



Gear R

Designation of the Bohai Sea as Special area



Limitation of total mass of
nutrients such as Nitrogen and Phosphorus
from passenger ships while operating in
special area

“

Why Should We Need
Limitation of Total mass?

”

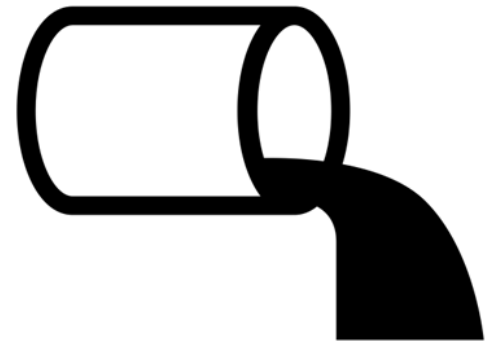
Pollution in The Bohai Sea



Causes of pollution

1. Passenger ship's sewage
2. Geographical characteristic
3. Industrial development

Sewage from
passenger ships



| PORT YEAR | YINKOU | QUNHUAN GDO | TIANJIN | DALIAN | YUNTAI |
|--------------|--------|----------------|---------|---------|---------|
| 2005 | 39,365 | 36,421 | 68,905 | 94,199 | 106,497 |
| 2006 | 40,302 | 46,558 | 73,997 | 97,896 | 95,994 |
| 2007 | 42,882 | 50,066 | 56,689 | 76,652 | 86,138 |
| 2008 | 40,085 | 51,903 | 44,563 | 91,393 | 79,063 |
| 2009 | 46,304 | 56,206 | 36,462 | 61,279 | 70,155 |
| 2010 | 47,608 | 60,731 | 83,128 | 88,073 | 92,514 |
| 2011 | 50,341 | 63,226 | 102,705 | 111,416 | 97,126 |
| 2012 | 48,318 | 41,765 | 104,448 | 94,056 | 81,350 |
| 2013 | 46,100 | 47,391 | 9,773 | 102,524 | 72,681 |
| 2014 | 59,203 | 36,709 | 31,330 | 101,391 | 93,881 |
| 2015 | 38,180 | 32,971 | 48,436 | 37,449 | 56,016 |

Geographical Characteristics of the Bohai sea





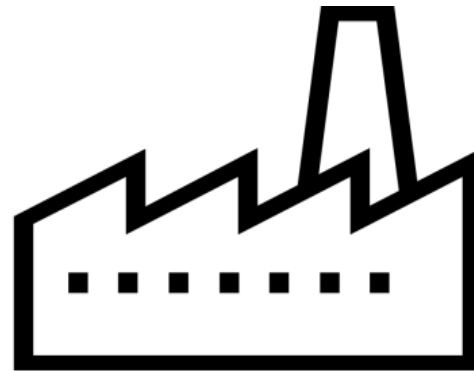
조선
민주주의
인민공화국

대한민국



동중국해

Development of Industrial complex



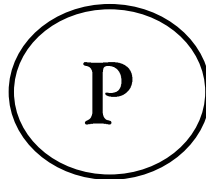
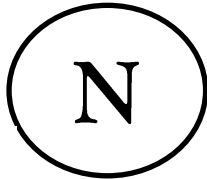
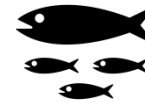
Report On the State of the Environment In China

