

Ecological Purification System renamed from Slow Sand Filtration.

2026年度 JICA 沖縄課題別研修
「水の安全保障の実現に向けた浄水・水道技術」
Water Purification and Water Supply
Management for Achieving Water Security

EPS 2026-OBW
Part ①:1-15
15 slides

JICA Okinawa training from
Nov. 11. to Dec.12. in 2026.

Managed by Okinawa Blue Water

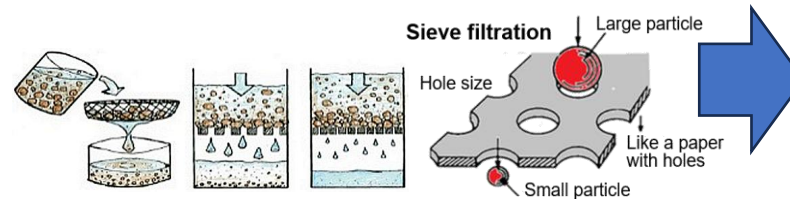
Purification mechanism of **SSF** was **misunderstood under the name.**

NAKAMOTO Nobutada Dr. Science
Professor Emeritus of Shinshu University

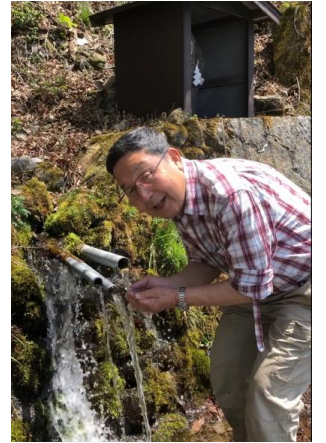
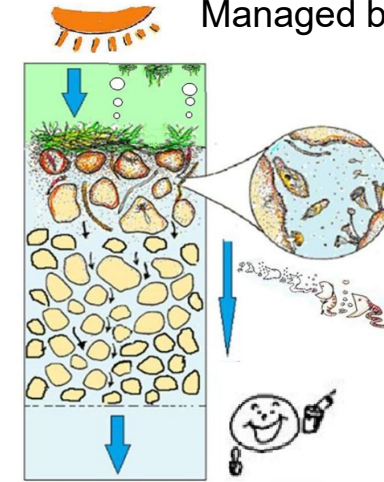
cwsckmt@yahoo.co.jp
nkmtnbtd@gmail.com
<https://eps.watervision.jp>



Image of **Slow Sand Filter**



200 years have passed, since SSF was developed
to supply clean water to **urban** areas in **London, UK.**



SSF is to make **artificial spring water** by biological community.

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

I, Nakamoto proposed **new name** of **EPS** instead of **SSF.**

<https://www.youtube.com/watch?v=b7wPQIKVIMY>

53
seconds



I found this EPS is our technology
for ours in Ueda, Nagano, Japan.

Ecological Purification System

renamed from Slow Sand Filtration.

Part 1. Introduction

EPS 2026-OBW
Part ①:1-15 15 slides

Treatment System for Safe Water by Wise Use of Natural Phenomena

An English invention of **Slow Sand Filtration** to make artificial spring water for safe drinking water is re-defined in Japan as **Ecological Purification System**.

2026年度 JICA 沖縄課題別研修
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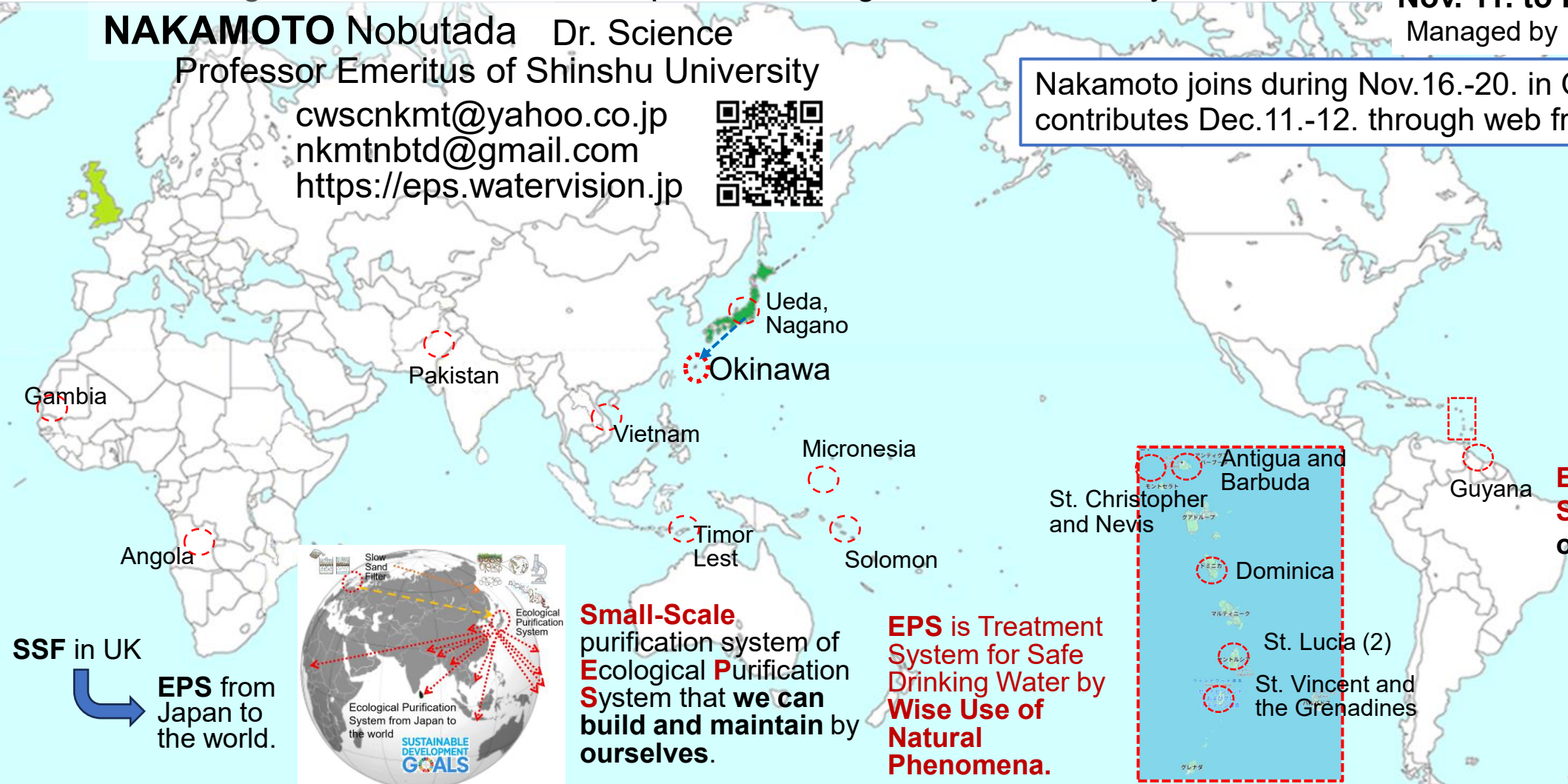
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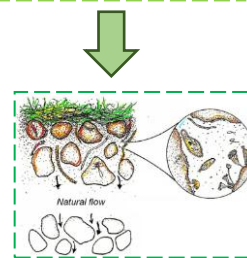
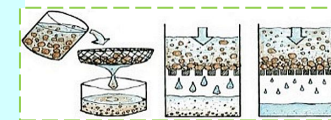
<https://eps.watervision.jp>



Nakamoto joins during Nov.16.-20. in Okinawa and contributes Dec.11.-12. through web from Nagano, 2026.



