

# Global Water Pathogens Project (GWPP)

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# I'd like to learn a bit more from you...

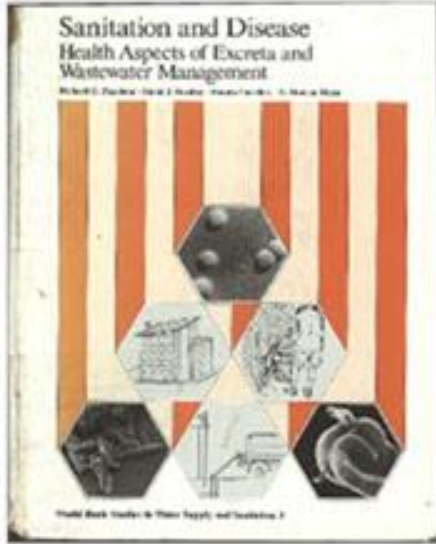
***I would like to...***

**[describe any specific needs you have for interaction or data sharing with people in the water sector? e.g. what type of data?]**



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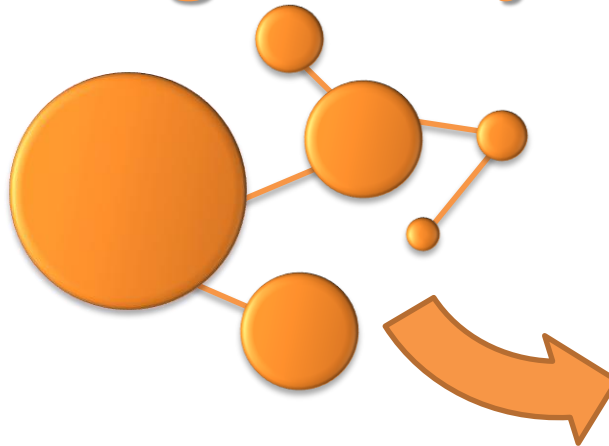
# Overview of Project



Feachem, R.G., Bradley, D.J., Garelick, H., Mara, D.D. (1983). *Sanitation and Disease: Health Aspects of Excreta and Wastewater Management*. World Bank.



## Global Water Pathogen Project



6 CLEAN WATER AND SANITATION



**SUSTAINABLE  
DEVELOPMENT  
GOALS**



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Global Water Pathogen Project



# SUSTAINABLE DEVELOPMENT GOALS



CLEAN WATER  
AND SANITATION



- 6.1 Safely-managed drinking water, sanitation, and hygiene (soap and water) for all
- 6.2 Wastewater safely treated (substantially increasing recycling and safe reuse globally)
- 6.3 Water bodies with good ambient water quality



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# Project Leadership



## Joan B. Rose

2016 Stockholm Water Prize Recipient  
Homer Nowlin Chair in Water Research  
Department of Fisheries and Wildlife  
Michigan State University  
Lansing, Michigan, USA



## Blanca Jiménez Cisneros

Director of the Division of Water Sciences  
and IHP Secretary  
International Hydrological Program  
UNESCO/Division of Water Sciences  
Paris, France

# Motivation and Mission

- Reduce global disease burden from excreted pathogens
- Create a state-of-the-art knowledge hub on risks from excreted pathogens and the efficacy of interventions
- Establish a collaboration and information-sharing network between international stakeholders from multiple sectors and all regions of the world



