



# Should we accept SEPTAGE at WWTPs?

By:

Dr. MR Mohammadi



# Definition of septage

**EPA:** “Septage” is the material removed from a septic tank by pumping.

This article focuses on septage of domestic origin.

**Notice:** Industrial septage containing toxic compounds or heavy metals requires special handling, treatment, and disposal methods, a description of which is beyond the scope of this document.

سپتاز (Septage) به لجن و فاضلاب غلیظ جمع شده از مخازن سپتیک تانک و چاه های فاضلاب غیرشبکه ای گفته می شود که نیاز به جمع آوری، حمل و دفع یا تصفیه ایمن دارد.

وقتی سپتاز به درستی مدیریت شود، محیطی سالم تر و جامعه ای پایدارتر خواهیم داشت.

**جمع آوری ایمن**

- ▶ حمل به واحد تصفیه یا دفع مجاز
- ▶ یک محیط سالم تر برای همه

فرآیند جمع آوری سپتاز از سپتیک تانک

مخزن سپتیک تانک → حمل با تأسیس تخصصی → تصفیه یا مدیریت ایمن → محیط سالم آینده بهتر



## Characteristics of septage(EPA)

Table 2-3. Characteristics of Septage: Metals and Organics (2)

| Parameter        | Concentration (mg/L) |         |         |
|------------------|----------------------|---------|---------|
|                  | Average              | Minimum | Maximum |
| <b>Metals</b>    |                      |         |         |
| Iron             | 39.3                 | 0.2     | 2,740   |
| Zinc             | 9.97                 | <0.001  | 444     |
| Manganese        | 6.09                 | 0.55    | 17.1    |
| Barium           | 5.76                 | 0.002   | 202     |
| Copper           | 4.84                 | 0.01    | 261     |
| Lead             | 1.21                 | <0.025  | 118     |
| Nickel           | 0.526                | 0.01    | 37      |
| Chromium (total) | 0.49                 | 0.01    | 34      |
| Cyanide          | 0.469                | 0.001   | 1.53    |
| Cobalt           | 0.406                | <0.003  | 3.45    |
| Arsenic          | 0.141                | 0       | 3.5     |
| Silver           | 0.099                | <0.003  | 5       |
| Cadmium          | 0.097                | 0.005   | 8.1     |
| Tin              | 0.076                | <0.015  | 1       |
| Mercury          | 0.005                | 0.0001  | 0.742   |

Table 2-2. Characteristics of Septage: Conventional Parameters (1)

| Parameter                 | Concentration (mg/L) |         |         |
|---------------------------|----------------------|---------|---------|
|                           | Average              | Minimum | Maximum |
| Total solids              | 34,106               | 1,132   | 130,475 |
| Total volatile solids     | 23,100               | 353     | 71,402  |
| Total suspended solids    | 12,862               | 310     | 93,378  |
| Volatile suspended solids | 9,027                | 95      | 51,500  |
| Biochemical oxygen demand | 6,480                | 440     | 78,600  |
| Chemical oxygen demand    | 31,900               | 1,500   | 703,000 |
| Total Kjeldahl nitrogen   | 588                  | 66      | 1,060   |
| Ammonia nitrogen          | 97                   | 3       | 116     |
| Total phosphorus          | 210                  | 20      | 760     |
| Alkalinity                | 970                  | 522     | 4,190   |
| Grease                    | 5,600                | 208     | 23,368  |
| pH                        | —                    | 1.5     | 12.6    |



Land application

Treatment at independent septage treatment plants

Treatment at wastewater treatment plants (WWTPs)





