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Sustainable Development Goals 6.1 & 6.2: Universal and equitable water and sanitation

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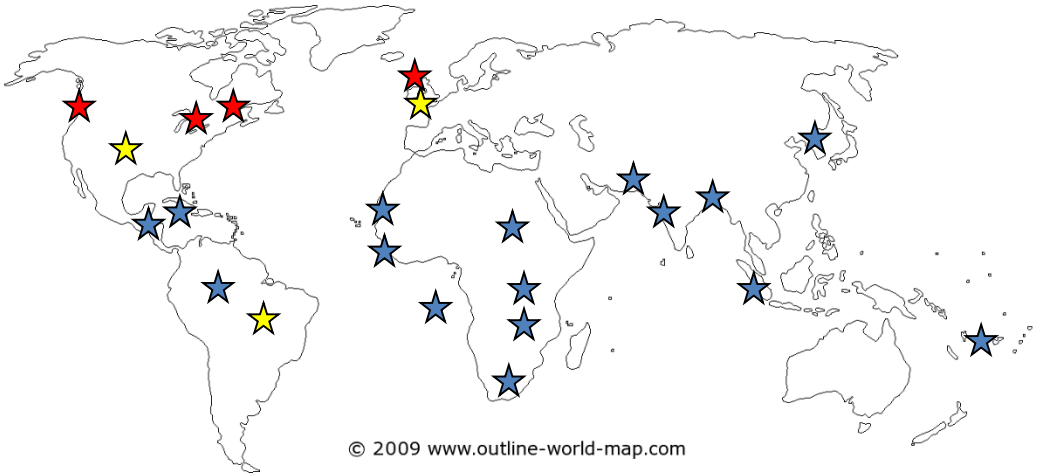
2019 BRASIL World Toilet Summit

Background

Civil Engineering (1999) — MSc (2001) — PhD (2005)

Universidade de Brasília — KU The University of Kansas — University of Surrey — University of Surrey



PDF (2006) — Lecturer (2007) — Assis. Prof. (2011) — Assoc. Prof. (2017)

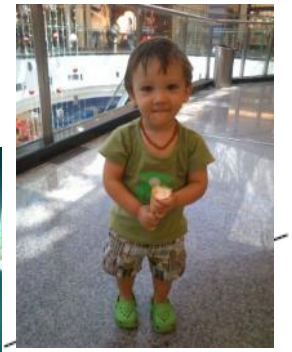
Health Canada — University of Glasgow — Université Laval — University of Victoria

Oxfam — World Health Organization — GOAL — Canadian Red Cross / Croix-Rouge canadienne — unicef

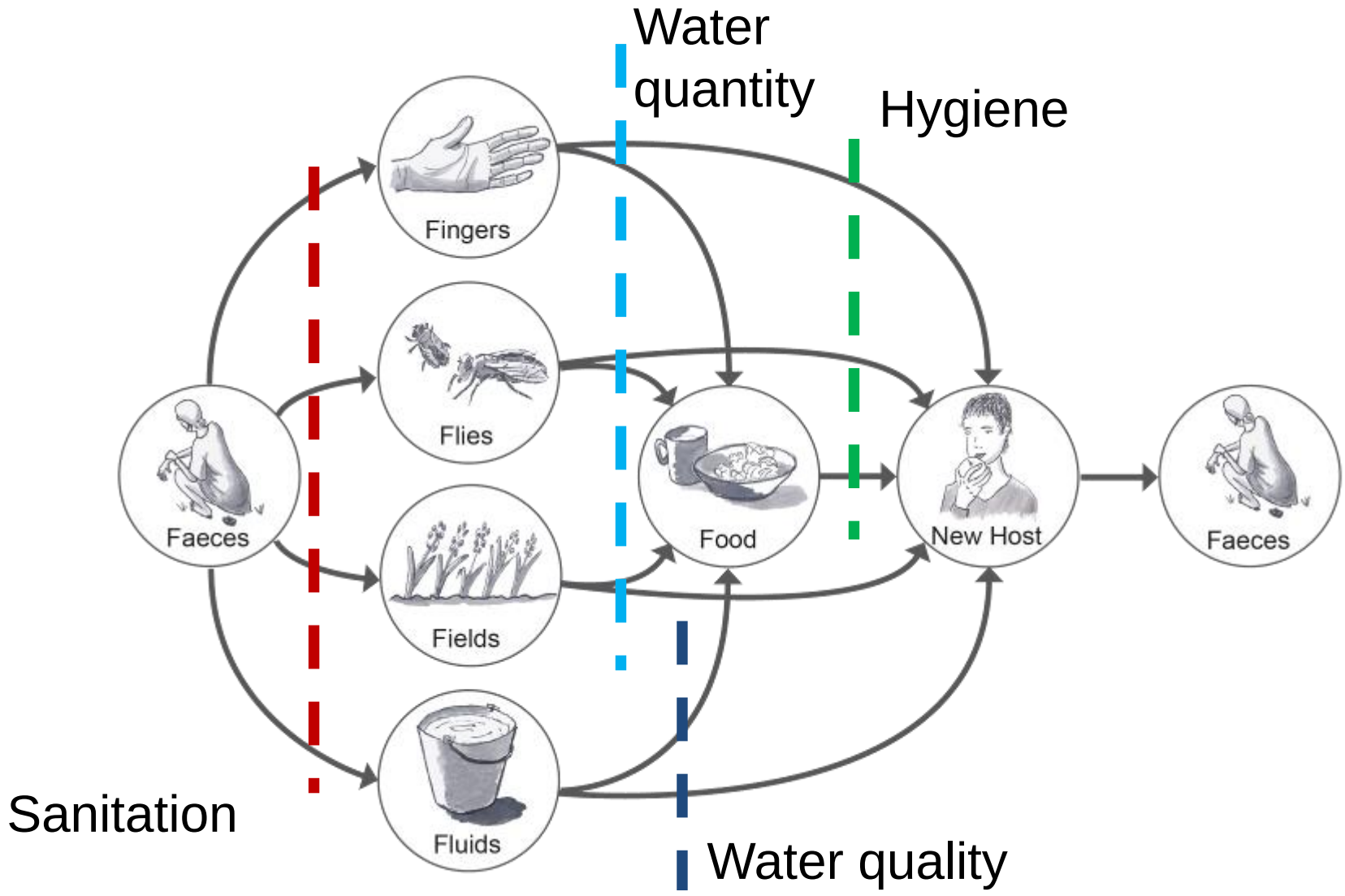
The tale of two boys: Emilio & “Juan”

Poutine!

The tale of two boys: Emilio & “Juan”



What are the main transmission routes?



F-Diagram: Faecal-oral transmission route

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The problem: drinking water.

Around 1.5 billion people (~20 % of world population) do not have access to a safe drinking water.

The problem: sanitaiton

The most vulnerable :

4 out of 10 (approximately 3 billion) people live surrounded by human shit

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Inadequate sanitation

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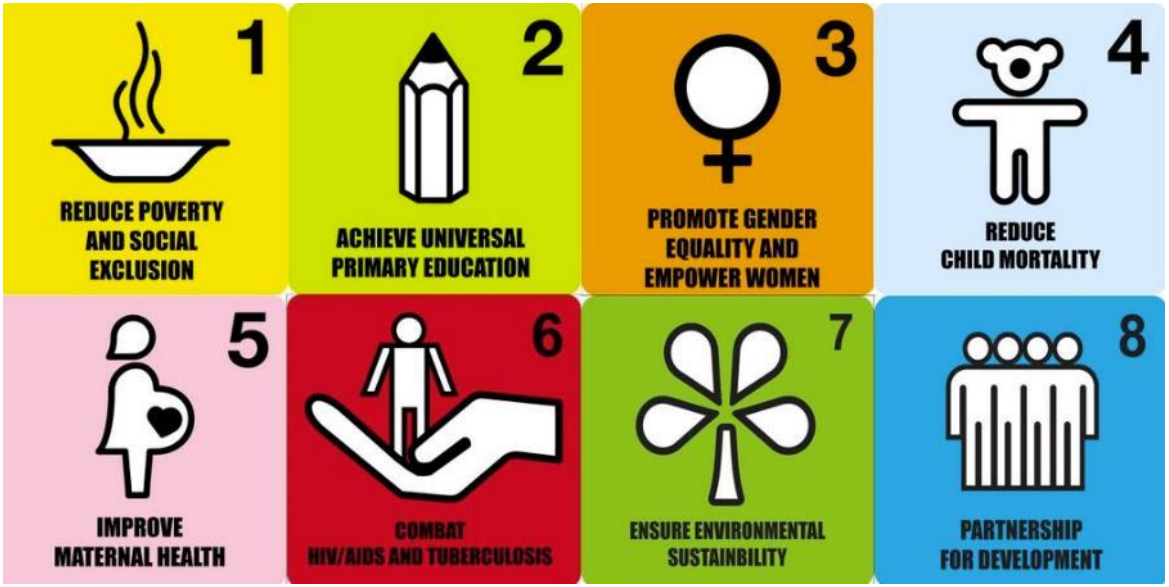
“Flying toilets”

Millenium Development Goals (MDGs)

Target 7.C – Halve, by 2015, the proportion of the population without sustainable **access to safe drinking water…**



What happened? The objective has been reportedly met (5 years in advance) with regard to water supply

What was considered as access to safe drinking water?