# Thank you...

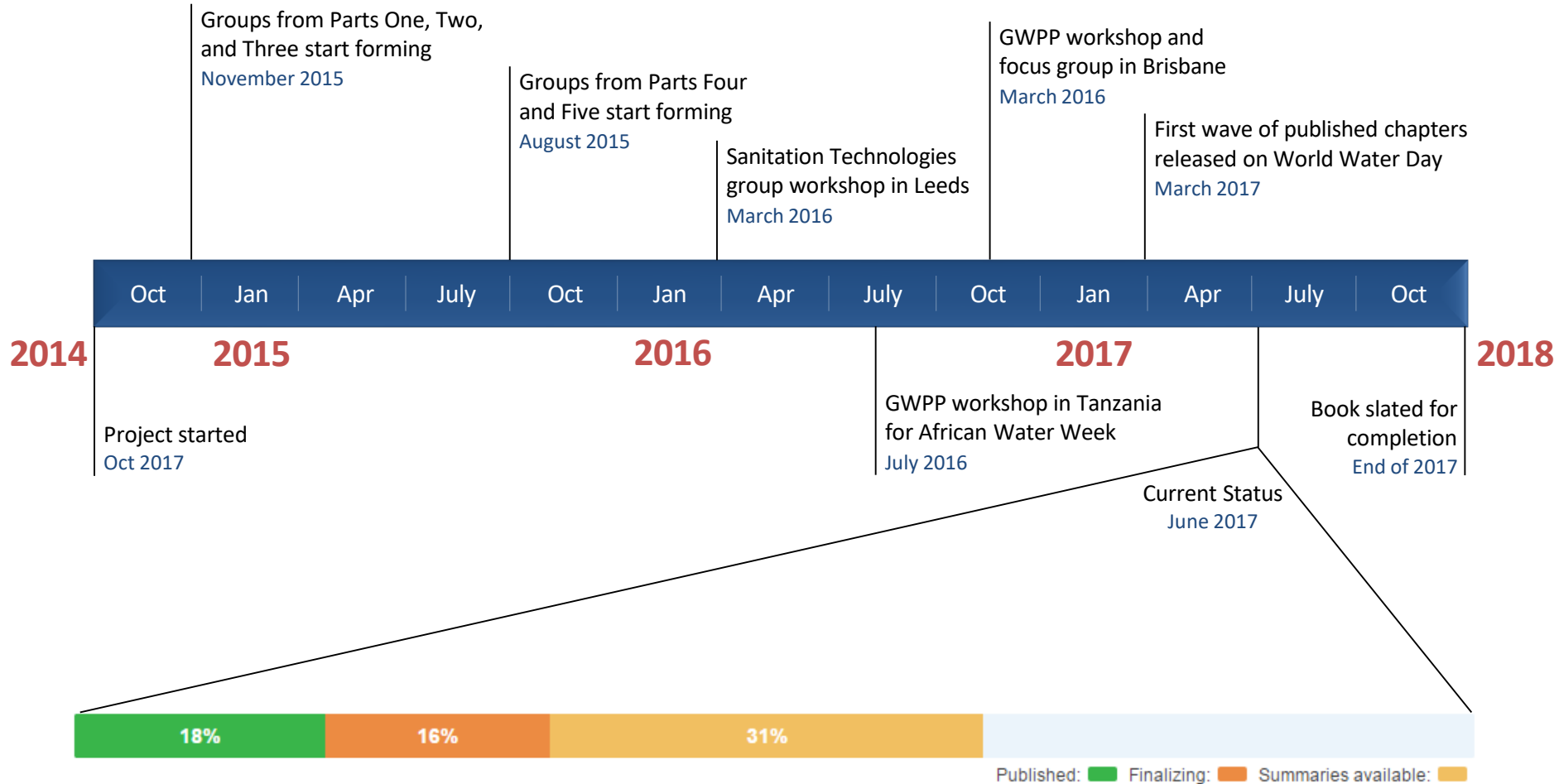
- Update knowledge from the 1983 reference book
- Place everything on an online open access integration platform (a Wiki site) with updates via a global network in collaboration with AgroKnow.
- Align our goals with other major international goals including those stated by:



- Support from:



# Progress and Timeline



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# Knowledge Sharing on a Global Scale



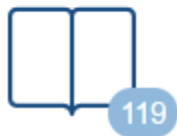
Contributors



Countries



Glossary terms



Book Chapters



Data tables



Scientific resources

# Network of Contributors

158 collaborators (48% female) from 46 countries



# Organized into 10 groups

1. Sanitation and Health: Theory and Control
2. Fecal Indicators and Microbial Source Tracking
3. Environmental and Epidemiological Aspects
  - Viruses
  - Bacteria
  - Protists
  - Helminths
4. Management of Risk from Excreta and Wastewater
  - Persistence
  - Sanitation Technologies
  - Disinfection Mechanisms
5. Case Studies



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# Overall Goal

- Empower sanitation service providers to use an evidence-based approach for sanitation safety planning by providing access to data on pathogen removal for different sanitation technologies



