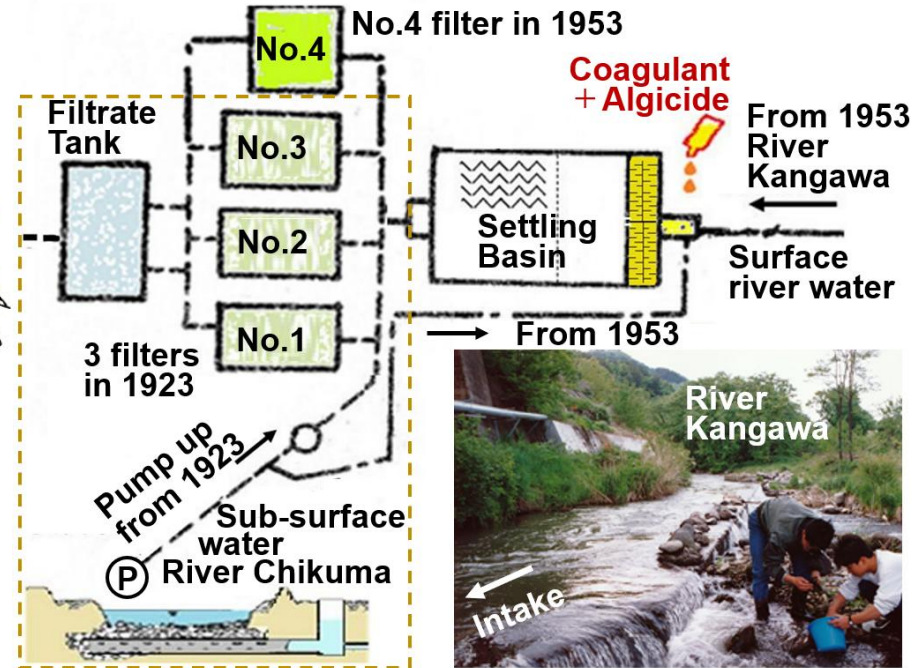


⑨ EPS : Trust Our Sense

EPS 2026-OBW
Part ⑨:1-17 17 slides



SSF is a wise application of natural purification System. We misunderstood by the name of SSF.

I, applied ecologist proposed EPS instead of SSF.

Contents:

① Introduction : EPS

② Quest for Pure Water : Food Chain is key.

③ Chemical free URF and EPS.

④ From Miyako Island to Samoa

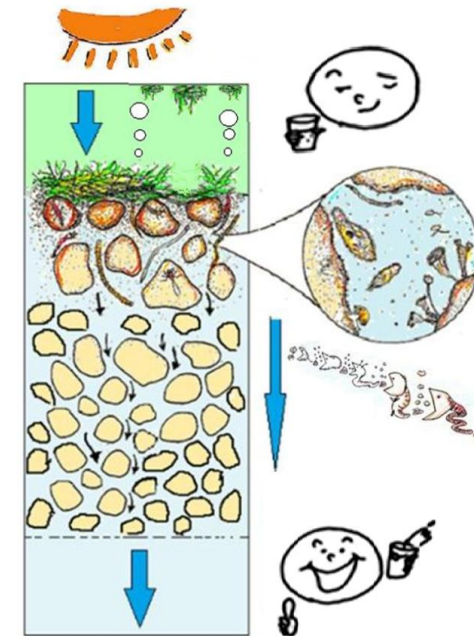
⑤ From Okinawa to Fiji

⑥ EPS as Social Contribution

⑦ EPS trial in Malaysia and Guyana

⑧ EPS in Sri Lanka and Pakistan

⑨ EPS: Trust Our Sense



EPS :
Eco-friendly
Smart
Technology.

SUSTAINABLE
DEVELOPMENT
GOALS

Nagano prefecture

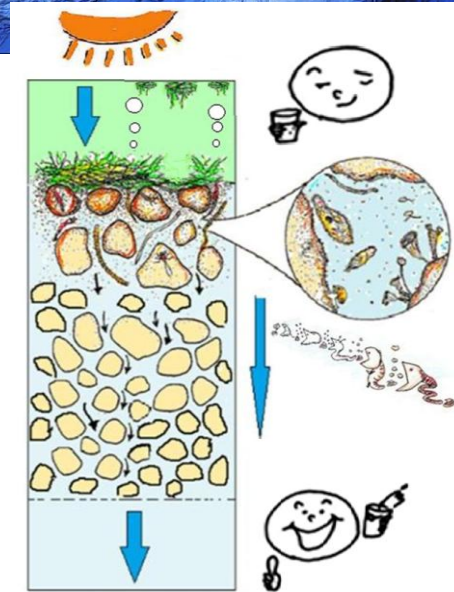
Ueda city



1975



Someya WTP
1923



Suwagata WTP 1964
Rapid Sand Filter

This is a
commercial filter.



This is **natural filter** for ours.

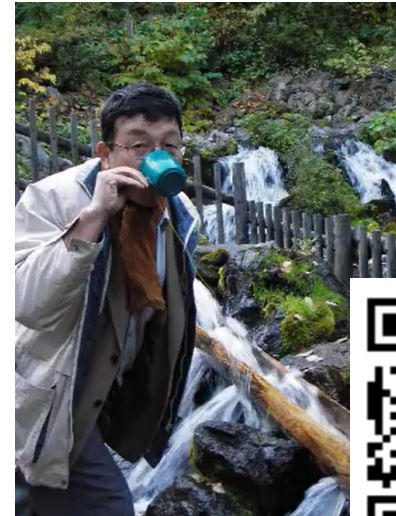
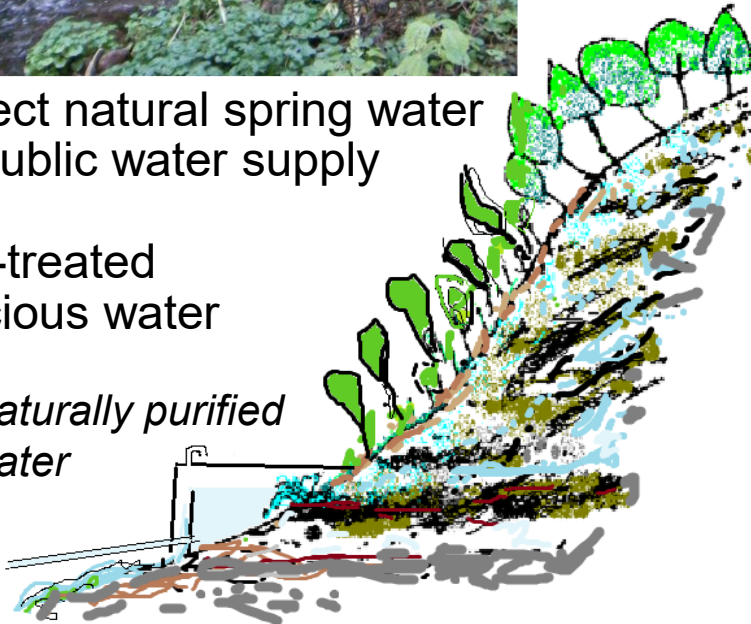


There are many plants of non-treated supply systems in rural area in Japan.

Collect natural spring water for public water supply

Non-treated delicious water

Naturally purified water



1min.14sec.

<https://youtu.be/RJLgf63s5Og>

Sweet Water



Confirm by yourself.

Don't believe commercial.

Trust your true sense.

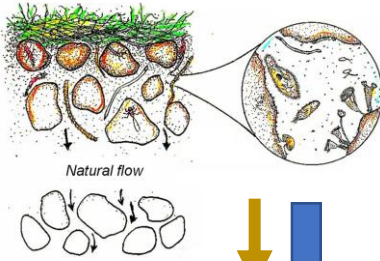
I, applied biologist, began to study the role of algae in slow sand filter pond.

I noticed SSF has been misunderstood by the name. This is Ecological purification system.

This system is wise application of natural system to make an artificial spring water.

