

Waste Water Treatment in the UAE

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Situation

The UAE has scarce water resources and depends heavily on groundwater and desalinated water as its main resources for domestic, commercial and industrial use. The systems that retrieve water from these resources are becoming more expensive and challenging to manage as the UAE continues to increase demand for water [1]. Increasing population also causes demand for water to rise.



Problems

- Water stress
- The lack of alternative water sources
- Distribution of channel networks
- Cost and energy consumption of desalination of sea water
- Complex operations of desalination plants
- Effects of seasonal variability on plant efficiency [3]
- Deteriorating quality of groundwater in the UAE
- Negative impact on marine life from dumping waste water into the ocean.

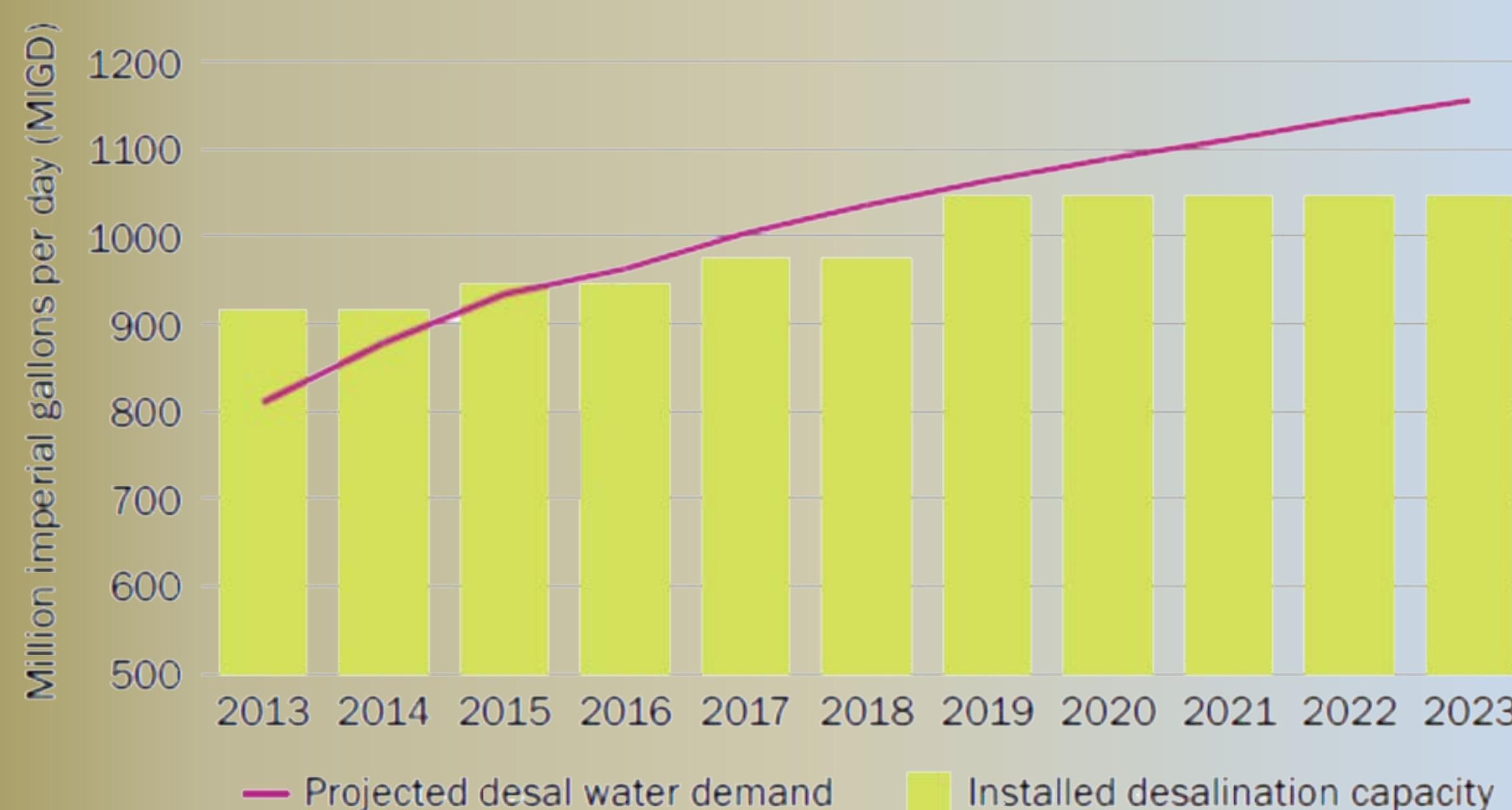


Fig. 2: Projected desalinated water supply and demand in Abu Dhabi

Solutions

Sustainable wastewater treatment systems would help solve the problem of wastewater in the UAE and reduce the UAE's dependence on desalination plants and ground water as its main water resources.

Our chosen secondary water treatment system is **The Activated Sludge method.**

