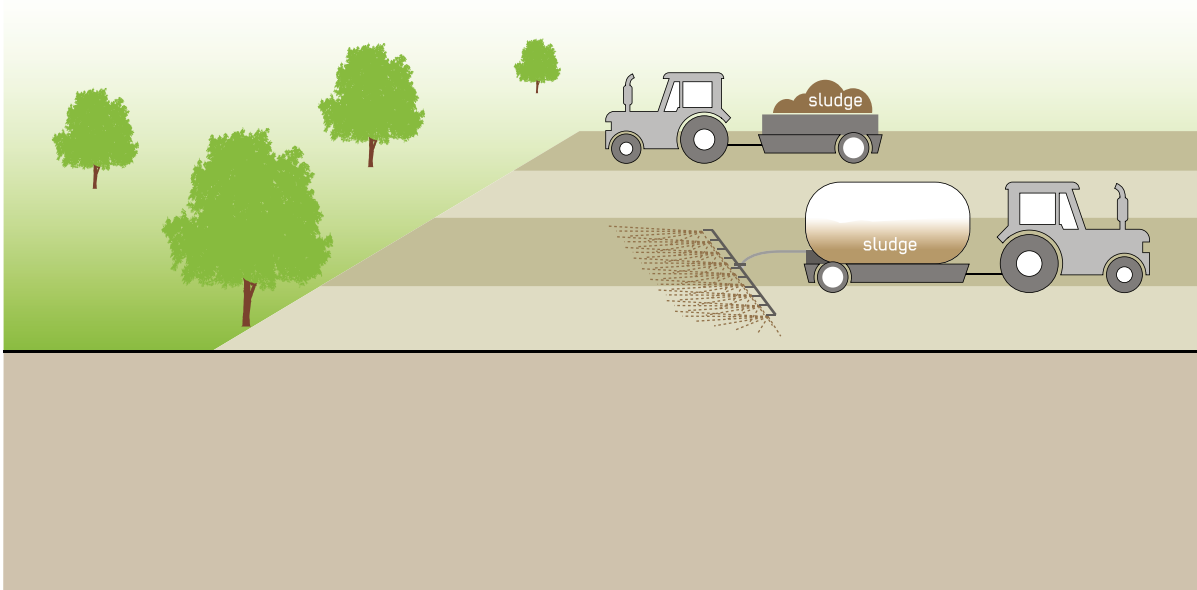


# Application of Sludge

| Phase of Emergency                                | Application Level / Scale               | Management Level                       | Objectives / Key Features                            |
|---|---|--|--|
| Acute Response<br>** Stabilisation<br>** Recovery | Household<br>* Neighbourhood<br>** City | ** Household<br>** Shared<br>** Public | Productive use of nutrients, Use as soil conditioner |
| Space Required                                    | Technical Complexity                    | Inputs                                 | Outputs  |
| *** High  | * Low                                   | ● Sludge                               | ● Biomass  |



Depending on the treatment type and quality, digested or stabilised sludge can be applied to public or private lands for landscaping or agriculture.

Treated sludge (e.g. from Planted Drying Beds: **T.10**) can be used in agriculture, home gardening, forestry, sod and turf growing, landscaping, parks, golf courses, mine reclamation, as a dump cover, or for erosion control. Although sludge has lower nutrient levels than commercial fertilisers (for nitrogen, phosphorus and potassium), it can replace a part of the fertiliser need. Additionally, treated sludge has been found to have some properties superior to those of fertilisers, such as bulking and water retention properties, and the slow, steady release of nutrients.

**Design Considerations:** Solids are spread on the ground surface using conventional manure spreaders, tank trucks or specially designed vehicles. Liquid sludge (e.g. from anaerobic reactors) can be sprayed onto or injected into the ground. The user must consider the level of treatment of the sludge and the type of use to determine how and when to best apply the sludge. Application rates and usage of sludge should account for the presence of pathogens and contaminants, and the quantity of nutrients available so that it is used at a sustainable and agronomic rate. On-farm Co-Composting (**T.11**) can be used to achieve improved treatment and increase the volume of soil conditioner.

**Materials:** A vehicle to transport and equipment to spread the sludge are required. This may include conventional manure spreaders, tank trucks or specially designed vehicles.

**Applicability:** The World Health Organization (WHO) Guidelines for the Safe Use of Wastewater, Excreta and Greywater should be consulted regarding the type of crops and conditions for the safe use of sludge. Depending on the source, sludge can serve as a source of nutrients. The Application of Sludge on land may be less expensive than disposal. Application of Sludge can be considered during the stabilisation and recovery phases of an emergency, when a functional sludge treatment system is in place.

**Operation and Maintenance:** The equipment used for applying sludge requires maintenance. The amount and rate of sludge application should be monitored to prevent nutrient overloading of both the soil and water bodies.

**Health and Safety:** Even after treatment, sludge is rarely pathogen-free. The WHO Guidelines for the Safe Use of Wastewater, Excreta and Greywater should be consulted regarding the security measures needed to protect public and environmental health. Workers should wear personal protective equipment (e.g. clothing, boots, masks). Although sludge is sometimes criticised for containing potentially high levels of heavy metals or other contaminants, faecal sludge from pits and tanks should not have any chemical inputs and is, therefore, not a high-risk source of heavy metal contamination. Sludge that originates from large-scale wastewater treatment plants is more likely to be contaminated as it may receive industrial and domestic chemicals, as well as surface water run-off, which can contain hydrocarbons and metals. Sludge from domestic wastewater and on-site sanitation systems can be considered safer as it is not contaminated by industrial waste.

**Costs:** The main cost to consider is the potential transport of the sludge to the fields. The Application of Sludge contributes to revenue generation by increasing agricultural yields. The application of sludge can save money if it replaces commercial fertilisers.

**Social Considerations:** The greatest barrier to the use of sludge is, generally, social acceptance. However, even when farmers or local industries do not accept sludge, it can still be useful for municipal projects and can provide significant savings (e.g. mine reclamation). Depending on the source of the sludge and the treatment method, sludge can be treated to a level where it is generally safe and no longer generates significant odour or vector problems. Following appropriate safety and application regulations is important. The WHO guidelines should be consulted for more detailed information.

**Strengths and Weaknesses:**

- ⊕ Can reduce the use of chemical fertilisers and improve the water-holding capacity of soil
- ⊕ Can accelerate reforestation
- ⊕ Can reduce erosion
- ⊕ Low costs
- ⊖ Odours may be noticeable, depending on prior treatment
- ⊖ May require special spreading equipment
- ⊖ May pose public health risks, depending on its quality and application
- ⊖ Social acceptance may be low in some areas

→ **References and further reading material for this technology can be found on page 195**