MODULE 4

DEVELOP AND IMPLEMENT AN INCREMENTAL IMPROVEMENT PLAN

SANITATION
SAFETY
PLANNING

SSP Manual
Pages
21 to 37

SSP Modules

Page 61 of your SSP manual

What needs to be improved?

MODULE 4

Overview

STEPS

4.1 Consider options to control identified risks.

4.2 Develop an incremental improvement plan.

4.3 Implement the improvement plan.

OUTPUTS

- An incremental improvement plan that protects all exposure groups along the sanitation chain.
- Progressive investments the plan

STEP 4.1

Consider options to control identified risks

OBJECTIVE

This helps considers options to control highest risks along the sanitation chain, including technology upgrades, changes in management and operation, behaviour change measures, and policy and regulatory measures.

These options may include:

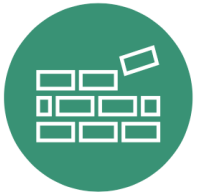
- Short- and long-term plans
- a range of locations along the sanitation chain.

STEP 4.1

Consider options to control identified risks

Improvement options

Option 1: Regulatory measures



Option 2: Technical control measures

Option 3: Management and operational control measures

Option 4: Behaviour change measures

Improvement options

Option 1: Regulatory measures

Mechanisms to regulate the sanitation service chain.

SSP measures should focus on ordinances and local by-laws passed by local authorities.

STEP 4.1

Consider options to control identified risks

SSP Manual Guidance note 4.1, page 66

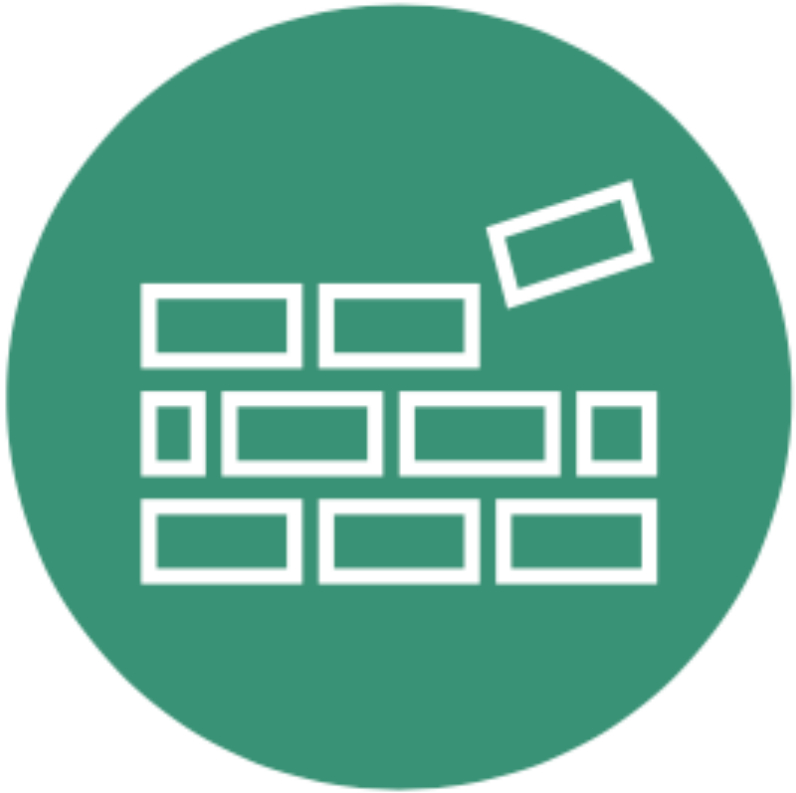
WHO Guidelines Chapter 4 Page 59

Examples of sanitation aspects covered by legislation and regulation

Toilet	Containment–storage/treatment	Conveyance	Treatment	End use/disposal
Minimum requirements for toilet room/ superstructure	Registration of onsite facilities.	Obligation for premises to be connected to sewer system if available.	Designated facilities and opening hours for faecal sludge reception	Standards for use of other products derived from faecal waste

World Health Organization

Improvement options



Option 2: Technical control measures

Also called technology upgrades, refer to the construction or refurbishment of the sanitation system.

