TOILET BOARD COALITION

INDIA IAPMO भारत

TOILET BOARD COALITION INDIA

Treated Faecal Sludge Compost for Non-food Applications

IAPMO – I TFSC – 01: 2022 (Standard)

With thanks to our leaders:

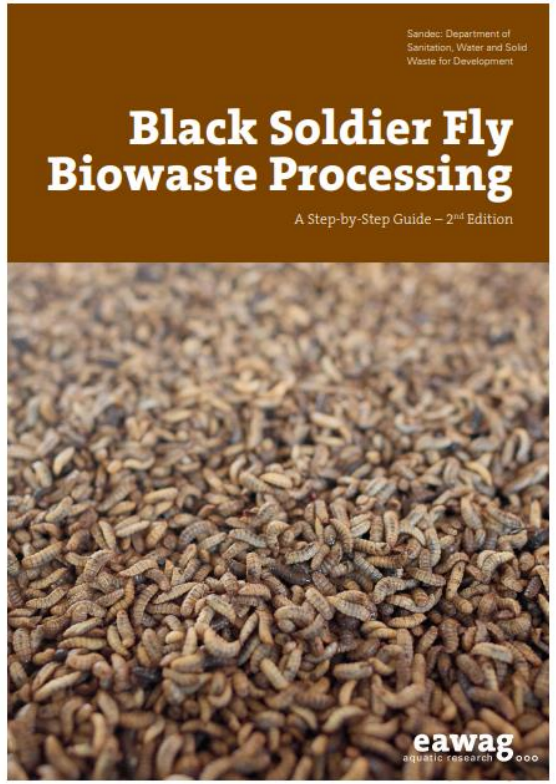
Unilever LIXIL ATHENA INFONOMICS Data Science for Development TÜV SÜD USAID FROM THE AMERICAN PEOPLE ADB

Standards and certifications of products from black soldier fly biowaste processing

Dr. Moritz Gold, ETH Zurich
Daniela Peguero, ETH Zurich & Eawag

SuSanA Webinar, World Toilet Day 2022
24 November 2022, online
Prof. Mathys, ETH, Sustainable Food Processing (SFP)
Prof. Christian Zurbrügg, Eawag/SLU

What is black soldier fly biowaste processing?



Eawag/Sandec, Practical knowhow on Black Soldier Fly (BSF) biowaste processing, www.sandec.ch/bsf

Fly larvae as animal feed

Live

Dried

Aquaculture

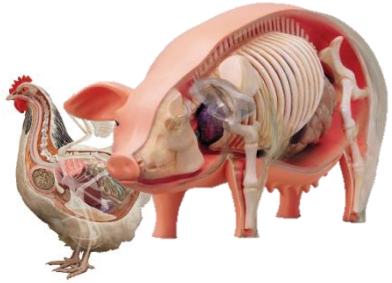
Chitin

Melanin

Pet food

Defatted protein meal

Fat/lipids



Livestock

Picture: Sirajuddin Kurniawan/Eawag,
Gold et al. *Waste Management* 82 (2018)
Images: Buhler AG, Dr. Andreas Baumann

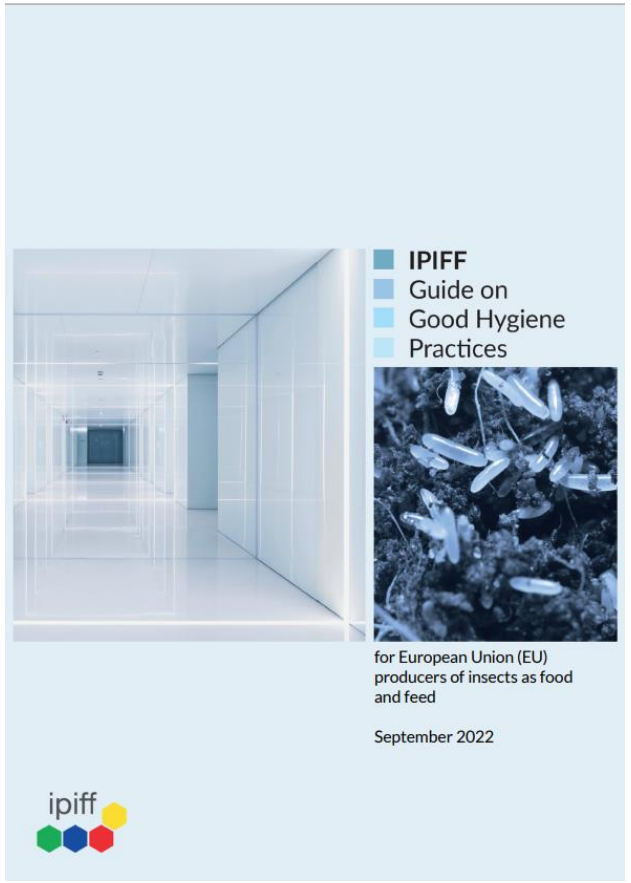
Fly larvae poop as compost and fertilizer

- Largest product in mass/volume
- Typically co-composted
- Other forms
  - Pelletized
  - Pyrolysed
  - Burned
  - Used for biogas production
- In EU: heat treatment (70°C, 1 h)

https://www.farmstar.co.ke

Europe – allowed feedstocks

- Harmonized regulation
- Fly larvae = farmed animal
- Larvae can only fed with feed for farmed animals
- No non-traceable byproducts, no post-consumer
- No meat or fish (even if pre-consumer)
- No manure, sludge, food or canteen waste



https://ipiff.org/good-hygiene-practices

Europe – allowed products and animals

Insects as feed - **Regulation (EU) No 68/2013** on the Catalogue of feed materials and in accordance **with Regulation (EC) No 999/2001 and Regulation (EC) No 1069/2009**	Ruminant animals	Aquaculture	Poultry	Pigs	Pets	Fur and other animals (e.g. zoo)	Technical uses(e.g. cosmetic industry, bio-based fuels, production of other bio-based materials such as bioplastics)
Insect proteins (under entry 9.4.1. 'Processed animal protein')	✗	✓ **	✓ **	✓ **	✓	✓	✓
Insect fats (under entry 9.2.1 'animal fat')	✓	✓	✓	✓	✓	✓	✓
Whole insects (untreated) (under entry 9.16.2. 'terrestrial invertebrates, dead')	✗	✗	✗	✗	✓ *	✓ *	✓
Whole insects (treated- e.g. Freeze drying) (under entry 9.16.2.'terrestrial invertebrates, dead')	✗	✗	✗	✗	✓ *	✓ *	✓
Live insects (under entry 9.16.1 'terrestrial invertebrates, live')	✗	✓ *	✓ *	✓ *	✓ *	✓ *	✓
Hydrolysed insect proteins (under entry 9.6.1. 'Hydrolysed animal proteins')	✓	✓	✓	✓	✓	✓	✓

https://ipiff.org/good-hygiene-practices

EC No 999/**2001**:
Banning animal proteins for animals

EU regulation **2017**/893:
Allowing animal proteins in aquaculture

EU regulation (EU) **2021**/1372:
Allowing animal proteins in for pigs and poultry