Amount of major pollutants directly discharged into sea

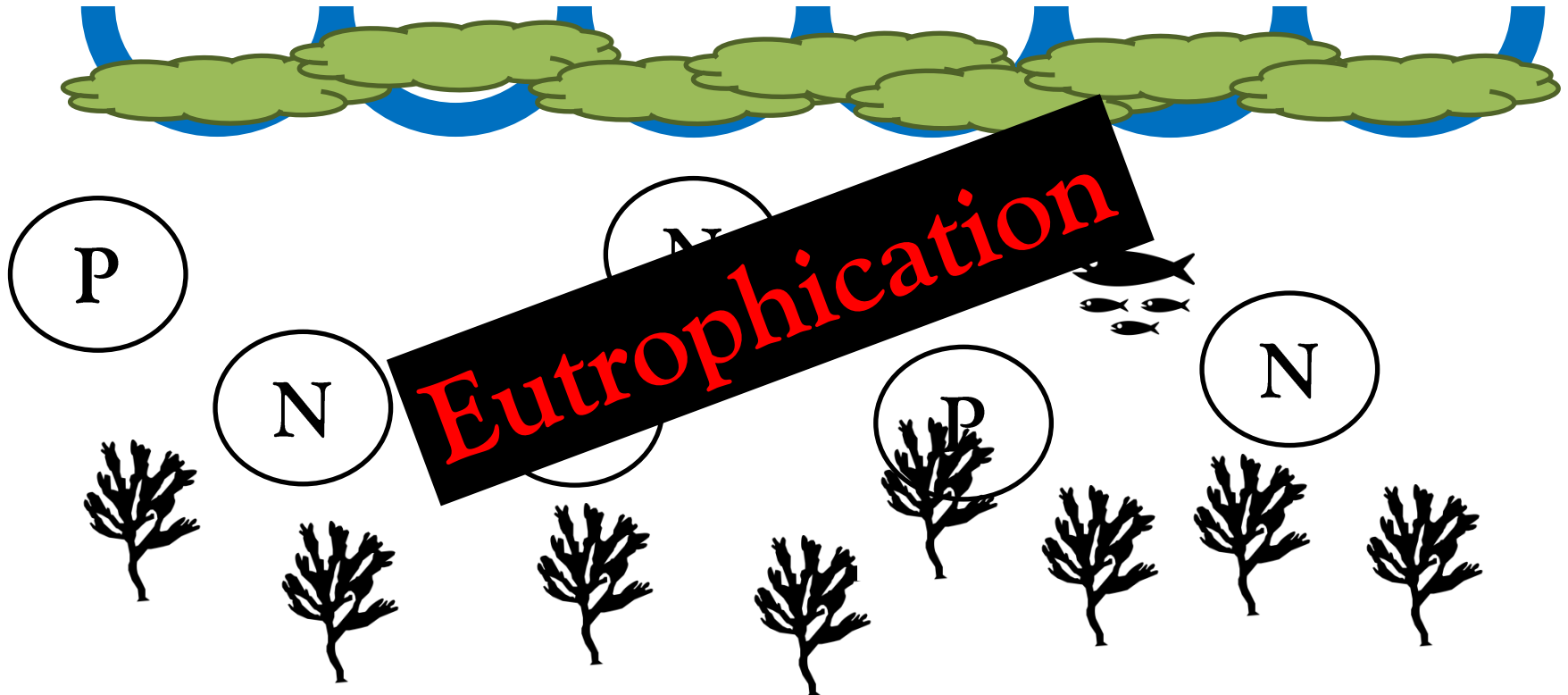
| Year | waste water (million tons) | COD (t) | Ammonia nitrogen (t) | Petroleum (t) | Total Phosphorus (t) |
|------|-------------------------------|---------|----------------------------|------------------|----------------------------|
| 2008 | 132 | 7700 | 800 | 166.3 | 35.2 |
| 2009 | 162 | 7500 | 1400 | 77.5 | 43.5 |
| 2010 | 181 | 7900 | 1100 | 74.7 | 66.9 |
| 2011 | 166 | 10000 | 1000 | 59 | 134.1 |
| 2012 | 180 | 7000 | 1000 | 35.8 | 90.8 |
| 2013 | 206 | 12000 | 2000 | 36.2 | 180.4 |
| 2014 | 299 | 19000 | 2000 | 29.3 | 247.3 |

If the Bohai Sea is wholly polluted,
Toxic algae will appear and it has
potential to flow into **the Yellow sea**