Slow Sand Filter

Ecological Purification System



Settling pond



56,000m3/day capacity

Main Process
Slow Sand Filter
Ecological Purification System

Natural Filter

Chlorination

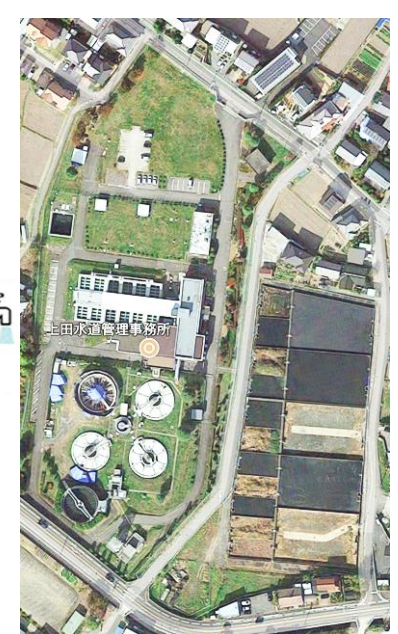
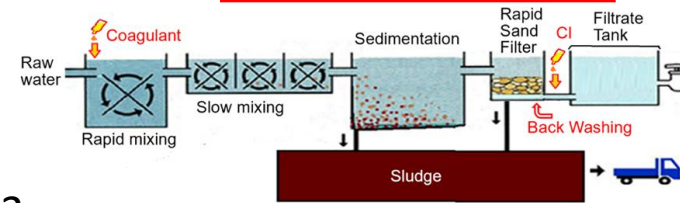
Filtrate tank



Rapid Sand Filter

1964
Suwagata

Chemical Physical Treatment



48,000m3/day capacity

Main Process
Pretreatment (coagulation/ mixing/ settling)

Sludge treatment

Sludge

Rapid Sand Filter

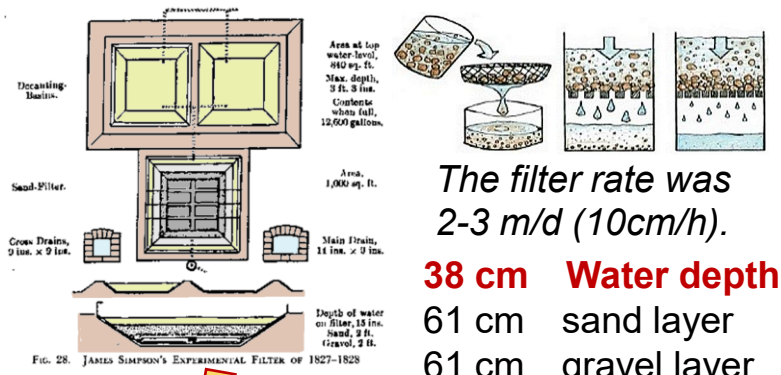
Commercial Filter

Chlorination

Back Washing process is essential.



The name of **Slow Sand Filter** caused a **misunderstand** of real mechanism.

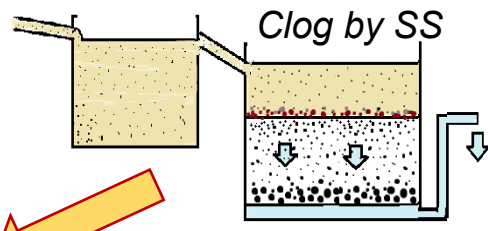


The filter rate was 2-3 m/d (10cm/h).

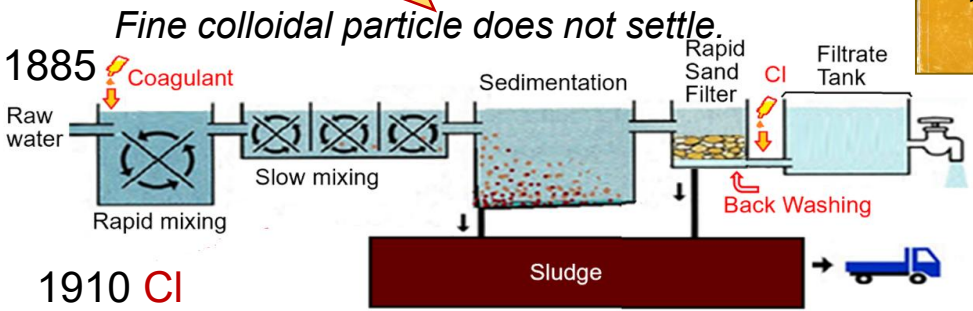
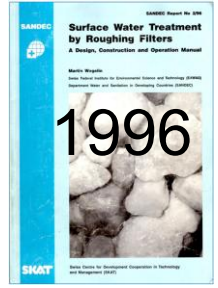
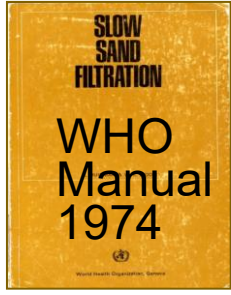
38 cm Water depth
61 cm sand layer
61 cm gravel layer

They believed **mechanical reduction** by **slow** filtration with **fine sand** in 200 years ago. They called **Slow Sand Filter**.

SSF spread to USA.



Refocus to SSF of chemical free system.



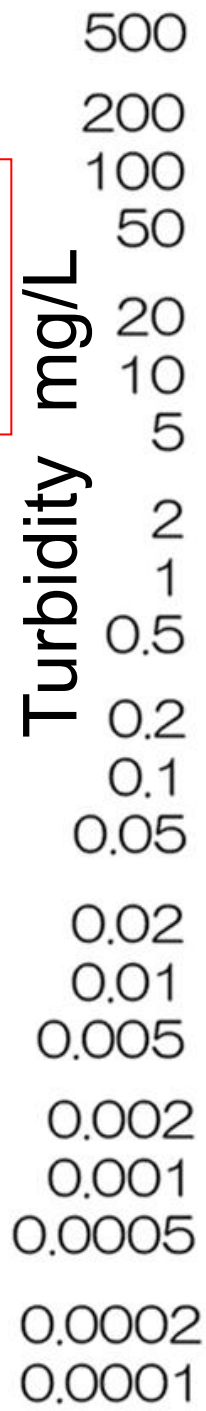
1910 **CI**
 This is American Commercial Filter.



Back washing
 RSF spread to the world.

I began to study on odor problem in Ueda city, 1975.

I proposed Ecological Purification System instead of Slow Sand Filter in Japan, 2004.



Storm event

Major turbid matter in mountain stream is easily set within several hours.

Coagulant + Chlorine Rapid Sand Filter

SS passes by backwash.

2 degrees Jap. standard

After Crypto outbreak.

Recommended to 0.1 degrees

Chlorination is essential.