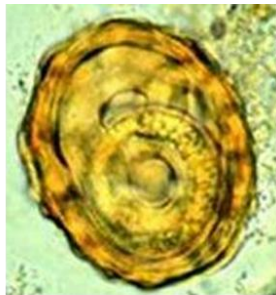
Images entitled "[Karnataka Urban Development and Coastal Environmental Management Project in India](#)" by [Asian Development Bank](#) are licensed under [CC BY-NC-ND 2.0](#)

# Specific Objectives

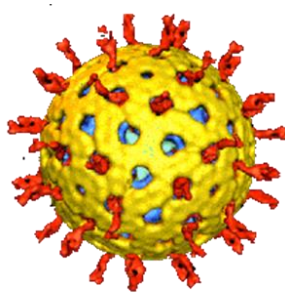
- Compile a database on key factors for pathogen removal in different sanitation technologies
- Enable users to access and filter the data and produce relevant tables and graphs
- Provide access to this database on the GWPP website and via mobile device applications



Protozoa



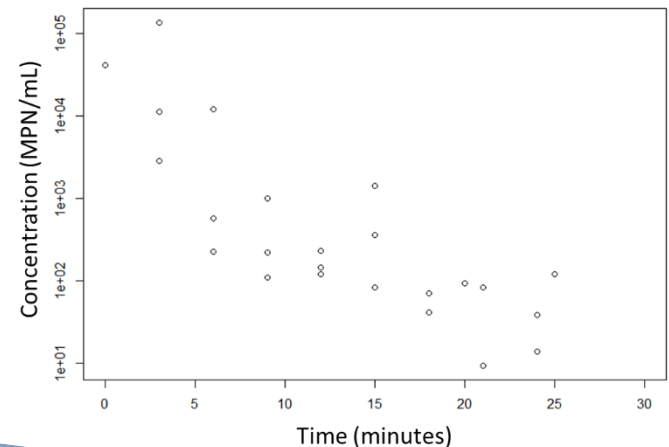
Helminth Eggs



Viruses



Bacteria



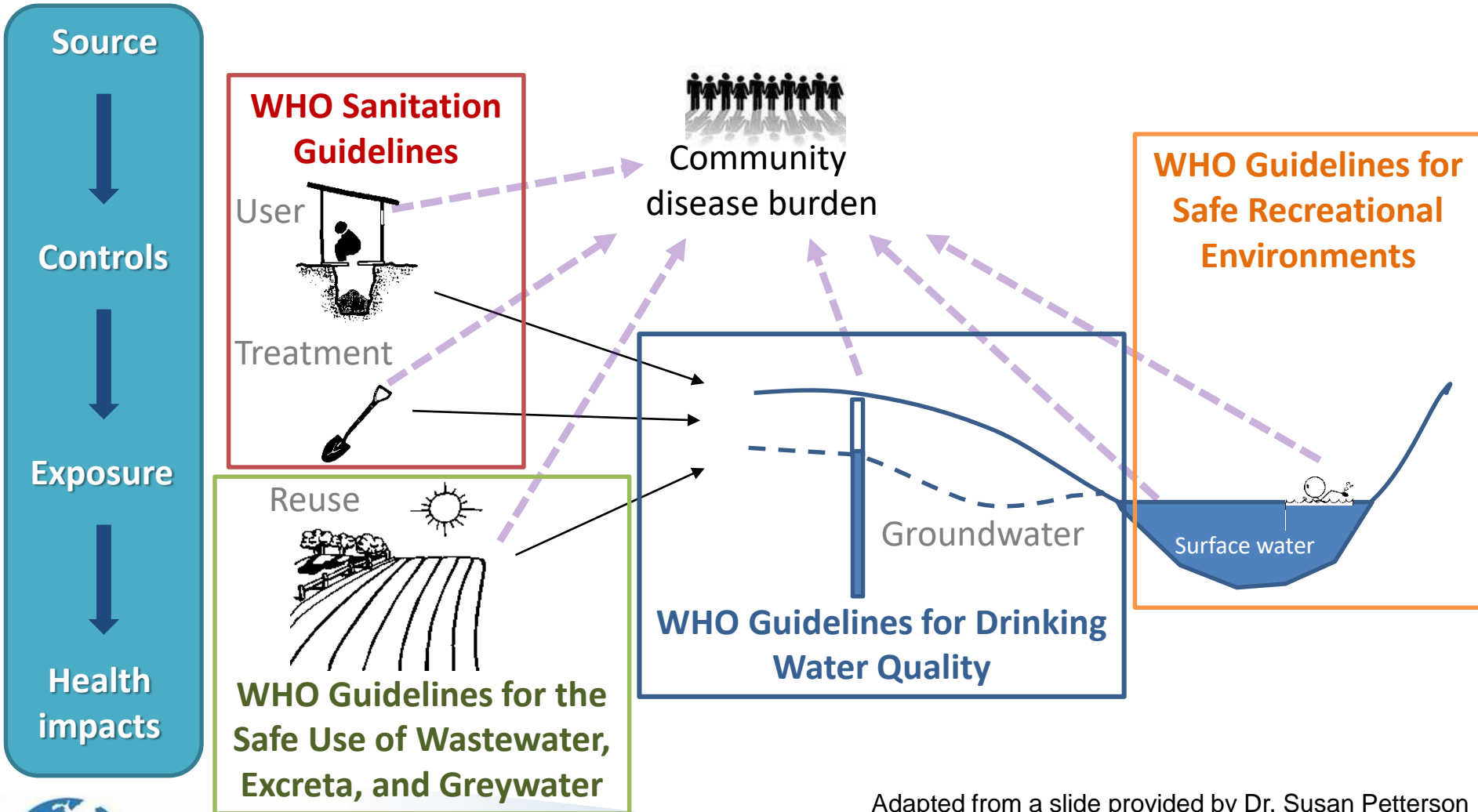
**What do we know about the fate of pathogens in the different technologies used in water and sanitation systems?**

