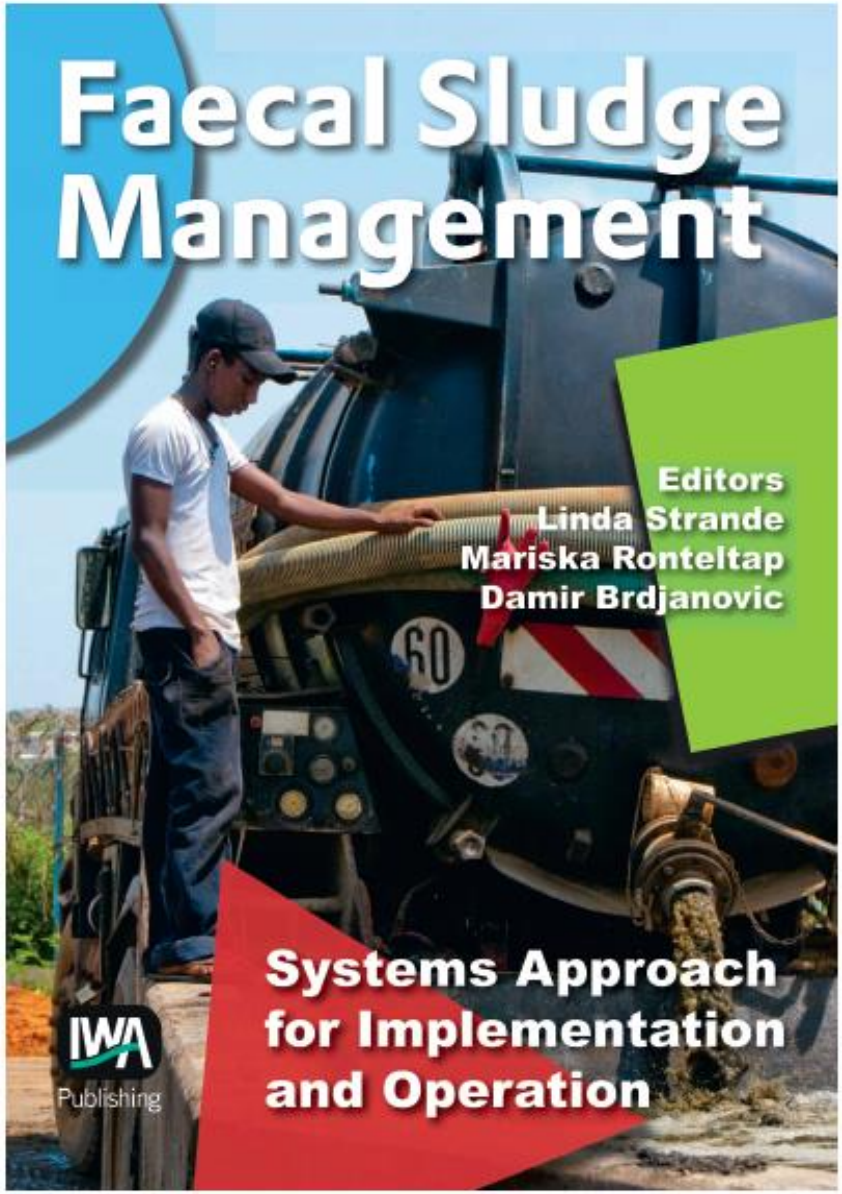

Unit 4.1 Overview of Technologies

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Sandec - Sanitation, Water and Solid Waste for Development

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Treatment technologies

Established
- settling tanks
- drying beds
- planted drying beds
- co-composting
- co-treatment in WSPs
- deep row entrenchment