**Overview of approaches to septage treatment and disposal**

| Method                                                         | Description                                                                                                                                                                                                                                                                                                                                         | advantages                                                                                                                                                                                            | Disadvantages                                                                                                                                                                                                                |
|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Land application</b>                                        | Septage is applied to sites infrequently visited by the public. Stabilization to reduce odors, pathogens, and vector attraction may be encouraged or required by the state.' Land application may be by hauler truck or other vehicle to apply septage to the land surface, or by specialized equipment to inject septage beneath the soil surface. | <ul style="list-style-type: none"><li>• Simple and economical</li><li>• Recycles organic material and nutrients to the land<ul style="list-style-type: none"><li>• Low energy use</li></ul></li></ul> | <ul style="list-style-type: none"><li>• Need holding facility during periods of frozen or saturated soil</li><li>• Need for relatively large remote land area</li></ul>                                                      |
| <b>Treatment at independent septage treatment plant (FSTP)</b> | A facility is constructed solely for the treatment of septage. Treatment generates residuals which must be disposed of.                                                                                                                                                                                                                             | <ul style="list-style-type: none"><li>*Provides regional solution to septage management</li></ul>                                                                                                     | <ul style="list-style-type: none"><li>*High capital and operation and maintenance (O&amp;M) cost</li><li>*Requires high skill levels for operation</li></ul>                                                                 |
| <b>Treatment at WWTPs</b>                                      | Septage is added to the plant head works, upstream manhole, or sludge handling process for co-treatment with sewage or sludge. Septage volumes that can be accommodated depend on plant capacity and types of unit processes employed.                                                                                                              | <ul style="list-style-type: none"><li>*Some plants are capable of handling some septage</li><li>*Centralizes operations</li></ul>                                                                     | <ul style="list-style-type: none"><li>*<b>need WWTPs permission</b></li><li>*Potential for plant upset if septage addition not properly controlled</li><li>*Increased residuals handling and disposal requirements</li></ul> |