Slow Sand Filtration



Ecological Purification System (EPS) instead of Slow Sand Filter.

Small-Scale
purification system of
Ecological Purification System that **we can build and maintain by ourselves.**

EPS is Treatment System for Safe Drinking Water by Wise Use of Natural Phenomena.

You have to learn suitable knowledge and technology for your countries.

My background: Phytoplankton, Reservoir study,
Meet Slow Sand Filter, Importance of Ecological point.

I was born in May, 1942 in Tokyo. 84 years old.

→ Tokyo Metropolitan Univ.: **Biology**

Plankton, pond, reservoir,
ocean and stream.

1994-96
Thames Filter

Odor problem
of tap in Ueda
city

→Shinshu Univ.: **Applied Biology, 1975**

→Eutrophication study on Reservoir

→Slow Sand Filter (SSF) from 1984

→Wise Use of Biological Phenomena

Bad algae

Retired in 2008,
Prof. Emeritus.

Role of algae in
this ecosystem.

The growing period is short,
and the hungry state is normal.
Biological communities change
at environmental boundaries.
New organisms adapt to the
new environment and replace
the old ones.

I found "**Hungry
condition is normal**".

1969, Hawaii, Tahiti, Samoa,
in Pacific

1970, Miami, USA

JICA Expert to Fed.
Univ. São Carlos and
Univ. São Paulo in
1974, 1976

dry season

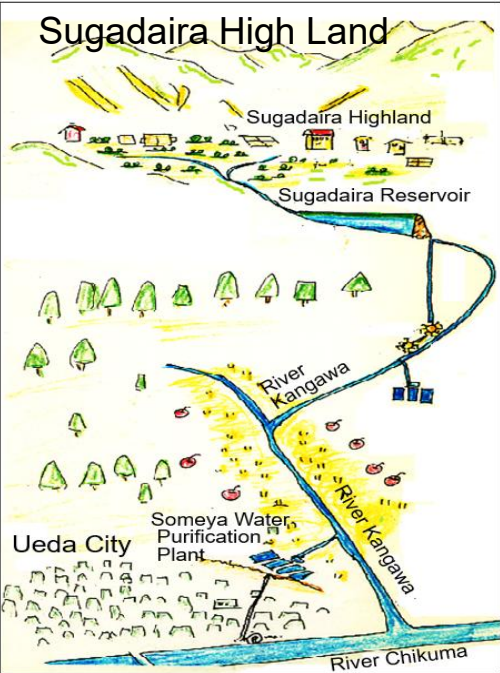
wet season

Advice to
ecosystem
management
of a reservoir
in Brazil.

Odor problem of tap water happened in Ueda city.



4min. 31 sec. YouTube
<https://youtu.be/0KZq3dpORps>



Sugadaira Dam was completed in 1964.



Odor problem in tap water in Ueda city.

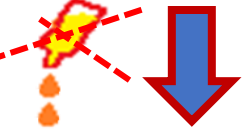


From 1975, I worked as a teaching staff of Shinshu University.

→Eutrophication study on Sugadaira Reservoir from 1975.

I explained on pollution and purification related with biological activity in Ueda city.

They (Ueda WTP) stopped algicide.



Turn to Delicious tap water



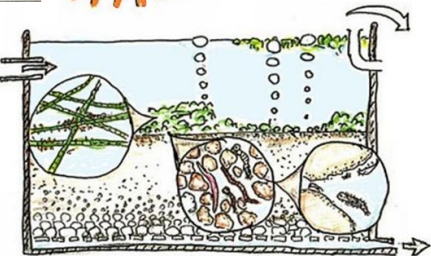
Original Water source of Someya WTP was **sub-surface water** of River Chikuma in 1923 (103 yrs ago).

Surface water of River Kangawa was taken from 1953 (73 yrs ago).

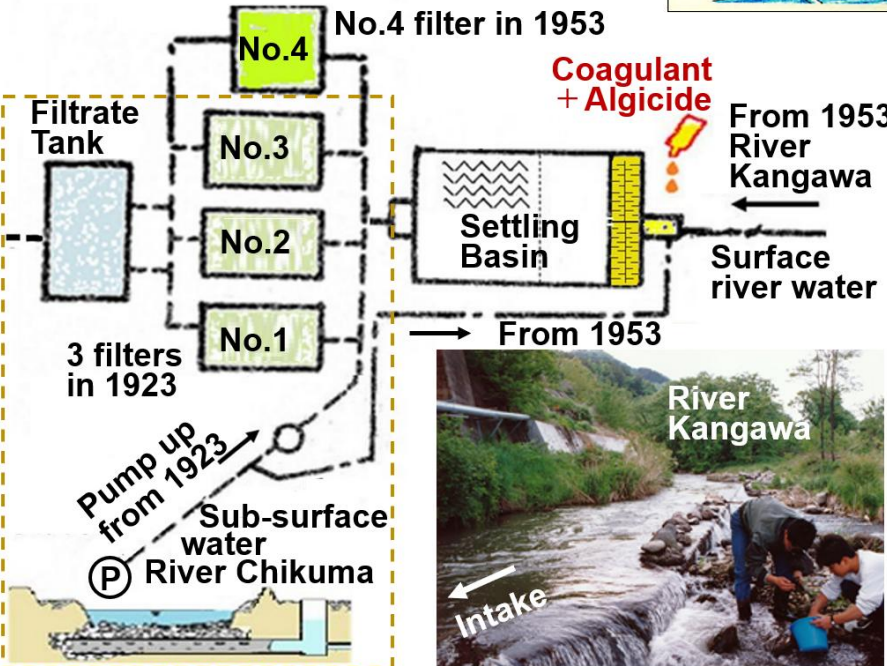
Plant manager said **Good Algae** in filter pond but **Bad Algae** in the reservoir.

Then, I started to study **Role of algae in SSF.**

They misunderstood the biological purification system in SSF.