STEP 4.1

Consider options to control identified risks

SSP Manual Guidance note 4.2, page 67

WHO Guidelines Chapter 3 Page 29

Examples of incremental technical control measures

Toilet	Containment–storage/treatment	Conveyance	Treatment	End use/disposal
Cover any wooden squatting slab with a coating of mortar.	Elevate the pits or implementing container-based sanitation.	Make motorized and/or manual pumps available to the workers.	Co-treatment of faecal sludge in existing wastewater treatment plants.	Low-contact irrigation methods.

TIP

WHO Guidelines Chapter 3 offers

- Measures to reduce risk
- Incremental control measures

For each step of the sanitation chain

STEP 4.1

Consider options to control identified risks

WHO Guidelines
Chapter 3
Page 29

Improvement options

Option 3: Management and operational control measures

Methods, procedures and routines to carry out a specific activity within the sanitation service chain.

They include arrangements for how people are organized and trained to carry out their work.

TIP

WHO Guidelines Chapter 3 offers

- Measures to reduce risk
- Incremental control measures

For each step of the sanitation chain

STEP 4.1

Consider options to control identified risks

SSP Manual Guidance note 4.3, page 68

Standard operating procedures

Written instructions describing steps or actions to be taken:

- during **normal operating conditions**, and
- for **corrective actions** when operational monitoring parameters reach or breach operational limits.
- for **emergencies**.

Personnel need to be **appropriately trained** to implement the procedures and other management protocols.

STEP 4.1

Consider options to control identified risks

WHO Guidelines
Chapter 5
Page 84

Improvement options

Option 4: Behaviour change measures

Programs designed to foster behaviour change at the levels of the individual, the household, the community and key stakeholders involved in sanitation delivery.

TIP

WHO Guidelines Chapter 5 offers

- Different approaches to changing behaviours.
- Recommendations on how to design, adapt, and deliver behaviour change interventions.

STEP 4.1

Consider options to control identified risks

WHO Guidelines
Chapter 5
Page 84

Depending on the specific situation, **desired user behaviours** include:

- **Abandoning open defecation** and adopting safe sanitation facilities.
- Ensuring the **regular desludging** of such facilities.
- **Connecting** to a sewerage system where available and paying the service charges.
- **Wearing** Personal Protective Equipment.

STEP 4.1

Consider options to control identified risks

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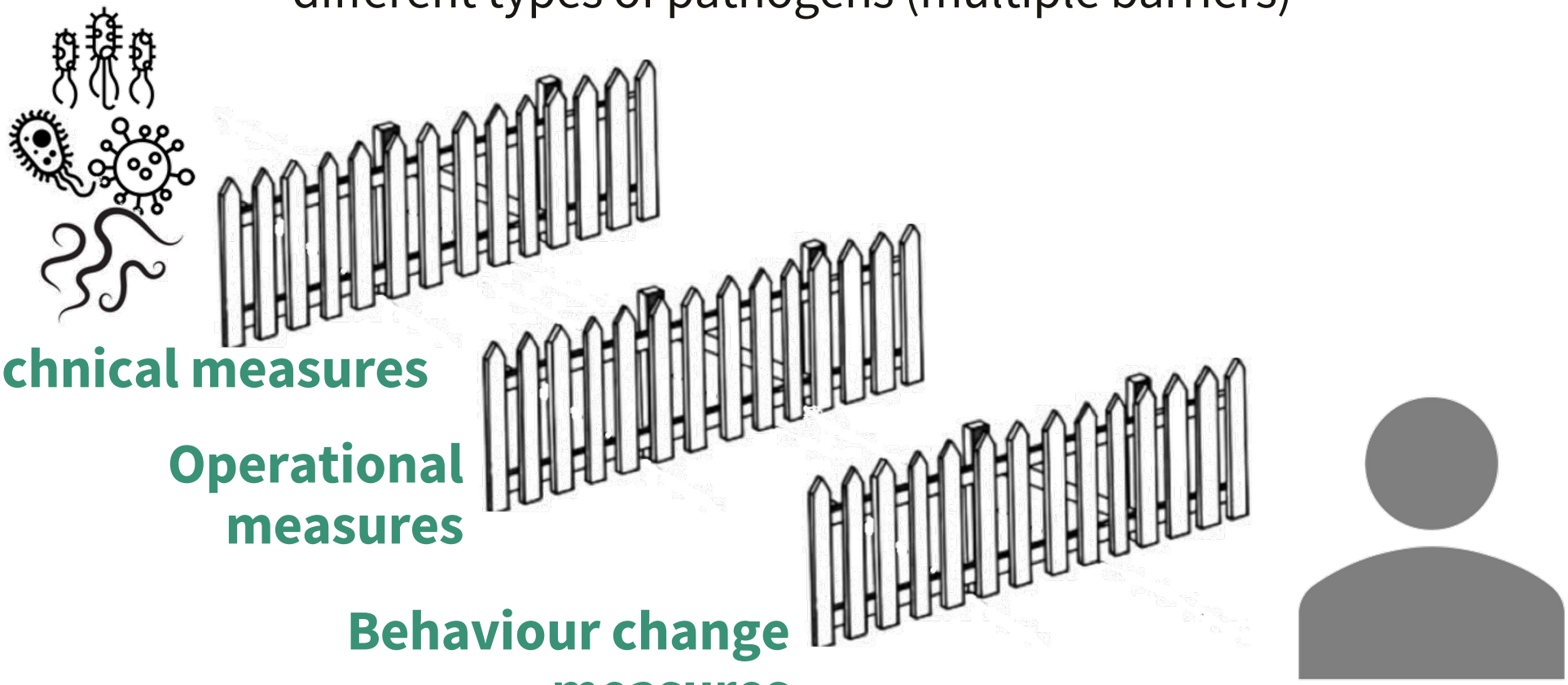
Multibarrier approach