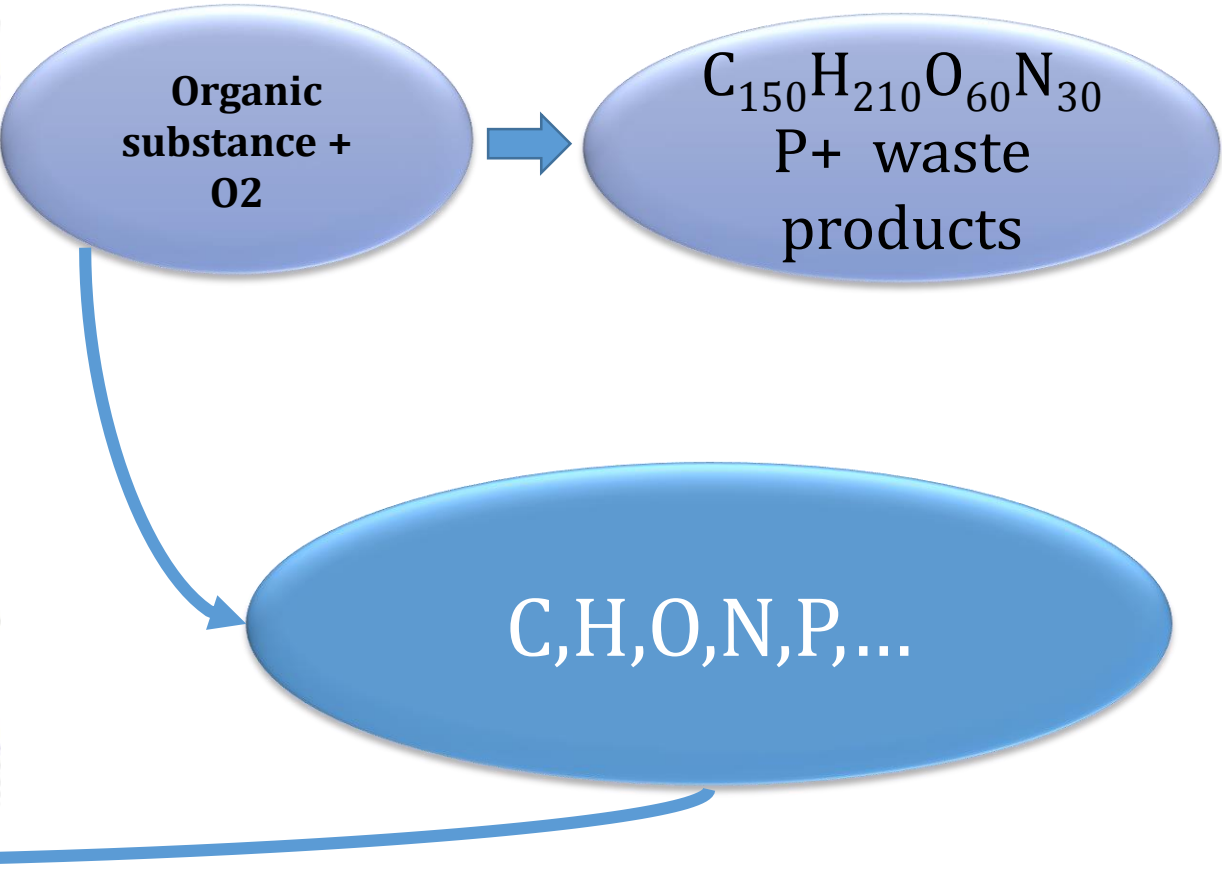
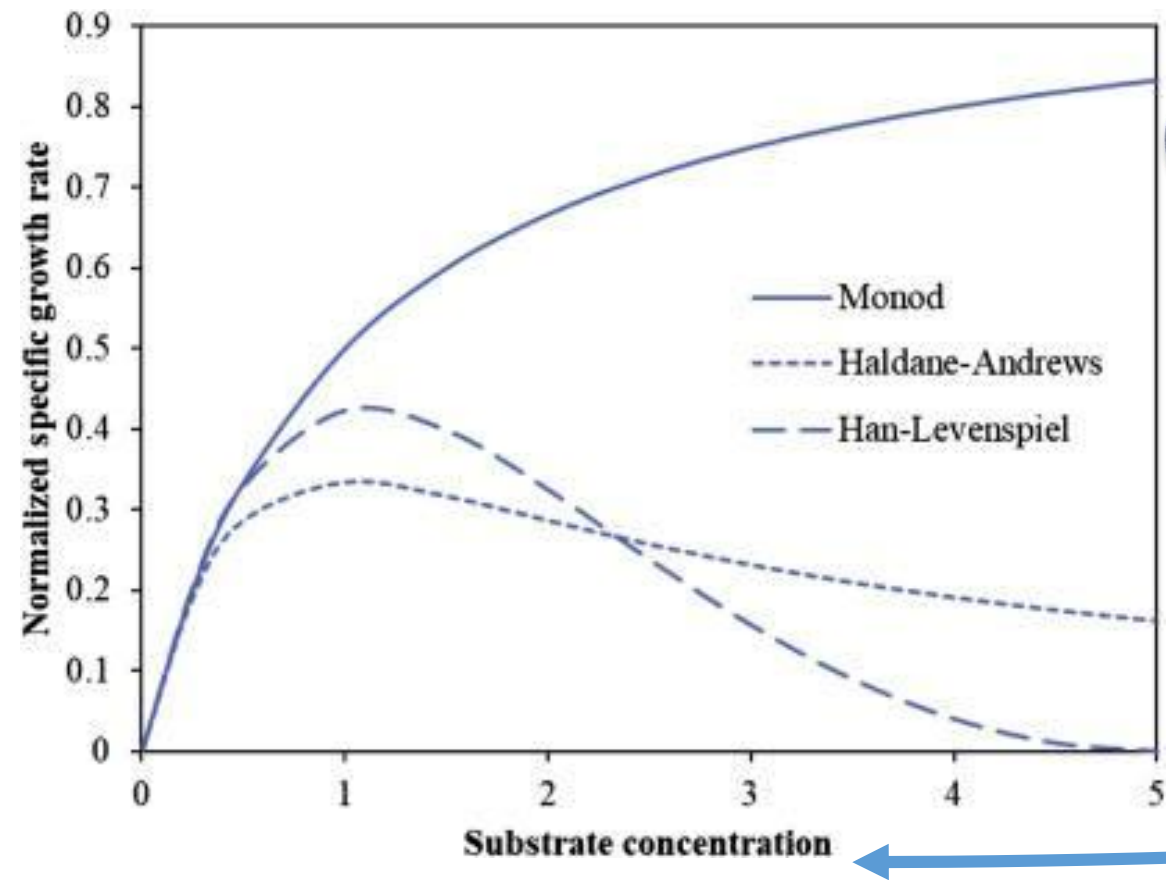


Necessary assessments  
for issuing the permit

| parameter                                            | Control scope      |
|------------------------------------------------------|--------------------|
| Flow (average & max)                                 | Hydraulic profile  |
| Organic load (BOD,COD,TOC)                           | Treatment process  |
| Nitrification capacity (TKN, TN, Alkalinity)         | Treatment process  |
| Extra oxygen demand& aeration capacity               | Aeration tank      |
| Total solid load                                     | Sedimentation tank |
| Thickener, digester, dewatering and storage capacity | Sludge facilities  |
| Effluent standard guarantee                          | Functional tests   |