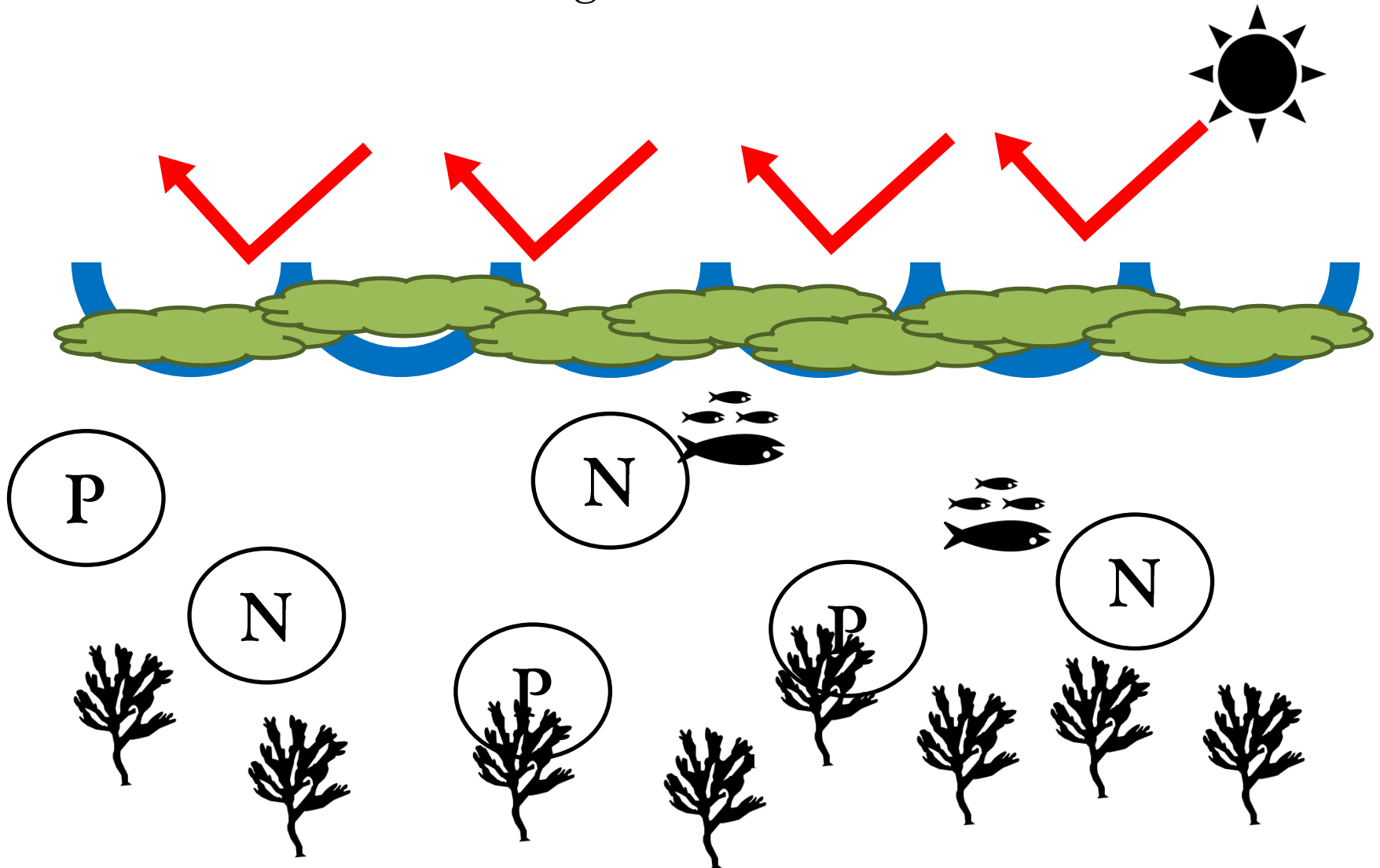
1. Passenger ship discharges Nitrogen and Phosphorus



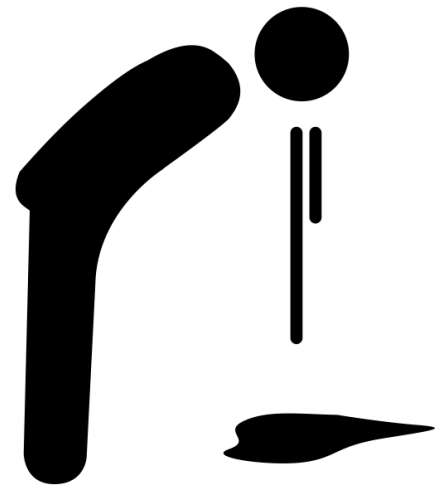
2. The presence of the N, P in the water causes overgrowth of the algae



3. Now, no sunlight can reach the lower part of the lake causing fishes to die



Someday, we may eat
the fishes of the
Bohai sea



“ Oh! Oil spill!”