**How can we make this information accessible to engineers, policy makers, and service providers so that they can manage public exposure and risk?**



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# Provide knowledge for our user community which includes policy makers (WHO)

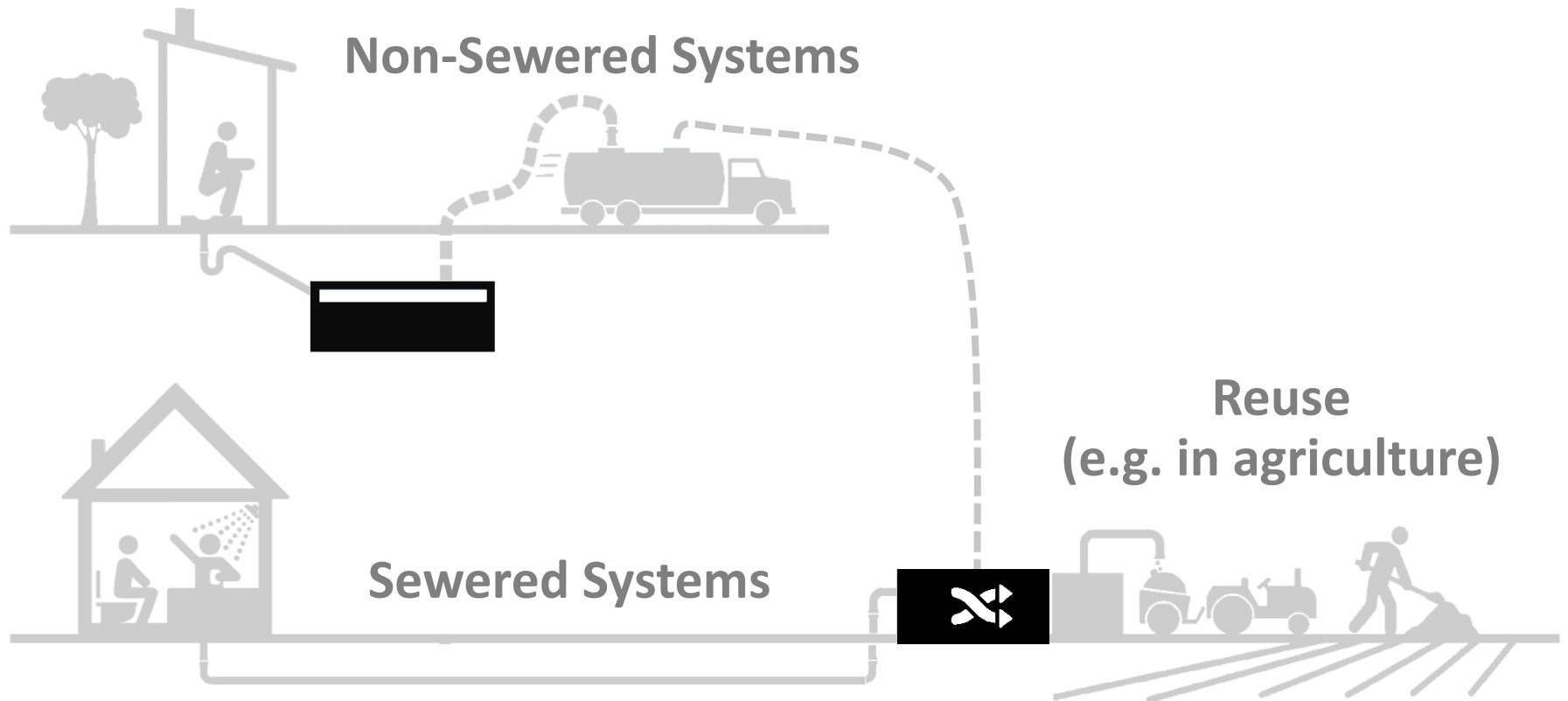
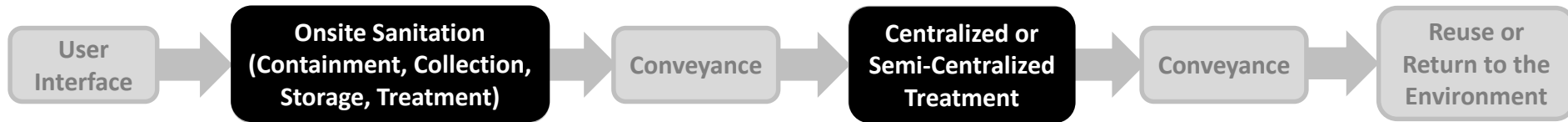