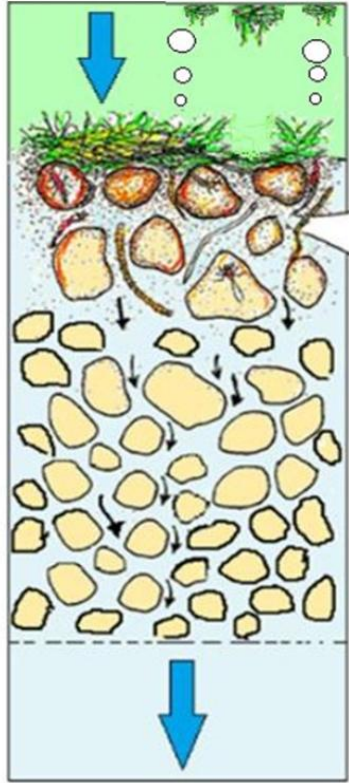


Heavy Algal bloom in a **slow sand filter pond.**



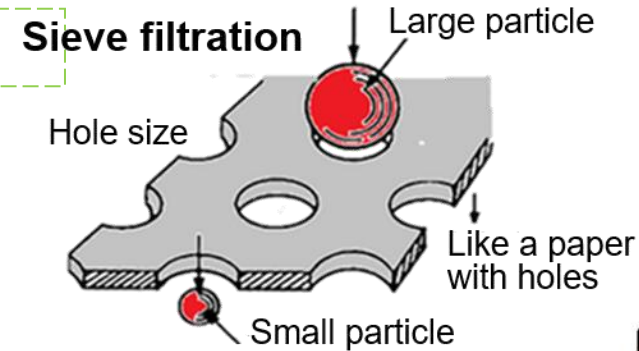
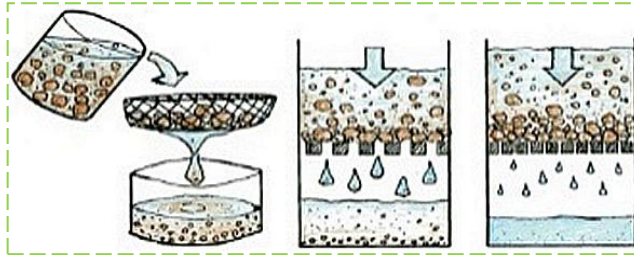


Slow Sand Filter is Wise Use of Natural Purification System to make artificial spring water.



Microorganisms trap and decompose **dirt** in water near the surface of the sand.

Image of Slow Sand Filtration



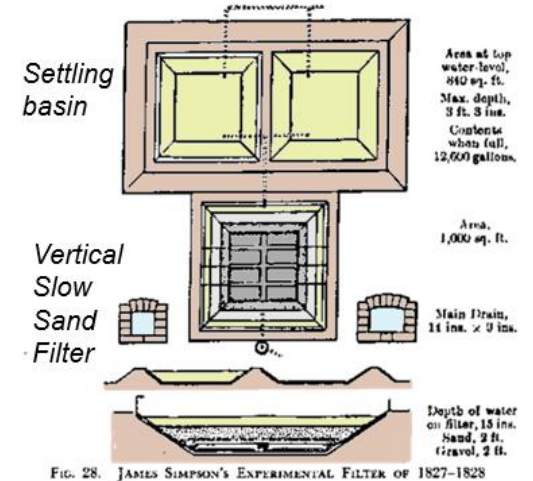
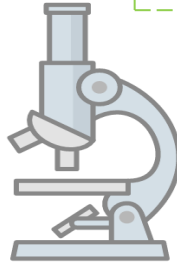
Slow filtration through fine sand layer.

People believed purification was done with slow filtration by fine sand. They called Slow Sand Filtration.

I noticed that Purification was done by the microscopic organisms.

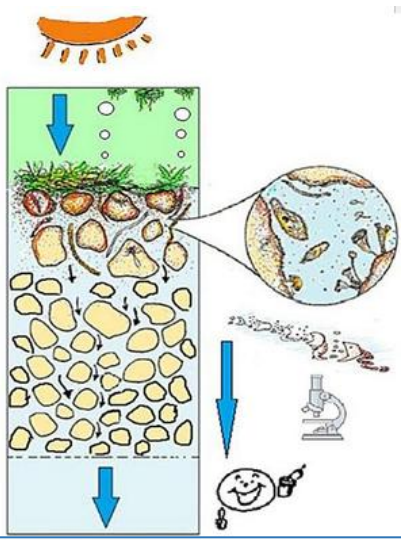
I proposed **Ecological Purification System (EPS)** in **2004** instead of the name of **Slow Sand Filter**.

The **filtrate** becomes **clean** and **delicious** water.

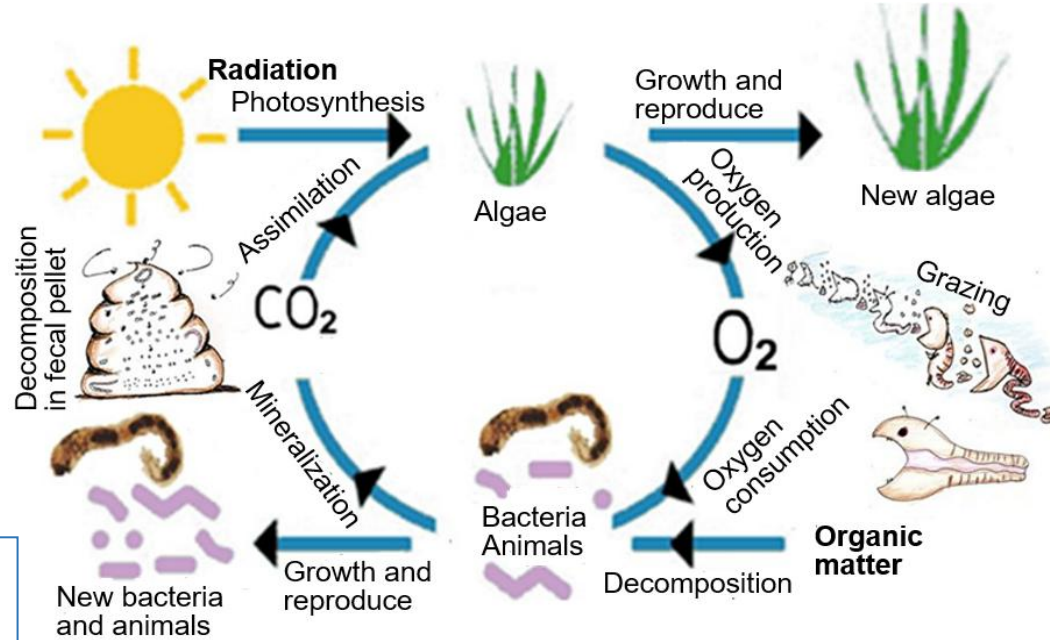


Simpson's Filter in 1827: **water depth 38 cm**

I have been teaching this **EPS** at JICA training **since 2006.**



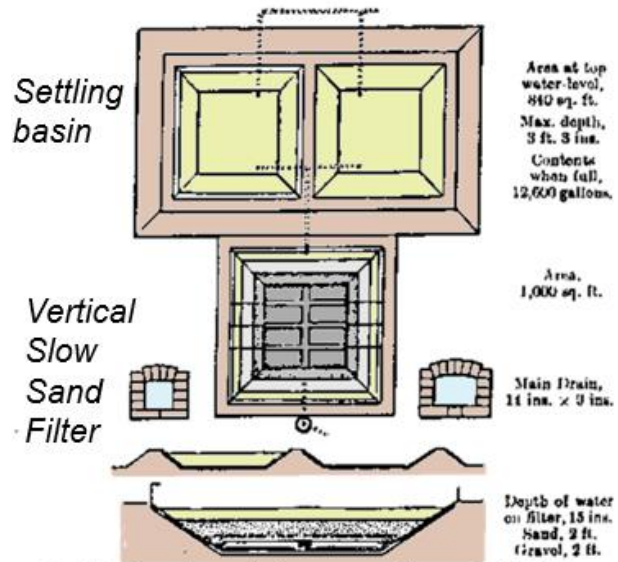
The sand does not move even when the flow rate changes.



