



WASTEWATER MANAGEMENT

Managing multiple discharge points from Septic Tanks

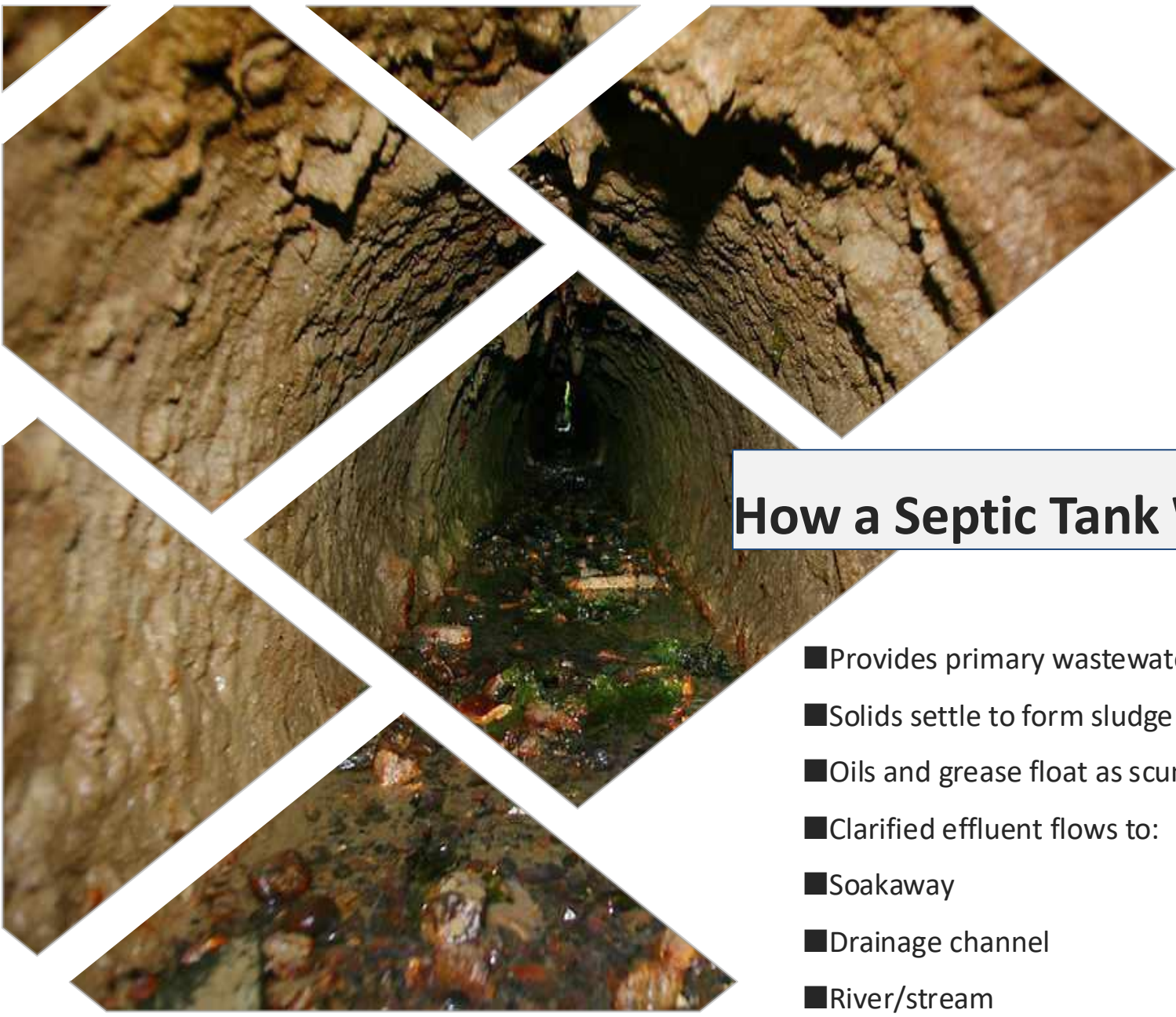
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Introduction

- ◆Septic Tanks and Environmental Challenges
- ◆Common on-site wastewater treatment system
- ◆Used where centralized sewerage is unavailable
- ◆Typical lifespan: ~50 years
- ◆Constructed from reinforced concrete, fiberglass, or plastic