Adapted from a slide provided by Dr. Susan Petterson





# Sanitation Service Chain



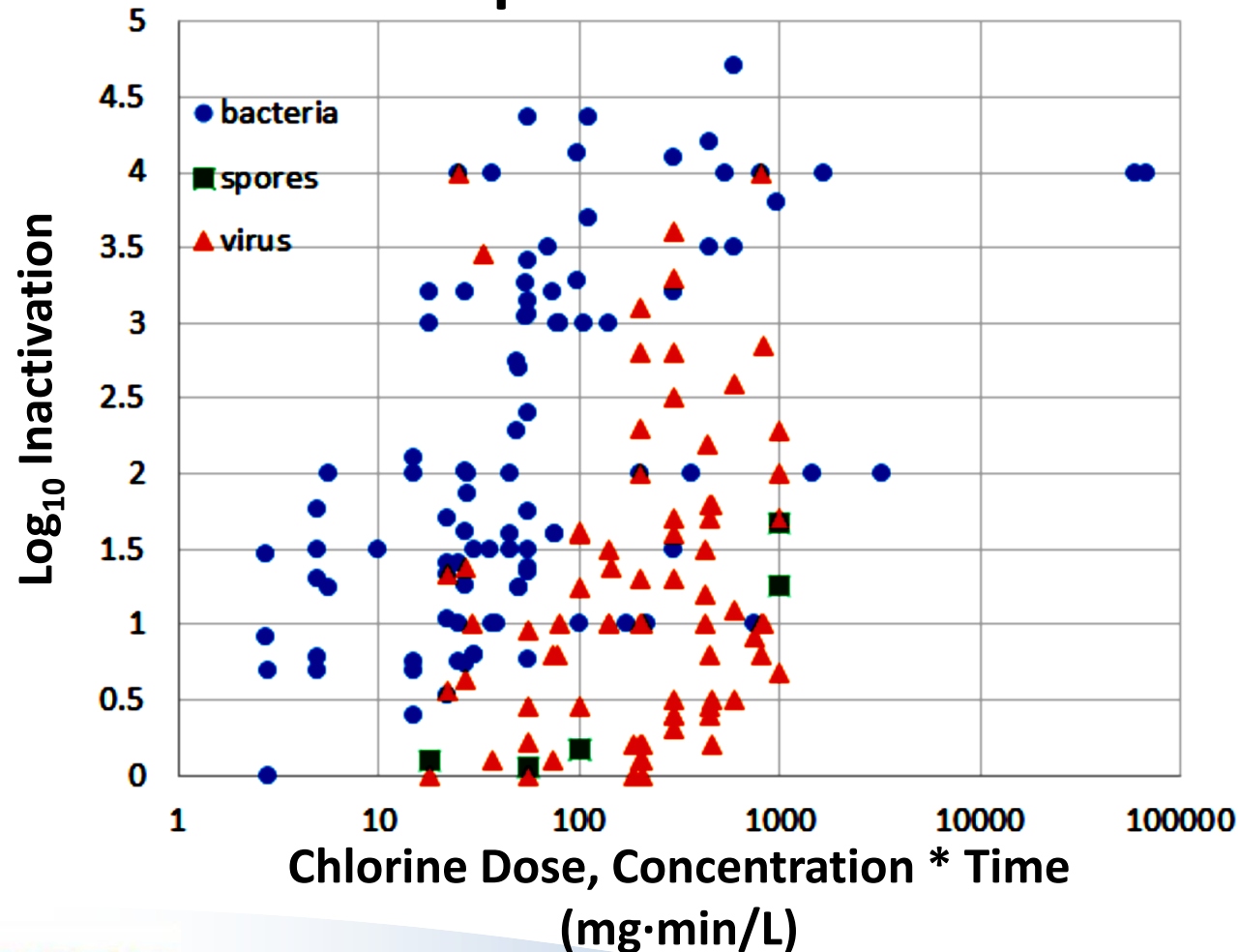
# Compiling, Cleaning, and Annotating Data from the Literature and Practitioners