Improved drinking water source	**Unimproved drinking water source**
House connection	Unprotected spring
Public standpipe	Open water hole, rivers or ponds
Borehole	Vendor-provided water
Protected spring or dug well	Tanker truck water
Rainwater collection	Bottled water

Access to a technology

(WHO/Unicef 2004)

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Question…

Who washes their hands after using the toilet?

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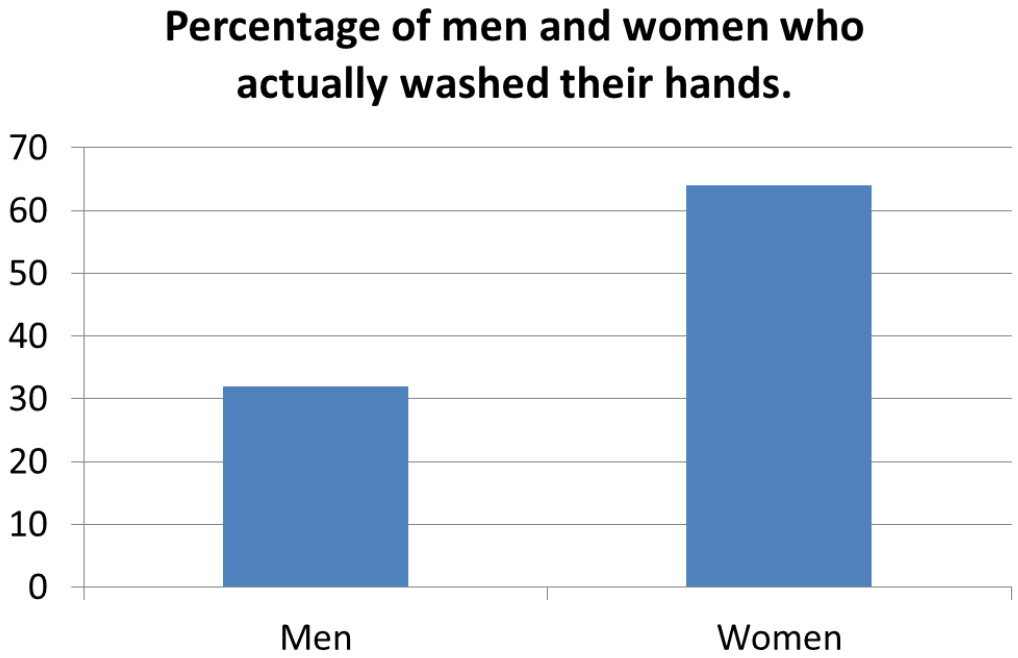
Self-reported vs. observations



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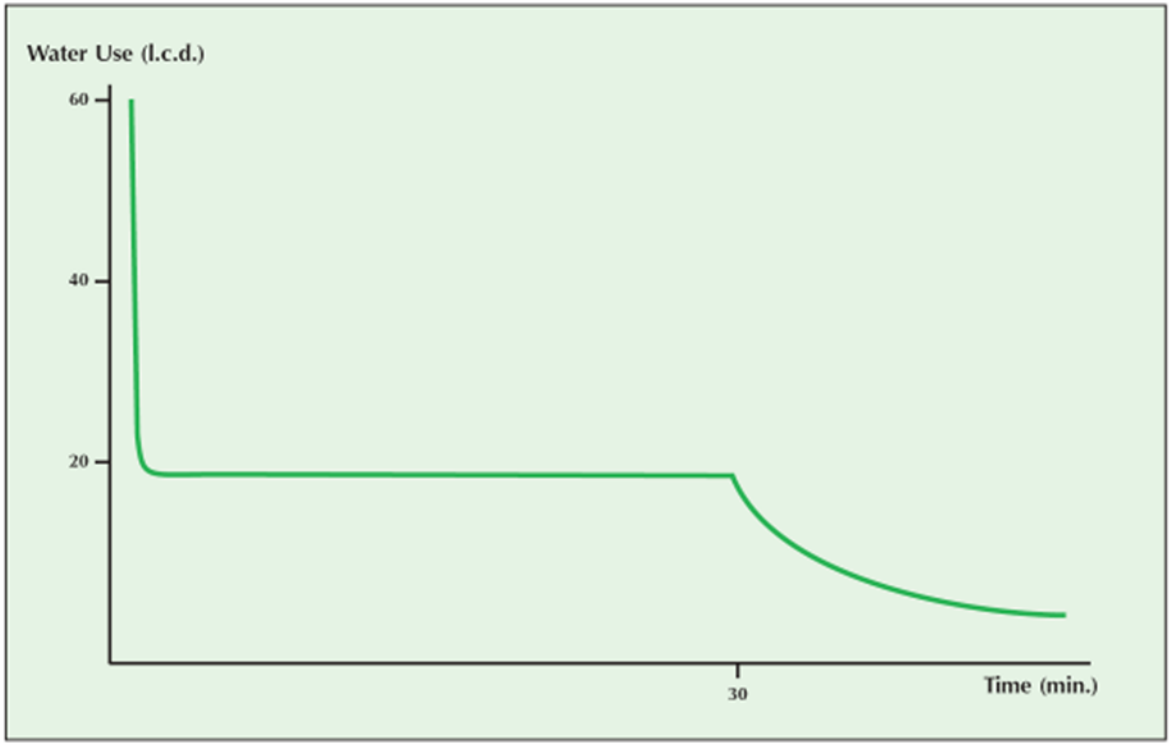
Issue…

- A considerable amount of data used was self-reported information from household surveys.
- What was the quality?
- Was it accessible?
- Was water even available?

What about accessibility: “Water plateau”

