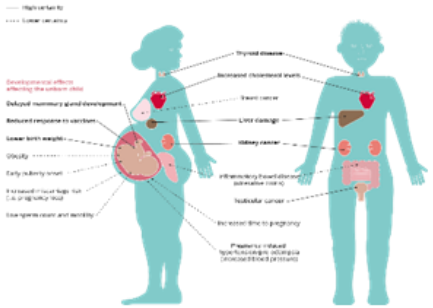
Food and Agriculture Organization of the United Nations

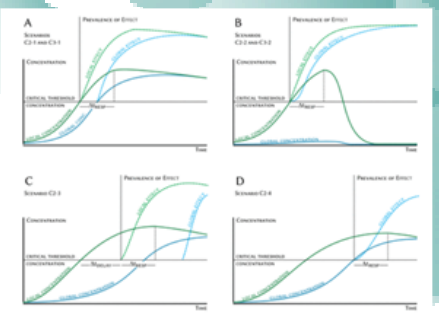
GLOBAL SOIL PARTNERSHIP

PFAS: THE FOREVER CHEMICALS

- **PFAS: a large chemical family of over 8,000 highly persistent chemicals that don't occur in nature**
- Given its stability, it is also known as the Forever Chemicals
- PFAS are/have been used in:
  - Fire fighting foams
  - paper and cardboard food packaging (e.g. takeaway containers, popcorn bags, pizza boxes, ready-made cakes etc.)
  - non-stick cookware
  - textiles (e.g. waterproof outdoor clothing and equipment, carpets, mattresses etc.)
  - cosmetics (e.g. hair conditioner, foundation cream, sunscreen etc.)
  - electronics (e.g. smartphones)

What are the concerns: the multiple lines of evidence of harm of PFAS





- **Widespread pollution and exposure to >5000 PFAS, from >200 'use categories'** [2]
  => practically impossible to measure/hazard assess all PFAS
- **Emission along lifecycles**[1,3,4]**:** production phase (e.g. fluoropolymers), use phase (e.g. PFAS firefighting foams, food contact materials), waste phase (e.g. F-gases, textiles)
- **PFAS incl. degradation products are persistent => PFAS accumulate** [1]
- **Toxic – various types, mixtures, severe effects** [1,3]
- **Many PFAS have Planetary Boundary Threat characteristics** [5]
- **Costly – diseases, damaged ecosystem services, remediation, house prices** [1,3]
- **Pollution and harm of PFAS is irreversible - *prevention* is needed**

[1] Kwiatkowski et al.(2020): Scientific basis for managing PFAS as a chemical class
[2] Glüge et al. (2020): An overview of the uses of per- and polyfluoroalkyl substances (PFAS)
[3] EEA (2019): Emerging risks in Europe – PFAS.
[4] ETC/WMGE report (2021): Fluorinated polymers in a low carbon, circular and toxic-free economy.
[5] MacLeod et al. (2014): Identifying chemicals that are planetary boundary threats

ENVIRONMENTAL BUSINESS JOURNAL®
Strategic Information for a Changing Industry
Vol. XXXII, Numbers 5/6, 2019 | *2019 Remediation & PFAS* | Environmental Business International Inc.

Estimated Number of Sites With PFAS Contamination in U.S alone>

Regulated sites:	10,560
Dept. Defense:	2,240
Manufacturing:	7,625
Landfills:	4,895
Airports:	1,675
Water/Wastewater:	10,625
DOE/Agencies Other:	4,910
TOTAL	**42,530 Sites**