A	B	D	E	G	M
Reference	BibTeX	Pathogen / Fecal Indicator	Location	Sanitation Technology Description	LOG10 Reduction
Bausum et al. (1983)	bausam1983enteric	Culturable Enterovirus	Lennox, SD, USA	Waste Stabilization Pond - Maturation	0.2
Bausum et al. (1983)	bausam1983enteric	Culturable Enterovirus	Lennox, SD, USA	Waste Stabilization Pond - Maturation	0.0
Bofill-Mas et al. (2006)	bofill2006quantification	Adenovirus	Barcelona, Spain	Activated Sludge	4.6
Bofill-Mas et al. (2006)	bofill2006quantification	Adenovirus	Barcelona, Spain	Activated Sludge	4.0
Bofill-Mas et al. (2006)	bofill2006quantification	Adenovirus	Barcelona, Spain	Activated Sludge	3.9
Bofill-Mas et al. (2006)	bofill2006quantification	Adenovirus	Barcelona, Spain	Activated Sludge	4.1
Bofill-Mas et al. (2006)	bofill2006quantification	Adenovirus	Barcelona, Spain	Activated Sludge	3.6
Bofill-Mas et al. (2006)	bofill2006quantification	Adenovirus	Barcelona, Spain	Activated Sludge	4.2
Bosch et al. (1986)	bosch1986fate	Culturable Enterovirus	Barcelona, Spain	Chemical Coagulation (with lime)	2.6
Bosch et al. (1986)	bosch1986fate	Culturable Enterovirus	Barcelona, Spain	Primary Sedimentation	1.8
Bosch et al. (1986)	bosch1986fate	Fecal coliforms	Barcelona, Spain	Chemical Coagulation (with lime)	0.9
Bosch et al. (1986)	bosch1986fate	Fecal coliforms	Barcelona, Spain	Primary Sedimentation	0.4
Bosch et al. (1986)	bosch1986fate	Fecal streptococci	Barcelona, Spain	Chemical Coagulation (with lime)	0.9
Bosch et al. (1986)	bosch1986fate	Fecal streptococci	Barcelona, Spain	Primary Sedimentation	0.1
Bosch et al. (1986)	bosch1986fate	Rotavirus	Barcelona, Spain	Chemical Coagulation (with lime)	1.5
Bosch et al. (1986)	bosch1986fate	Rotavirus	Barcelona, Spain	Primary Sedimentation	1.4
Bouhoum et al. (2000)	bouhoum2000occurrence	Entamoeba coli	Marrakech, Morocco	Waste Stabilization Pond - Primary	1.7

**>3,000 rows of data for more than 10 different sanitation system technologies including:**  
latrines, septic systems, natural systems such as lagoons and wetlands, micro- and ultrafiltration systems, biological treatment processes, coagulation and sedimentation processes, and fecal sludge and biosolids management processes.