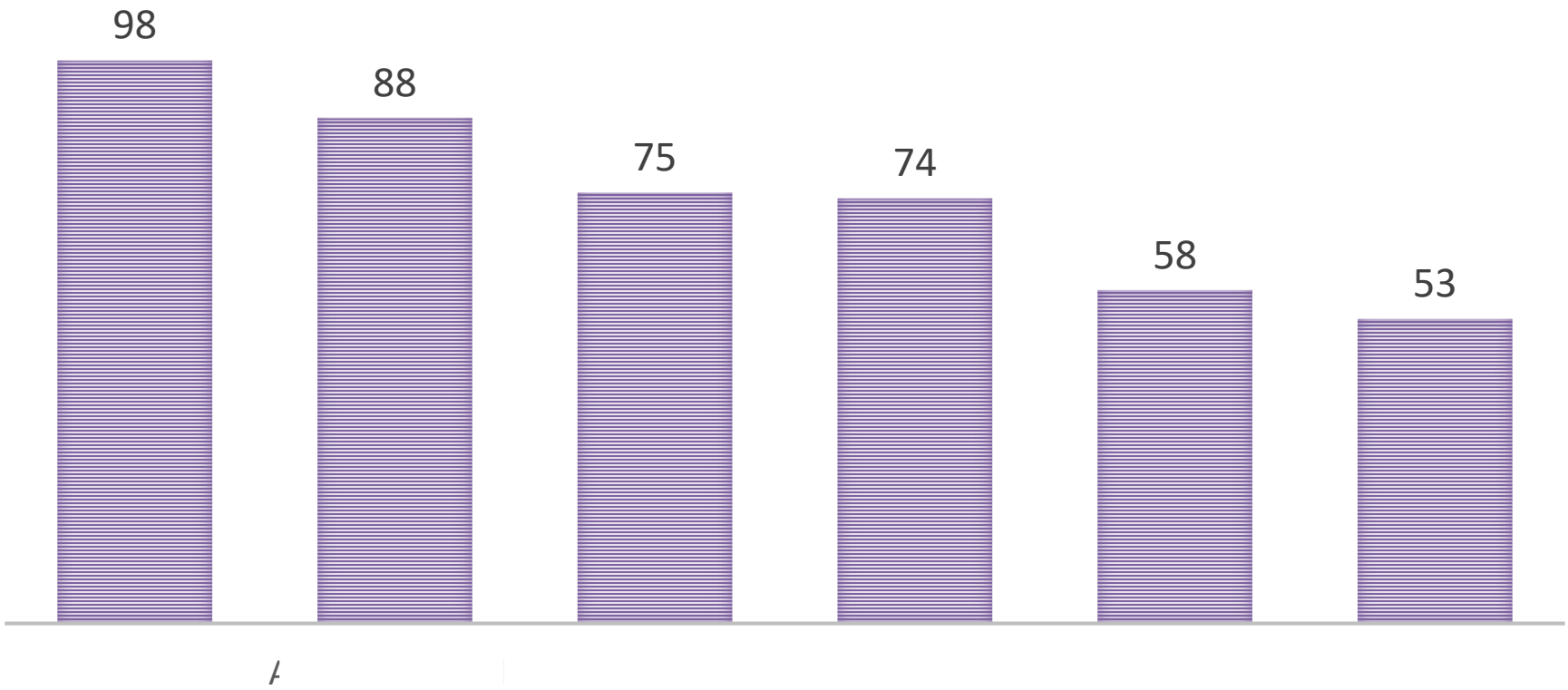
When criteria not fulfilled: people typically haul less water than they need to meet their basic requirements!



This is also self-reported… and we know what that means!

Cassivi et al. (2019)

Bangladesh: is an improved source enough?



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SDG target 6.1

"By 2030, achieve universal and equitable access to safe and affordable drinking water for all"

Metric:

Proportion of population using safely managed drinking water services

Safely managed drinking water services

Population using an improved drinking water source which is:

- located on premises, — Accessibility
- available when needed, and — Availability
- free of faecal and priority chemical contamination — Quality

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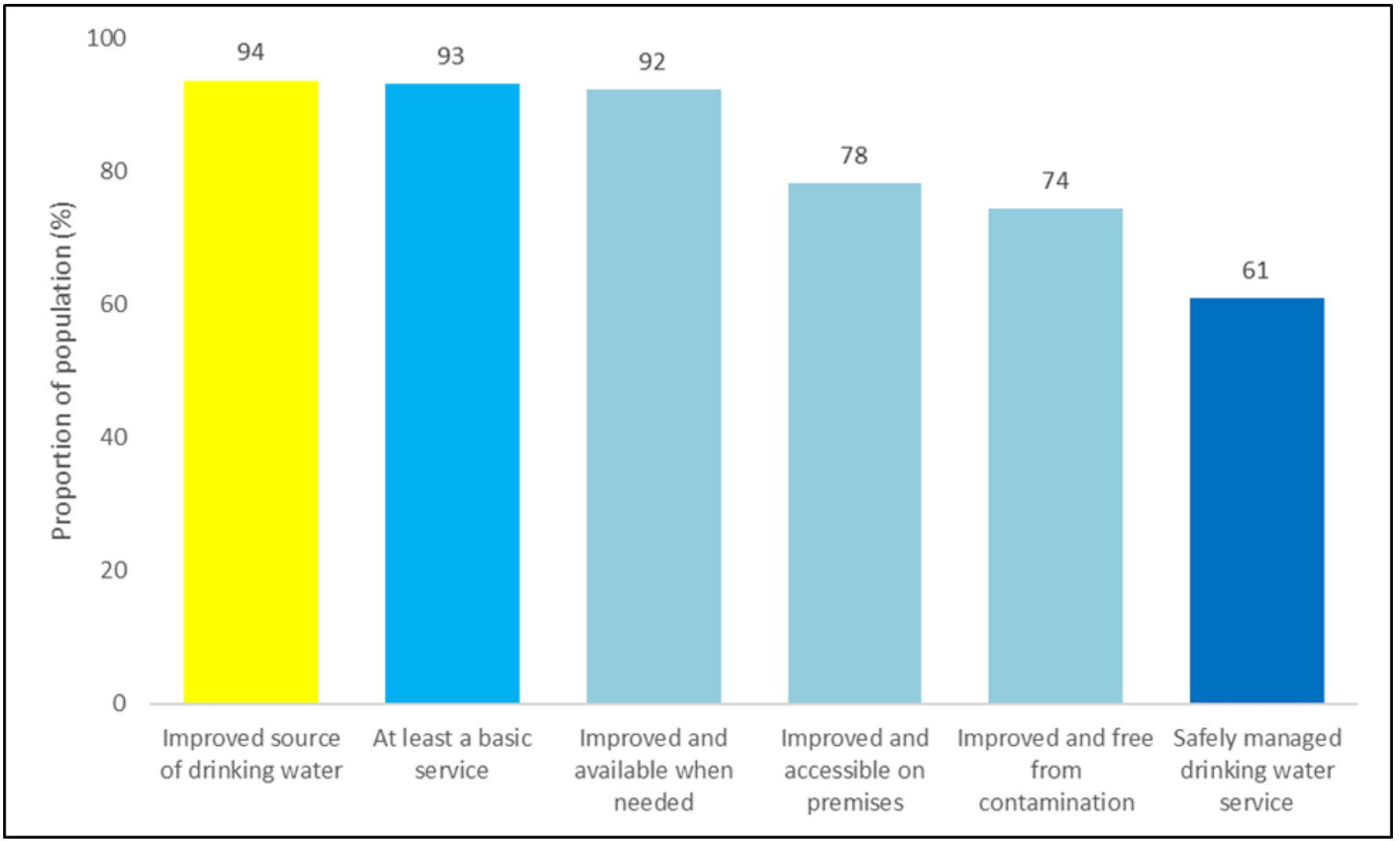

