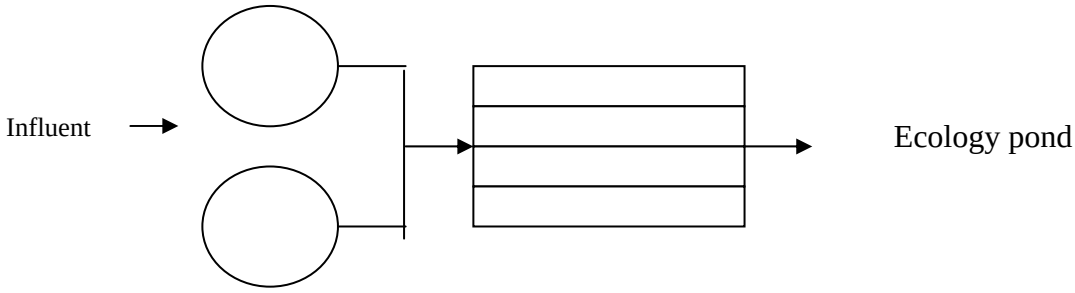
Matala filter media installation Quantity and Type Installation Design Example

(Project for River Purification)

System Capacity：62,000 CMD。

1. Influent BOD: 55 mg/L, SS: 100 mg/L, COD: 100 mg/L, NH_3-N: 15 mg/L。
3. Effluent Target : BOD≦ 10 mg/L。
4. Treatment process：



Fine bubble aerobic treatment　　fixed bed biological filtration(horizontal flow)

5. **Process description：**

(1)fine bubble aerobic tank: HRT 30min，tank ∮15m，average water depth: 3.5m，total two tanks，each tanks : 4untis of air blower (15KW) (2 units for back up)，Total 8 units，nozzles total 270pcs，Provides dissolvable air for reduce the suspended solid and increase Do for the biological treatment.

In this process BOD from 55 reduce to 45 mg/L

(2)Horizontal flow fixed bed biological filtration：

2.1 HRT9.3hrs,　L x W x H = 100m L x 20m W x 3.5m H (effective water depth 3.0 m) total 4 chambers。

Total filter media surface area: 1.83 x 10^6 m^2，2/3 of this total surface area distribution in 1/3 of the front tank，the remaining 1/3(0.62 x 10^6 m^2) distributing in the 2/3 tank

2.1.1 Based on this design, the total Matala filter media is 6000 m3, The land are is 15000 m2; in the case of gravel, it needs 25000m3, which requires land area of 50000m2。

2.1.2 Gravel is not always easy to get, and Matala free volume is 4-5 times higher than the gravel, therefore:

a.The treatment land area for the wetland can be reduced to 1/4~1/5 of the traditional gravel。

b.beacuse less chance for clogging, it can reduce the wetland maintenance, and increase the life time.

c.as the high void volume and the high pressure load, it provides the idea environment for the roots of plants to grow。

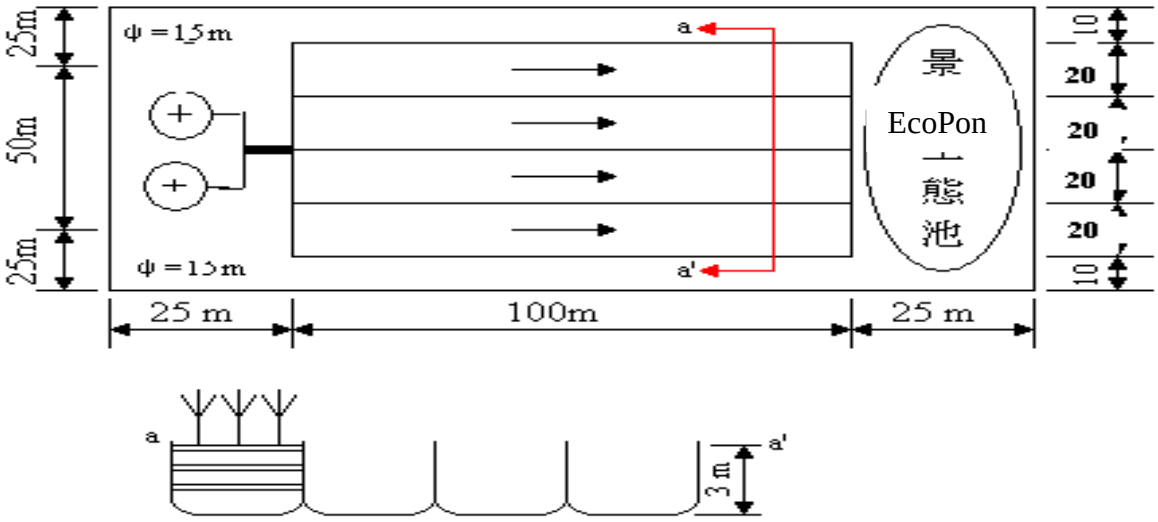
2.1.3 Besides the above strength, it is light weight, 65 kg/CBM~80 kg/CBM, which is easier for the maintenance, have machines is not necessary for the maintenance.