Purified by small organisms

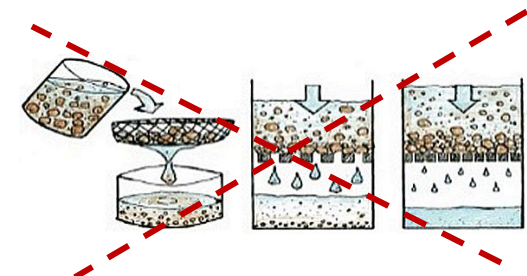
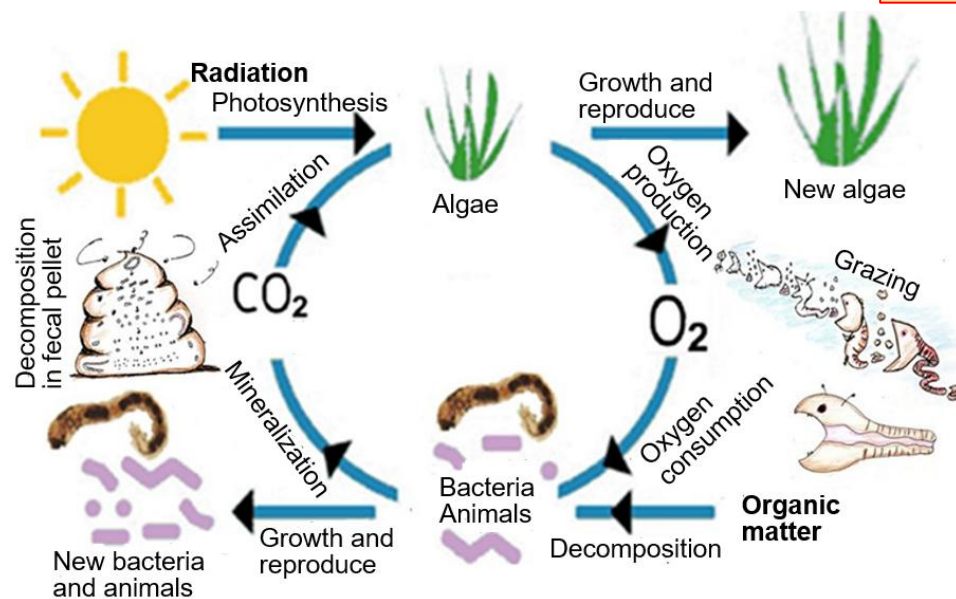
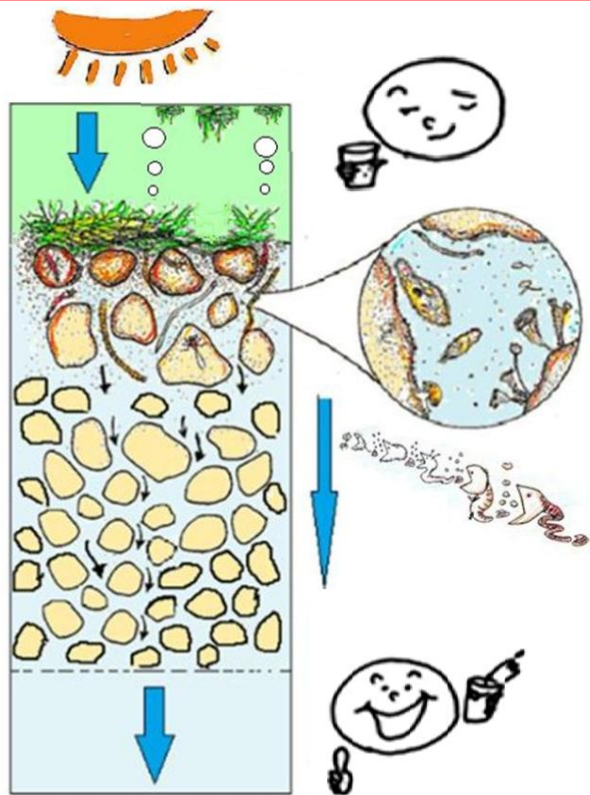
Natural spring

Artificial Natural spring water

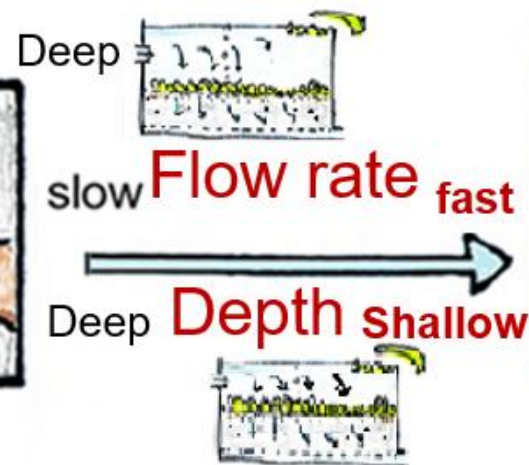
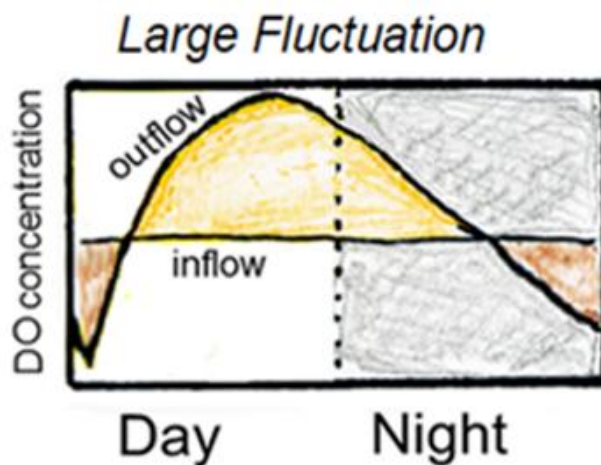
Super clean and delicious.

Food chain is the key for real decomposition.

Purification mechanism of **SSF** was **misunderstood** under the name.

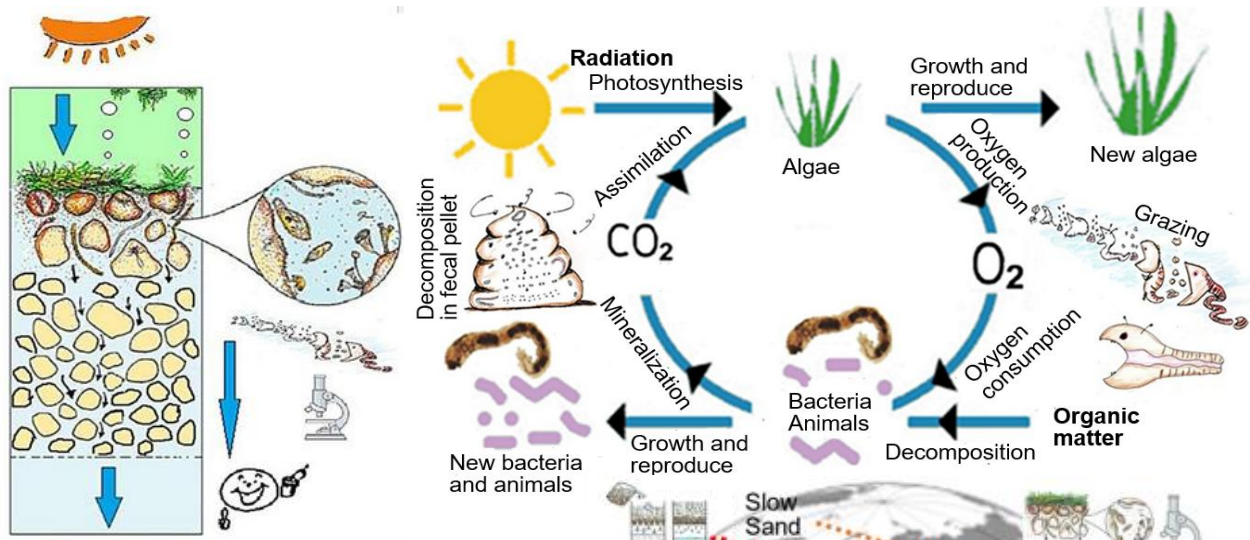


Ecological Purification System: EPS



Don't remove biological active layer.

Aerobic condition is essential. Gentle for small organisms.



The sand does not move even when the flow rate changes.

Slow sand filtration is a purification process that relies on the efforts of a biological community. **Algae produce oxygen** through photosynthesis, and the **presence of dissolved oxygen creates an environment in which heterotrophic organisms can thrive without worry**. Slow does not refer to speed, but to being gentle to the organisms.



Idea of EPS spreads from Japan to the world.

Biological active layer near the surface of sand layer is **the key** of EPS.



Vacuum removal for muddy matter on the sand surface.

My first visit to Thames Water Company was on **August 19th in 1992**. I explained my study on the role of algae in SSF system in Ueda.