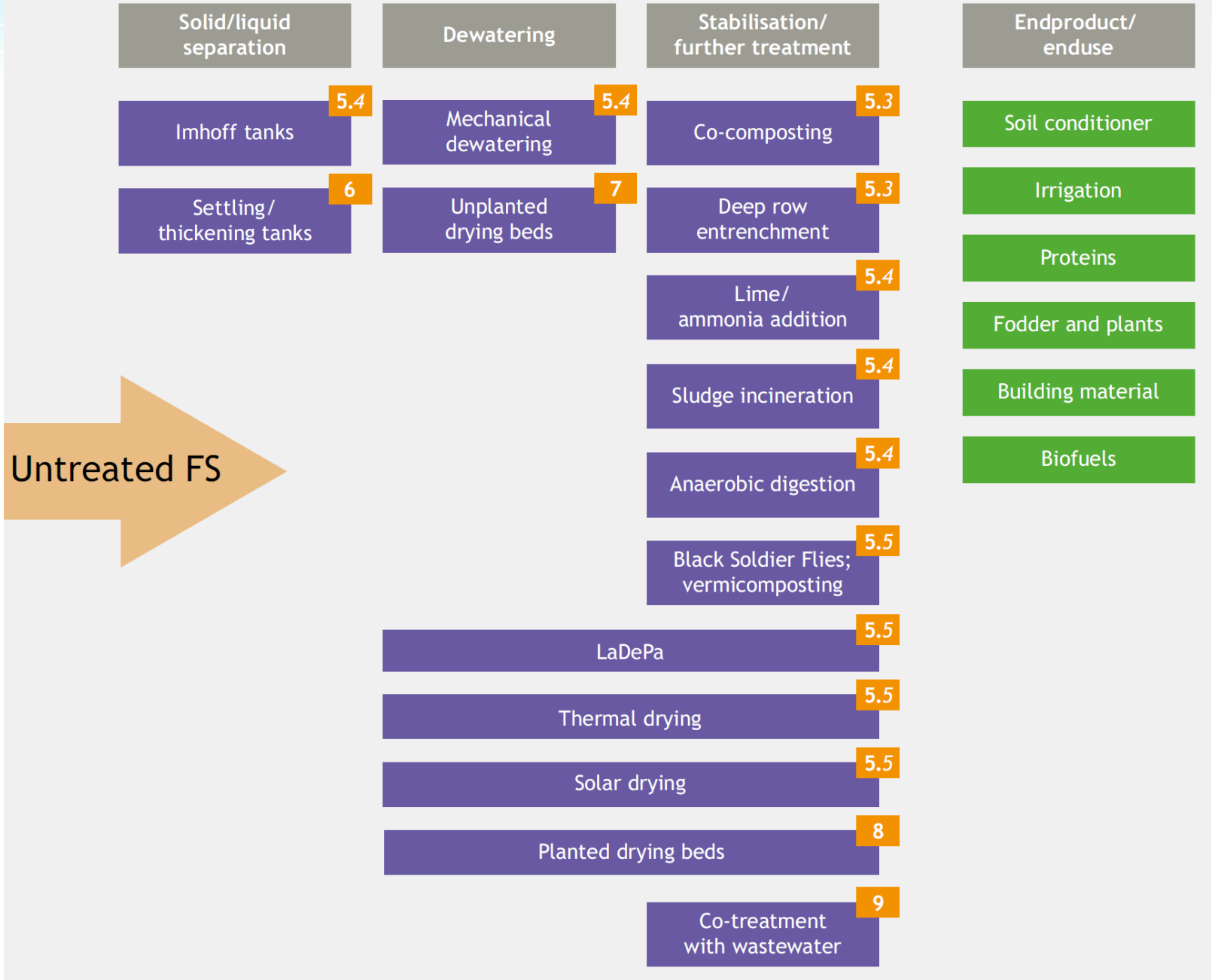
Transferring
- anaerobic digestion
- incineration
- mechanical treatments
- lime addition

Innovative
- vermicomposting
- black soldier fly (BSF)
- thermal drying and pelletising
- ammonia
- solar drying

Resource recovery endproducts

- soil conditioner (dried sludge, compost, pellets)
- fertilizer (with addition of NPK)
- reclaimed water
- animal fodder (planted drying beds)
- fish (aquaculture)
- protein (black soldier fly larvae)
- building materials (bricks & cement)
- fuel – liquid (biogas)
- fuel – solid (combustion)
- electricity (gasification)

Treatment objectives



Resource recovery

production of animal feed

soil conditioner

production of biogas

solid biofuel

component in building materials

Design approach for FSM

Appropriate FS treatment technology (combination)

… to arrive at solution

… considering all design variables…

- FS characteristics and quantities
- Existing FS infrastructure and services
- Skills and capacities
- Legal requirements, regulations, norms
- Social acceptance
- Operation and maintenance
- Financial viability
- Etc, etc, etc