Removal of dissolved pollutants in the water is achieved through the addition of biological flocs, such as micro-organisms, non-living organic matter and inorganic material, which are continuously circulated in untreated waste water.

These biological flocs feed on the dissolved organic matter in waste water if provided the appropriate atmosphere and conditions.

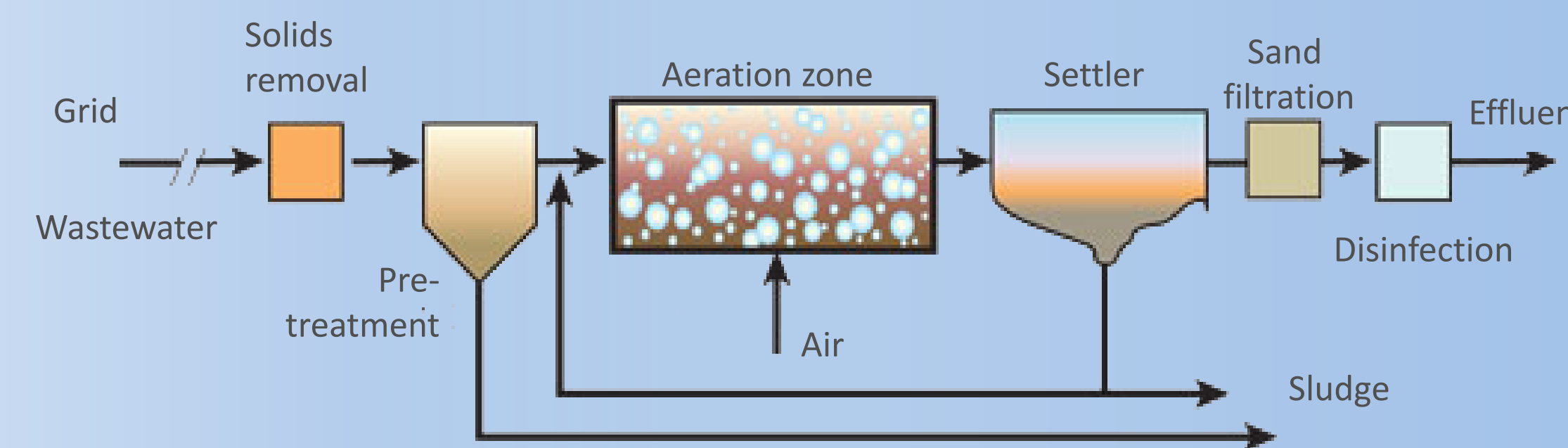


Fig. 3: The Activated Sludge Process [2]

The process includes multiple phases:

Phase I: Primary Treatment – Removal of suspended solids through settlement

Phase II: Anaerobic – dissolved organic matter is transformed into suspended solids and organic acids by bacteria, ammonia is oxidized into nitrates

Phase III: Anoxic – The nitrates and organic acids are converted into nitrogen gas and carbon dioxide and released into the atmosphere

Phase IV: Aeration – The concentration of phosphates and ammonia is decreased by aerobic bacteria

Phase V: Secondary Clarifier – Excess sludge with organic phosphate is removed by gravitational force and circulated again, clarified water is extracted [5]

Evaluation

Advantages

- Lower energy consumption than desalination plants
- Minimal maintenance - The process mainly relies on chemical reactions
- High reliability and sustainability
- Reduced odor
- Purity level of water enhanced
- Flexibility of process
- Most widely used and best documented method [5]
- Low land requirement