Ashford Common WTP



About higher flow rate asked by N. Nakamoto
Michael Chipps Principal Research Scientist

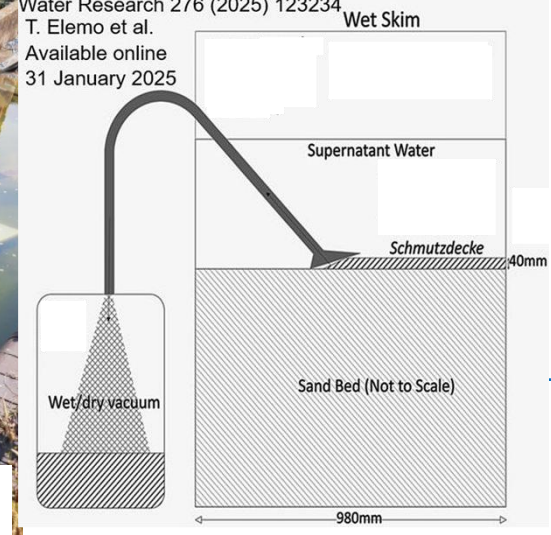
2025/03/18

Since your visit (Aug. 19th 1992) we have added DO and turbidity monitoring on the outlet of all SSFs.

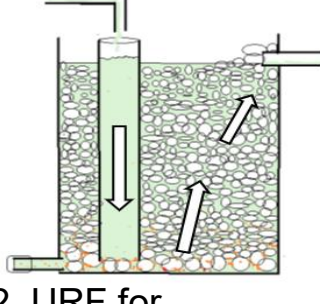
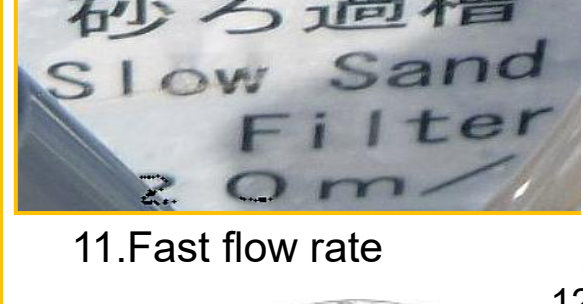


Thames Water's asset standard says we can operate up to **0.5 m/h (12m/d)**, but in reality, we are usually in region of 0.25 to 0.35 m/h, but we can reach 0.4 m/h occasionally if we have to. We do have **keep a careful eye on dissolved oxygen (DO)**.

Water Research 276 (2025) 123234
T. Elemo et al.
Available online
31 January 2025

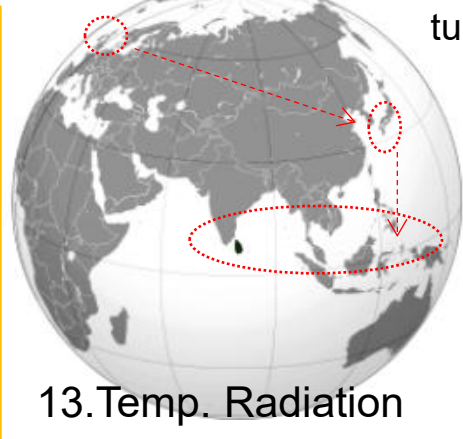


When we can understand EPS, we can make the plant for our life by ourselves.



Gentle: chemical free

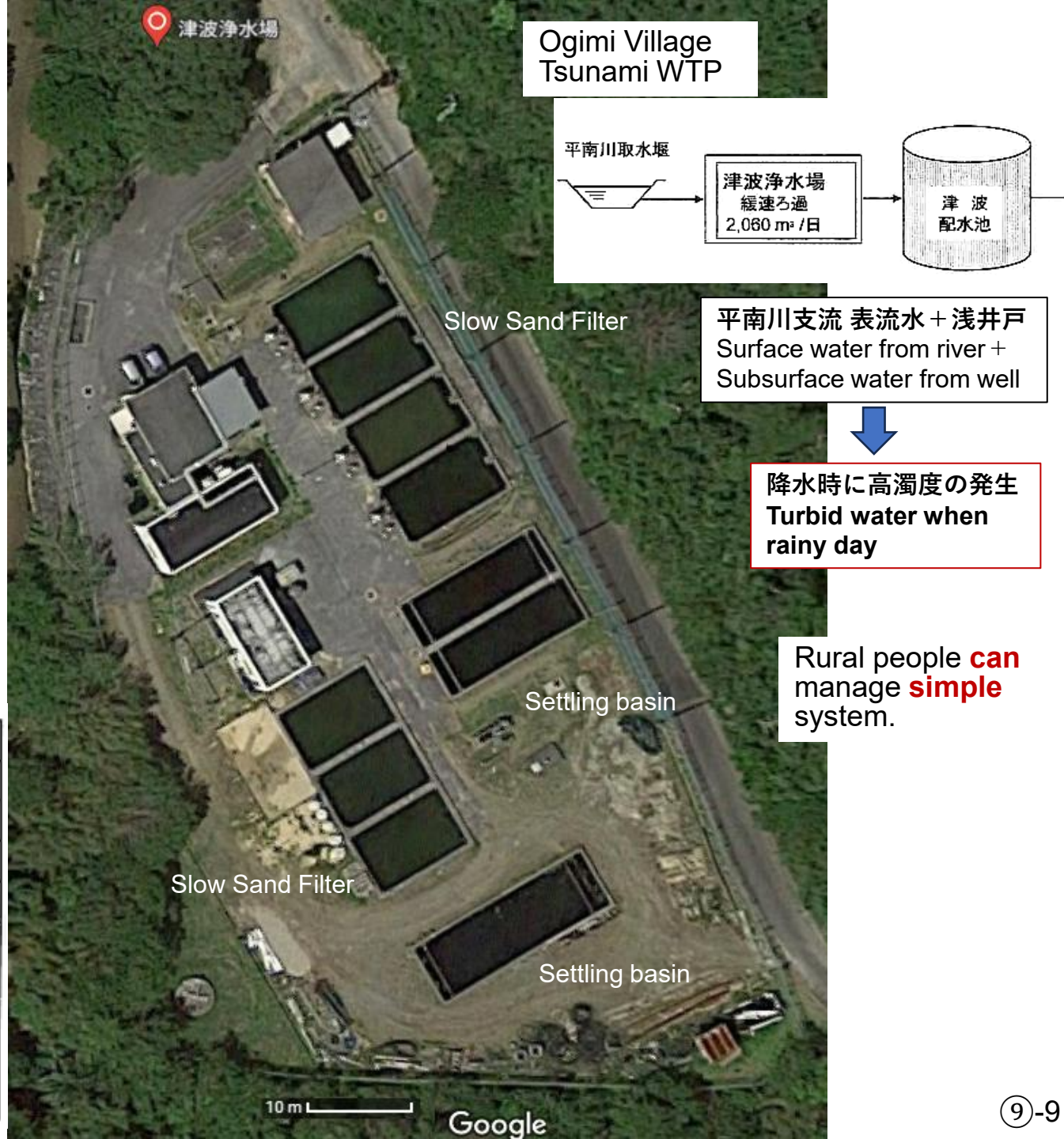
EPS is Eco-Friendly Smart Technology.