Over-design wastes money and resources

Under-design does not protect human and environmental health

work backwards…

Required quality of treatment endproducts

Market driven approach

Market Attractiveness

Market Size

Indicators

- Market capacity
- Market potential
- Market volume

Market Growth

Indicators

- Historical market analysis
- Demographic data
- Scenario analysis

Endproduct	Form	Industry application
Solid fuel	Pellets, briquettes, powder	Energy through combustion
Liquid fuel	Biogas	Lighting, heat, cooking fuel
Soil conditioner (pathogen reduced)	Compost, pellets, digestate, black soldier fly residue	Agriculture, horticulture
Fertilizer	Pellets, powder	Agriculture, horticulture
Protein	Black soldier fly larvae, fish meal	Aquaculture, livestock
Animal fodder	Plants from drying beds, dried aquaculture plants	Livestock
Building materials	Additive to bricks, road construction	Construction industry
Reclaimed water	Effluent from FS treatment	Agriculture, horticulture
Soil conditioner	Untreated sludge, dewatered sludge from drying beds	Forestry
Electricity	Conversion of biogas or gasification of solid fuel	Feeding into the grid
Fish	Grown on effluent from FS treatment	For human consumption

Design of treatment technologies

?

Faecal sludge treatment

- Quantities (How much?)
- Characteristics (e.g. COD, TS)

- Performance Goals
- Resource recovery products

Faecal sludge quantification

1. FS collection	Emptying service providers Existing discharge locations Truck counting survey	estimates current collection
2. FS volumes	Desludging intervals Construction of the system Use of the system	estimates the current need
3. FS production	Per capita generation Accumulation rates Septic tanks vs. pit latrines	estimates the future need

Faecal sludge characterization

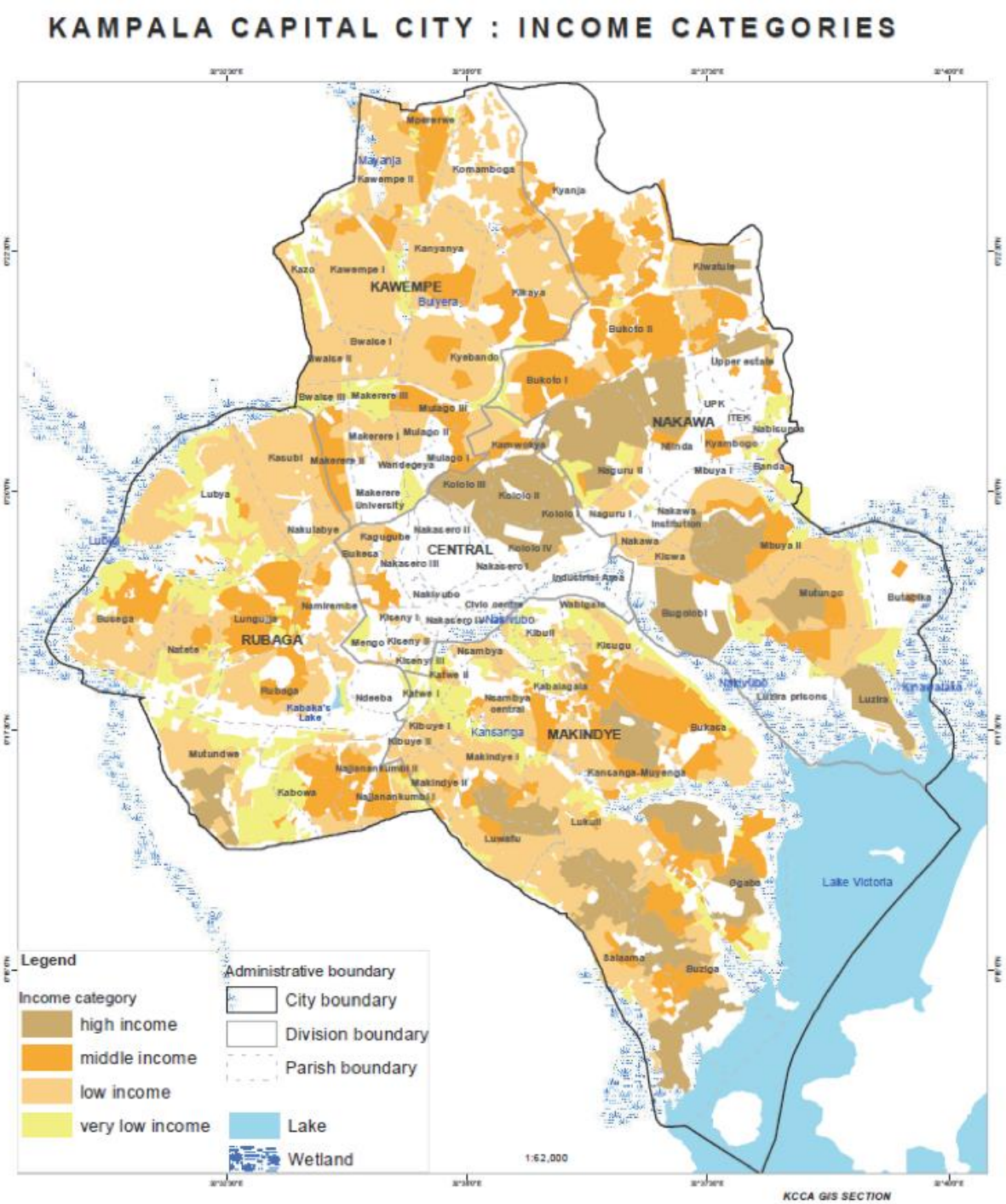
Parameters that could influence or predict faecal sludge characteristics