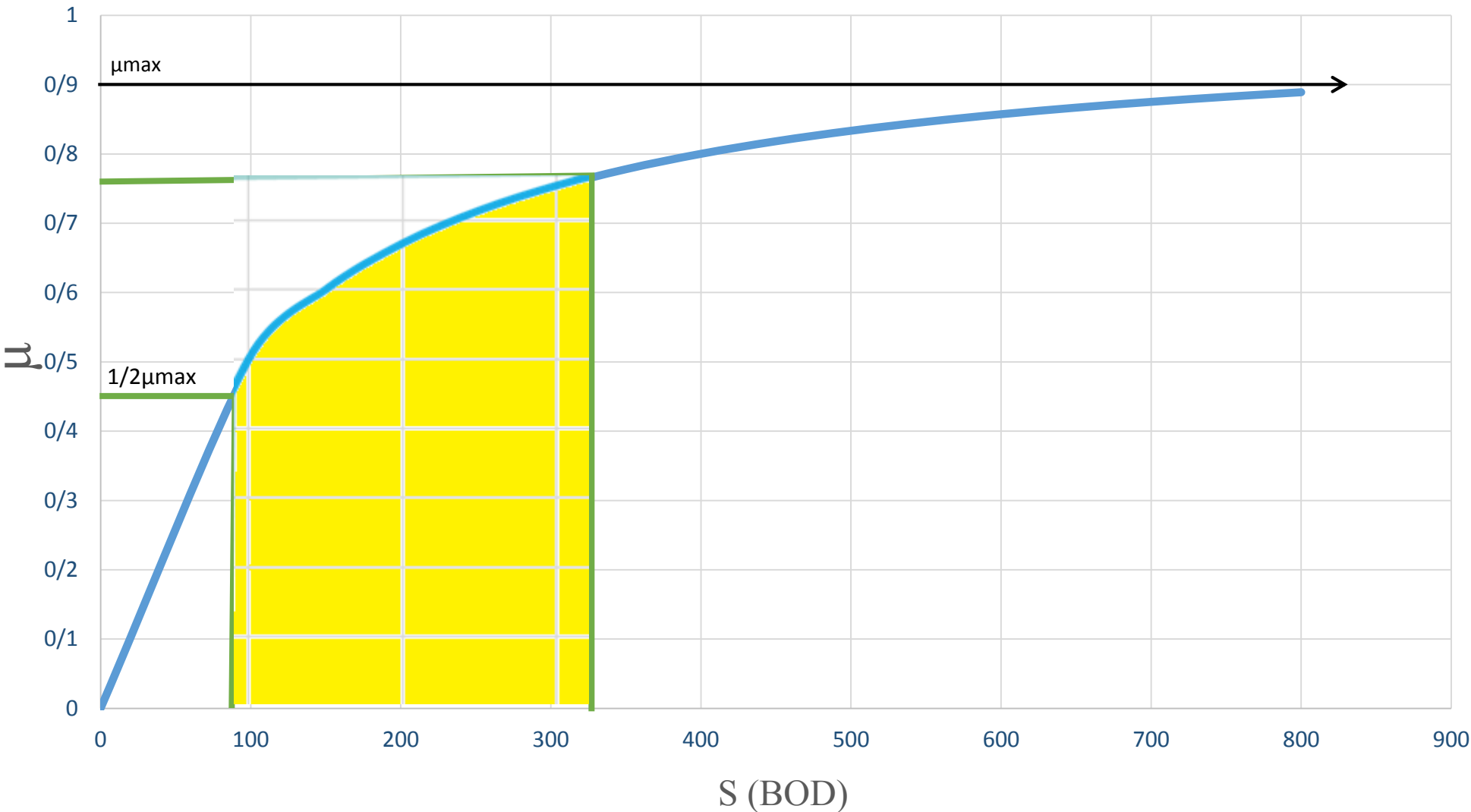
Biological consideration for  
septage acceptance at  
WWTPs