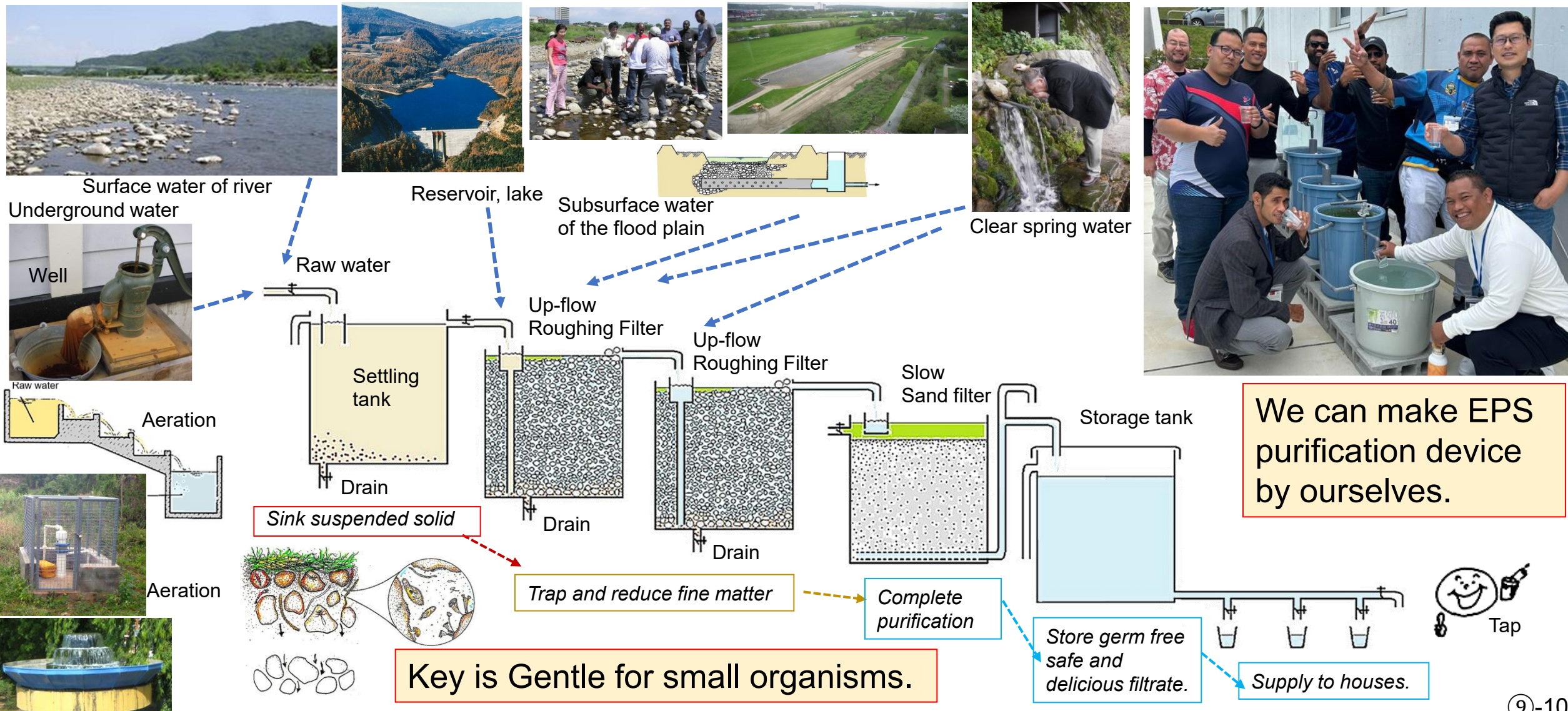


項 目	内 容
給水区域 Cover all village	村内全域
給水人口(人)Supply persons	3,153
普及率(%) Cover %	99.9
給水戸数 Houses	1,894
計画一日最大給水量(m ³)design	2,000
一日最大給水量(m ³) actual	1,665
一日平均給水量(m ³) actual	1,366
	Max/day
	Max/day
	Average/day

浄水場名	津波浄水場
所在地	大宜味村字津波 1550 番地
敷地面積(m ²)	2,880 m2 area
原水の種類	①河川水(平南川支流) ②伏流水(浄水場内)
処理能力(m ³ /日)	2,060 Capacity m3/day
浄水処理方法	緩速ろ過 Slow Sand Filter 後塩素処理 Post chlorination
施設概要	沈澱池:3 池、ろ過池:7 池、 浄水池:3 池、 自家発電設備 遠方監視制御設備



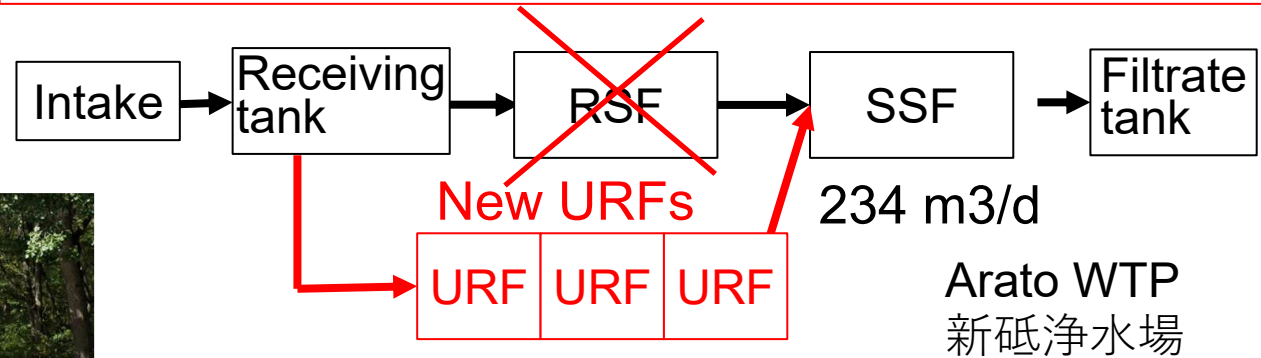
Ecological Purification System (EPS) : This is Wise Use of Natural Phenomena.
 This is Chemical Free System to make Artificial Delicious Spring Water.
 This is a Smart and Eco-friendly technique.



Performance : Reduce scrape works after introduce URF.

Mr. K. SANDA informed me his wonderful result on URF.

To prevent clogging of the slow sand filter (SSF) and to reduce turbidity, a rapid sand filter (RSF) was installed. This RSF was removed and a new 3-step URF was installed.