GMP+ product certification scheme

- World`s largest animal feed certification scheme
- GMP = Good manufacturing practices
- + = HACCP (Hazard Analysis and Critical Control Points)
- Based on EU regulation

Guidance

S9.41 - Insects in feed

Version EN: 1 July 2022

https://www.gmpplus.org

Africa

- Development currently underway
- Examples: Uganda, Kenya, Tanzania, Malawi
- Uganda and Kenya
  - Specifying nutritional composition of products
  - Maximum permissible concentration (microbial, heavy metals, aflatoxins)
- Typically, no limitation on feedstock choice (for local markets), including manure, faeces and faecal sludge

Alagappan, S. et al. *Journal of Insects as Food and Feed* (2022)
Nakimbugwe, D. et al. *Critical Reviews in Food Science and Nutrition* (2020)
Uganda: US 2146:2020 and US 1712:2017; Kenya: 2711:2017, DKS 2921:2020

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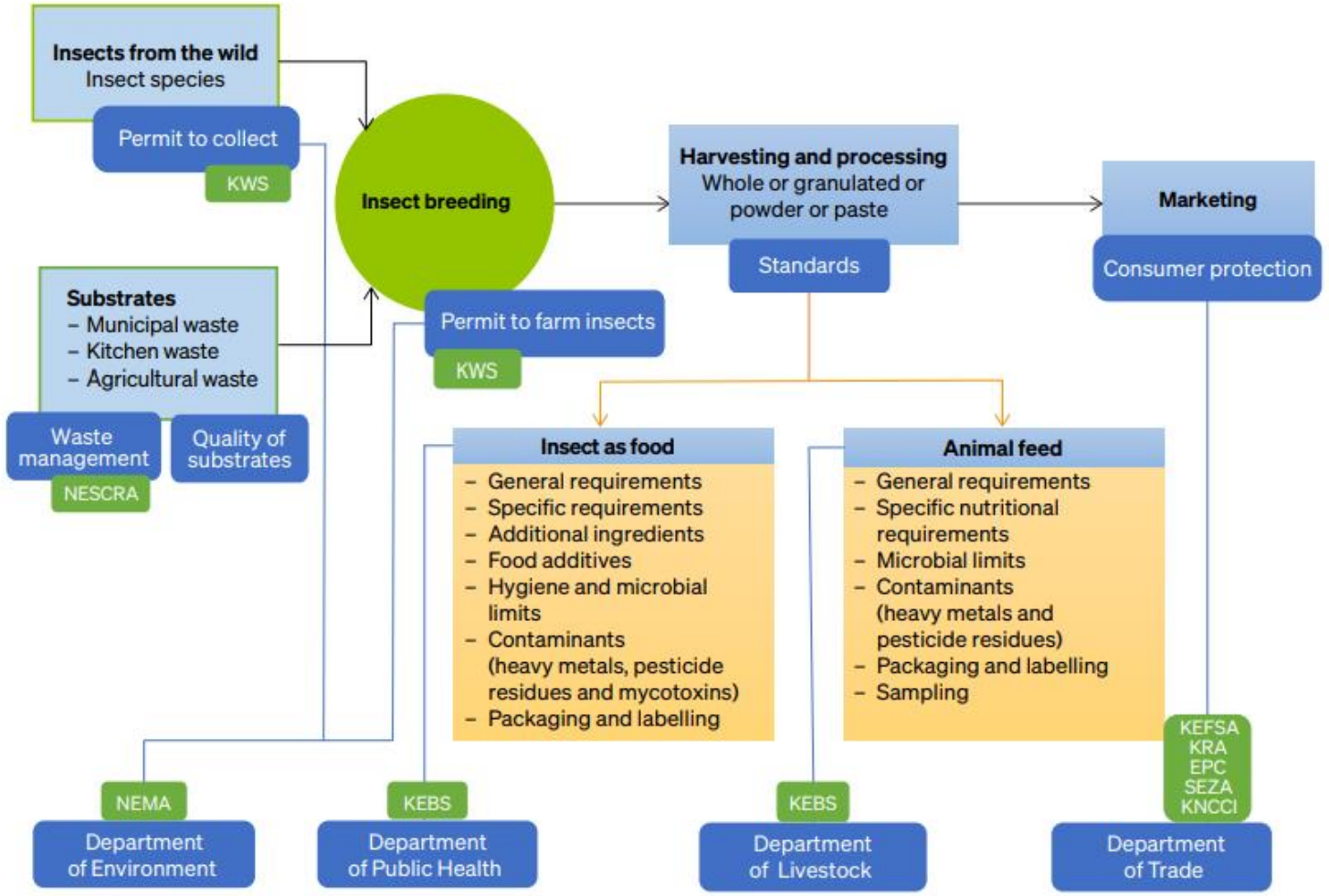
Regulation of the insect production chain in Kenya



EPC: Export Promotion Council
KEBS: Kenya Bureau of Standards
KEFSA: Kenya Food Safety Authority
KNCCI: Kenya National Chamber of Commerce and Industry

KRA: Kenya Revenue Authority
KWS: Kenya Wildlife Service
NEMA: National Environment Management Authority

NESCRA: National Environmental Sanitation Coordinating and Regulatory Authority
SEZA: Special Economic Zones Authority

Niassy, S. et al. *Revue scientifique et technique (International Office of Epizootics)* 1 (2022)

ETH zürich eawag aquatic research Sandec Sanitation, Water and Solid Waste for Development icipe

Asia

- Frequently no insect-specific legislation
- In some countries can be reared on non-traceable pre- and post-consumer food wastes as well as wastewater sludge
- Several large companies produce based on EU standards
- Singapore developed own legislation (including import)
  - Food waste allowed
  - Manure and materials of ruminant origin not allowed

AFFIA
ASIAN FOOD AND FEED INSECT ASSOCIATION

Lähteenmäki-Uutela et al. *Journal of Insects as Food and Feed* (2021)
Singapore Food Agency (2022)

Summary

- Products from black soldier fly biowaste treatment
  - Larval-based products → animal feed
  - Frass → compost/fertilizer

- For frass, compost/fertilizer standards/certifications exist

- Insects not part of global animal feed standards such as the Codex Alimentarius Commission or the World Organisation for Animal Health (WOAH)

- Insect-specific legislation varies globally, currently in development

- Larval from biowastes require thorough heat treatment and product safety analysis

Thank you!