# Accessible Data: Key Operational Factors

## Example: Chlorination



# Future Work: Interactive Data Access



<https://smeister.shinyapps.io/database/>

Developed by Simon Meister

# Thank you...

- Acknowledgements:
  - Joan Rose
  - Jim Mihelcic
  - Kyana Young
  - Everyone at Agroknow
- Support from:

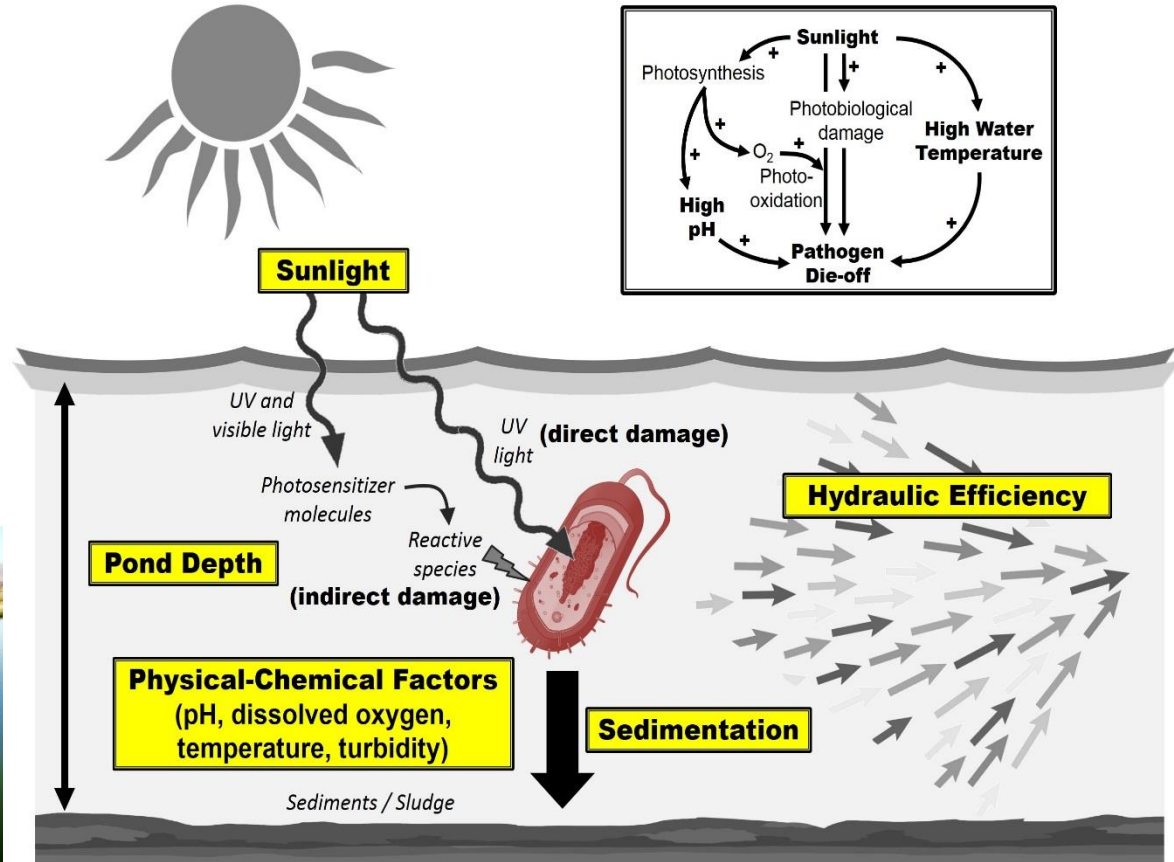


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# Key Factors Affecting Pathogen Reduction