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



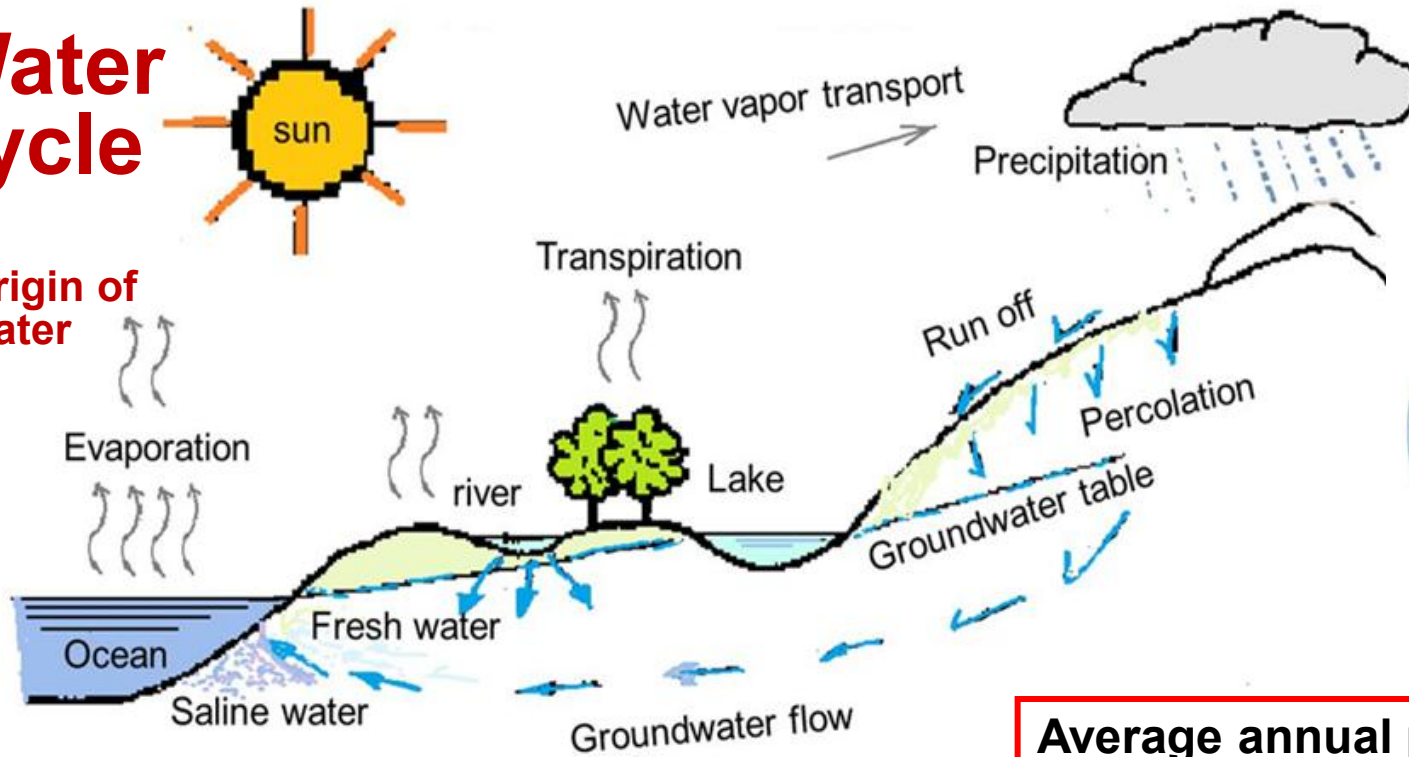
Simpson's filter in 1827 is 38 cm. Shallow water depth is better for biological activity.

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 better environment for heterotrophic organisms.** **Slow** does not refer to speed, but to being **gentle** for every organisms.

About higher flow rate asked by N. Nakamoto
Michael Chipps Principal Research Scientist
 Since your visit (Aug. 19th 1992) we ^{2025/03/18}
 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 cycle



Origin of water

Where is available water.

Mountain: much precipitation



Spring water

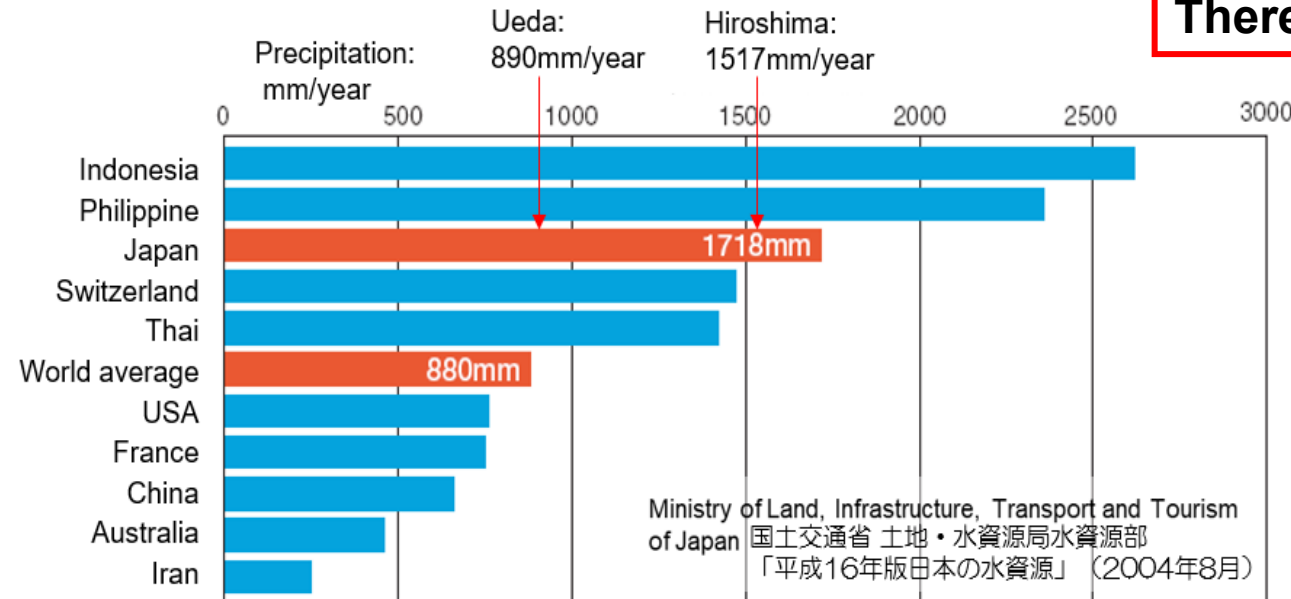
Average annual precipitation varies in location. There is seasonal variation.