Sanitation systems should provide more than one barrier against the different types of pathogens (multiple barriers)



World Health Organization

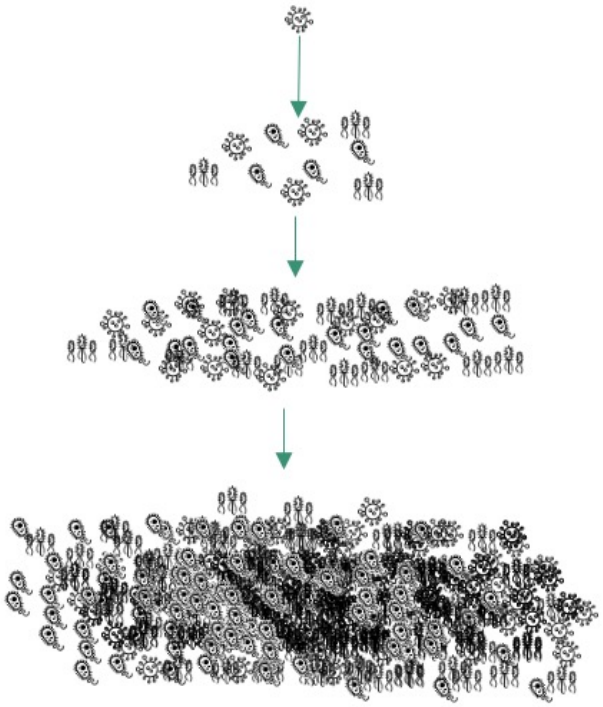
Understanding log reductions and the multibarrier approach

Raw sewage typically has about:

10^7 E. Coli per 100 ml

Remember:

Original concentration units/100 mL	
10^0=	1
10^1=	10
10^2=	100
10^3=	1000
10^4=	10,000
10^5=	100,000
10^6=	1,000,000
10^7=	10,000,000



STEP 4.1

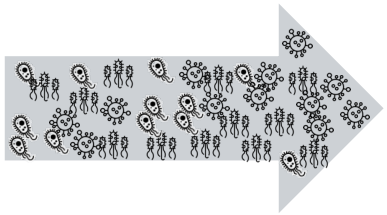
Consider options to control identified risks

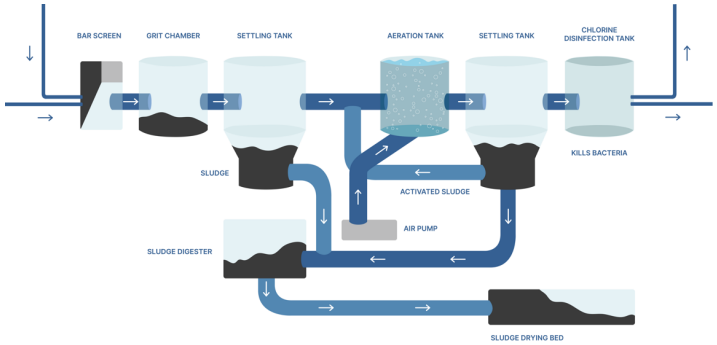
SSP Manual Guidance note 4.6, page 72

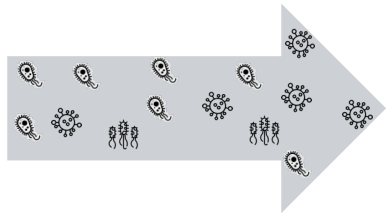
Efficiency of a sanitation system can be expressed as:

LRV: $\log^{10}$ reduction value

***Difference** between the log-transformed pathogen **concentrations** of the **influent** and the **effluent** across a particular sanitation technology*







$C_{INFLUENT} = 1.00 \times 10^7$

$C_{EFFLUENT}$ = depends on the LRV of the sanitation measure

Sedimentation tank →

LRV	% Reduction	Concentration after control measure
1	90%	1,000,000 (10^6)
2	99%	100,000 (10^5)
3	99.9%	10,000 (10^4)
4	99.99%	1000 (10^3)
5	99.999%	100 (10^2)
6	99,9999%	10 (10^1)
7	99,99999%	1 (10^0)

! Very expensive

Sedimentation + activated sludge + microfiltration →

STEP 4.1

Consider options to control identified risks

SSP Manual Guidance note 4.6, page 72

How do we achieve a safe pathogen concentrations?

- Understand the **exposure group** (*who should be protected?)*
- Understand the **exposure route** (*how pathogens get into their body?)*
- Understand the **step in the sanitation system** where the hazardous event occurs.
- Use a **combination of control measures** that together achieve the safe concentrate of pathogens.
- For effluents or end products, consider their **intended use:**
    - **Discharge in water bodies**: national regulation.
    - **Onsite infiltration**: think about the groundwater level.
    - **Reuse in agriculture**: protect farmers and consumers and plan the measures depending on the type of crops grown, irrigation practices and farming practices.
    - **Reuse for watering green areas:** protect visitors.