Household specific data	Physical Data	Demographic data
Construction of system	Soil	Income categories
Age of system	Permeability	Population densities
Type of system	Elevation/water table	Informal settlements
Use of system	Land-Use	Institutional, commercial, industrial areas
Users per system		Tenure status of residents
Desludging interval		Age of building
Origin of sludge		
Questionnaire	2nd Data	2nd Data

Sampling plan

Faecal sludge characterization

Spatially analyze data to develop representative sampling plan?



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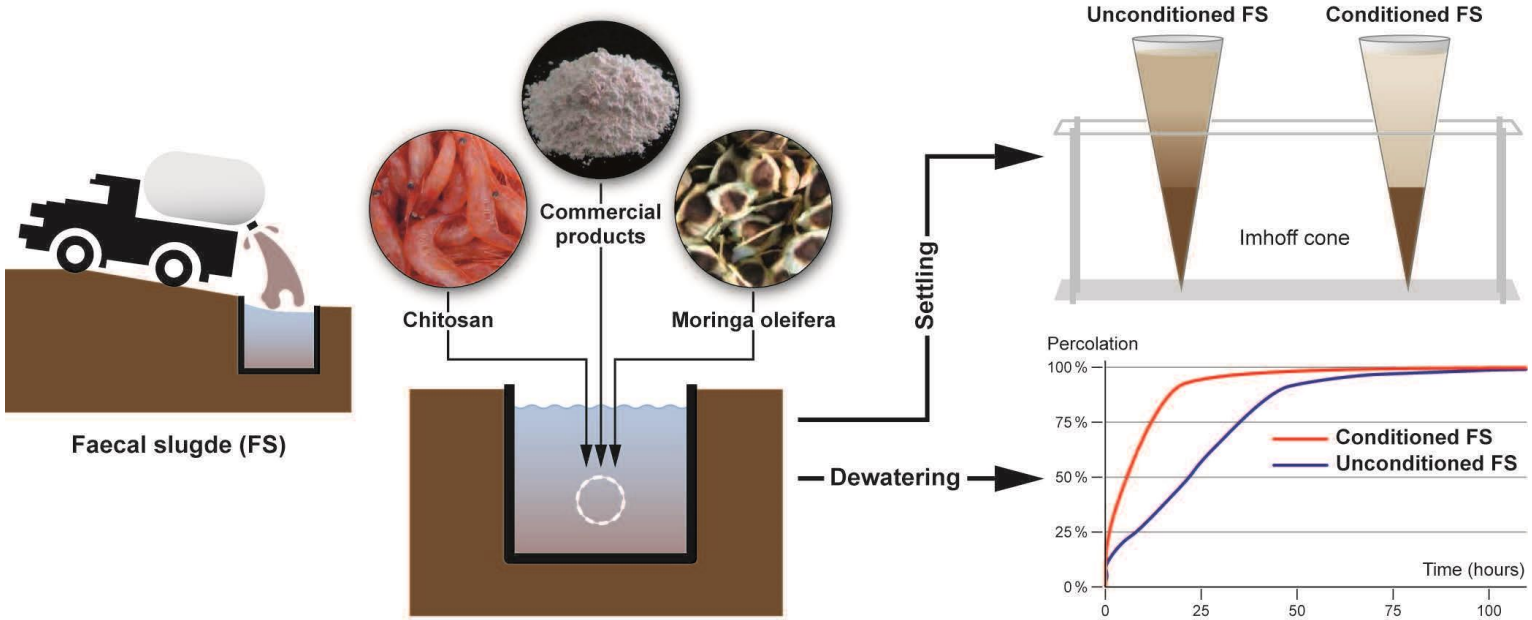
Reduce required footprint?



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