Inside URF



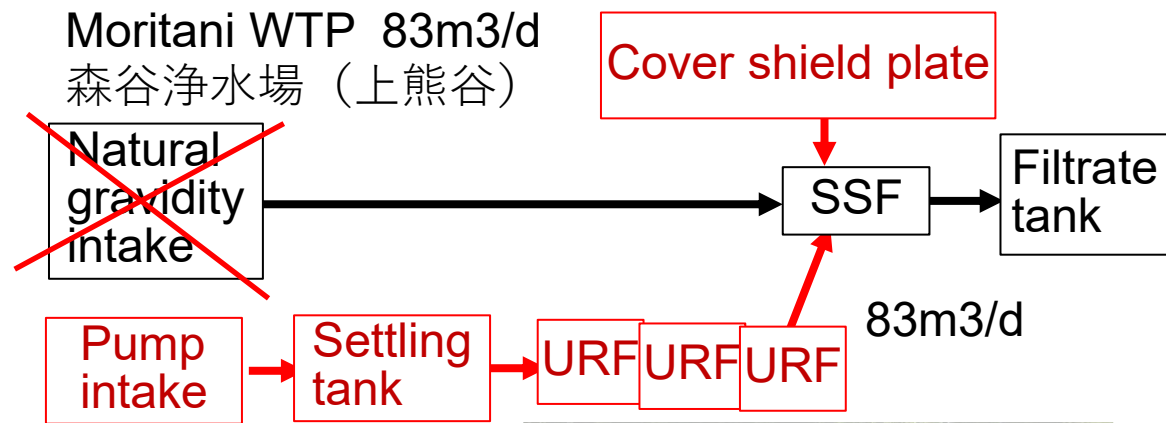
RSF

New URF

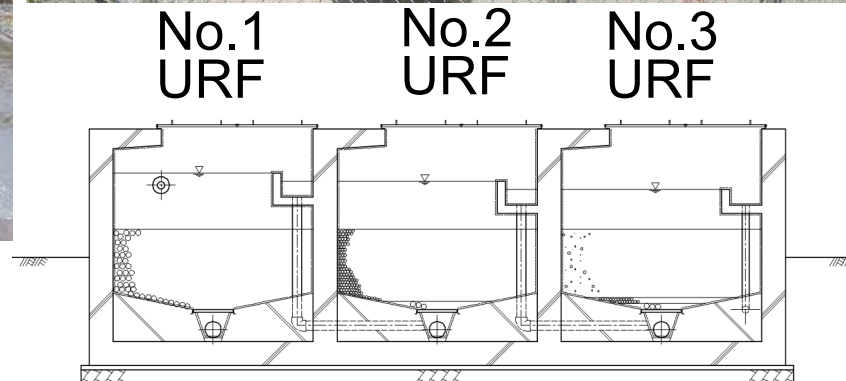
Receiving tank



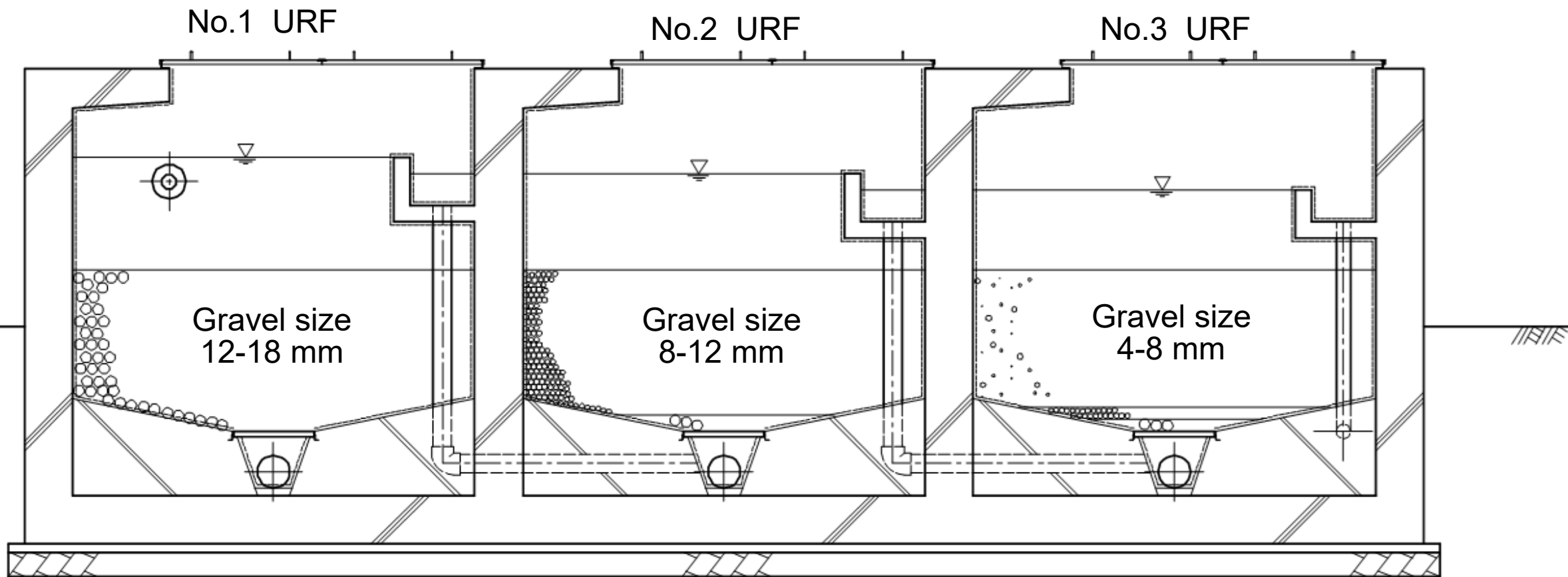
To prevent clogging of the slow sand filter (SSF), the water intake method was changed from natural gravity flow to pump intake, and a conventional settling tank and three stages of upward flow coarse filter (URF) were newly installed before the existing slow sand filter. To reduce the frequency of SSF erosion, a float-type light-shielding plate was installed in the slow sand filter. To reduce the frequency of SSF erosion, a float-type light-shielding plate was installed in the slow sand filter (SSF).



The inflowing river water quickly turns into muddy water after rainfall.



Three steps of URF with different size of small gravel.



Management of the URF is simple, requiring only the opening and closing of a sludge discharge valve, and the draining process takes **only about 5 minutes per filter**, thus minimizing the time spent on maintenance. Drain of the settling tank is also the same.



The slow sand filter (SSF) requires less frequent scraping, thus reducing the manpower needed for scraping.

No.1 URF after 1 year

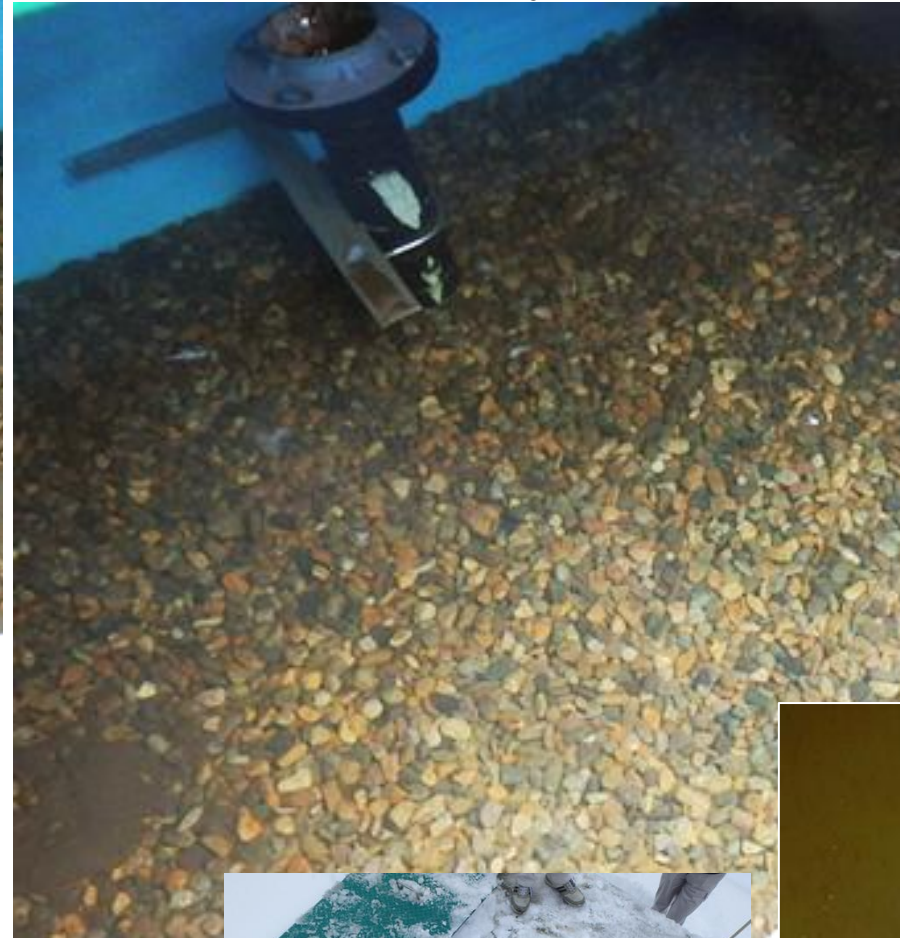


Drain off of accumulated mud in No.1 URF was not done during 10 years after the construction (in 2015).

However, Mr. SANDA noticed thick accumulated mud on the surface gravel layer of No.1 URF.

Then, he tried the drain off mud using the drain valve.

No.1 URF after 3 years



No.1 URF
after 3 years
in winter time



No.1 URF after 10 years



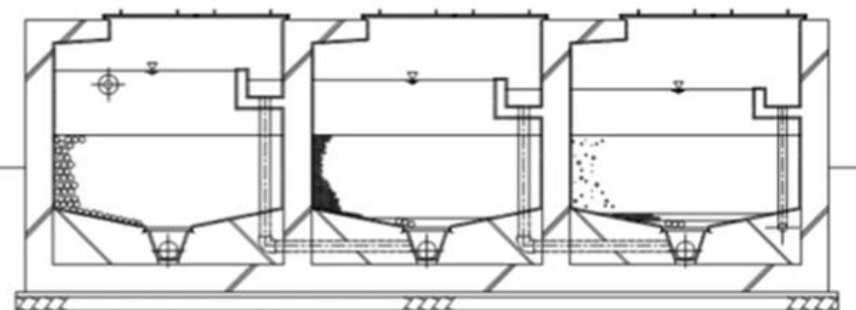
No.1 URF after 10 years
was covered with mud on
the gravel surface.



<https://www.youtube.com/watch?v=3lytpVhzdsQ&t=52s>

English with Jap.
10min 33sec

Mr. SANDA found an interesting phenomena in this system. He took them in his video and sent me. Please watch this video.