Questions?

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www.sandec.ch

SUSTAINABLE **FOOD** PROCESSING

eawag aquatic research

Sandec
Sanitation, Water and
Solid Waste for Development

References

Niassy, S., E. R. Omuse, N. Roos, A. Halloran, J. Eilenberg, J. P. Egonyu, C. Tanga et al. "Safety, regulatory and environmental issues related to breeding and international trade of edible insects in Africa." *Revue scientifique et technique (International Office of Epizootics)* 41, no. 1 (2022): 117-131.

Alagappan, S., Rowland, D., Barwell, R., Mantilla, S. M. O., Mikkelsen, D., James, P., Yarger, O., & Hoffman, L. C. (2022). Legislative landscape of black soldier fly (Hermetia illucens) as feed. *Journal of Insects as Food and Feed*, *8*(4), 343–355.

Nakimbugwe, D., Ssepuuya, G., Male, D., Lutwama, V., Mukisa, I. M., & Fiaboe, K. K. M. (2020). Status of the regulatory environment for utilization of insects as food and feed in Sub-Saharan Africa-a review. *Critical Reviews in Food Science and Nutrition*, *61*(9), 1–10.

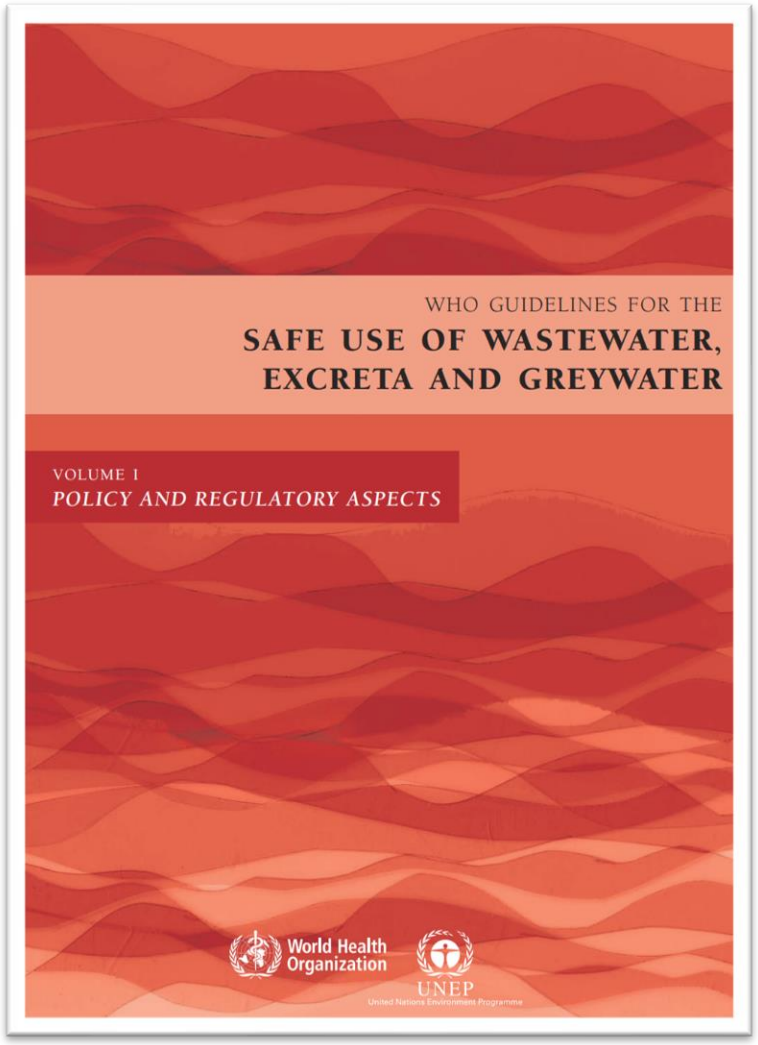
Lähteenmäki-Uutela, A., Marimuthu, S. ., & Meijer, N. (2021). Regulations on insects as food and feed: a global comparison. *Journal of Insects as Food and Feed*, *7*(5), 849–856.

