Worksheet 1.c

Preparing for the field visit

Group 3: Offsite institutional based systems (cubicle and gooseneck toilet + household connection to sewer + WWTP Sewon)

On Tuesday, June 17th, 2025

Questions regarding the description of the system (steps 2.1 and 2.2)

After discussing with your group, write in the first column in the table below what you need to find out tomorrow **to map the system** and **characterize the system flows**?

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| **Question** | **Answer** (to be filled during field visit) |
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Questions regarding the exposure groups and the actual hazards (steps 2.3 and 2.4)

After discussing with your group, write in the box below what you need to find out tomorrow **to identify the exposure groups** and **the actual hazards** (pathogens existing in the community?

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| **Question** | **Answer** (to be filled during field visit) |
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Questions regarding possible hazardous events, their probability, severity as well as the control measures in place (module 3)

Tomorrow, after the field visit, you and your group will be preparing the **health risk assessment table** of your assigned sanitation system (see below). This responds to the questions: *what could go wrong?* (Hazardous event), *who could get affected?* (Exposure groups), *how many of them?* And *what is in place to control the risk?* (Existing control measures). Whitin your groups, you will be completing the table, which already contains some hazardous events. During the visit, you should: (1) decide if these are relevant, (2) find out other hazardous events not listed here and (3) find all the information needed to complete the risk assessment.

| **Sanitation step** | **Hazard Identification** | | | | **Existing Control(s)** | | **Risk Assessment** | | | | **Comments justifying risk assessment, under current conditions or effectiveness of the control** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Under current climate conditions** | | | |
| L=Likelihood; S=Severity; R=Risk | | | |
| **Component** | **Hazardous event** | **Hazard** | **Exposure Groups** | **Number of persons at risk** | **Description of existing control** | **Validation of control**  Explain if this is working | **L** | **S** | **Score** | **R** |
| Toilet | Vector-borne transmission of pathogens to users, due to wrong design and/or construction of the toilets (e.g., lack of water seal or lid) |  |  |  |  |  |  |  |  |  |  |
| Conveyance (sewer) | Ingestion of contaminated groundwater due to leakages of wastewater from cracked/damaged sewers into  shallow groundwater | Faecal pathogens |  |  |  |  |  |  |  |  |  |
| Nitrates and nitrites |  |  |  |  |  |  |  |  |  |
| Conveyance (sewer) | Dermal contact with pathogens due to effluent discharging directly into open drains/streams |  |  |  |  |  |  |  |  |  |  |
| Conveyance (sewer) | Ingestion of pathogens after contact with wastewater during sewer cleaning and maintenance |  | Workers |  |  |  |  |  |  |  |  |
| Conveyance (sewer) | Ingestion of contaminated drinking water due to cross contamination with sewer leakage |  |  |  |  |  |  |  |  |  |  |
| Conveyance (sewer) | Ingestion after contact with wastewater from overflowing sewers due to blockage with solid waste |  |  |  |  |  |  |  |  |  |  |
| Sewon WWTP - screening | Inhalation of aerosols containing pathogens when removing screens or grids with accumulated debris |  | Workers |  |  |  |  |  |  |  |  |
| Sewon WWTP – inlet chamber | Ingestion after contact with leakages of raw or partially treated wastewater into the surrounding soil and groundwater, caused by breakage of inlet pipes |  |  |  |  |  |  |  |  |  |  |
| Sewon WWTP- stabilization ponds | Ingestion of contaminated drinking water caused leakages or dam failures into soil and shallow groundwater |  |  |  |  |  |  |  |  |  |  |
| Sewon WWTP - stabilization ponds | Injury to the body, possible drowning, caused by  entering or falling into the ponds |  | Workers |  |  |  |  |  |  |  |  |
| Local community |
| Sewon WWTP stabilization ponds | Inhalation of aerosolized microbes or toxins created by algae blooms, that come into contact with workers during pond access |  |  |  |  |  |  |  |  |  |  |
| Discharge / Reuse | Ingestion of pathogens in incompletely treated effluent, resulting from discharge of fresh fecal sludge in wastewater treatment ponds, causing overload and failure |  |  |  |  |  |  |  |  |  |  |
| Discharge / Reuse | Ingestion of partially treated sewage during farming activities (spray irrigation) |  |  |  |  |  |  |  |  |  |  |
| Discharge / Reuse | Consumption of contaminated produce grown with partially treated sewage |  |  |  |  |  |  |  |  |  |  |

After discussing with your group, write in the box below what you need to find out tomorrow **to prepare this table**?

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| **Question** | **Answer** (to be filled during field visit) |
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**Space for additional notes:**