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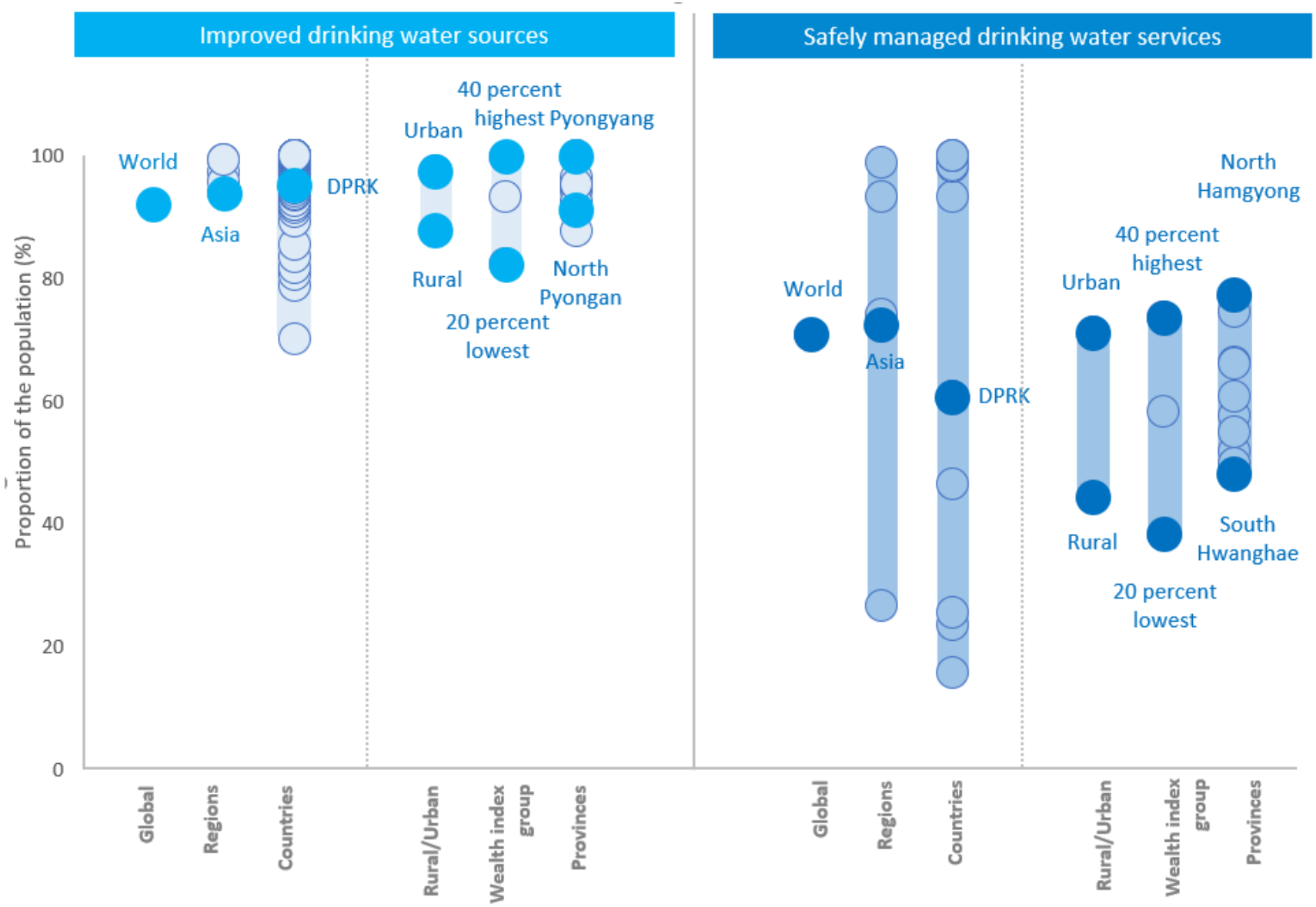
Results DPRK



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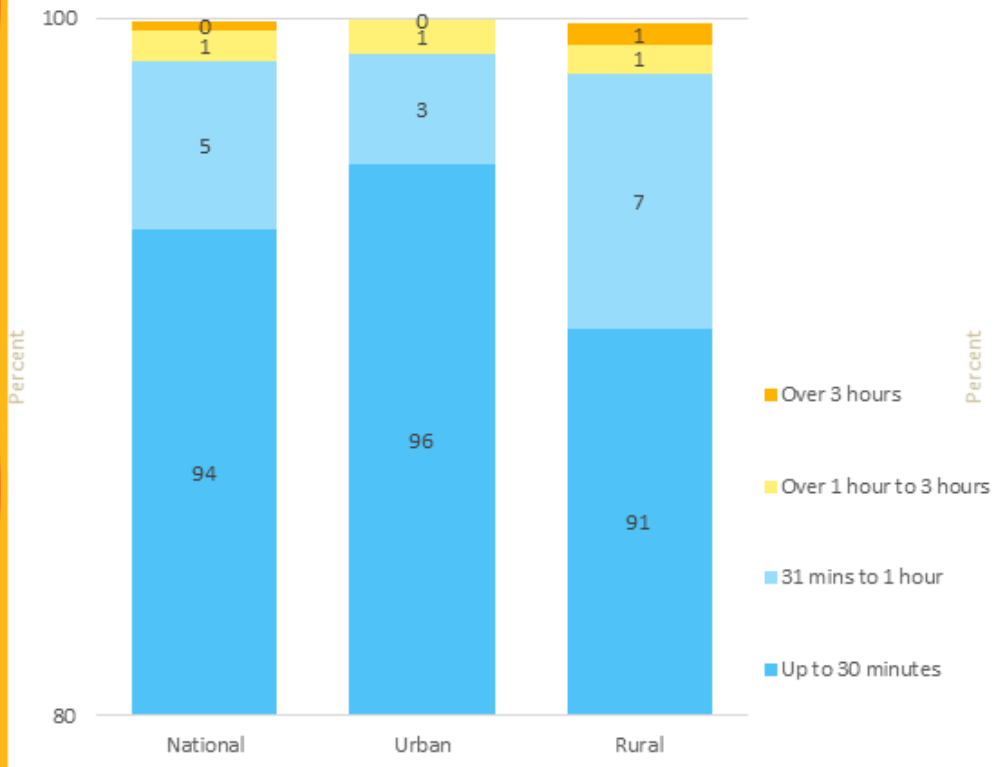
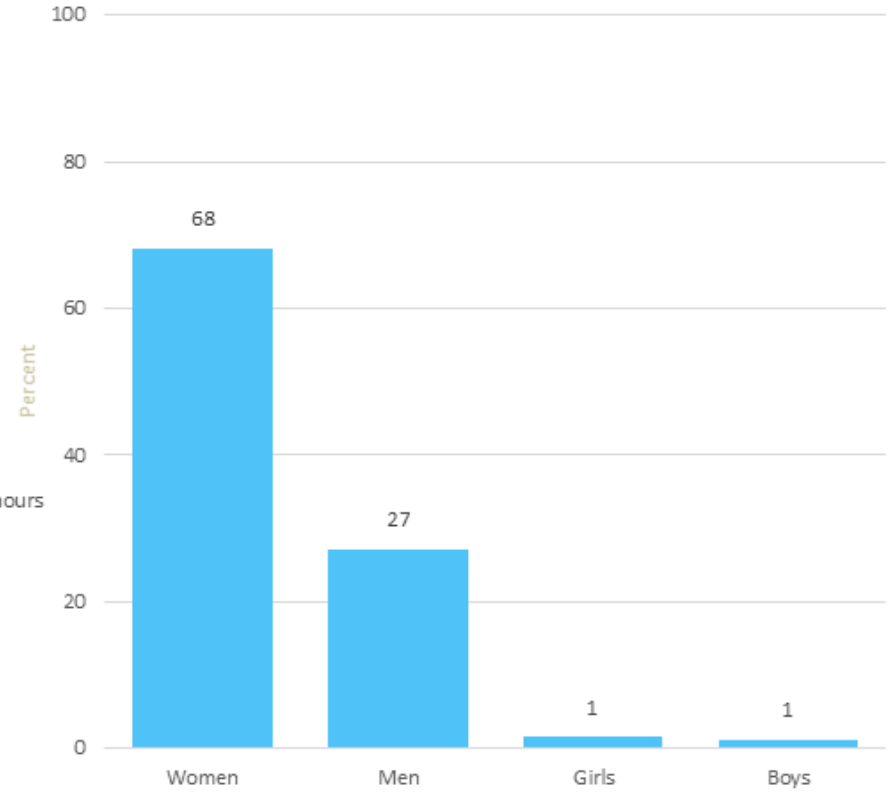
Time Spent Each Day Collecting Water