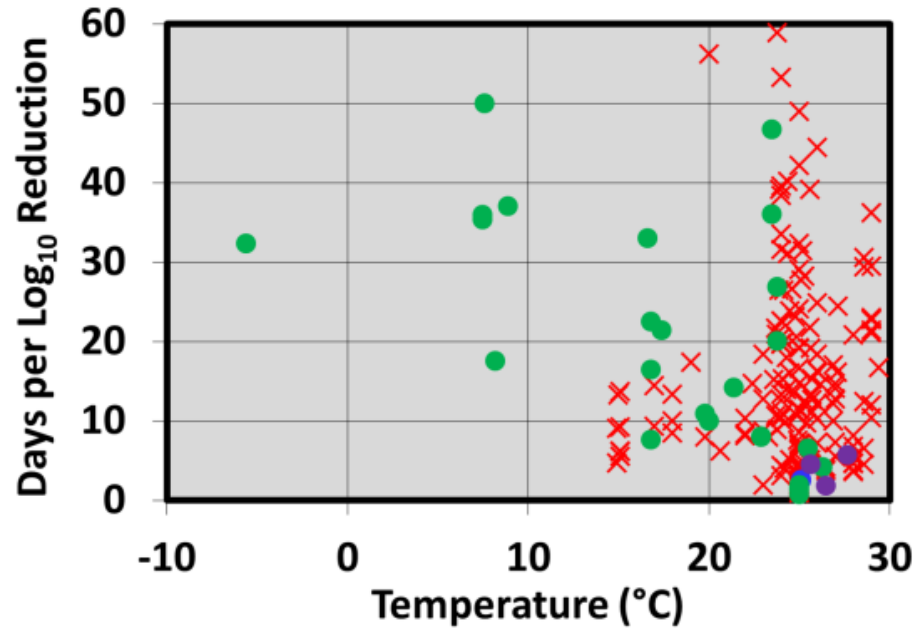
## Example: Stabilization Ponds (Lagoons)

- Retention Time  
(design factor)
- Depth  
(design factor)
- Temperature  
(environmental factor)



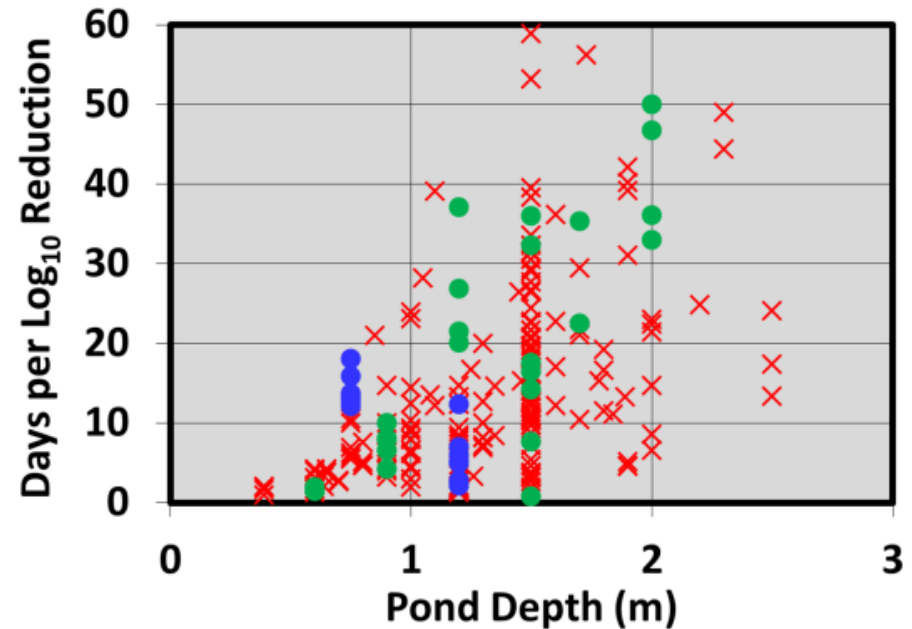
# Key Design, Environmental and Operational Factors

## Example: Stabilization Ponds (Lagoons)



Fecal Indicators

× Coliforms



Pathogens

● Bacteria

● Viruses

● Helminths

● Protists



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