EBJ's Working Model on Number of Sites with PFAS Co

Site Category	Sites	% possible PFAS contamination	Est. Sites PF/ contaminatio
NPL: Superfund	1,850	20-30%	460
RCRA Corrective Action	4,000	20-30%	1,000
RCRA UST	140,000	1-2%	700
DOD	6,400	30-40%	2,240
DOE	5,000	10-15%	600
Civilian Agencies	3,000	25-30%	810
State Sites	120,000	5-10%	8,400
Manufacturing Sites Using PFAS	3,500	80-90%	875
Other Manufacturing Sites	270,000	2-3%	6,750
Landfills: Active	3,100	40-50%	1,395
Landfills: Closed	10,000	30-40%	3,500
Airports: Major	500	80-90%	425
Airports: Regional	1,000	50-60%	550
Airports: Commercial/Private	17,500	3-5%	700
Wastewater: POTWs 10 MGD+	500	50-60%	275
Wastewater: POTWs <10 MGD	15,000	10-20%	2,250
Water Utilities: Urban	4,000	10-20%	600
Water Utilities: Rural	50,000	10-20%	7,500
Other	50,000	5-10%	3,500
Total	**705,450**	**6%**	**42,560**

Source: Environmental Business International, Inc. EBI estimates using site count estimates from EPA, T tions, and a consensus of expert respondents to a '% possible PFAS contamination' surveys and intervie

ENVIRONMENTAL BUSINESS JOURNAL®
Strategic Information for a Changing Industry
Vol. XXXII, Numbers 5/6, 2019 | *2019 Remediation & PFAS* | Environmental Business International Inc.

Estimated Nu
PFAS Cont

Regulated site	
Dept. Defense	
Manufacturing	
Landfills:	
Airports:	
Water/Wastewa	
DOE/Agencies Ot	
TOTAL	**42,530 Sites**

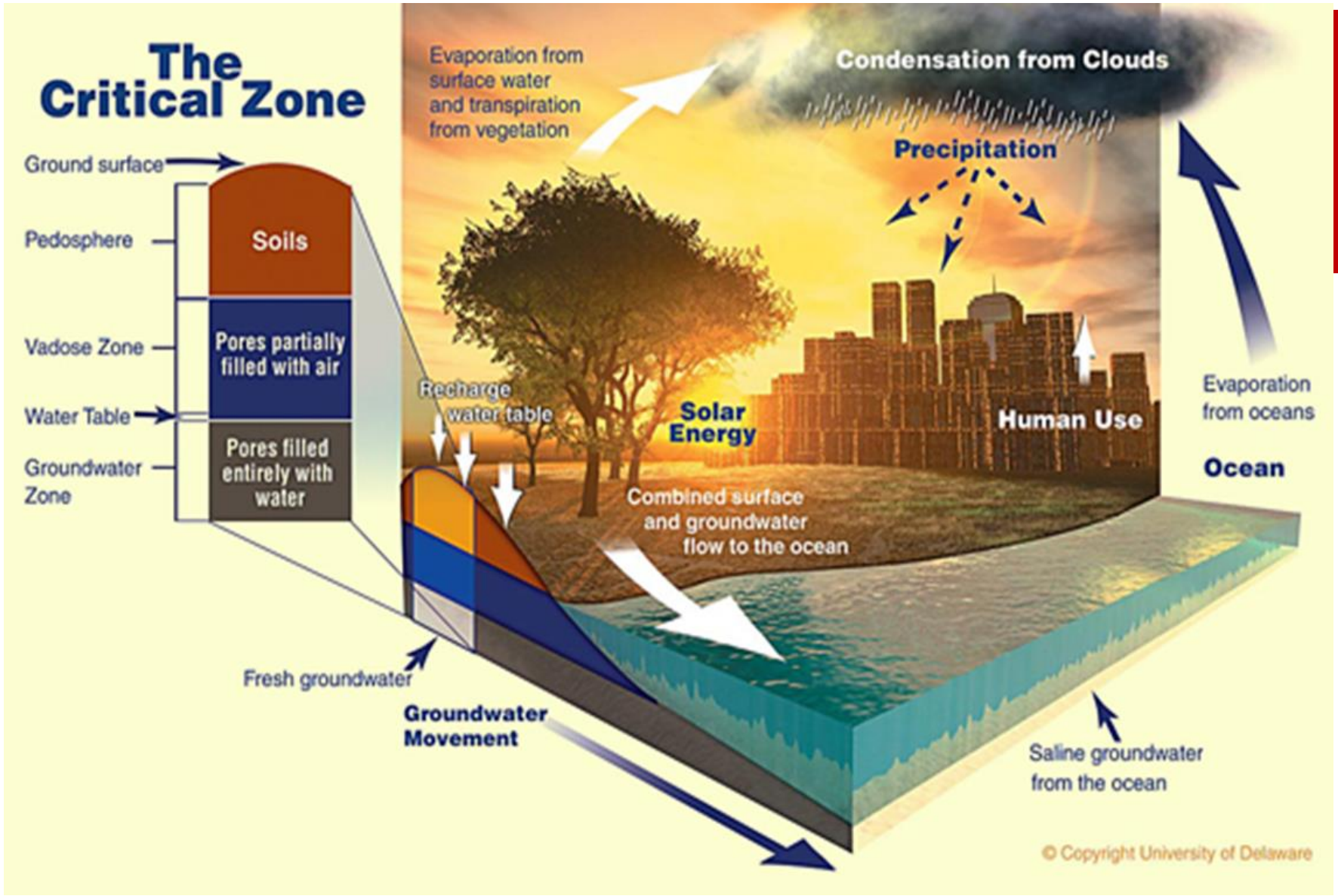
The number of PFAS contaminated sites >100,000 globally: major concerns:

(a) thousands of chemical constituents;
(b) Ultra low health and environmental threshold values
(c) Analytical challenges
(d) Toxicity- single vs mixtures
(e) No remediation technology as yet available to fully mineralise PFAS

EBJ's Working Model on Number of Sites with PFAS Co

Site Category	Sites	% possible PFAS contamination	Est. Sites PF/ contaminatio
NPL: Superfund	1,850	20-30%	460
RCRA Corrective Action	4,000	20-30%	1,000
RCRA UST	140,000	1-2%	700
		30-40%	2,240
		10-15%	600
		25-30%	810
		5-10%	8,400
		80-90%	875
		2-3%	6,750
		40-50%	1,395
		30-40%	3,500
		80-90%	425
		50-60%	550
		3-5%	700
		50-60%	275
		10-20%	2,250
		10-20%	600
		10-20%	7,500
Other	50,000	5-10%	3,500
Total	**705,450**	**6%**	**42,560**

Source: Environmental Business International, Inc. EBI estimates using site count estimates from EPA, T tions, and a consensus of expert respondents to a '% possible PFAS contamination' surveys and intervie



PFAS as well as other pollutants impact the critical zone

These processes support and/or control many ecosystem processes

↓

Supply products that benefit society

GLOBAL SOIL PARTNERSHIP

What is the INSOP?

- Launched in April 2022, the International Network on soil pollution focuses on minimizing soil pollution and achieving the global goal of Zero Pollution
- The mission is to support and facilitate joint efforts towards reducing the risks of soil pollution and effectively remediate already polluted areas
- Targets both diffuse and point source contamination and
- Conventional and emergent contaminants

GLOBAL SOIL PARTNERSHIP

INSOP areas of work

- INSOP focuses on six main areas of work under each of which various tasks will be carried out to achieve the overall goal
- Creation of awareness relating to the presence of contaminants is crucial first step

GLOBAL SOIL PARTNERSHIP

INSOP current tasks

Timeframe	Task	Outcome
Short-term goals	Technical Guidelines on soil pollution	Technical Manual on assessing, mapping, monitoring and reporting polluted soils
	Identify the main soil contaminants and laboratory methodologies in order to develop standard operating procedures (SOPs) in close cooperation with GLOSOLAN	SOPs for contaminants of major concern
	Develop SOPs for other soil contaminants, including emerging contaminants in cooperation with GLOSOLAN	SOPs for other soil contaminants
	Awareness raising on mineral and organic fertilizers and pesticides	Webinars and workshops
Medium-term goal	Establish a capacity building program on the full cycle of soil pollution, from assessment to monitoring and the application of SOPs	Soil pollution included in EduSOILS, the Global Soil Doctors programme, and GLOSOLAN capacity-building programme
	Identify all key stakeholders and develop the vision, mission and action of the Global Soil Pollution Observatory	Global soil pollution observatory
Long-term goals	Develop the methodology to map soil pollution/contaminants and identify data gaps in close cooperation with INSII	Global soil pollution map(s)