Questions regarding to climate resilience of the sanitation system

During the field visit, you should be able to evaluate the robustness of the existing infrastructure in different climate change scenarios (e.g. more intense/prolonged precipitation, sea-level rise, variable temperature, more frequent storms). To do this, complete the following table:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Climate change scenario** | **Is this expected?** | **Causes of hazardous events** | **Sanitation step** | **Effect on the sanitation system** | **Is the sanitation step/system robust? (yes, no). Explain** | **What would be the hazardous events?** | **Is this relevant in your system?** |
| More intense or prolonged precipitation |  | Increased flooding | Conveyance (fecal trucks) | Damage to other infrastructure/systems on which sanitation systems rely (e.g., electricity networks for pumping; road networks used by FSM vehicles) |  |  |  |
| Conveyance (sewers – pumping stations) |  |  |  |
| Treatment (units needing electricity) |  | Ingestion of surface water contaminated with raw sewage due to non-functioning wastewater treatment plant |  |
| Containment–  storage/treatment (septic tank) | Flooding of treatment units, causing spillage and contamination |  | Ingestion after contact with fecal sludge during overflowing of on-site systems |  |
| Treatment (holding tanks, ponds) |  |  |  |
| Treatment (holding tanks, ponds) | Treatment plants receive flows that exceed their design capacities, resulting in flows bypassing the treatment processes |  | Ingestion of contaminated water with raw sewage due to bypassing wastewater treatment plant |  |
| Increased erosion, landslides | Conveyance (sewers – pumping stations) | Destruction and damage to sanitation infrastructure |  |  |  |
| Treatment (holding tanks, ponds) |  | Ingestion of contaminated water with raw sewage due to non-functioning wastewater treatment plant |  |
| Contamination of and damage to surface water and groundwater supplies | Treatment (holding tanks, ponds) | Treatment plants receive flows with concentrations of pollutants that exceed their design capacities, resulting in lower treatment performance |  | Ingestion of contaminated water in partially treated sewage due to higher pollutant concentration |  |
| Changes to groundwater recharge and groundwater levels | Containment–  storage/treatment (septic tank) | Floating of septic systems due to groundwater levels |  | Ingestion of pathogens after contact with fecal sludge due to floating of septic tank |  |
| Collapse of septic tanks, via groundwater |  | Injury to the body, possible asphyxiation, caused by falling into septic tanks due to collapsing latrine structure |  |
| Sea-level rise |  | Saline intrusion in coastal/low-lying zones | Treatment (holding tanks, ponds) | Damage to wastewater treatment works (which are often low-lying/coastal) from exposure to saltwater |  | Ingestion of microbial pathogens in surface water contaminated with partially or non-treated sewage |  |
| Reduced effectiveness of biological treatment processes due to saltwater exposure from saline intrusion into wastewater influent |  | Ingestion of microbial pathogens in surface water contaminated partially treated sewage due to higher pollutant concentration |  |
| Rising groundwater levels in coastal/low-lying zones | Containment–  storage/treatment (septic tank) | Damage to underground infrastructure from rising groundwater levels |  | Ingestion of groundwater contaminated with fecal pathogens |  |
| Higher risk of inundation, especially from extreme weather events (potentially contributing to flooding, erosion, landslides) | Conveyance (fecal trucks) | Damage to other infrastructure/systems on which sanitation systems rely (e.g., electricity networks for pumping; road networks used by FSM vehicles) |  |  |  |
| Conveyance (sewers – pumping stations) |  |  |  |
| Treatment (units needing electricity) |  | Ingestion of surface water contaminated with raw sewage due to non-functioning wastewater treatment plant |  |
| Containment–  storage/treatment (septic tank) | Flooding of treatment systems causing spillage and contamination |  | Ingestion after contact with fecal sludge during overflowing of on-site systems |  |
| Treatment (holding tanks, ponds) |  | Dermal contact with fecal sludge due to overflowing of on-site systems |  |
| Treatment (holding tanks, ponds) | Treatment plants receive flows that exceed their design capacities, resulting in flows bypassing the treatment processes |  | Ingestion of contaminated water with raw sewage due to bypassing wastewater treatment plant |  |
| More variable or increasing temperatures |  | Higher freshwater temperatures | Treatment (holding tanks, ponds) | Proliferation of algal blooms or microbes carried by vectors in water |  | Ingestion of contaminated surface water during bathing |  |
| Hot and cold temperature extremes | Treatment (holding tanks, ponds) | Reduced efficiency of biological wastewater treatments (if temperature exceeds or falls below operational limits) |  | Ingestion of water contaminated with partially treated sewage due to higher pollutant concentration |  |
| Conveyance (sewers – pumping stations) | Increased corrosion of sewers |  | Ingestion of groundwater contaminated with fecal pathogens leaking from broken sewers |  |
| More frequent or intense storms or cyclones |  | Increased flooding | Treatment (units needing electricity) | Damage to other infrastructure/systems on which sanitation systems rely (e.g., electricity networks for pumping; road networks used by FSM vehicles) |  | Ingestion of surface water contaminated with raw sewage due to non-functioning wastewater treatment plant |  |
| Containment–  storage/treatment (septic tank) | Flooding of on-site systems causing spillage and contamination |  | Ingestion after contact with fecal sludge during overflowing of on-site systems |  |
| Treatment (holding tanks, ponds) |  | Dermal contact with fecal sludge due to overflowing of on-site systems |  |
| More extreme winds | Conveyance (sewers – pumping stations) | Damage to other infrastructure/systems on which sanitation systems rely (e.g., electricity networks for pumping; road networks used by FSM vehicles) |  | Ingestion of surface water contaminated with raw sewage due to non-functioning wastewater treatment plant |  |
| Prolonged or Severe Drought |  | Water shortages | Toilet | Decreased water availability impairs the operation of flushing toilets |  | Ingestion after contact with non-functional toilets |  |
| Water-dependent treatment units | Decreased water availability impairs the operation of water-dependent sanitation processes, leading to reduced functionality of treatment systems |  | Ingestion after contact with wastewater that has not been treated sufficiently |  |
| Containment–  storage/treatment (septic tank) | Increased reliance on alternative water sources for drinking |  | Ingestion of contaminated drinking water |  |
| Reuse | Increased reliance on alternative water sources for irrigation |  | Ingestion after contact with polluted irrigation water |  |
| Discharge | Potential contamination due to insufficient dilution |  | Ingestion after contact with polluted river water |  |

After discussing with your group, write in the box below what you need to find out tomorrow **to prepare this table**?

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| **Question** | **Answer** (to be filled during field visit) |
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**Space for additional notes:**