“ What’s the problem?”



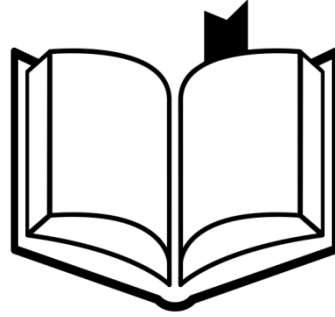
We think



The Limitation of Total mass is the SOLUTION

There are two ways to discharge sewage

1. The Limitation of Concentration
2. The Limitation of Total mass



The Limitation of Concentration is a
regulation controlled by the concentration of
sewage

ANNEX 12

RESOLUTION MEPC.200(62)

Adopted on 15 July 2011

**AMENDMENTS TO THE ANNEX OF THE PROTOCOL OF 1978 RELATING TO
THE INTERNATIONAL CONVENTION FOR THE PREVENTION OF
POLLUTION FROM SHIPS, 1973**

**(Special Area Provisions and the Designation of the Baltic Sea as a Special Area under
MARPOL Annex IV)**

MEPC 62/24
Annex 12, page 4

B Discharge of sewage from passenger ships within a special area

3 Subject to the provisions of regulation 3 of this Annex, the discharge of sewage from a passenger ship within a special area shall be prohibited:

- a) for new passenger ships on, or after 1 January 2016, subject to regulation 12*bis*, subparagraph 2; and
- b) for existing passenger ships on, or after 1 January 2018, subject to regulation 12*bis*, subparagraph 2,

except when the following conditions are satisfied:

the ship has in operation an approved sewage treatment plant which has been certified by the Administration to meet the operational requirements referred to in regulation 9.2.1 of this Annex, and the effluent shall not produce visible floating solids nor cause discoloration of the surrounding water.

4.2 For the purpose of regulation 9.2.1 of MARPOL Annex IV, a sewage treatment plant installed on a passenger ship intending to discharge sewage effluent in special areas should additionally meet the following effluent standards when tested for its Certificate of Type Approval by the Administration:

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MEPC 64/23/Add.1
Annex 22, page 9

.1 Nitrogen and phosphorus removal standard

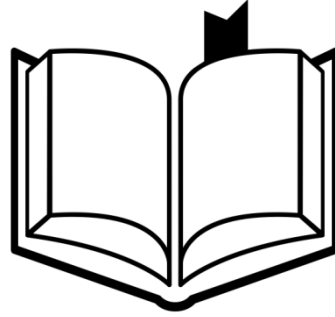
The geometric mean of the total nitrogen and phosphorus content of the samples of effluent taken during the test period should not exceed:

.1 total nitrogen¹: 20 Qi/Qe mg/l or at least 70 per cent reduction²;

.2 total phosphorus: 1.0 Qi/Qe mg/l or at least 80 per cent reduction³.



Limitation of concentration is **easy**
to supervise



The Limitation of Total mass is a regulation controlled by the amount of pollutant in sewage



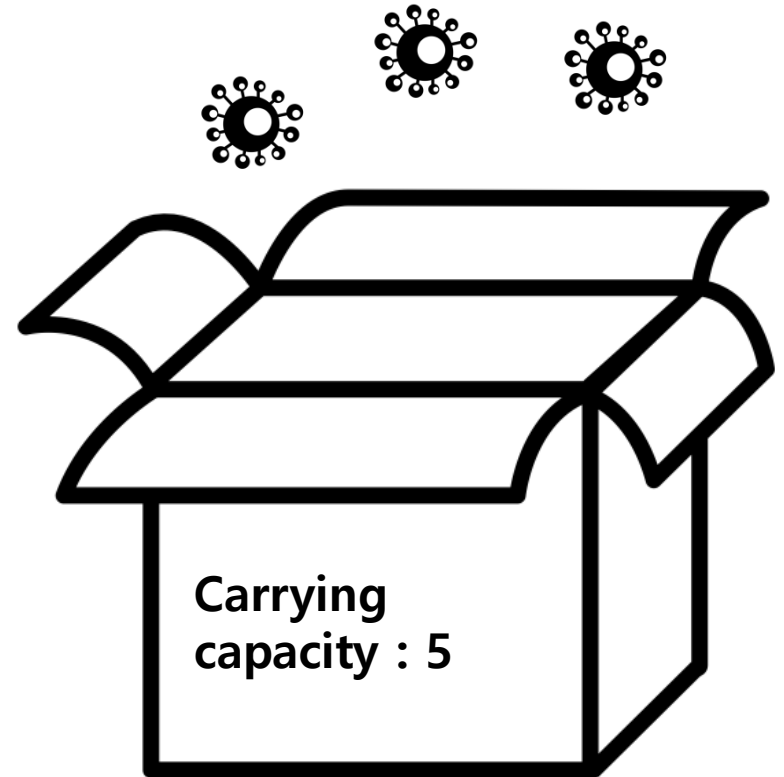
The Limitation of Total mass has difficulty to
calculate **Carrying capacity**