STEP 4.1

Consider options to control identified risks

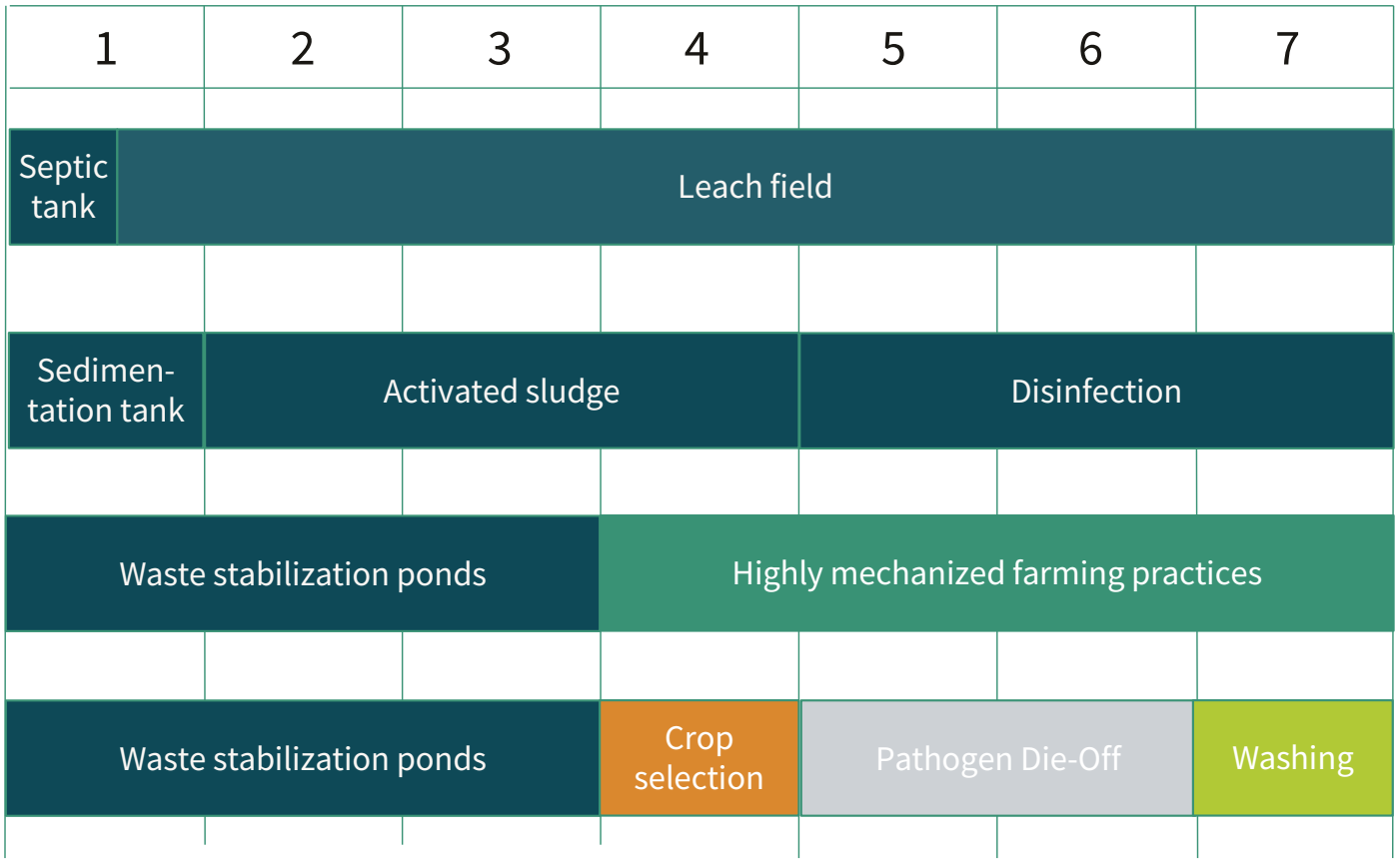
Some examples

Protecting **USERS** at their premises in areas with low groundwater levels

Protecting **WIDER COMMUNITIES** in WWTP surrounding areas

Protecting **FARMERS** during wastewater reuse.

Protecting **CONSUMERS** of crops irrigated with wastewater.



Graph based on WHO 2006 Guidelines Vol. 2 Figure 4

STEP 4.1

Consider options to control identified risks

SSP Manual
Example 3.2
Page 44

WHO Guidelines
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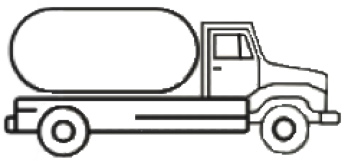
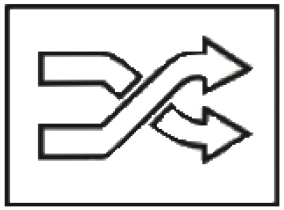
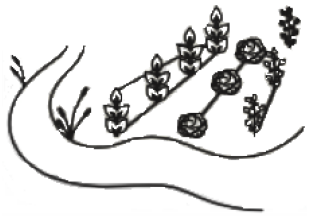
Consider all types of improvement options in each step of the sanitation service chain

	Installation of flush toilets	Training of masons for correct installation	Program to encourage correct use and maintenance	Technical standards on material, dimensions and location
	Installation of sealed and impermeable septic tanks	Building a data base of on-site sanitation infrastructure	Program to encourage non-sealed tanks refurbishment	Guidelines on periodic inspection of onsite-systems
	Installation of faecal sludge transfer stations	Establishing a call centre for septic tank emptying	Consumer protection program	Licencing of emptying service providers

STEP 4.1

Consider options to control identified risks

	Construction of a faecal sludge treatment plant	Development of Standard Operating Procedures for operation and maintenance	Internal awareness raising program to ensure occupational health and safety	Guidelines on control of nuisances (odours, flies, noise) from treatment facility
	Additional treatment of dried sludge (e.g. co-composting)	Training farmers on crop selection (e.g. only crops not eaten raw)	Household food safety program (to encourage washing of produces)	Standards for sludge products, categorized by type of use

Analysis of improvement options

When selecting improvement options, think about:

- **Potential** for improving existing control(s).
- **Cost** effectiveness.
- Technical **effectiveness**.
- **Acceptability** to workers or exposure groups and **reliability**.
- **Responsibility** for managing new measure.
- Extent to which the control measure will provide benefits under expected **changes to the climate.**
- Potential for the control measure to **fail if the climate changes** in unexpected ways.