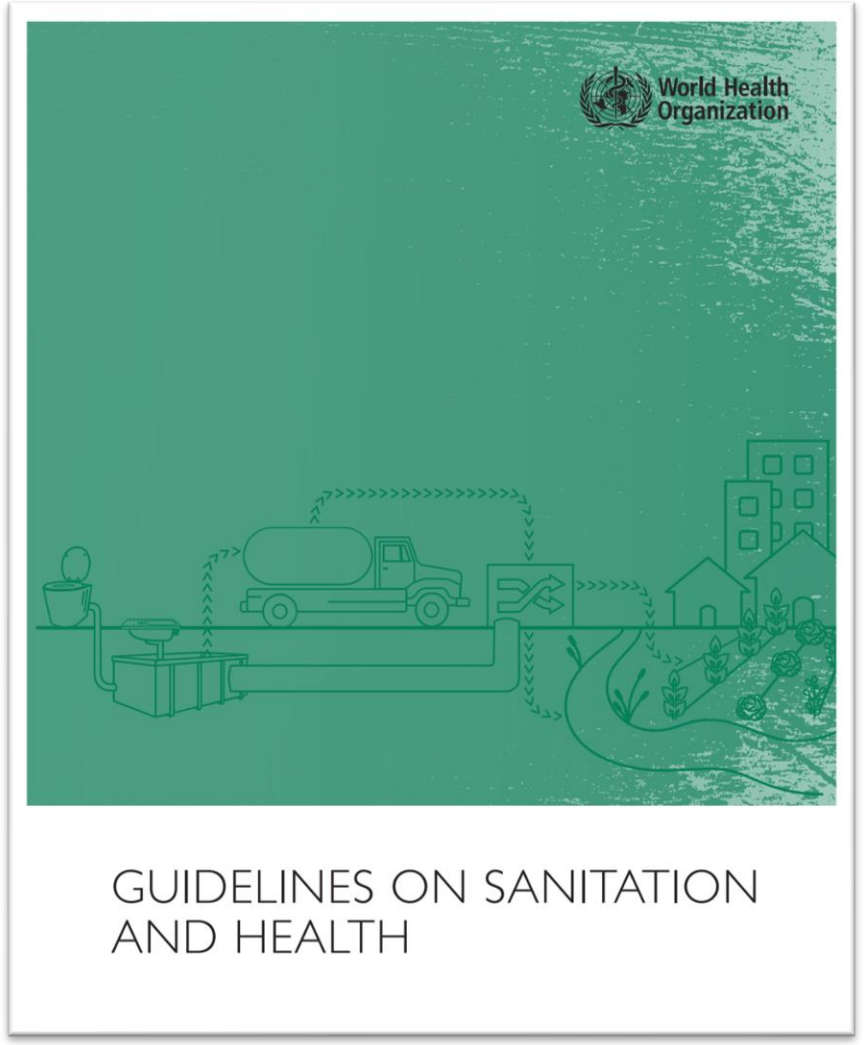
Singapore Food Agency Consultation on regulation of insect and insect products (importants and locally farmed/processed) (2022): https://www.sfa.gov.sg/docs/default-source/default-document-library/consultation-on-regulation-of-insect-and-insect-products.pdf

Risk-based regulation, management, monitoring and investment - from toilet to farm

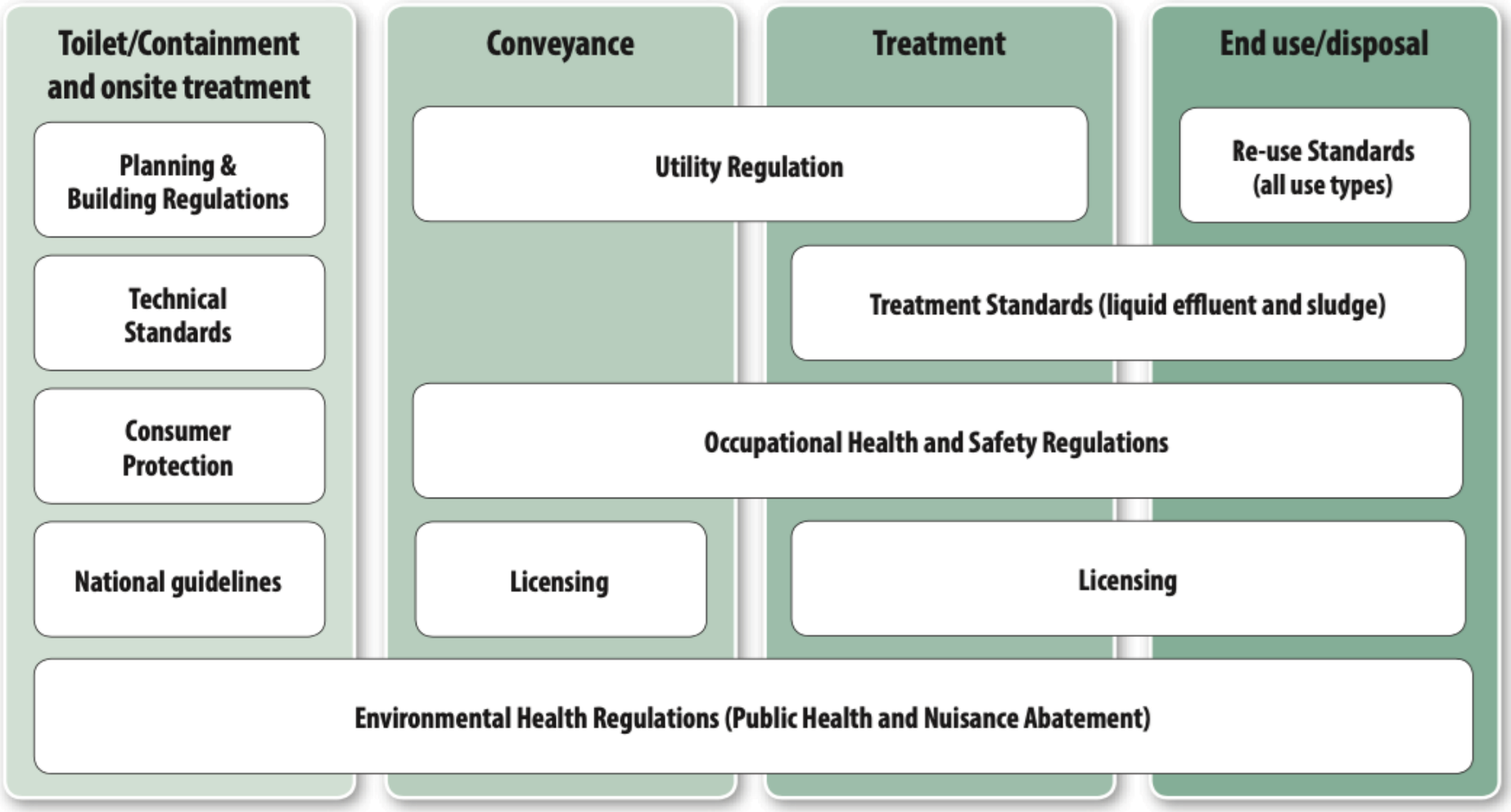
Kate Medlicott
Sanitation Team Lead – World Health Organization

Background - 2 points of departure





National level – regulations



Key Challenge: Who's responsible?

- Where are there gaps and overlaps in mandates for SMS regulation along the chain?
- What are the accountability mechanisms for service providers?