GLOBAL SOIL PARTNERSHIP

INSOP AND PFAS

- Recognised as a contaminant that has just emerged
- Regulatory guidance and policies yet to be fully established
- The need for assemblage and dissemination of existing information from developed to developing countries
- Limited funds available for advocacy by INSOP
- FAO-INSOP- crcCARE-globalCARE- September 2022 symposium on PFAS in Adelaide- global input towards:
  - Regulatory
  - Analytical
  - Risks and
  - Remediation
- Subject to availability of funds- PFAS symposium to be held in Europe in 2023

GLOBAL SOIL PARTNERSHIP

INSOP

Many other relevant activities to come:

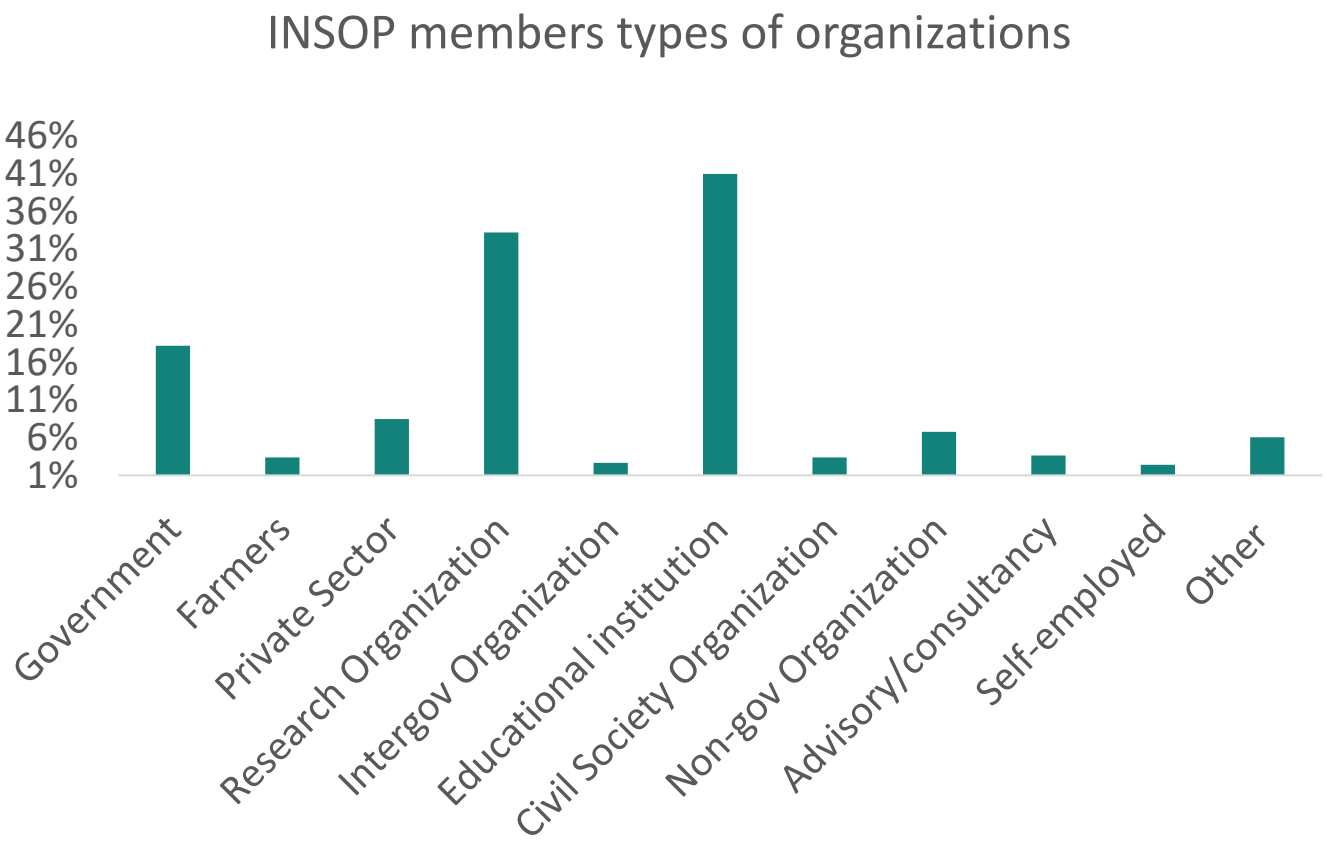
- Building global capacities on soil pollution
- Awareness on soil pollution
- Harmonization of SOPs for contaminants of major concern
- Soil health index
- Global soil pollution map(s)
- Sustainable remediation of polluted soils
- Creating a global database of soil contaminants threshold values