The different fiber density can be adjusted accordingly, unlike gravel,　it is easy to install layer by layer without the struggle of trying to screen and classify the particle sizes.

2.2　Aeration allocation:：the front parts of 1/3 (0-40m) no aeration，the remaining 2/3(41-100m) install total 400 pcs of fine bubble membrane diffusers.　Air Blower 8 units,(4 units run at one time)

,capacity air blower 9KW/unit，air total flow: 9 m^3/min，air pressure 3500 mmAq，total air input 20 m^3/min　，60Hz, 1750 rpm。　In this process BOD from 45 reduce to 10 mg/L

(3)Effluent Ecopond (FWS)：HRT = 1.0 hr, area : 2150 m^2，Water depth:1.2 m，Pond with liner。



Biological filter media calculation base:

As the art design of Matala filter media, there are 5 different surface area available (from 150 m^2 / m^3 ~460 m^2 / m^3, with the step-wise transition philosophy, it provides both the mechanical and biological filtration.

Product Code.	Surface area	color	Ave. Weight (Matala) kg/m3 , lb/ft3	Free volume
	M^2 / M^3			
M150	140±160	Black	60 , 3.74	93
M190	190±10	Black	67 , 4.17	92
M290	290±10	Green	61 , 3.8	93
M365	365±10	Blue	55 , 3.43	94
M460	460±10	Gray	88 , 5.48	94

BOD load

A. if influent is the raw water direct from the river:

Matala filter media in this system is around 5 g BOD/ m^2 –Day or 750 g BOD/ m^3 –Day ~ 2300 g BOD/ m^3 –Day (depending on type(surface area)),eg

(M150) 5 g BOD/ m^2 –Day * 150 m^2 / m^3 =750 g BOD/ m^3

It can work as mechanical filtration, reduce the SS for biofilm growth.

(M460) 5 g BOD/ m^2 –Day * 460 m^2 / m^3 =2300 g BOD/ m^3

It can focus more on pure biological filtration.

B. if the influent is not the raw water direct from the river:

As the pretreatment of the process has removed the higher BOD and SS(BOD from 55-45mg/l), which is consider as easier than the remaining SS and BOD(below 45mg/l). Therefore, the Matala filter media BOD load suggested to calculate as 1.5-2 g BOD/ m^2 –Day or 225 g BOD/ m^3 –Day ~ 920 g BOD/ m^3 –Day (depending on the type (surface area))

The calculation of Matala quantity:

BOD from 55 mg/L influent to the fine bubble aerobic treatment, it reduce to 45 mg/L, this water goes into fixed bed biological filtration tank, the effluent reduce to 10 mg/L

Therefore, the fixed bed filter BOD load equals:

A. flow capacity：62,000 CMD。

(45-10) mg/L*62000 CMD=2170000 mg* m^3 /L*Day=2,170,000 g/Day

The media BOD load is 1.5-2 g BOD/ m^2 –Day(Ave. BOD load 1.75 g BOD/ m^2 –Day, the total area needed:

2,170,000/1.75=1,240,000 m^2

Therefore the total usage of the Matala filter media per type is :

Matala Type	Install percentage (%)	Surface area (m2 / m3)	Total Matala media surface area (m2)	Total Matala media volum (m3)
SM150	10	150	1,240,000 x 0.10 = 12,400,000	12,400,000 ÷ 150 = 82,667
SM190	10	190	1,240,000 x 0.10 = 12,400,000	12,400,000 ÷ 190 = 65,263
SM290	20	290	1,240,000 x 0.20 = 24,800,000	24,800,000 ÷ 290 = 85,517
SM365	30	365	1,240,000 x 0.30 = 37,200,000	37,200,000 ÷ 365 = 101,918
SM460	30	460	1,240,000 x 0.30 = 37,200,000	37,200,000 ÷ 460 = 80,870
total			124,000,000	416,234
0.1% media installation spare allowrance			1,240,000	4,162
Total Matala media surface area(m2)			125,240,000	
tala media volum(m3)				420,397