STEP 4.1

Consider options to control identified risks

Template to list and analyse control options

TOOL 4.1. Template to list and analyse control options

Step of the sanitation service chain: _____

Description of the hazardous event: _____

Exposure group: _____

Improvement options					
Option of new or modified control measure for this hazardous event	**What is the likely effectiveness of this control measure option?** (High, medium, low)	**What is the level of resources required?** (Including financial, human resources, political support; high, medium, low)	**To what extent will this control measure be effective under the most likely climate change scenarios?** (Effective, ineffective, detrimental)	**Comments/discussion**	**Priority for improvement plan** (Immediate, short term, medium term, long term)

STEP 4.2

Develop an incremental improvement plan

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OBJECTIVE

To consolidate the options into a clear plan of action.

Planning sanitation systems

To formulate inclusive, equitable and practical solutions

WHO Guidelines
Section 4.3.2
Page 63

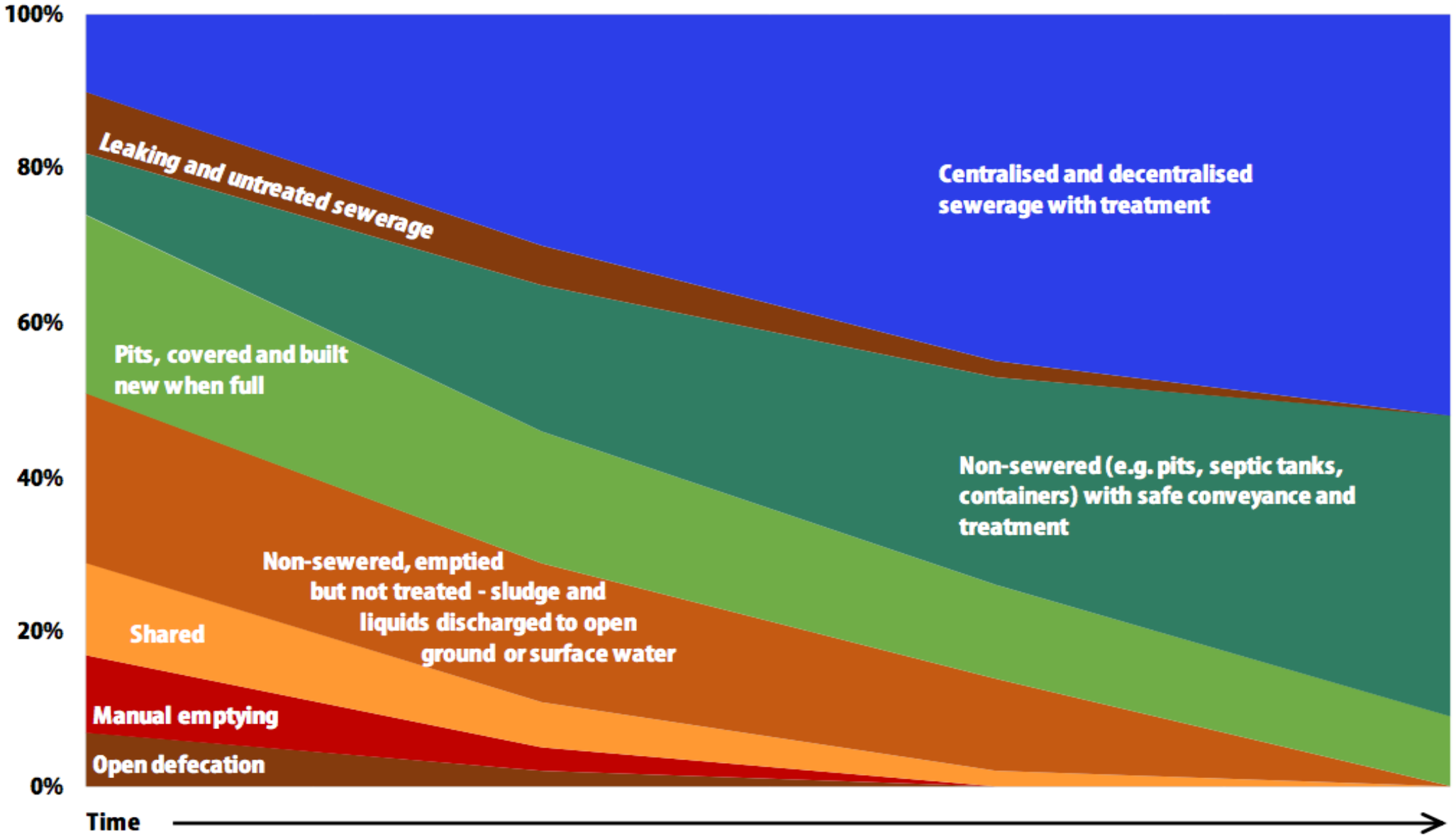
- One must understand the mix of sanitation systems in use
- Plan how that mix should change over time
- Incremental improvement of sanitation in different places at different times.
- Deliver short to medium term improvements, instead of long-term.