1: Areas close to the equator, with a lot of sunlight and the influence of the ocean, experience a lot of precipitation.

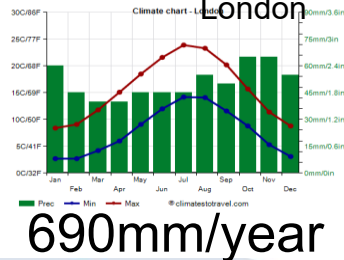
2: Even in areas close to the equator, inland areas experience less precipitation.

3: High latitude areas with less sunlight and less precipitation.

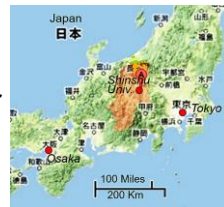
4: Water vapor in the atmosphere turns into clouds over mountains and falls as rain.



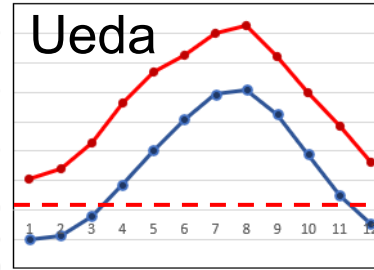
SSF developed in UK.
Not severe winter.
Small rain and no dry period.



<https://www.climatestravel.com/>



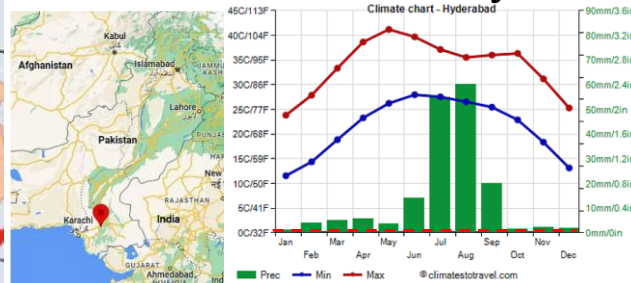
Ueda:
890mm/year



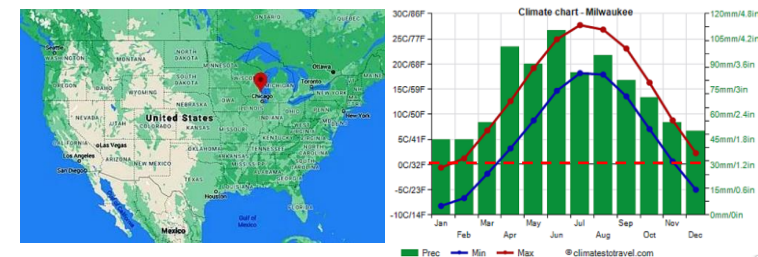
Always dry. Cold in winter and hot summer.
Small rain in Japan.

Different climate in different region.

Hyderabad, Pakistan
180mm/year

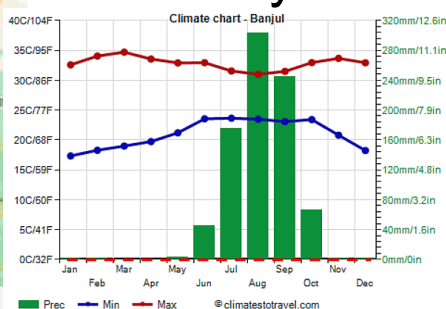


Milwaukee, USA
880mm/year



Precipitation and temperature vary significantly depending on location and season. Temperature and precipitation are influenced by the sea and the wind. The climate in the interior of the North American continent is characterized by bitterly cold winters.

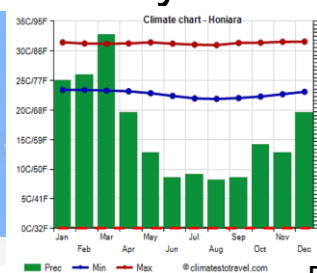
Banjul, Gambia
840mm/year



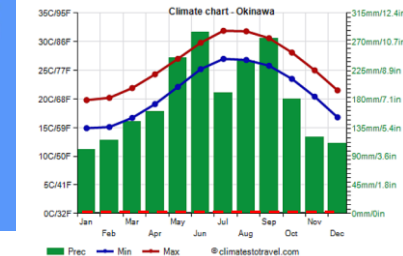
Honiara, Solomon
1,970mm/year



Honiara, where is located

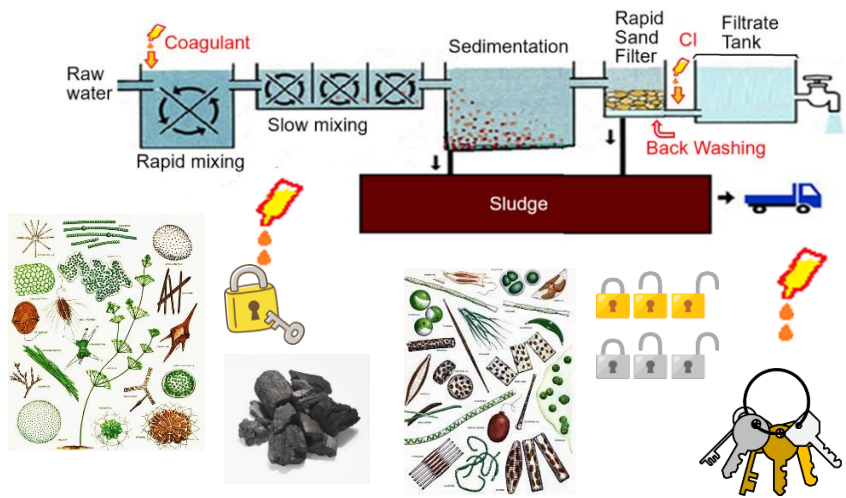


Okinawa, Japan
2,160mm/year

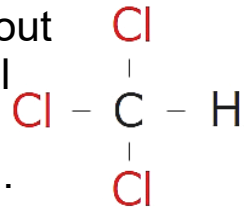


From June to October, with a maximum from August to early October, Okinawa can be affected by **typhoons**, the tropical cyclones of Southeast Asia.

Refocus to Slow Sand Filtration as chemical free treatment instead of chemical treatment of Rapid Sand Filter.



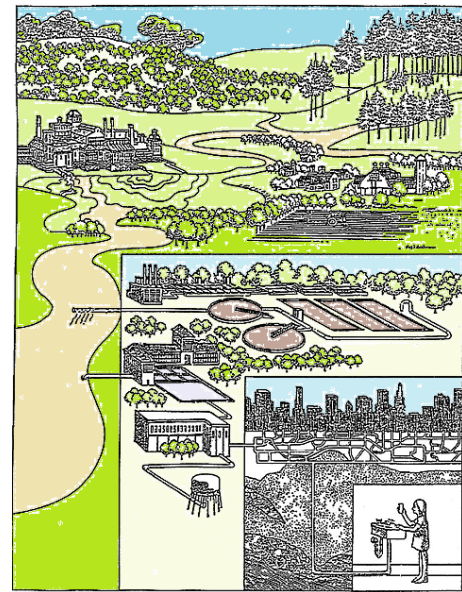
Rachel Carson 1962 **Silent Spring.**
Pesticides and herbicides have been pointed out the risk of chemical hazards through biological concentrations through the food chain.
That was Chlorine compound.