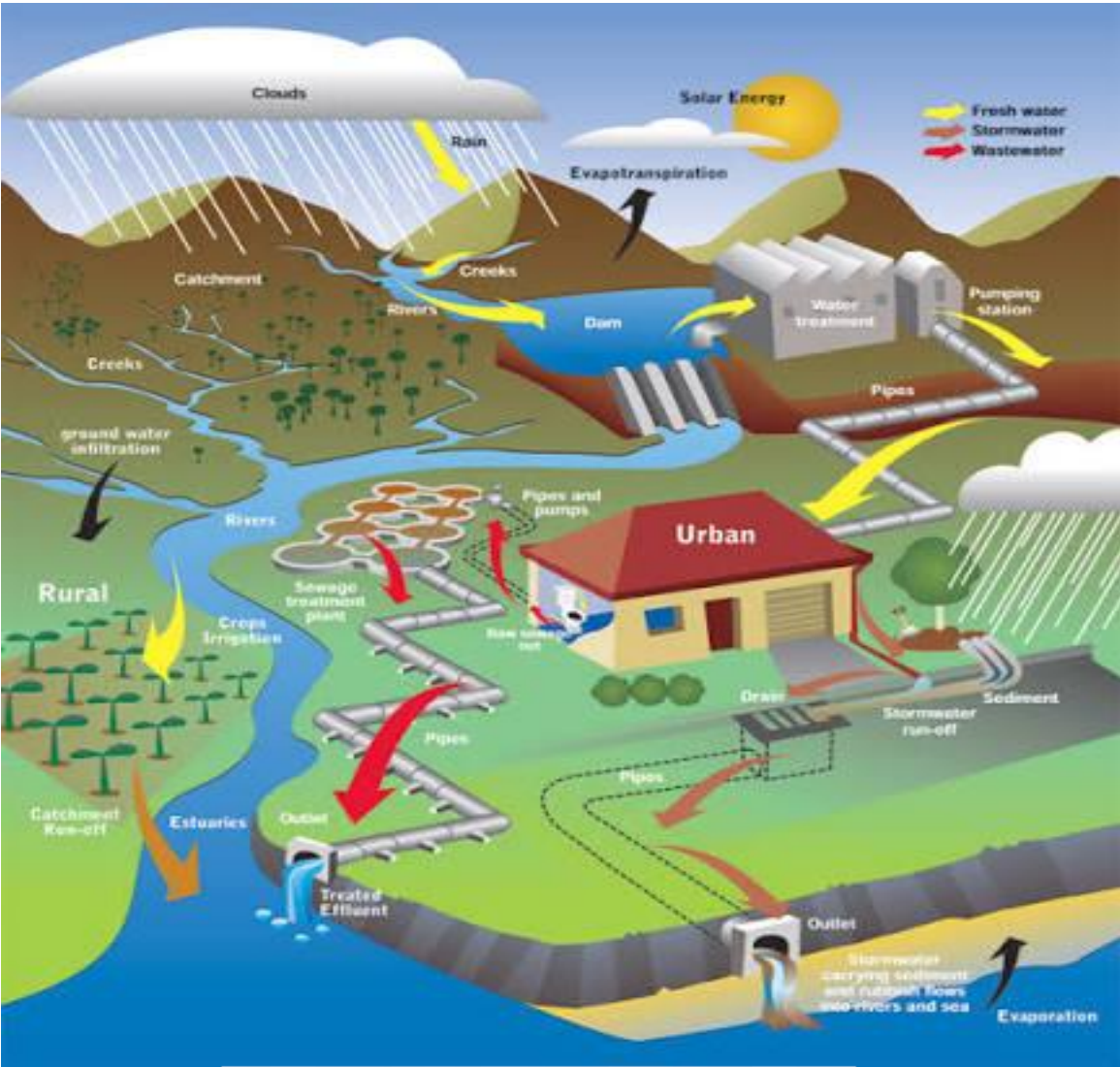


Biological conditions to accept septage into WWTPs

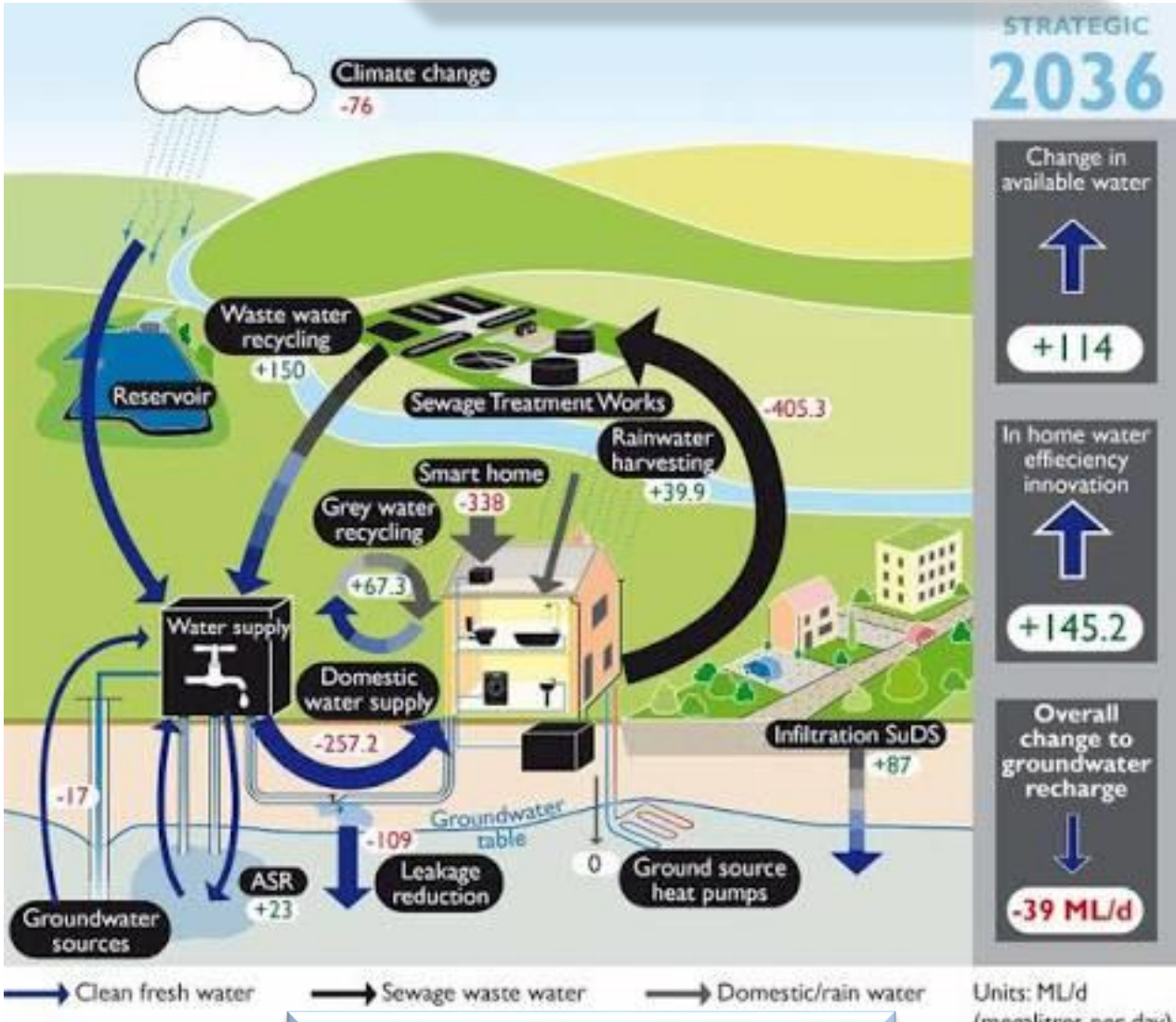
گراف مونود برای فرآیند متعارف لجن فعال



# The importance of effluent in the past and present



past



present



Which WWTPs are capable to accepting septage?

- Following the necessary assessments, there will be three categories of WWTPs.

| group | Assessment result                                                 | Action plan                                                                                                                                                          |
|-------|-------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A     | Sufficient capacity in the liquid and sludge section              | <ul style="list-style-type: none"><li>Design and construction of the receiving station</li><li>Setting the tariffs</li><li>Programmatic admission</li></ul>          |
| B     | Limited capacity                                                  | <ul style="list-style-type: none"><li>Design and construction of the equalization tank</li><li>Setting the tariffs</li><li>Limited and quantized admission</li></ul> |
| c     | Insufficient or temporary capacity or sensitive treatment process | <ul style="list-style-type: none"><li>Admission is not possible</li></ul>                                                                                            |