Who Primarily Collects Water for the Household



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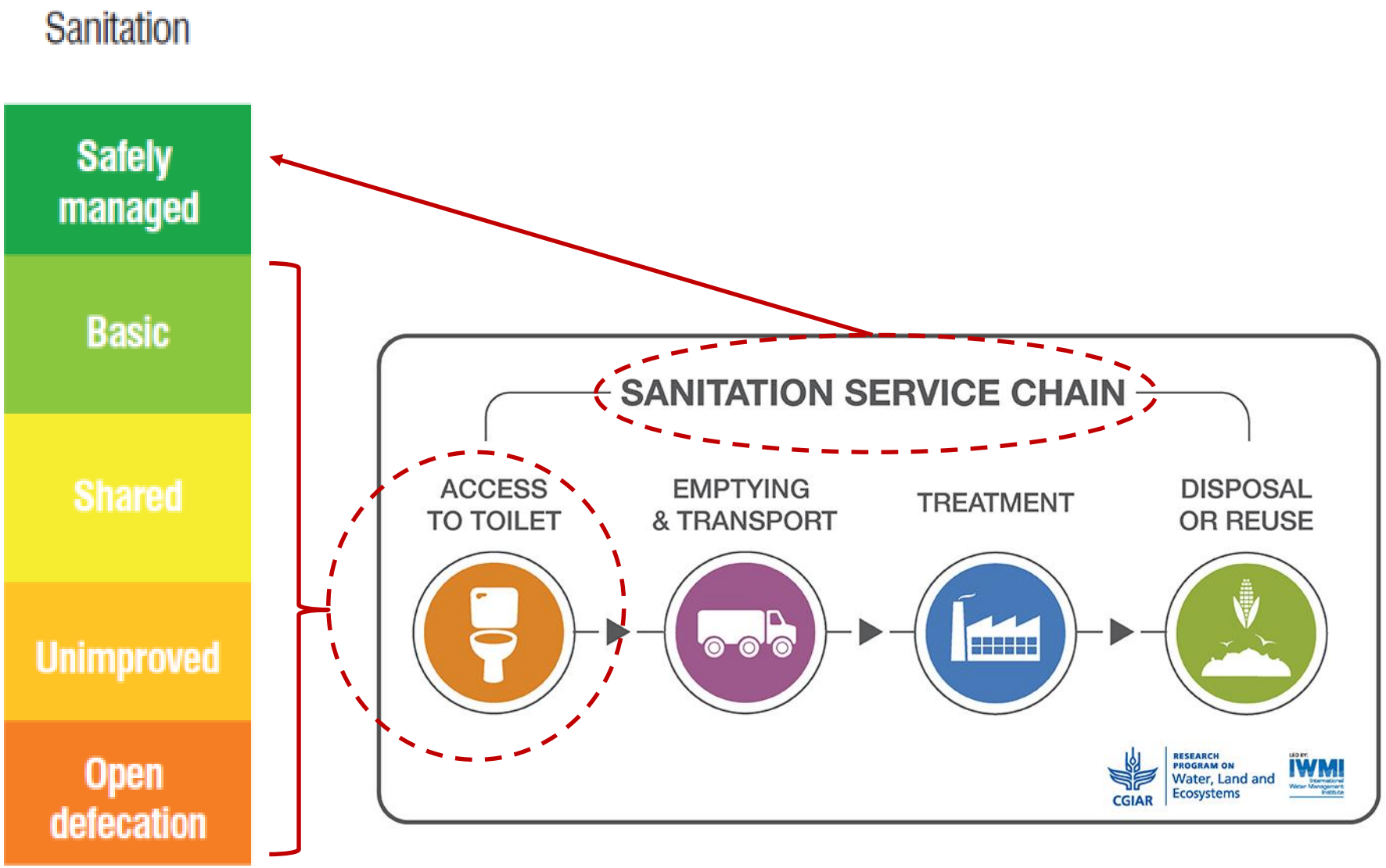
Safely managed sanitation services



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Faecal sludge management

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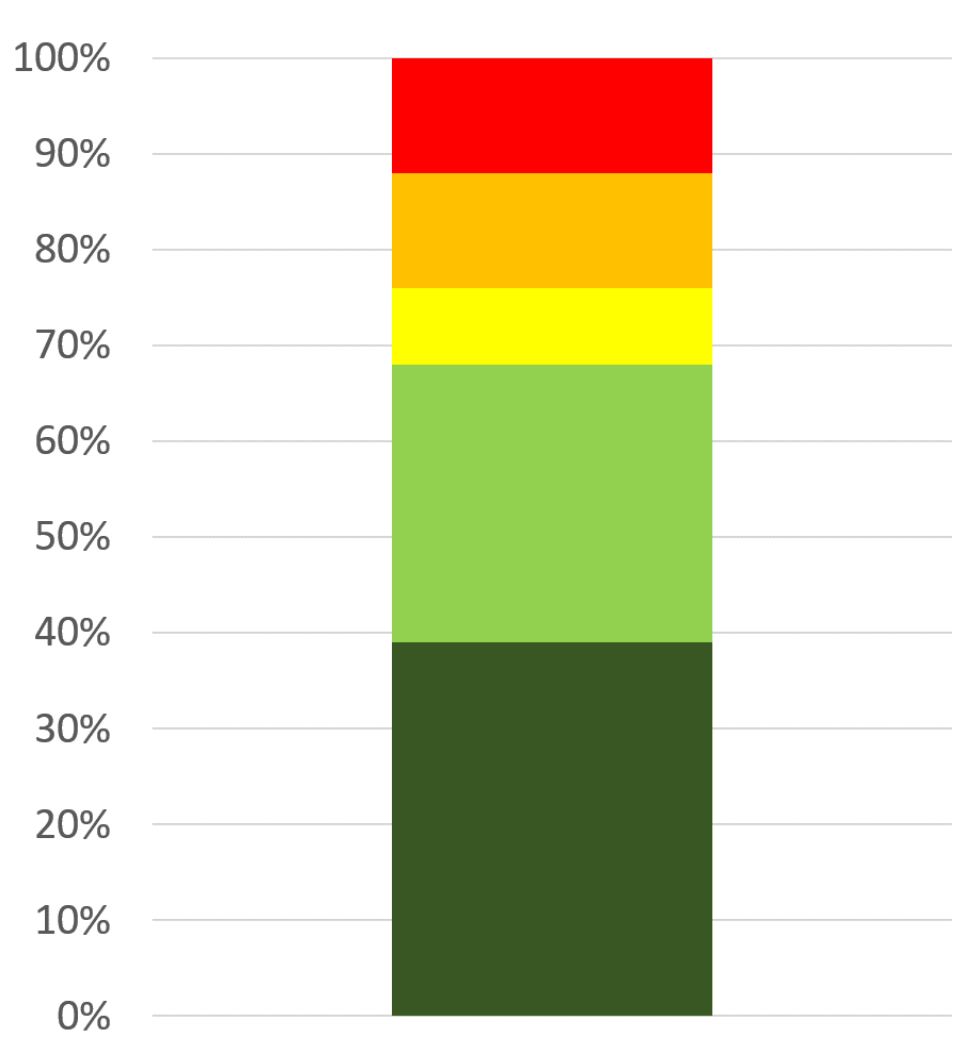
ACUTE demand for sanitation & waste treatment services