WHO published a manual of Slow Sand Filtration which is **chemical free treatment** for safe drinking water in 1974.



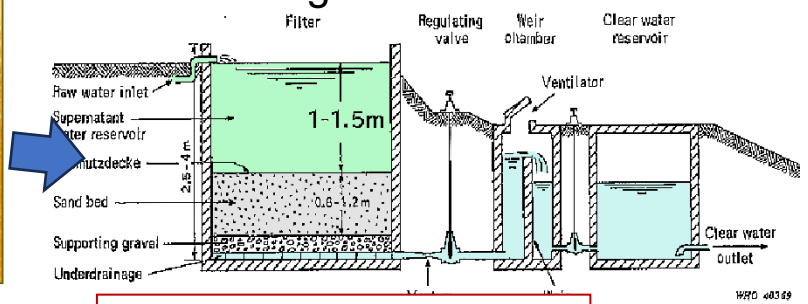
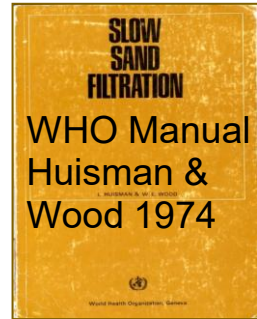
Filter problem : Odor, taste and filter clog problem caused by algae. New chemicals were developed one after another.



IS THE WATER SAFE TO DRINK?

PART 1: THE PROBLEM

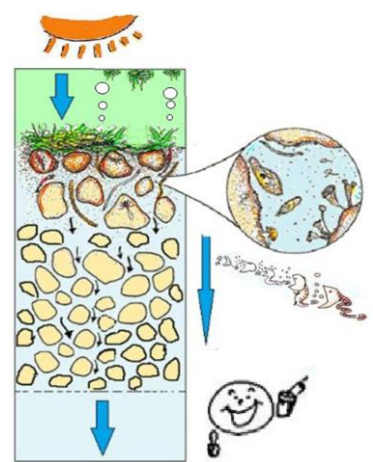
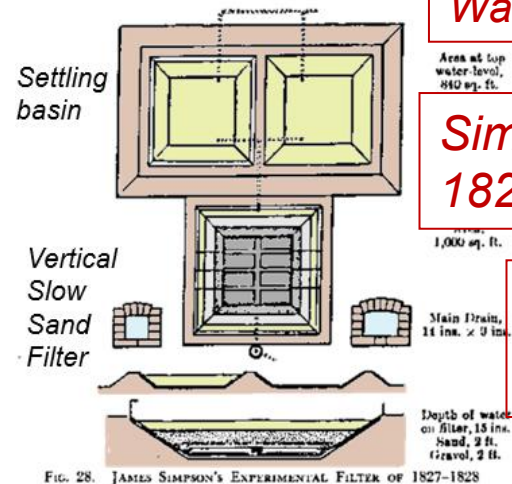
Robert H. Harris et. al. 1974 Consumer Report.
Chlorine sterilization is essential for rapid filtration of **chemical treatment**. There is a warning that trihalomethane, which are **cancer risk** substances, are generated by adding chlorine.



Water depth is 1-1.5 m.

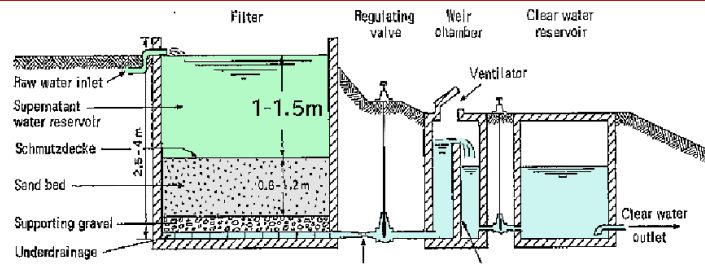
Simpson filter in 1827 is 38 cm.

Shallow water depth is better for biological activity.

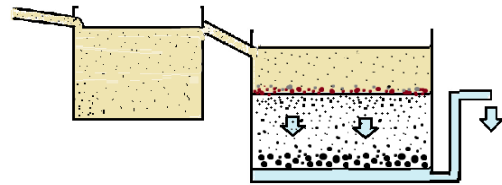


WHO manual is not suitable explanation.

Refocus and invention of Roughing Filters as **chemical free** pre-treatment against turbid matter for Slow Sand Filtration.



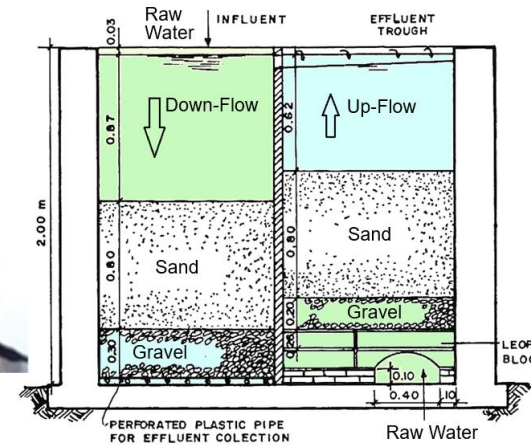
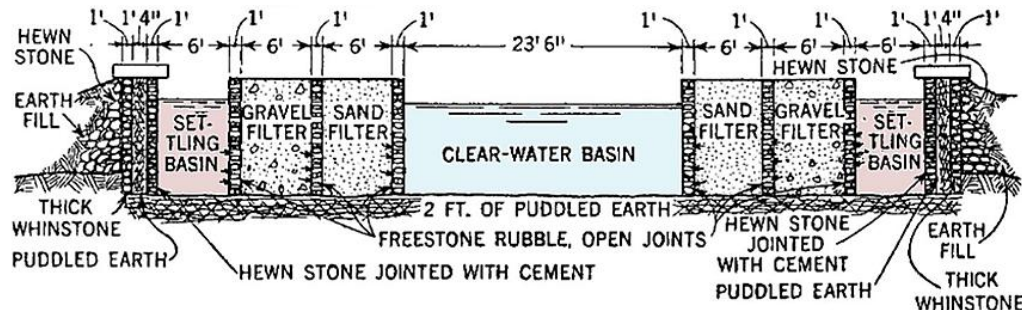
1974 – 1980s: Refocus to SSF.



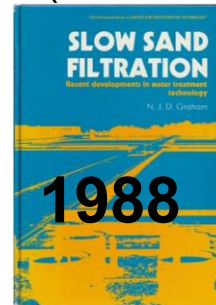
Fine suspended matter does not sink in settling basin.

Focusing on chemical free pre-treatment of SSF for turbid water.