Gravel size of URF 粗ろ過礫の粒径

No. 1.
12-18 mm

No. 2.
8-12 mm

No. 3.
8-4 mm

上向流粗ろ過の排泥

第1槽：未実施(2015年から10年間)

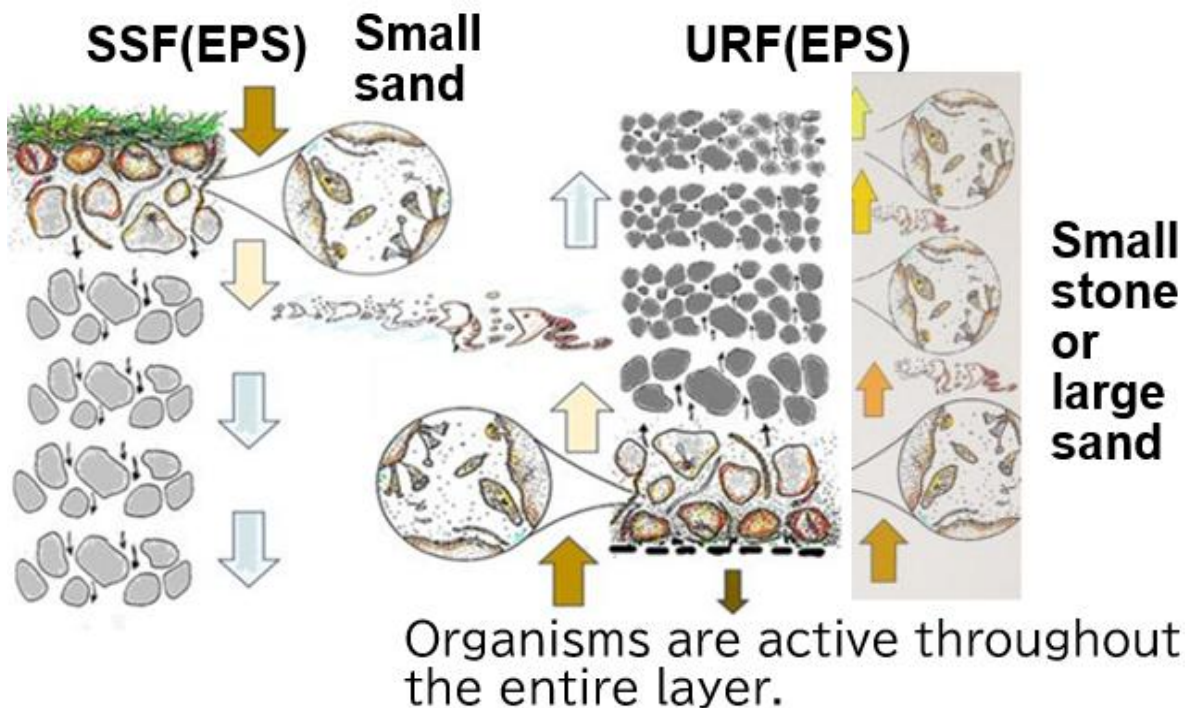
No.1 URF: Never drain off from 2015 (10 yrs.)

第2槽：2015年から2回実施

No.2 : 2 times during 10 yrs, from 2015.

第3槽：年に1回の頻度で実施

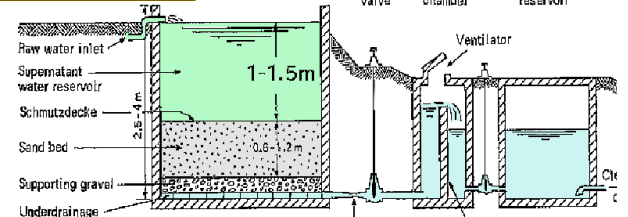
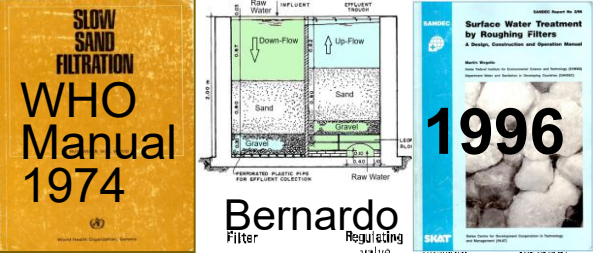
No.3 : Once per year.



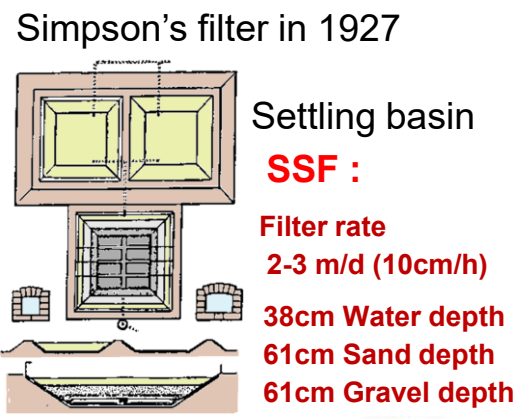
Accumulated mud on the gravel layer.



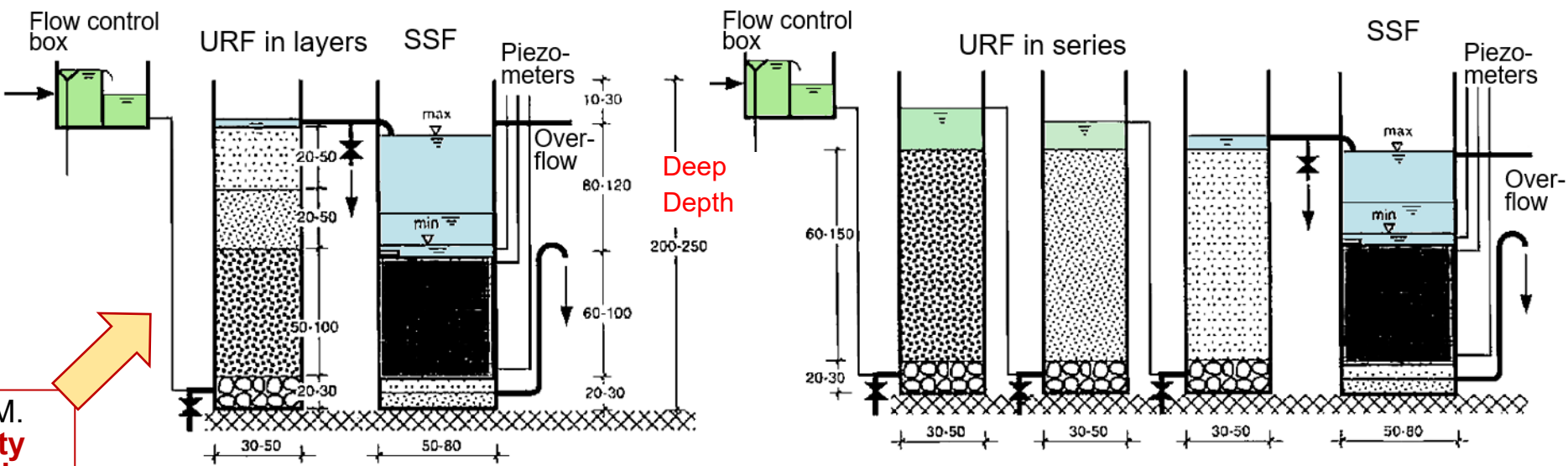
Collection of accumulated mud.



