PUNCA PENCEMARAN

Pencemaran air terbahagi kepada dua iaitu punca tetap dan punca tidak tetap. Pencemaran daripada punca tetap berlaku akibat pelepasan effluen yang dilepaskan ke alur air atau sungai melalui limpahan atau paip. Punca tidak tetap pula berpunca daripada air larian hujan (*surface run off*) yang membawa pencemar ke sungai atau ke laut.

Gambar 1: Punca Pencemaran Tetap (PS)

Gambar 2: Punca Pencemaran Tidak Tetap (NPS)

FORMULA BEBAN PENCEMARAN

Beban= kepekatan x kadar alir

Beban (kg/hari) = kepekatan (mg/L) x kadar alir (m^3/s) x 86.4

Contoh

i. Kepekatan NH_3-N yang dilepaskan dari Loji Kumbahan (STP) adalah 15mg/L dengan kadar alir sebanyak 0.1m^3/s

Beban NH_3-N yang dilepaskan oleh STP ke dalam sungai adalah sebanyak:

15 mg/L x 0.1 m^3/s x 86.4 = 129.6 kg/hari

ii. Kira beban pencemaran NH_3-N di Sg. A yang menerima beban dari STP. Kepekatan NH_3-N sedia ada di sungai tersebut adalah 0.2mg/L (Kelas II, National Water Quality Standards for Malaysia (NWQS)) dengan kadar alir 2 m^3/s.

Beban NH_3-N sedia ada di Sg. A adalah:

0.2 mg/L x 2 m^3/s x 86.4 = 34.6 kg/hari

Maka kepekatan NH_3-N di Sg. A sekiranya effluent dilepaskan dari STP adalah:

(129.6 + 34.6) kg/hari ÷ [(0.1 + 2.0) m^3/s x 86.4]
= 0.9mg/L (Kelas III, NWQS)

iii. Untuk memastikan kepekatan NH_3-N sebanyak 0.3 mg/L (Kelas II, NWQS) di sungai A, apakah kepekatan NH_3-N yang dibenarkan dilepaskan oleh STP?

0.3 mg/L x 2 m^3/s x 86.4 = <u>51.84 kg/hari</u>

(51.84- 34.6) kg/hari = 17.24 kg/hari

<u>Sekiranya 20% margin of safety digunakan:</u>

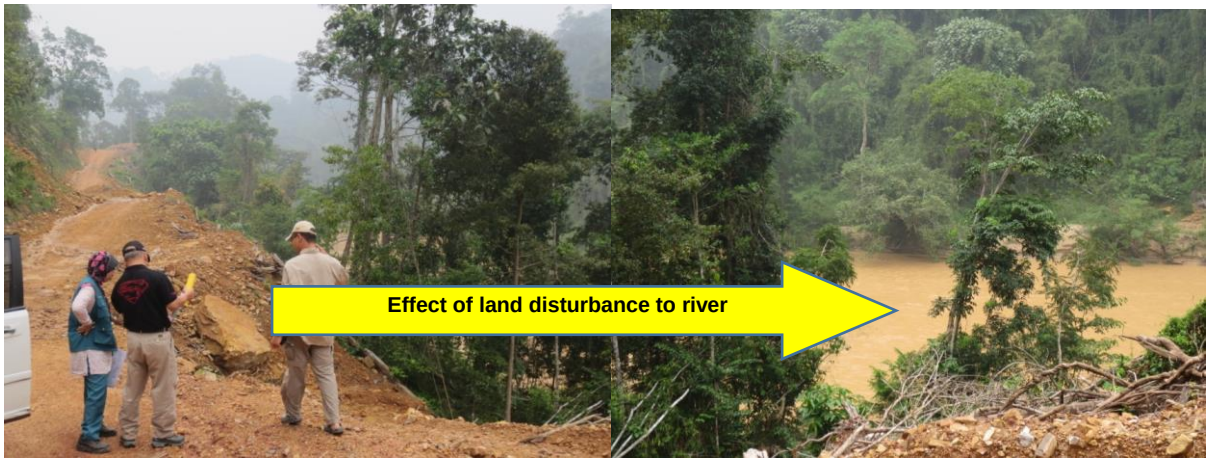
20% x 17.24 kg/hari = 13.8 kg/hari

13.8 kg/hari ÷ (0.1 m^3/s x 86.4) = <u>1.6mg/L</u>

POLLUTION SOURCES

Water pollution are generally due to the discharge contributed by point sources and non-point sources. Point sources (PS) are referred as the source of polluted water or discharges, and channeled into a water body through outfalls or pipes. Non-point sources are diffuse source that do not have specific discharge point, and normally occurs during rainfall and in the event of floods, which cause surface run-off to sweep all pollutants and wash it downstream.

Picture 1: Point Sources (PS) Pollution



Picture 2: Non Point Sources (NPS) Pollution

POLLUTION LOAD FORMULA

Loading = concentration x flowrate

Loading (kg/d) = concentration (mg/L) x flowrate (m^3/s) x 86.4

Example

i. Determine the NH_3-N pollution load of sewage treatment plant (STP) discharging NH_3-N at 15mg/L with corresponding discharge flowrate of 0.1m^3/s

NH_3-N load from STP:

15 mg/L x 0.1 m^3/s x 86.4 = <u>129.6 kg/hari</u>

ii. Determine in- stream NH_3-N load at Sg. A if the concentration was at 0.2mg/L (Kelas II, National Water Quality Standards for Malaysia (NWQS)) and river flowrate was at 2 m^3/s.

In- stream NH_3-N load at a section of Sg. A:
0.2 mg/L x 2 m^3/s x 86.4 = <u>34.6 kg/hari</u>

Load pollution if STP discharge to Sg. A:
(129.6 + 34.6) kg/hari ÷ [(0.1 + 2.0) m^3/s x 86.4) = <u>0.9mg/L</u>

iii. If want to make sure NH_3-N concentration in Sg. Semenyih at 0.3 mg/L (Class II, NWQS), what will be the maximum concentration of NH_3-N discharge from STP?

Maximum NH_3-N load from STP to Sg. Semenyih:

0.3 mg/L x 2 m^3/s x 86.4 = <u>51.84 kg/hari</u>

(51.84- 34.6) kg/hari = 17.24 kg/hari

<u>Example if 20% margin of safety been used:</u>

20% x 17.24 kg/hari = 13.8 kg/hari

13.8 kg/hari ÷ (0.1 m^3/s x 86.4) = <u>1.6mg/L</u>