The Limitation of Total mass suggest whether we can discharge more sewage or not

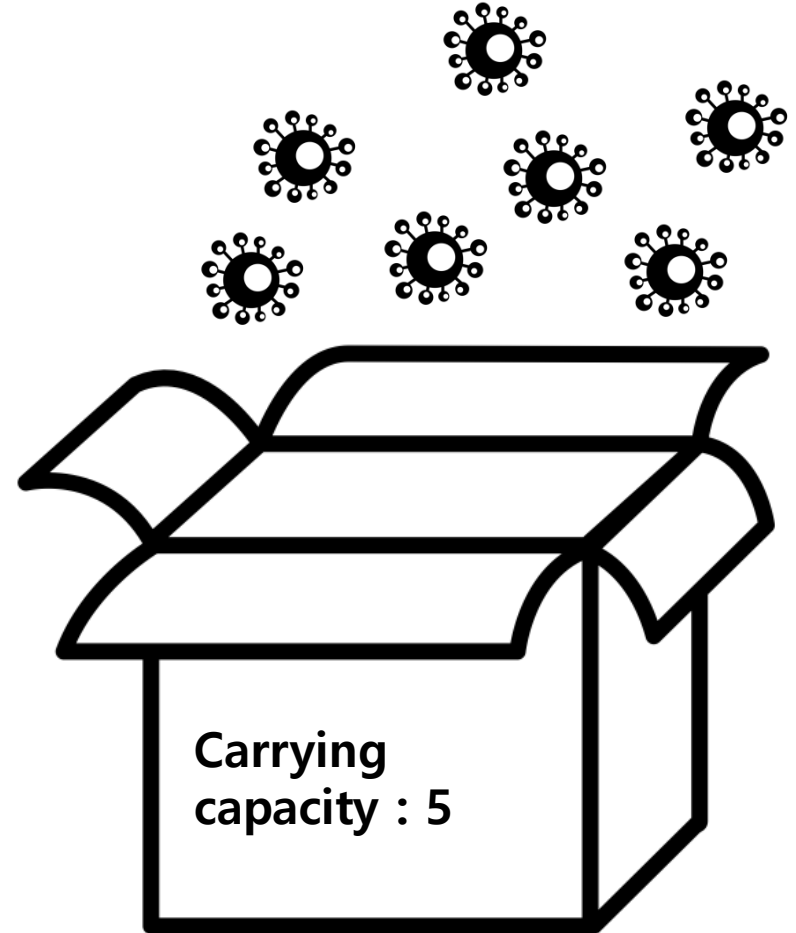
Situation 1.

Carrying capacity
> Amount of Pollutant



Situation 2.

Carrying capacity
< Amount of Pollutant



Limitation of concentration can make us
not perceive this situation

**“ Concentration of this is 15ppm.
so, There is NO problem”**



However, What if the carrying capacity was already full...?



People don't know whether the carrying capacity can accommodate more sewage or not



But Limitation of Total mass **NEVER** happen that kind of situation.



After
Limitation of Total mass
is adopted...