Risk-based implementation approach

Sanitation Safety Planning

- Step-by-step approach for local risk assessment and management along the entire sanitation chain.
- Identify and prioritize highest health risks to inform system improvements via a mix of controls.
- SSP manual 2nd edition (2022) – incorporate lessons learnt from SSP projects in >25 countries, cover the entire chain (not only end use), simplified process, include climate risks

Objectives

- Guide efforts to where it will have most impact
- Help coordinate efforts among stakeholders along the entire sanitation chain

Target audience

- Local authorities: help coordinate, plan improvements, and monitor services in an administrative area
- Sanitation service providers: help manage service quality, and provide assurances to local authorities and regulators
- **Public health regulators: help identify and verify effectiveness of risk-based regulatory measures applied to local authorities and service providers**

6 steps – at a glance

Guidance notes and examples

Get further information on key concepts and their application in examples and real-world cases for each module

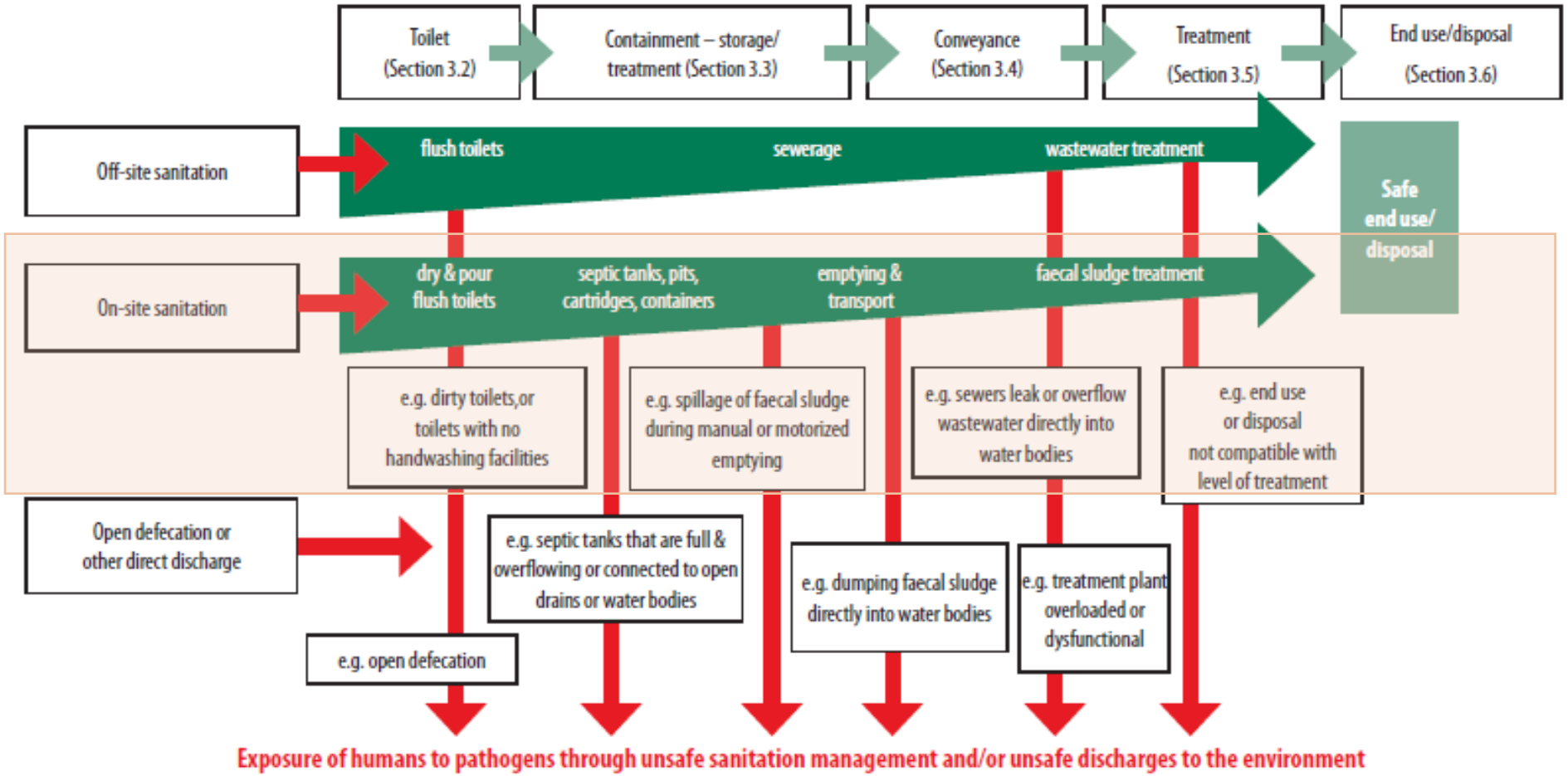
Tools

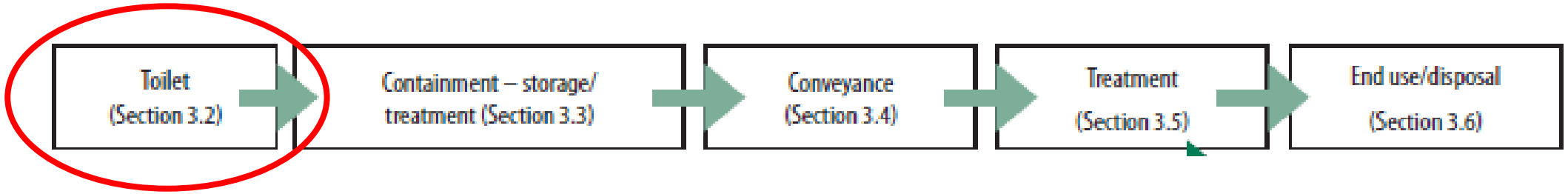
Get a quick start for a first SSP by using the templates provided, adapting them to your local context.