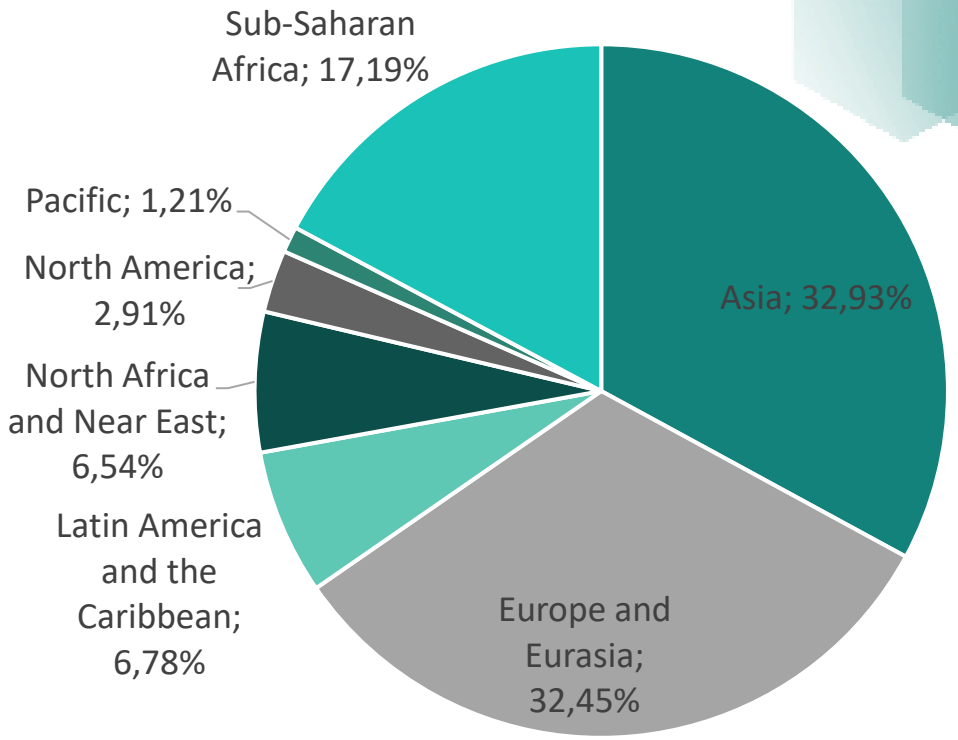
https://www.fao.org/global-soil-partnership/insop/en/

GLOBAL SOIL PARTNERSHIP

INSOP members

- 700 members from 90 countries





GLOBAL SOIL PARTNERSHIP

INTERGOVERNMENTAL PANEL ON CONTAMINANTS (IPC).

…a global plan to combat chemical pollution, including the establishment of a chemical pollution body, similar to the Intergovernmental Panel on Climate Change, or IPCC.

GLOBAL SOIL PARTNERSHIP

THANK YOU FOR YOUR ATTENTION

https://www.fao.org/global-soil-partnership/insop/en/

INSOP
Chair: Ravi.Naidu@crccare.com
Vice-chair: houdeyi@tsinghua.edu.cn
Coordinator: Sergejus.Ustinov@fao.org
GSP Secretariat: Natalia.rodriguezeugenio@fao.org

Food and Agriculture Organization of the United Nations

GLOBAL SOIL PARTNERSHIP