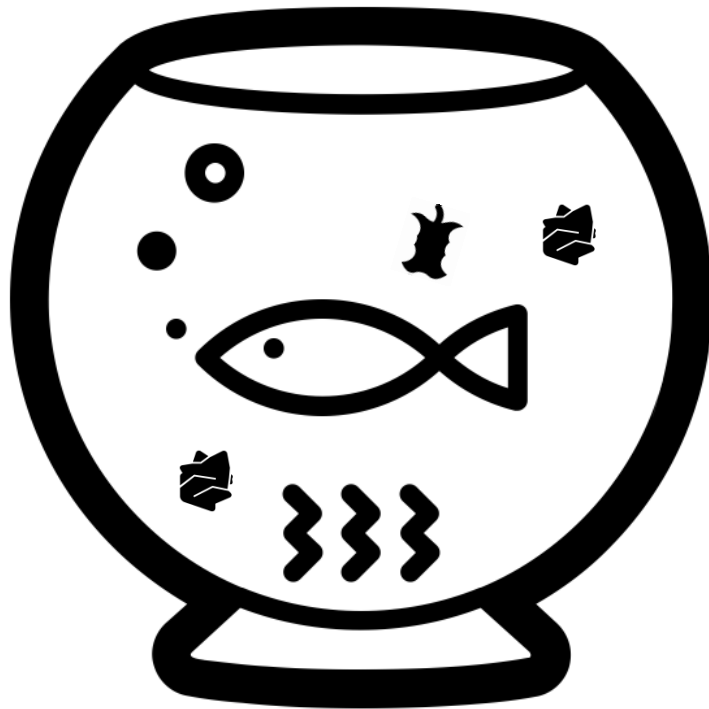
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We need Criteria between
Limitation of Total mass and
Concentration

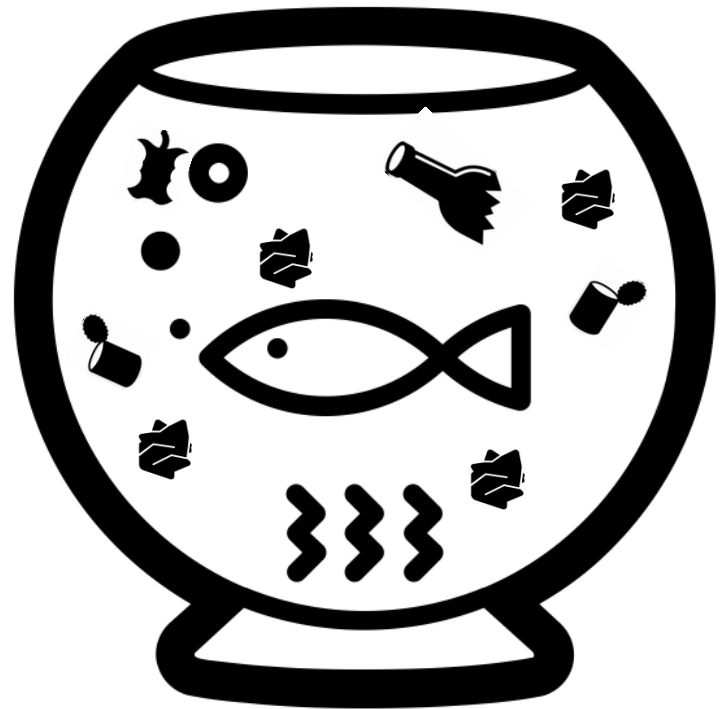
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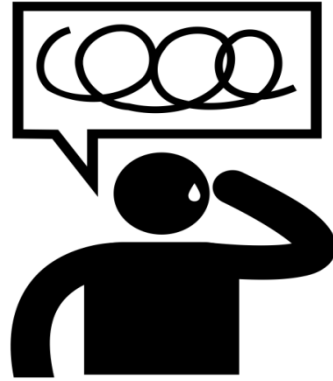


Limitation of
Concentration



Limitation of
Total mass





Difficulties to conduct Limitation of Total mass

- ✓ It is hard to calculate Carrying capacity
- ✓ It is hard to supervise
- ✓ It is expensive to install a Sewage treatment plant removing Nitrogen and Phosphorus



Automatic Sewage Measure Equipment
is the Key

Automatic Sewage Measure Equipment
is based on **this formula**

Total pollutant
= Concentration of Nitrogen and
Phosphorus \times amount of sewage

Thank you for listening