Worked example

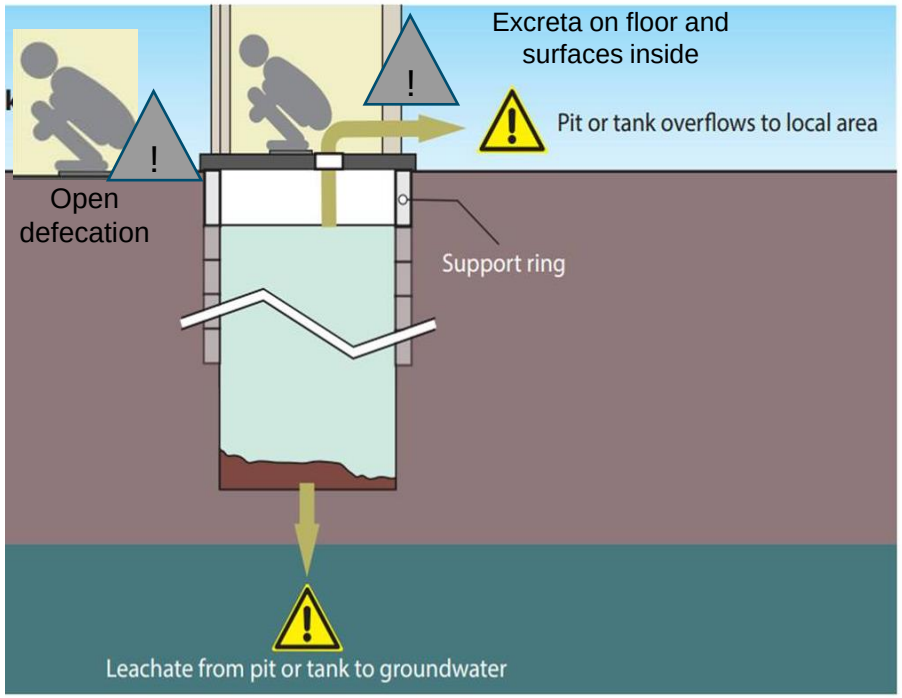
Follow a full worked example from the start to finish of the SSP process using tools and with decision points along the way explained.

Minimizing risks at each step of the sanitation chain





Typical risks

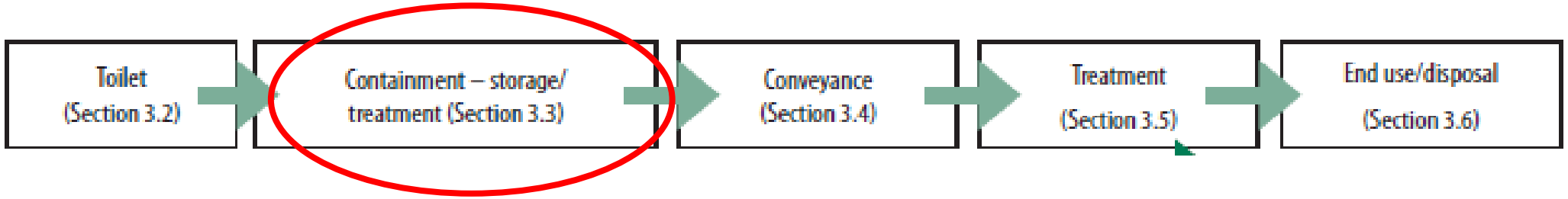


Example controls
(behavior, design, management, oversight/regulation)

- Toilet use – behavior change rooted in local determinants
- Supply of a range of safe toilet options meeting minimum standards (and matched to culture, economy and environment)
- Routine cleaning maintenance

Monitoring
(Operation and verification)

- Periodic sanitary inspection by local govt



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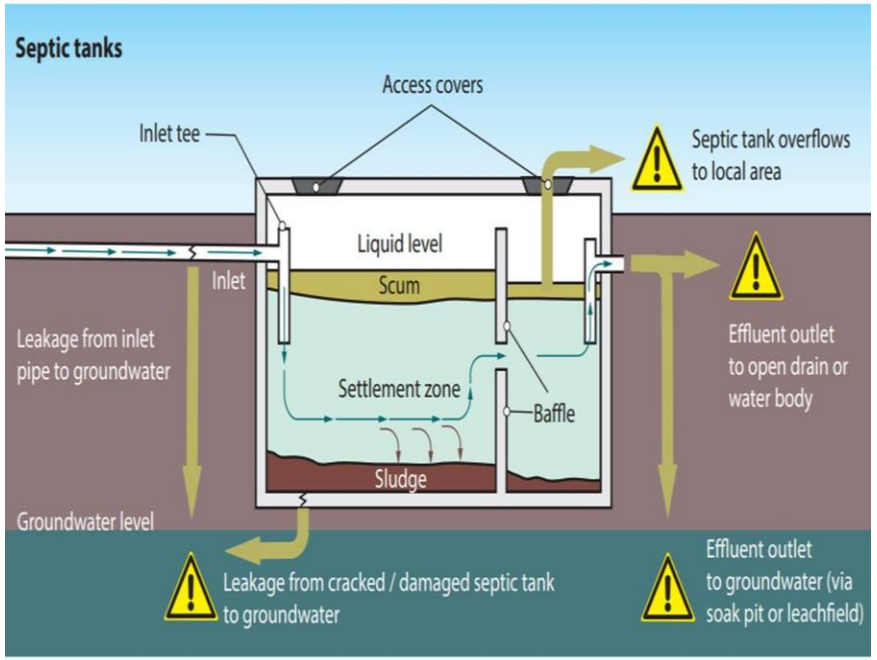


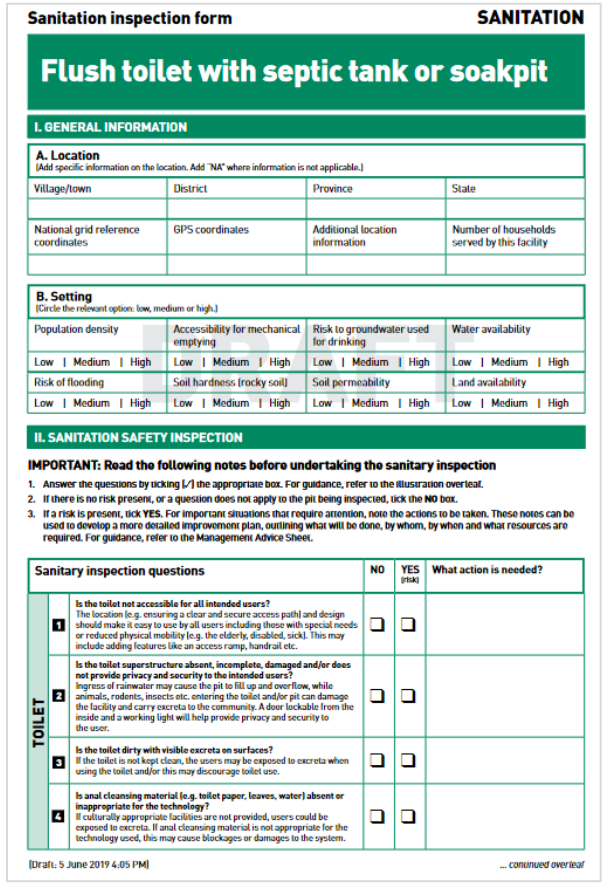
Example controls
(behavior, design, management, oversight/regulation)

