Sanitation Safety Plans for Safe Management and Valorization of Faecal Sludge

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Overview

- Excreta - Faecal sludge - Health risks
- WHO guidelines, RRR project
- SSP principles, the loop with WSP, tasks
- SSP_City vs SSP_subsystems
- Specific FS subsystem, stakeholders
- Recommendations
- **Main sources** of faecal sludge in developing countries: on-site sanitation systems (dry latrines, septic tanks)
- A great number of **pathogens** can be found in human excreta and therefore in faecal sludge
- One gram of feces would contain **enough pathogens** to lead to an infection
- **Potential risks** that pathogens remain in the biosolids reused in agriculture
- Long time need of **an indicator organism** that would allow making predictions about the die-off of pathogens in sludge
• Ascaris and Trichurus eggs: as representatives of helminth eggs

• Studies conducted in West Africa: all samples taken from public toilets and septic tanks were found infected with helminth eggs (Katharina Gallizzi 2003)

• Out of three helminth egg species analyzed (Ascaris lumbricoides, Trichuris trichiura, and Schistosomia mansoni) Ascaris was always the most frequent, followed by Trichuris and Schistosoma

• In all cases the helminth egg concentration was well above the recommended value for materials to be used in agriculture
• Usually before use the sludge are dewatered, like through drying beds

• Studies in West Africa showed that the helminth egg concentration even in the dried sludge ranged from **22 to 83 eggs per g total solids**

• The helminth egg contamination of the even dried sludge still exceeds the 3-8 eggs/g TS recommended for biosolids to be used in agriculture
• The viability of Ascaris in fresh sludge ranged from 40% to 82%, in dried sludge it ranges from 50% to 57%

• In most of the 2 cases, more than half of the Ascaris eggs were still alive and infective

• How can we go on promoting the use of a product that has such a potential of infection for the people? (Ethics)

• Need for mitigation measures and good monitoring

• WHO guidelines? SSP?
Call for Sanitation Safety Plans
to operationalize
the WHO 2006 Guidelines

The RRR project
WHO 2006 guidelines

• Paradigm shift from water quality standards to health-based targets
• Multi-barrier approach for risk mitigation

Implementation?
Health risks

• Risks of crops contamination (pathogens; chemicals, ..)
• Risks for human exposure / 4 exposed groups:
  i) agricultural workers and their families
  ii) crop handlers
  iii) consumers of crops
  iv) those living on or near the areas

Ethical dimensions
Developing countries vs Developed countries
a) Analyzing the viability of existing RRR cases and the feasibility of promising business models – IWMI, Sandec - EAWAG, CEWAS

b) Developing Sanitation Safety Plans (SSPs) supporting safe RRR – WHO, Swiss TPH
Sanitation Safety Plans

Principles

Loop with Water Sanitation Plan

Tasks
Maximize the benefits of waste reuse in productive agriculture and aquaculture while minimizing risks to health

Provide practical stepwise guidance to identify, prioritize and manage risks in the sanitation chain

Consider multiple routes of exposure and multiple exposed groups related to microbial and chemical safety

Expand the systematic approach to include downstream health and environmental effects

Account for fragmented sector responsibilities, diverse decision-making and implementing agencies

Build on the water safety planning
Expected benefits of SSP in contexts

- Allows a collective **eye opener** on integrated water and sanitation systems safety
- Allows to establish a **multisectoral team** tackling health risks of urban sanitation
- Allows targeting **limited resources** to the highest health risk areas
- Allows identifying **specific** knowledge and capacity **gaps**
- Incorporates **hazards** identification and risk management for emergencies and climate change
- Allows for progressive **improvement** and systematic **monitoring**
Multiple barriers to prevent contaminants coming in (single exposure group)

Environmental limits in ground and surface waters

Guidelines on Safe Use of Wastewater, Excreta & Greywater
Codex Alimentarius

Multiple barriers to prevent contaminants coming out (multiple exposure groups)

Environmental limits in soils

Guidelines for Drinking-water Quality (GDWQ)

EXPOSURE GROUPS
W  waste handlers
F  farm workers
L  local community
C  consumers

Source: Kate Medlicott 2012
(1) define the **system boundaries** and assemble the **SSP team**;

(2) describe **sanitation system** within a defined boundary;

(3) identify **hazards**, assess existing controls, and assess exposure risk;

(4) develop and implement an incremental **improvement** plan;

(5) **monitor** the plan and check that controls are working;

(6) develop supporting programs and **regularly review** SSP

**Key outputs:**

- Stakeholder coordination
- Prioritized improvement plan
- Operational monitoring plan

**Source:** Thor Axel Stenström 2012
SSP boundaries

City level vs Subsystems levels
System boundary, subsystems

**Task X** - Establish a sanitation safety steering group

**Task X** - Define the overall system boundary

**Task X** - Define optionally for potential sanitation system(s) within the system boundary

**Task X** - Describe sanitation system(s) within the system boundary (or sanitations of items)

**Task X** - Develop the SSP coordination plan that defines subsystem boundaries and corresponding SSP items

**Task X** - Analyse sanitation system options through multi-annual assessments (e.g., LCA, LCCA, cost-benefit analysis)

**Task X** - Select and implement sanitation systems, including risk mitigation and control measures

**Task X** - Identify potential hazards and assemble required evidence base

**Task 4** - Develop and implement an incremental improvement plan

**Task 5** - Operational monitoring of the SSP

**Task 5** - Verification monitoring of the SSP

**Task 7** - Review of the SSP and development of supporting processes

**Task X** - Assess exposure risks and existing controls

**SSP of sub-system X**

**SSP of sub-system Y**
SSP

Challenges and recommendations
Specific SSP for FS

Critical points:
• Adequate de-sludging on sites
• Safe handling and transport of sludge
• Treatment of sludge
• Safe disposal or reuse

Need for holistic thinking:
• FSM as an integral part of sanitation plan
• FSM as a major component of the overall sanitation system

Specific FSM stakeholders to be considered:
householders, community based organizations and non governmental organizations, authorities, public utilities managers, private sector actors, end users/farmers,
Challenges for SSP

Involvement
- **Government** & regulators
- Professional **associations**
- Surveillance **authorities**
- Municipality & town associations
- Building owner **associations**
- Universities & training providers
- Institutions which can **fund** improvements
- NGOs

*Source:* Oliver Schmoll 2010, Thor Axel Stenström 2012
**Recommendations FSM and SSP**

- **Health dimensions** of FSM are not enough covered
- Call for of a **specific important initiative of research on Health Aspects of FS management and valorization**
- **Synergies** with an ongoing project like the RRR can give a good start for that initiative
- The initiative could **test and promote SSP principles** on the specific stream of FS on different sites
- **Fields** of such initiative could be on the 3 continents (America, Asia and Africa)
- A **core group** to be put in place (starting with the contributors at the FSM2 under Health Aspects: Louton, Cissé, Maradufu, Stenström +?)
Thank you very much!

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  - Kate Medlicott
  - Thor Axel Stenström

- **IWMI**
  - Pay Drechsel

- **SANDEC**
  - Linda Strande
  - Chris Zurbrügg

- **CEWAS**
  - Johannes Heeb

- **Swiss TPH**
  - Guéladio Cissé
  - Mirko Winkler
  - Juerg Utzinger

Photo: RR&R Project, meeting Geneva February 2012

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