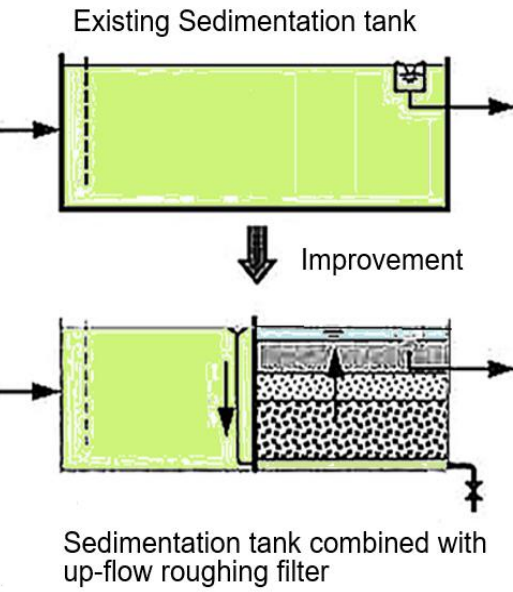
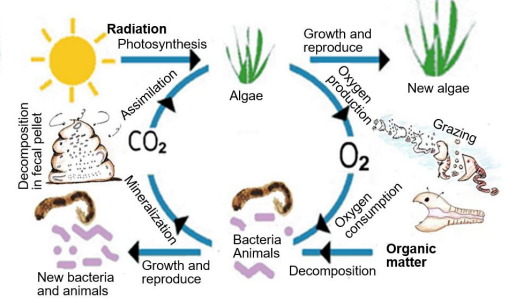
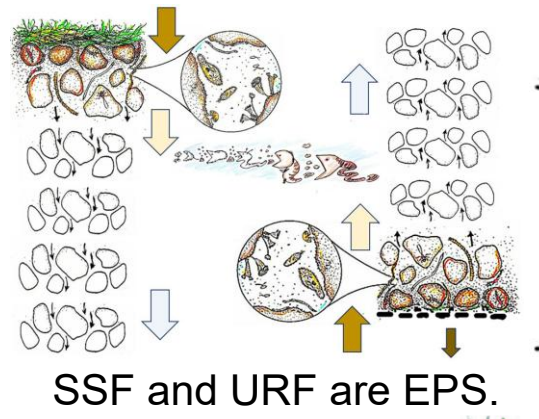
The WHO manual, L. Bernardo and M. Wegelin, **did not consider the activity of algae and micro-animals to be a key factor**; consequently, the water depth in the filtration ponds was set to be **deep**.



Slow filter rate and shallow water depth : gentle for algae and small organisms (bacteria, small animals).

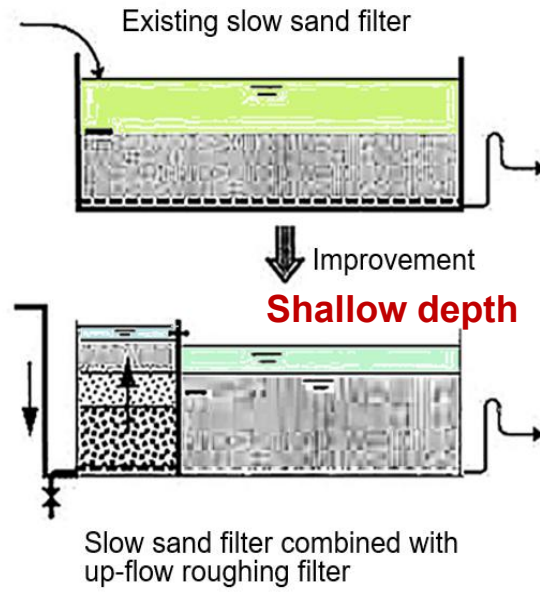


Pilot plant examples for URF in layers and for URF in series in SANDEC manual (M. Wegelin)1996 (Fig. 5/1)



Possible layouts for the integration of URF into existing sedimentation tanks or slow sand filters, in SANDEC manual (M. Wegelin) 1996 (Annex 6/5)

Gentle system without chemical for small organisms.

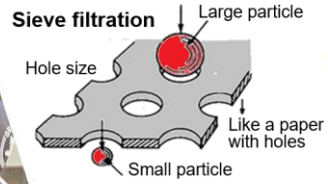


URF removes turbidity, thereby reducing resistance and allowing for faster filtration speeds. It also enables a reduction in filtration area.

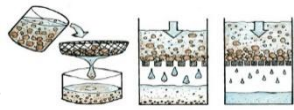
Even if you don't understand the reasoning, if the result is good, then everything is fine.

EPS from Japan to the World

Wise Use of Natural Phenomena for Human Life.
Safe and Delicious Water by EPS, Our Technology.



Slow Sand Filter



Purification mechanism of SSF
was misunderstood by the name.

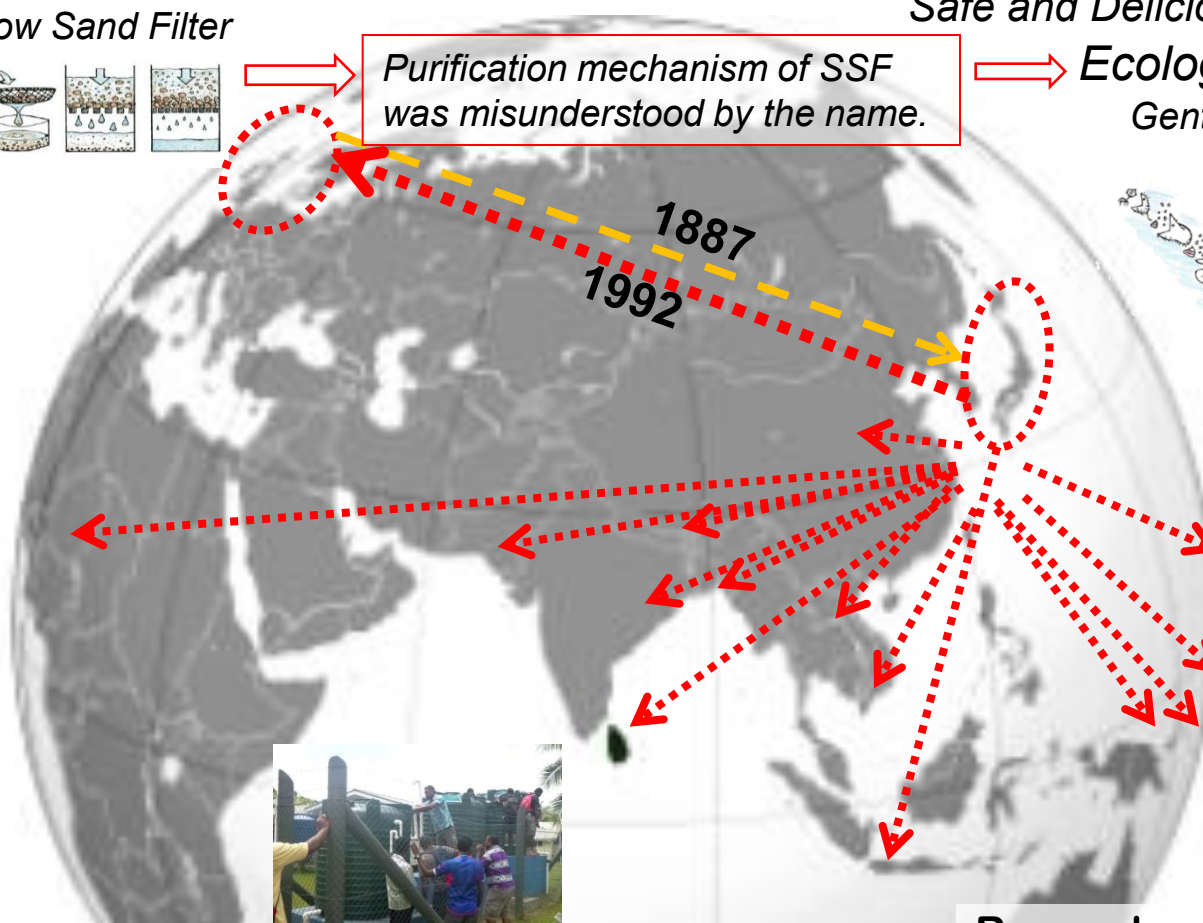
Ecological Purification System

Gentle for small organisms



Trust Our Sense !

Super clean delicious water



Nigeria



Remember Three Steps

1. Knowing is NOT enough. We must APPLY it to something useful.
2. Willingness is NOT enough. We must PUT it into the PLAN and ACTION.
3. Putting the PLAN into action is NOT enough. We must ACCOMPLISH the goals.