STEP 4.2

Develop an incremental improvement plan

WHO Guidelines Fig 4.3

Fig. 4.3: Example of phasing out unsafe sanitation over time



STEP 4.2

Develop an incremental improvement plan

While preparing the incremental improvement plan

- Prioritize plan, based on hazards with **highest risks.**
- Identify **who** (institution and individual) takes action.
- If more than one, the Steering Committee or lead SSP organization should take coordination responsibility.
- May choose **more affordable interim control** measures until sufficient funds for more expensive options are available.
- The incremental improvement plan should allow for adaptive management processes suitable to respond to emergent and unforeseen conditions, such as **climate-related hazards**.

STEP 4.2

Develop an incremental improvement plan

Template for an incremental improvement plan

TOOL 4.2. Template for an SSP incremental improvement plan

Improvement measure	Cost	Source of funds	Lead organization	Year 1												Year 2				Year 3			
				1	2	3	4	5	6	7	8	9	10	11	12	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8

STEP 4.3

Implement the improvement plan

WHO Guidelines
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OBJECTIVE

In this step, the SST team and steering committee mobilize investment and action by the responsible entities to implement the improvement plan.

A successful implementation requires:

- Enforcement and compliance
- Coordination
- Accountability and finance
- Monitoring
- Developing sanitation services and business models

GROUP WORK

Applying Steps 41 and 4.2 to our Alwar SSP

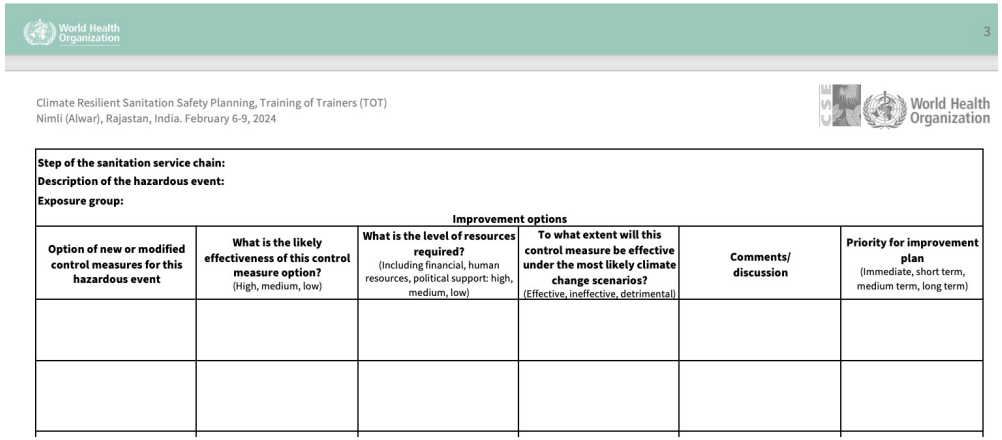
Within your groups:

- Consider different options to control the 3 prioritized hazardous events.

MODULE 4: DEVELOP AND IMPLEMENT AN INCREMENTAL IMPROVEMENT PLAN

STEP 4.1: Consider options to control identified risks

For each hazardous event prioritized, analyze the possible control measures using the following table:



World Health Organization 3

Climate Resilient Sanitation Safety Planning, Training of Trainers (TOT)
Nimli (Alwar), Rajastan, India. February 6-9, 2024

World Health Organization

Step of the sanitation service chain:
Description of the hazardous event:
Exposure group:

Improvement options

Option of new or modified control measures for this hazardous event	**What is the likely effectiveness of this control measure option?** (High, medium, low)	**What is the level of resources required?** (Including financial, human resources, political support: high, medium, low)	**To what extent will this control measure be effective under the most likely climate change scenarios?** (Effective, ineffective, detrimental)	**Comments/ discussion**	**Priority for improvement plan** (Immediate, short term, medium term, long term)

- If you have time, prepare an implementation plan using the table of step 4.2.

MODULE 4

DEVELOP AND IMPLEMENT AN INCREMENTAL IMPROVEMENT PLAN

SANITATION
SAFETY
PLANNING

World Health Organization