1804 : Horizontal Roughing Filter by John Gibb in Paisley, near Glasgow, Scotland, UK



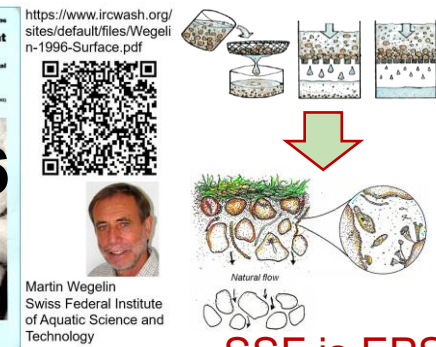
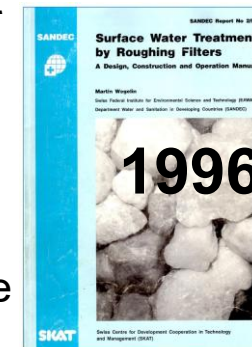
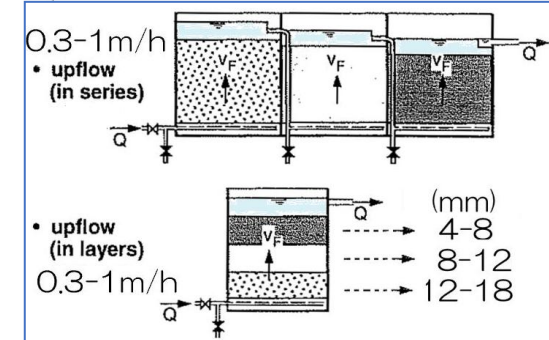
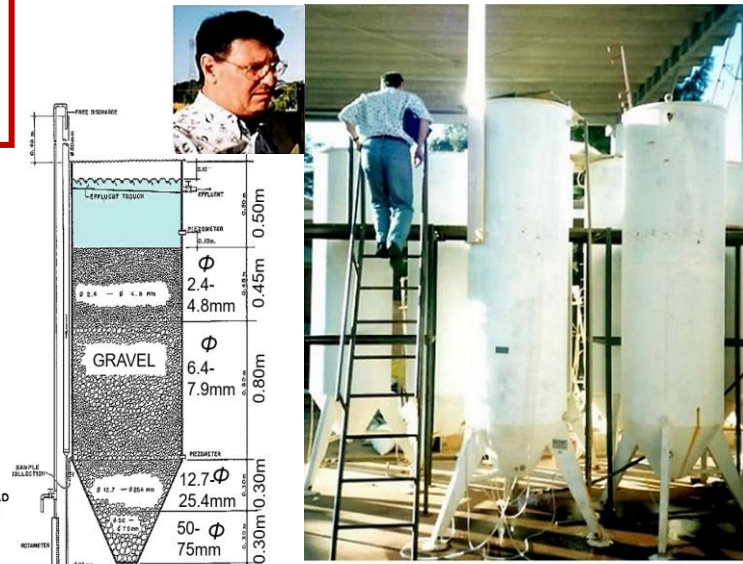
Luiz Di Bernardo, Univ. São Paulo, Brazil: Roughing filter experiment (Master student report 1980)



The First International Meeting on SSF was held in London, in 1988. Luiz Di Bernardo presented. And Martin Wegelin (Switzerland) reviewed past pre-treatments and related activities in the world.

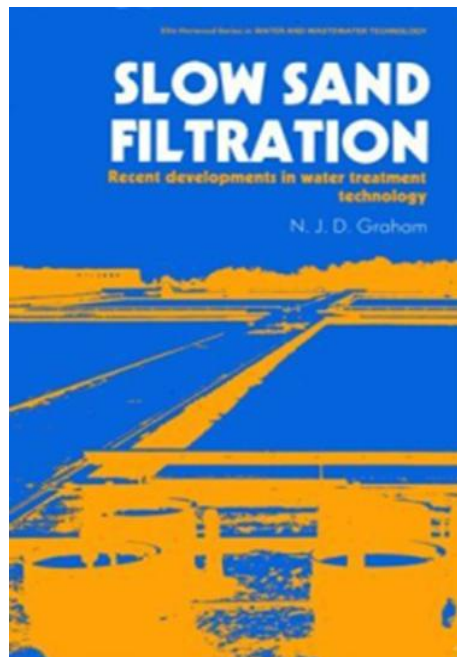
Chemical free roughing filter was focused in this meeting.

After this meeting, Martin Wegelin (Switzerland) summarized to "Surface Water Treatment by Roughing Filters" in 1996 and distributed from London.

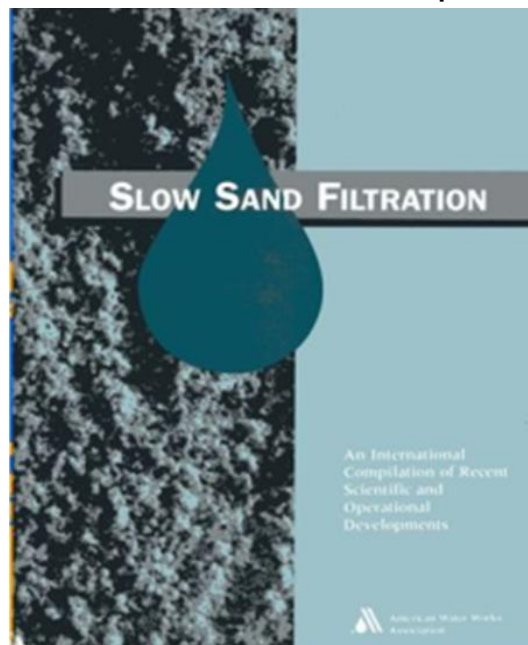


SSF is EPS.
Chemical free treatment is essential.

Focus to Slow Sand Filter from Chemical treatment of Rapid Sand Filter in the world.



1988, Nov.
1st. SSF
Conf. in
London,
UK



1991, Oct. 2nd.
SSF Conf. in
New Hampshire,
USA



My first visit to Thames
Filter was Aug. 1992.



I could study on Thames
Filters during 1994 to 1996.

1996 April, 3rd SSF
Conf. in London, UK

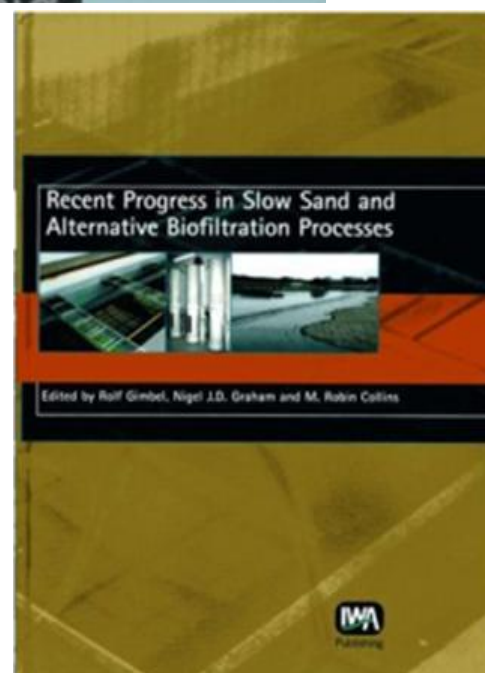


Key speech of Global
100 Eco-Tech Awards
Ceremony, 2005
World Expo. Aichi,
Japan.