Drawbacks

- Difficulty of Implementation
- Lack of availability of spare parts and chemicals
- Constant energy supply [5]

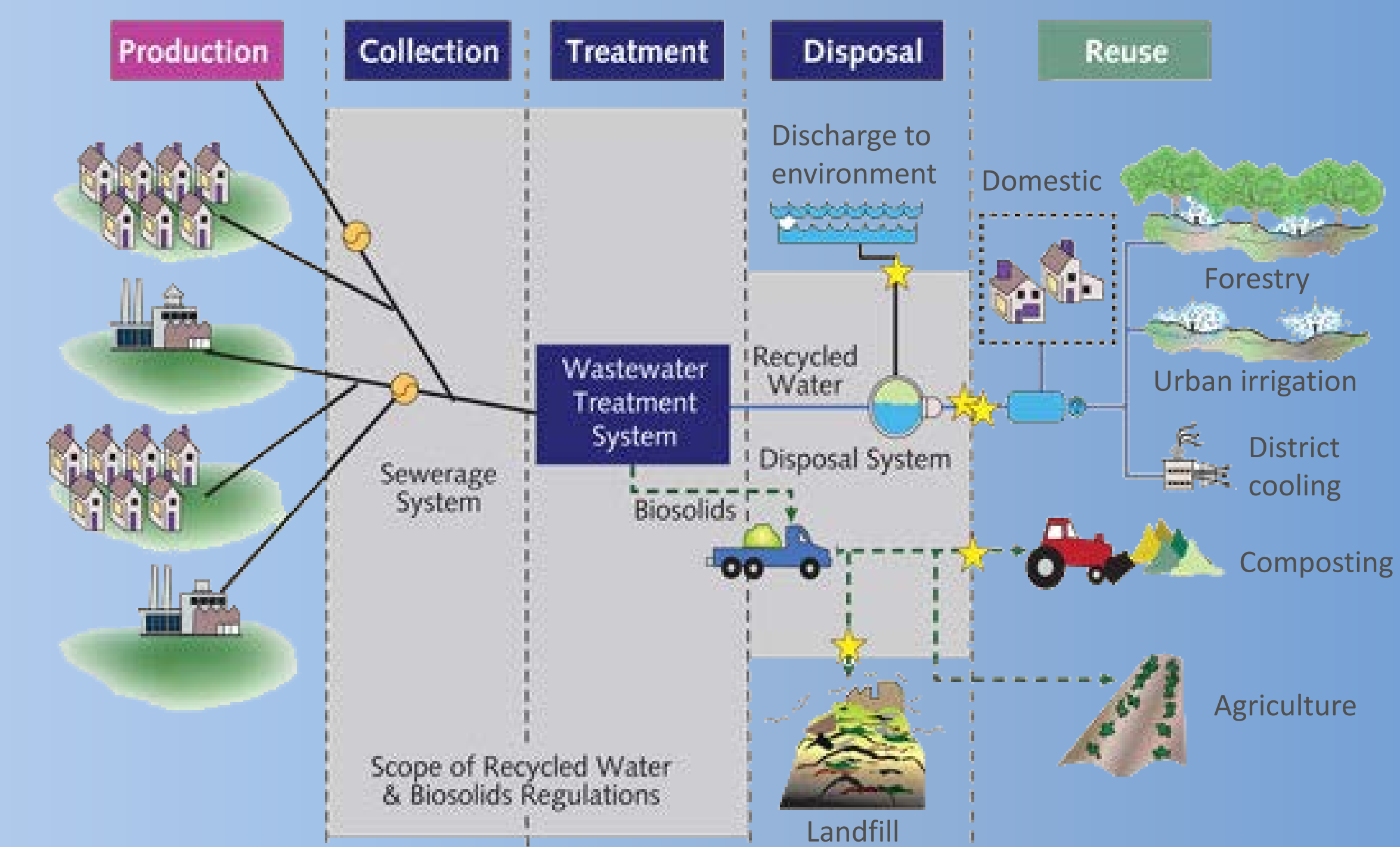


Fig. 4: Scope of wastewater regulations [2]

References

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