- Design standards for technologies
- Training of masons to consistently meet standard
- Quality control on installation

Monitoring
(Operation and verification)

- Periodic sanitary inspection by local govt

Sanitary inspection forms for sanitation systems



Sanitation inspection form — SANITATION

Flush toilet with septic tank or soakpit

I. GENERAL INFORMATION

A. Location
(Add specific information on the location. Add "NA" where information is not applicable.)

Village/town	District	Province	State
National grid reference coordinates	GPS coordinates	Additional location information	Number of households served by this facility

B. Setting
(Circle the relevant option: low, medium or high.)

Population density	Accessibility for mechanical emptying	Risk to groundwater used for drinking	Water availability
Low | Medium | High	Low | Medium | High	Low | Medium | High	Low | Medium | High
Risk of flooding	Soil hardness (rocky soil)	Soil permeability	Land availability
Low | Medium | High	Low | Medium | High	Low | Medium | High	Low | Medium | High

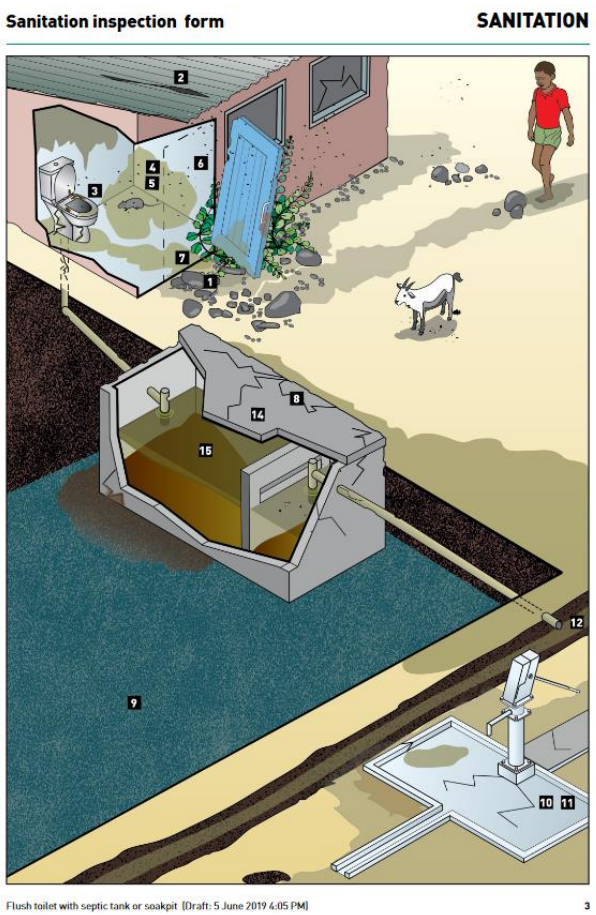
II. SANITATION SAFETY INSPECTION

IMPORTANT: Read the following notes before undertaking the sanitary inspection

1. Answer the questions by ticking [✓] the appropriate box. For guidance, refer to the illustration overleaf.
2. If there is no risk present, or a question does not apply to the pit being inspected, tick the **NO** box.
3. If a risk is present, tick **YES**. For important situations that require attention, note the actions to be taken. These notes can be used to develop a more detailed improvement plan, outlining what will be done, by whom, by when and what resources are required. For guidance, refer to the Management Advice Sheet.

Sanitary inspection questions		NO	YES (risk)	What action is needed?
TOILET	1 **Is the toilet not accessible for all intended users?** The location (e.g. ensuring a clear and secure access path) and design should make it easy to use by all users including those with special needs or reduced physical mobility (e.g. the elderly, disabled, sick). This may include adding features like an access ramp, handrail etc.	❑	❑	
	2 **Is the toilet superstructure absent, incomplete, damaged and/or does not provide privacy and security to the intended users?** Ingress of rainwater may cause the pit to fill up and overflow, while animals, rodents, insects etc. entering the toilet and/or pit can damage the facility and carry excreta to the community. A door lockable from the inside and a working light will help provide privacy and security to the user.	❑	❑	
	3 **Is the toilet dirty with visible excreta on surfaces?** If the toilet is not kept clean, the users may be exposed to excreta when using the toilet and/or this may discourage toilet use.	❑	❑	
	4 **Is anal cleansing material (e.g. toilet paper, leaves, water) absent or inappropriate for the technology?** If culturally appropriate facilities are not provided, users could be exposed to excreta. If anal cleansing material is not appropriate for the technology used, this may cause blockages or damages to the system.	❑	❑	

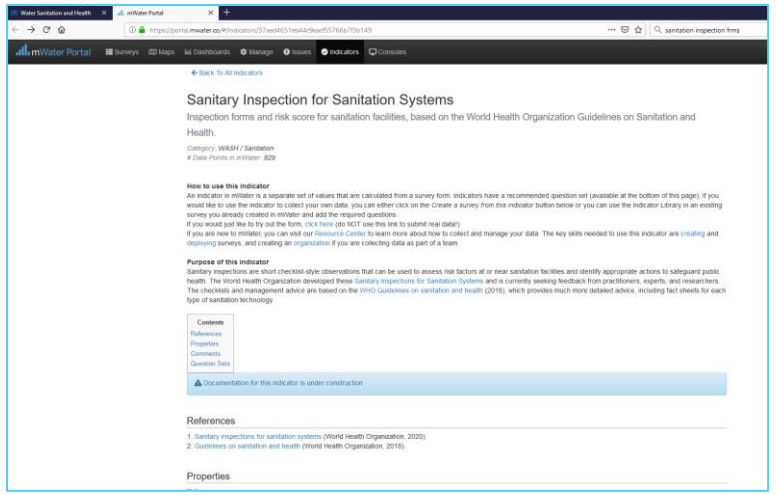
(Draft: 5 June 2019 4.05 PM) ... continued overleaf