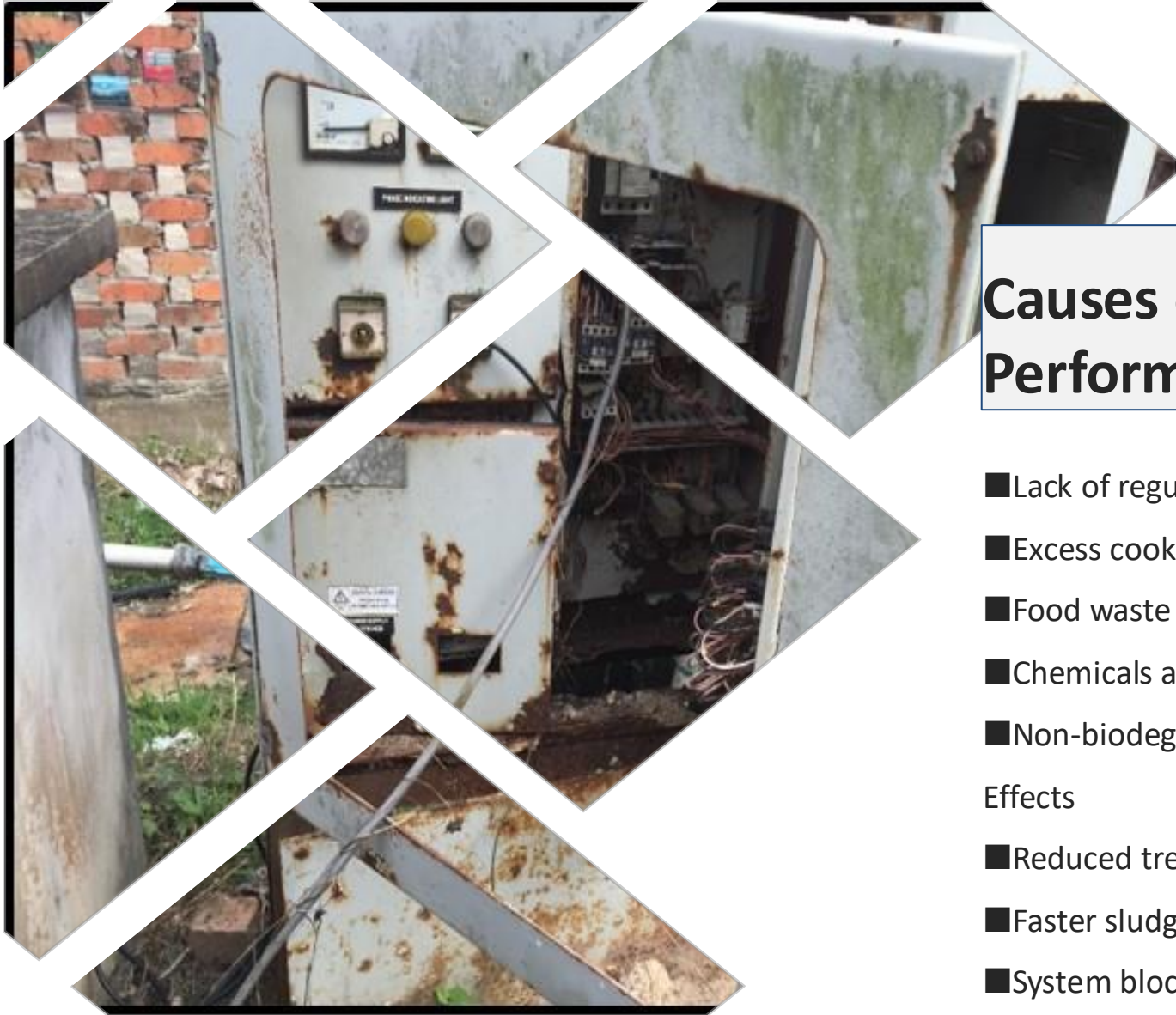
How a Septic Tank Works

- Provides primary wastewater treatment
- Solids settle to form sludge
- Oils and grease float as scum
- Clarified effluent flows to:
 - Soakaway
 - Drainage channel
 - River/stream
 - Surrounding soil



Anaerobic Treatment Process

- ◆Septic" = anaerobic treatment
- ◆Anaerobic bacteria decompose organic matter
- ◆Treatment efficiency is moderate
- ◆Sludge accumulates over time
- ◆Regular desludging is essential



Causes of Poor Performance

- Lack of regular maintenance
- Excess cooking oil and grease
- Food waste
- Chemicals and disinfectants
- Non-biodegradable materials

Effects

- Reduced treatment efficiency
- Faster sludge accumulation
- System blockage
- Untreated wastewater discharge



Environmental & Health Impacts

- ◆ Water pollution
- ◆ Presence of *E. coli* and coliform bacteria
- ◆ Offensive odours
- ◆ Methane emission (greenhouse gas)
- ◆ Poor nitrogen and phosphorus removal
- ◆ Eutrophication and algal blooms



Septic Tanks in Sabah

- Widely used in rural and suburban areas
- Common in residential housing developments
- Lower construction cost than centralized sewerage
- Performance depends on regular desludging
- Poor maintenance leads to environmental pollution



Case Study – Kundasang, Sabah

- ◆ Popular tourism destination
- ◆ Rapid growth of hotels, homestays, and resorts
- ◆ Increased wastewater generation
- ◆ Mountainous terrain limits centralized sewerage
- ◆ Most buildings depend on individual septic tanks





Septage Management

- Recommended desludging: every 2 years
- Septage transported to sewage treatment plants
- Dewatered to 50–70% solids
- Dried sludge remains unstable
- Requires further treatment before reuse or disposal.



Current Challenges

- Limited landfill capacity
- Restrictions on sewage sludge disposal
- Rising sludge management costs
- Need for sustainable alternatives





Sustainable Solutions

- ◆ Composting into organic soil conditioner
- ◆ Non-food agricultural applications
- ◆ Centralized sludge treatment
- ◆ Drying to 85–90% solids
- ◆ Reuse for:
 - ◆ Land reclamation
 - ◆ Soil stabilization
 - ◆ Landfill daily cover.





Conclusion

- ◆ Proper septic tank maintenance protects public health.
- ◆ Sustainable sludge management supports environmental protection and resource recovery