# Setting the tariffs

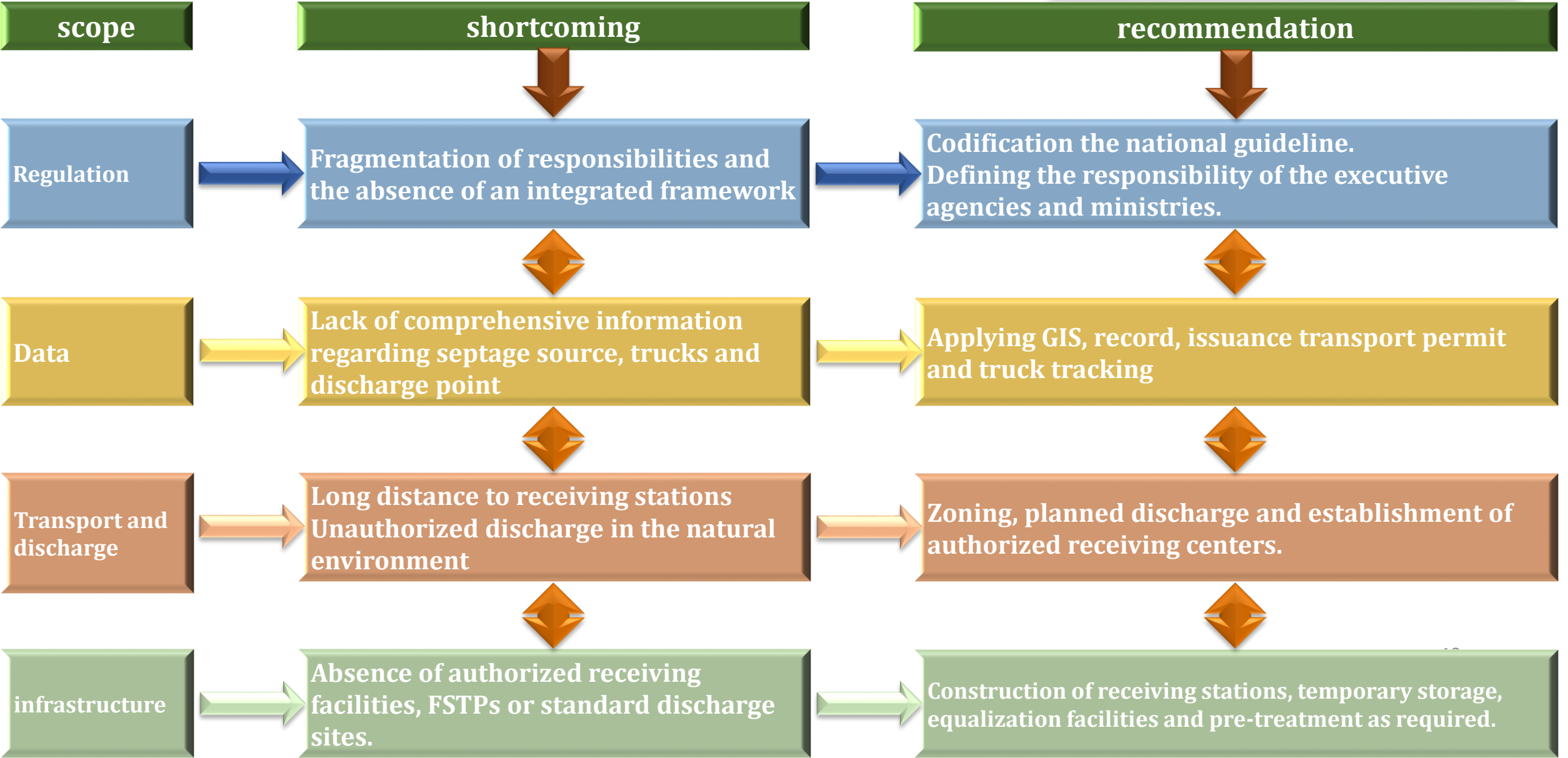
| Item              | Cost fraction                                  |
|-------------------|------------------------------------------------|
| Pumping           | Worker, equipment, washing                     |
| Vehicles          | Insurance, repair, maintenance, transit permit |
| Transport         | Distance, time, fuel, traffic, truck capacity  |
| Receiving station | Sampling, measurement, screening, washing      |
| Treatment         | Extra load cost                                |
| Monitoring        | Lab, inspection                                |
| Admission office  | Bill, receipt, contracts                       |
| Construction      | depreciation                                   |



- Deficiencies in regulation regarding the organization of septage trucks
- Absence of septage receiving facilities in WWTPs or upstream sewers
- Unspecified tariff
- Concerning about WWTPs performance especially the biological process
- Modular construction of WWTPs and lack of free capacity
- Sale of effluent and ensuring quantity and quality of effluent for customers (industries, agriculture, urban green spaces, ...)