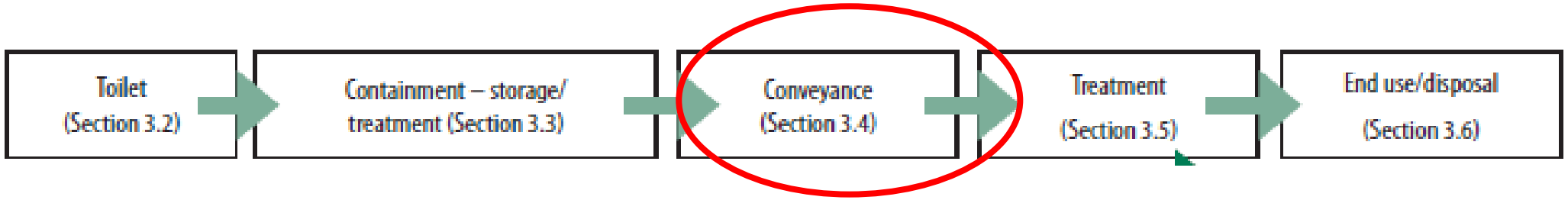
Sanitation inspection form — SANITATION

Flush toilet with septic tank or soakpit (Draft: 5 June 2019 4.05 PM) 3

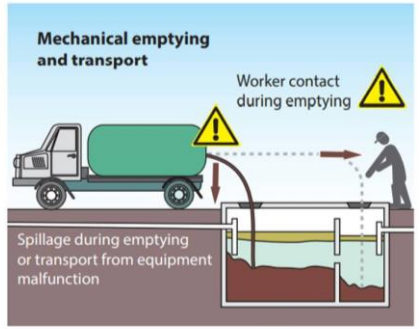
Digital SI forms available on:
m-Water portal
https://portal.mwater.co/#/indicators/37aed4651eb44c9eacf55766b7f3b149

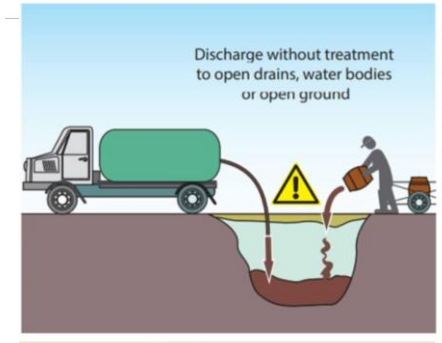


World Health Organization



Typical risks



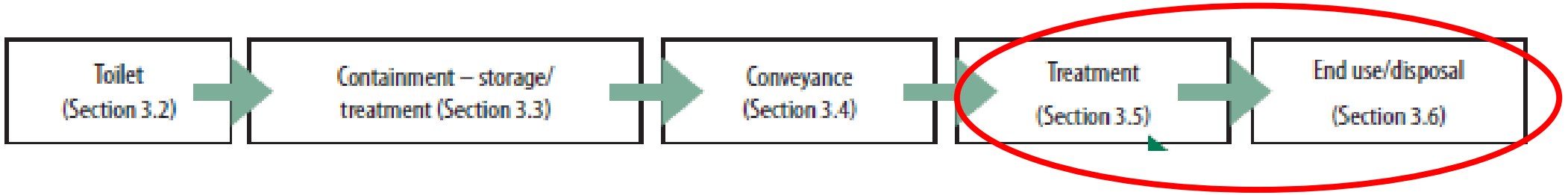


Example controls
(behavior, design, management, oversight/regulation)

- Protection of workers – PPE, equipment, formalization, association, OHS regulations
- Licensing and utility regulation
- Regular sewer inspection
- BC of users on solid waste disposal
- Sewer upgrades – stormwater separation

Monitoring
(Operation and verification)

- % illegal dumping
- % workers in formalized employment
- % compliance with PPE SOPs
- Infections/deaths workers
- No. of blocks or overflows



Typical risks

Example controls
(behavior, design, management, oversight/regulation)

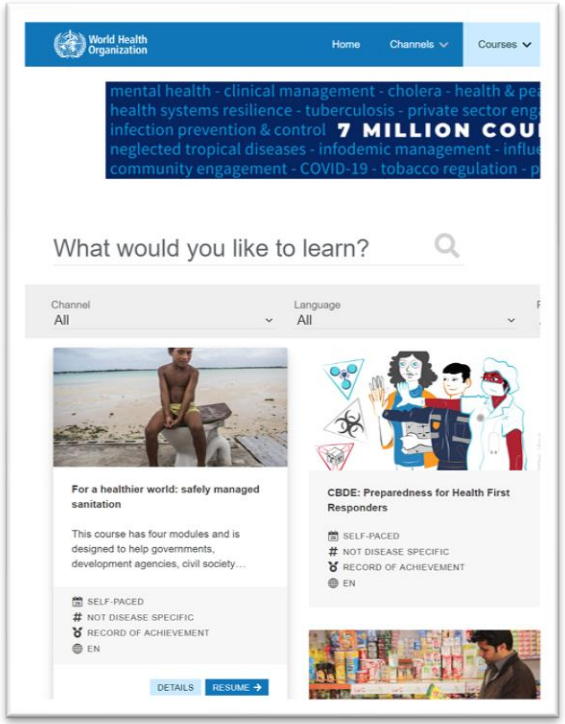
- Well designed WWTPs and FSTPs
- SOPs for treatment plant operation
- Monitoring of effluent and sludge
- Standards for treatment and reuse
- Protections for farmers and consumers of wastewater and sludge products (e.g. produce, compost etc.)

Monitoring
(Operation and verification)

- Composting temperatures
- Retentions times/flow rates in treatment processes
- Effluent quality
- Exposure to effluent during use – e.g. crop irrigation, recreational use.
- Quality of end products

Other resources and guidance available and under development

- Open WHO Course - https://openwho.org/
- SSP learning hub – https://ssp-learninghub.creation.camp/
- Country examples – EU, EMRO, LAC, ESAWAS, ASERASA and more…
- RRR business models- https://www.iwmi.cgiar.org/publications/resource-recovery-reuse/
- Guidance on setting standards for wastewater and sludge treatment (under development)
- Update to 2006 guidelines in safe use of wastewater, excreta and sludge (no immediate plans but needed)



Thank you

COUNTDOWN TO 2030 SANITATION FOR ALL

World Health Organization