More than 60% of human excreta enters the environment without treatment



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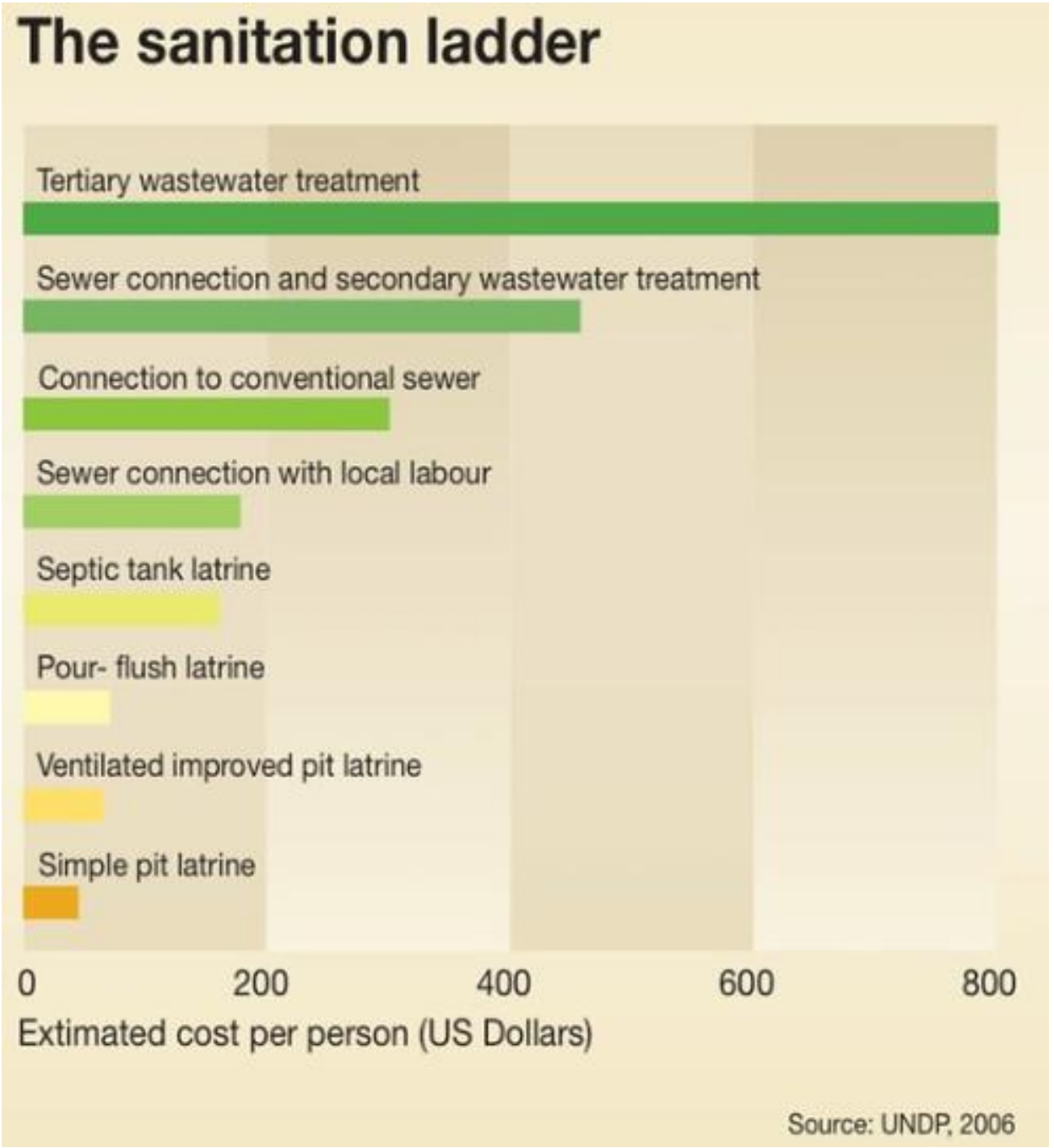
The sanitation ladder



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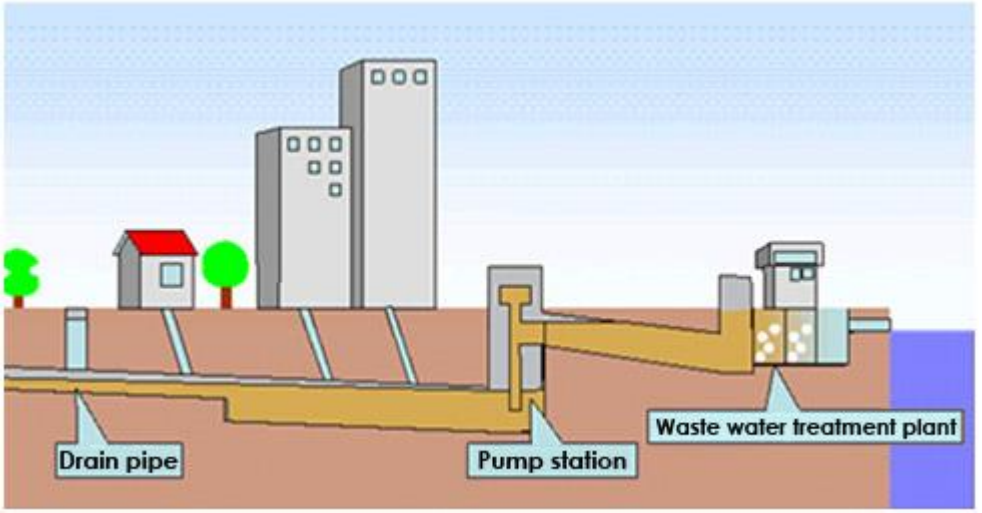
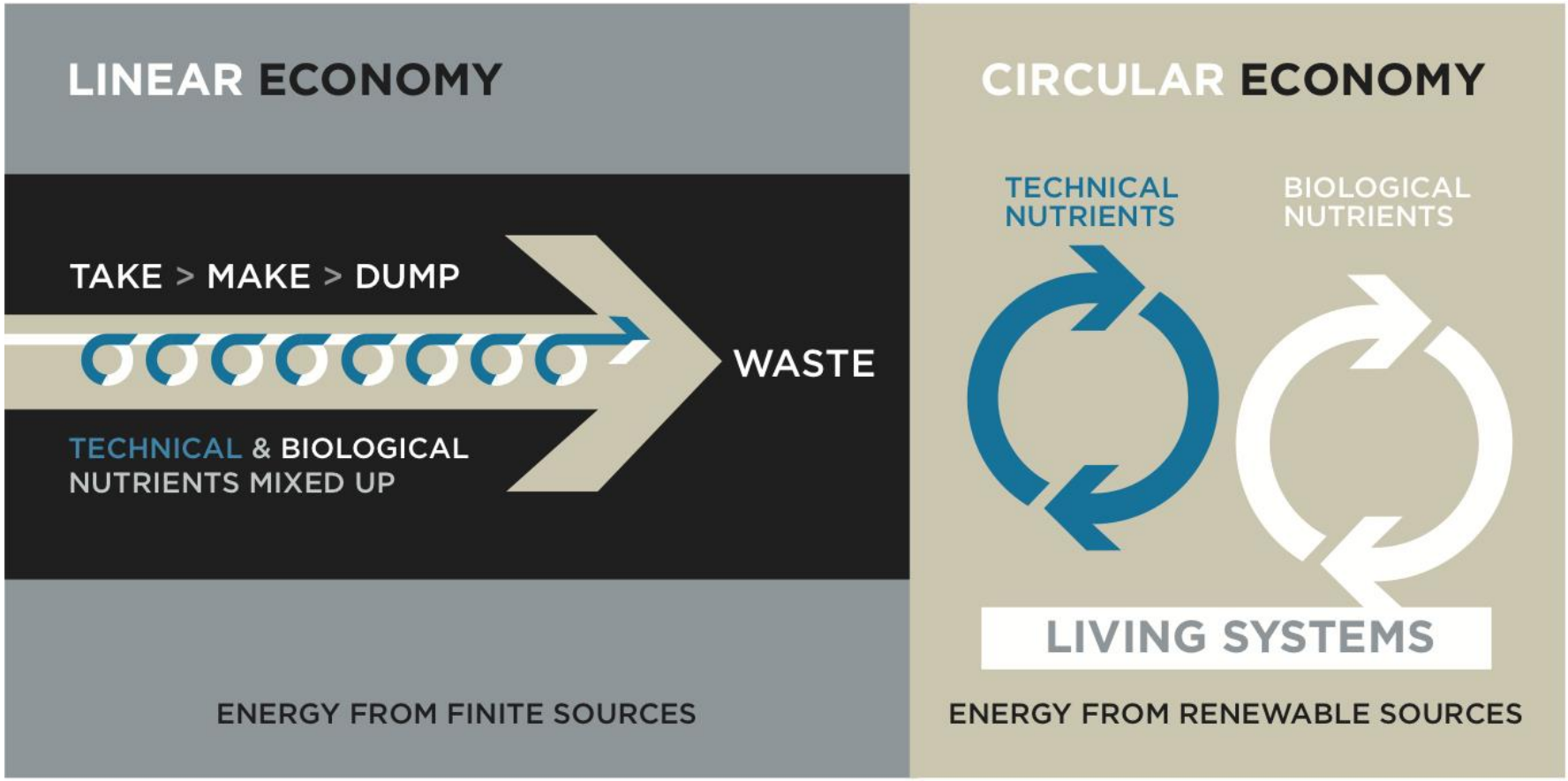
Is this really the best we can do?



Where are we on the spectrum?