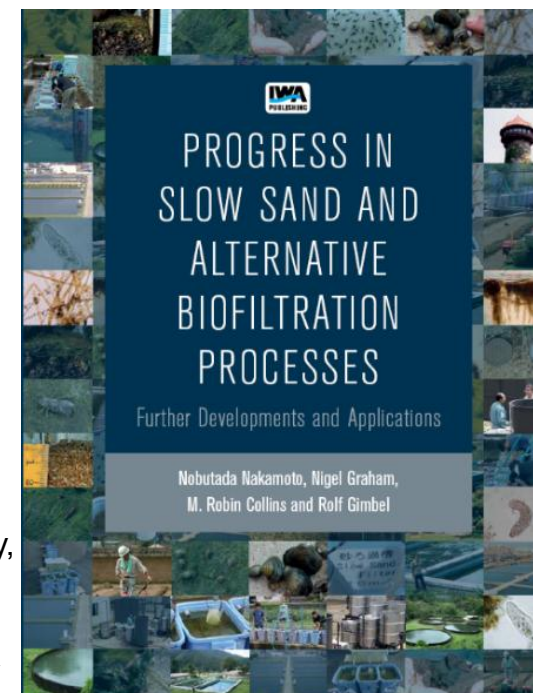


Slow Sand Filtration Technology
Focusing on Algal Production

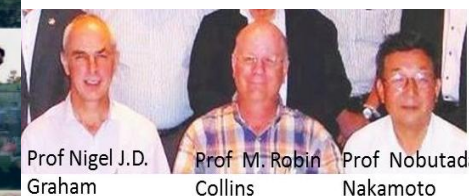
<https://www.youtube.com/watch?v=Xf2HOJ7y7c8&t=21s>
8 min 32 seconds



2006 May,
4th SSF
Conf. in
Mulheim,
Germany



Ecological Purification System was focused
and recognized.



2014 June, 5th SSF Conf.
in Nagoya, Japan

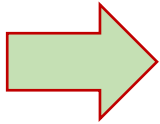
https://www.youtube.com/results?search_query=5ssabc



I presented on EPS at the 11th Pacific Water and Waste water conference, Nouméa, New Caledonia, August, 2018. And I distributed this EPS manual.



This is a concise English manual on EPS. You can down load from the following address.



Ecological Purification System for Safe Drinking Water

- Application of Natural Process -

Eco-friendly technique to make artificial spring water

NAKAMOTO Nobutada, Dr. Science
Prof. Emeritus of Shinshu University, Japan



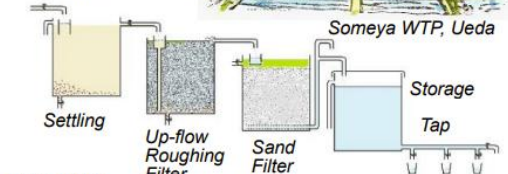
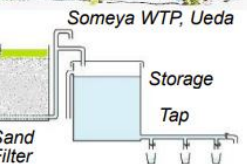
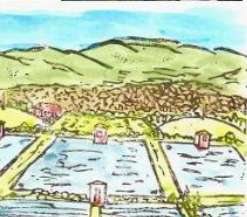
Fig.0. Fijian EPS using rain harvest tanks in a village.

August 2018

Ecological Purification System for Safe Drinking Water

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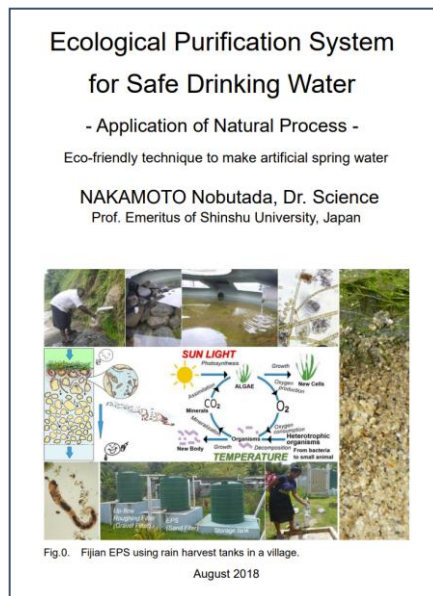


JICA supports EPS as Japanese innovation for the people.



How to make drinking water by **Ecological purification system**

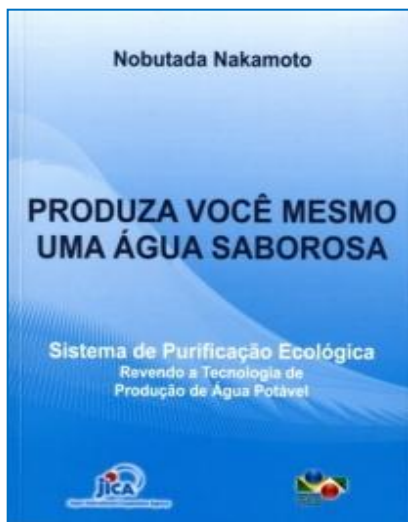
Aug. 2005.



August, 2018



<https://eps.watervision.jp/wp-content/uploads/2025/04/EPStext-NC-2019.pdf>



July 2010.

Portuguese, Brazil



Internet text by JICA

Slow sand filtration: creating clean, safe water



(26 min Full)
https://www.youtube.com/watch?v=V6_uDZE_I8E&t=423s



(3 min Digest)

<https://www.youtube.com/watch?v=QAH1SoAgfL0&t=27s>



<https://eps.watervision.jp/wp-content/uploads/2025/04/TratamentoEcologicoTexto.pdf>

Feb. 2021.

Clean drinking water is essential for life, but expensive water filtration systems are out of reach for many communities around the world. Japanese scientist NAKAMOTO Nobutada is unlocking the water-cleaning power of algae and microorganisms to bring down costs!



日本語

世界の水を
きれいに

英語

Clean Water
for All

ポルトガル語

Água Limpa
para Todos

中国語

创造洁净水源—
日本的净水技术

フランス語

De l'eau propre
pour tout le monde

スペイン語

Agua limpia
para todos

アラビア語

المياه النظيفة للجميع

<https://www.youtube.com/watch?v=ki8Qyb2lZ10>





Health & Welfare

Utilizing Microorganisms to Purify Water and Enhance Public Health

07/07/2023

A Japanese researcher has been promoting a method called the ecological purification system to purify water utilizing the activities of small organisms. **What is this low-tech but smart solution that produces safe and affordable drinking water to help protect people's health?**



“In places without safe access to this vital resource, slight improvements to water for drinking and cooking can reduce instances of diarrhea or dermatological



diseases. You'll then see a change in people's health awareness. **The key is promoting sustainable, do-it-yourself technologies and fostering awareness.**”