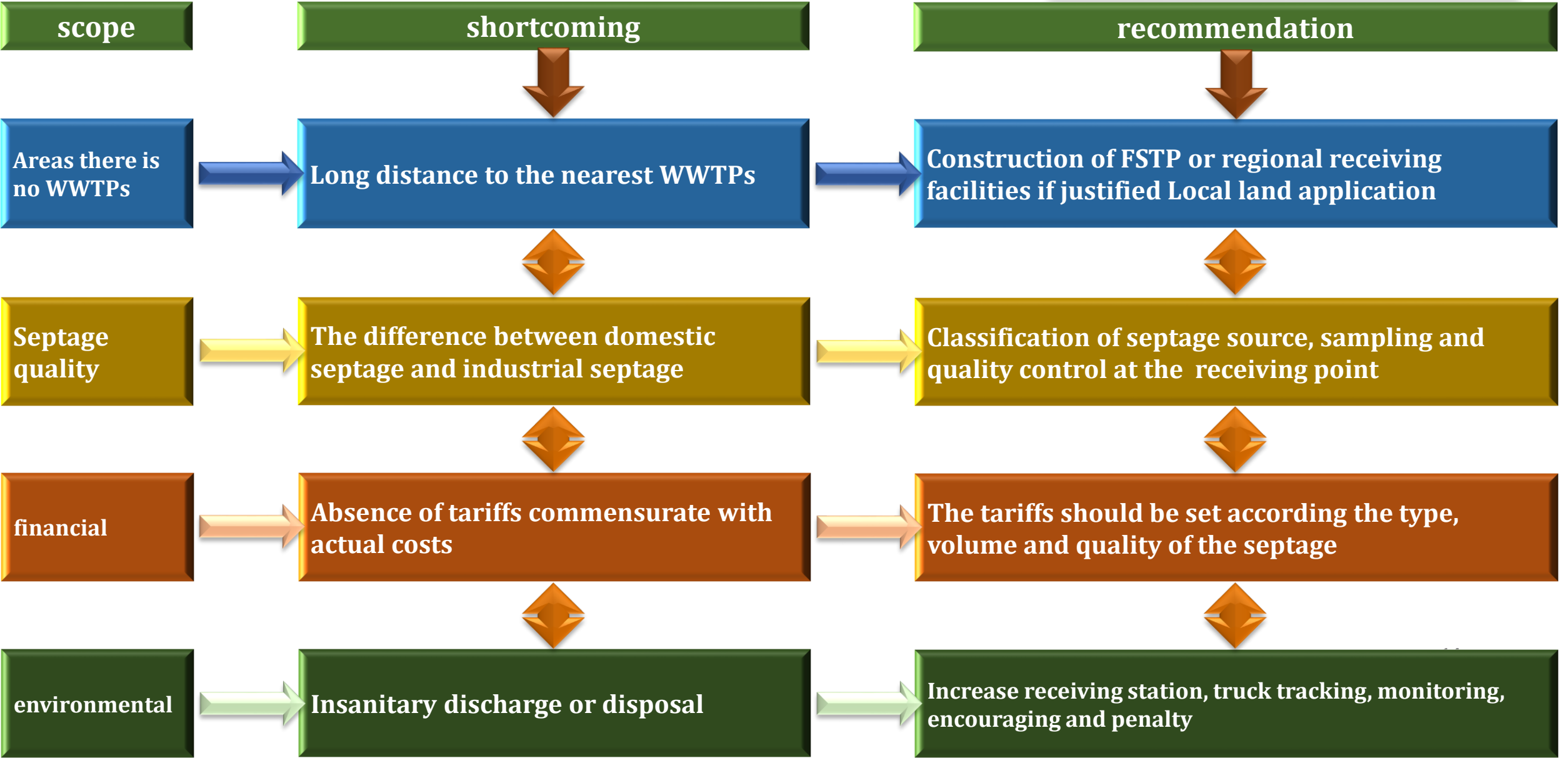


**Analysis of shortcomings and recommendations**





# Analysis of shortcomings and recommendations





Tehran Province Water & Wastewater

*Thank You For Your*  
**ATTENTION**