AFTER W McDONOUGH AND M BRAUNGART

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There is a need for a

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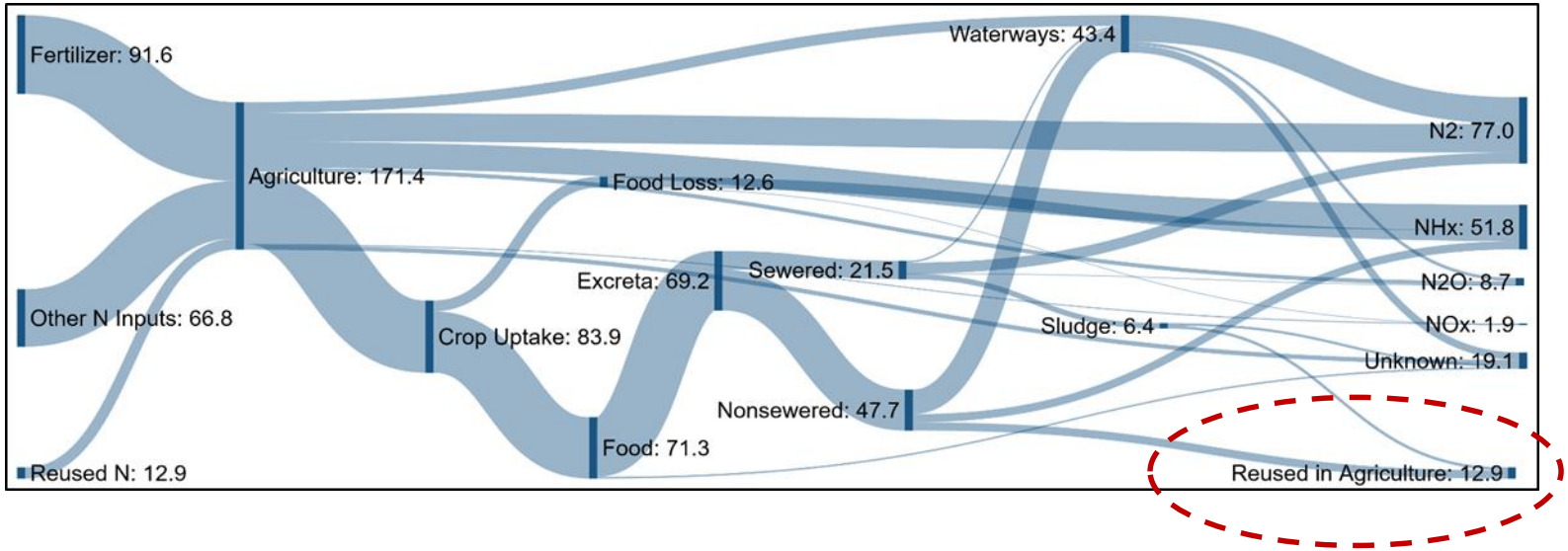
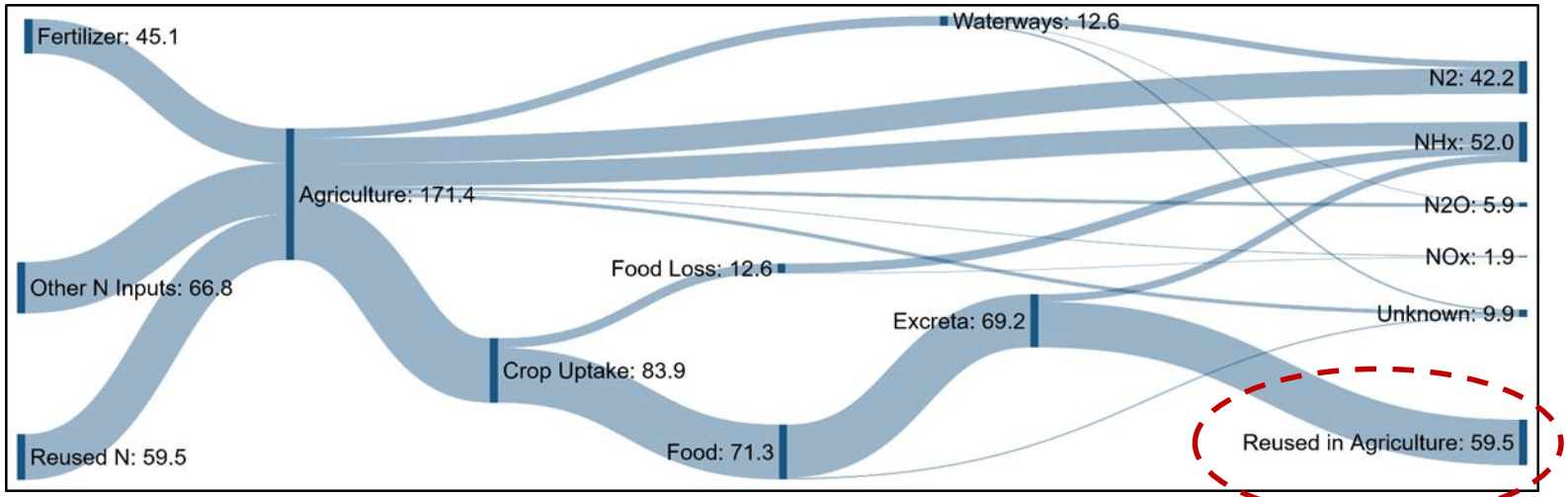
paradigm

Material flow analysis shows the potential for nutrient recovery from human “waste” (N)

Currently



Nitrogen recovery with composting



Remington (2019)

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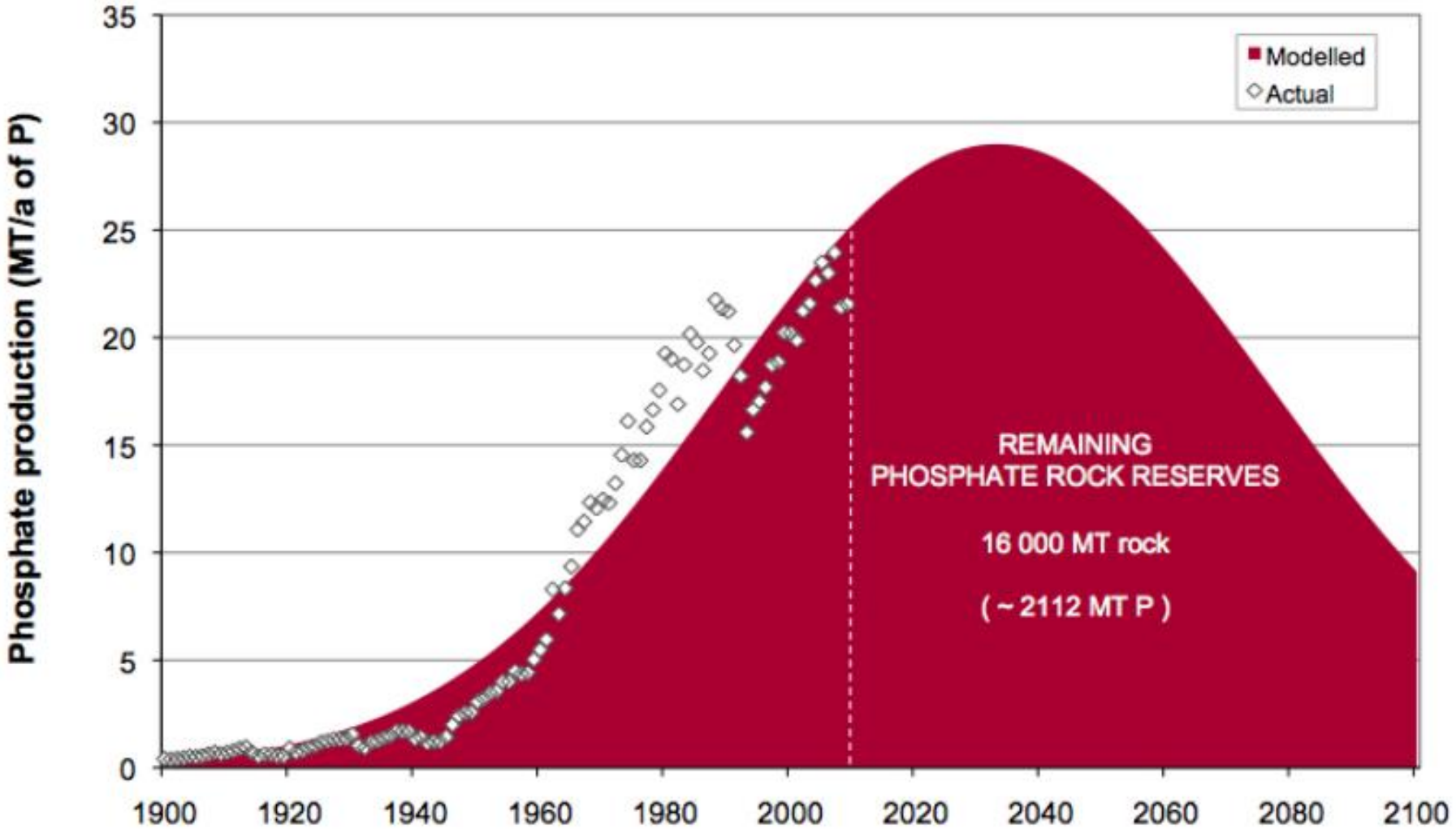
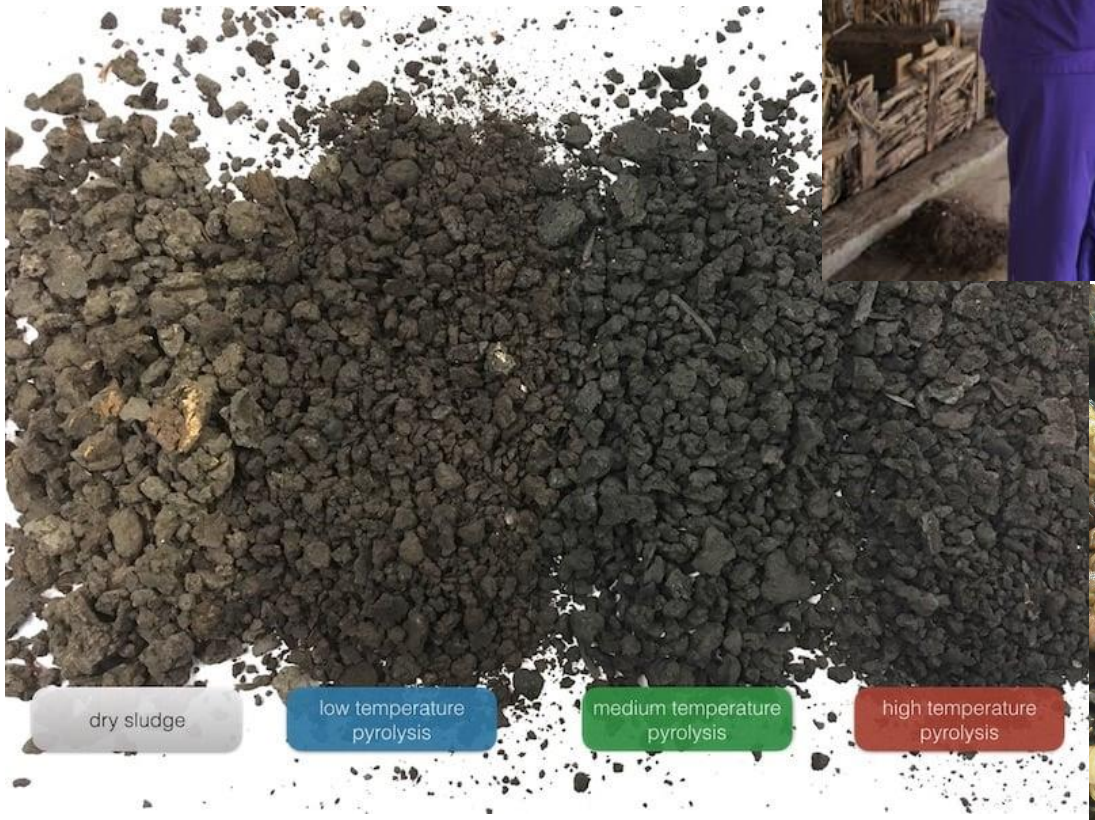
Peak phosphorus is projected to occur by 2040



Composting, biochar, black soldier fly larvae…



Does it make sense to continue with such a water intensive sanitation?

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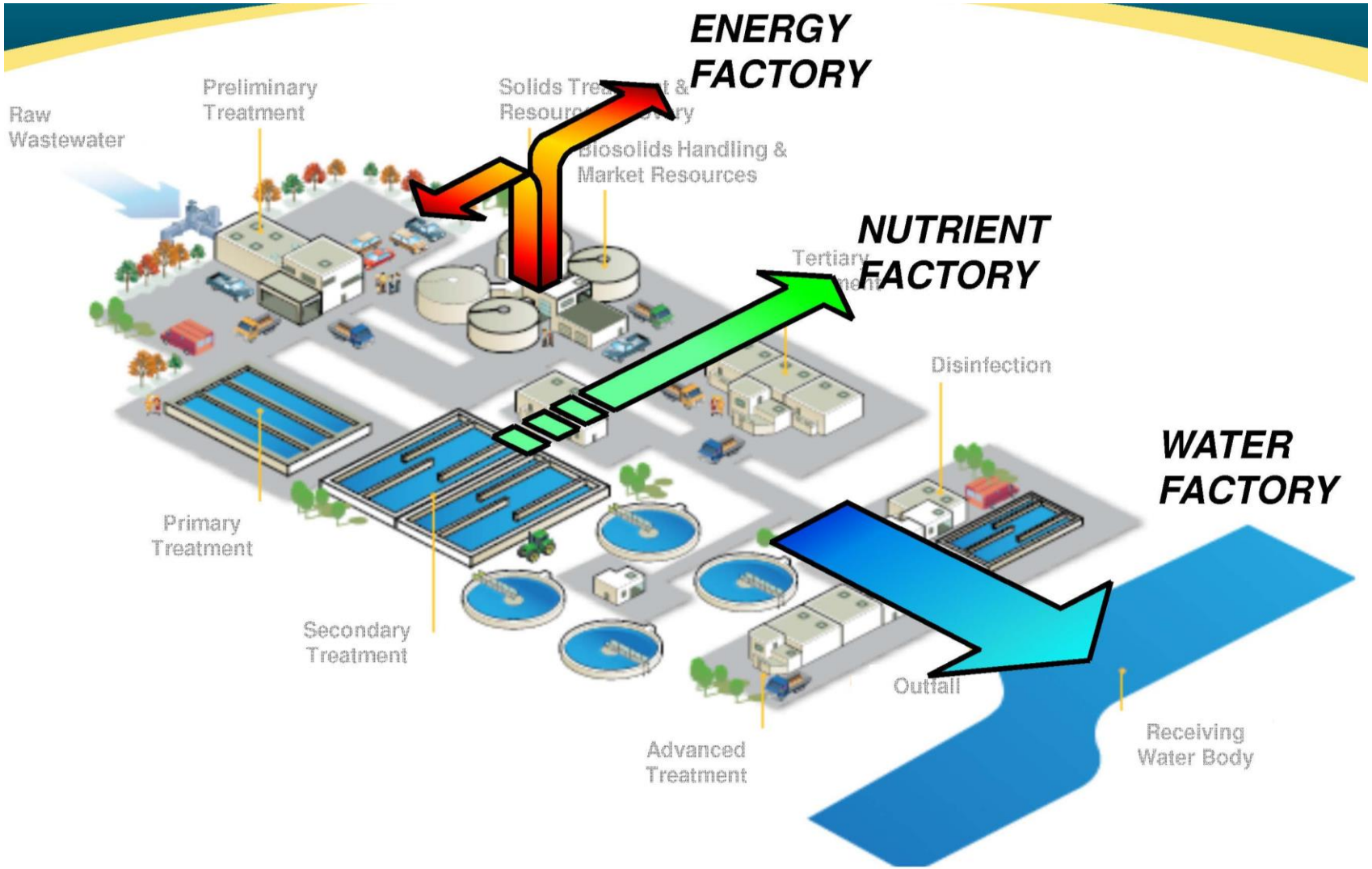

Is it time for the next sanitary (r)evolution?

600 BC 1800s 1900 2000

Cloaca maxima

Victorian sewers

Activated sludge

?

N.E.W. paradigm

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We no longer have the luxury of only addressing sanitation crisis through limited local perspectives!

Sanitation is intrinsically linked to many of the global issues we face.

Sustainable sanitation solutions are available and need to be rethought, adapted, and integrated to a circular economy.

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Thanks!

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