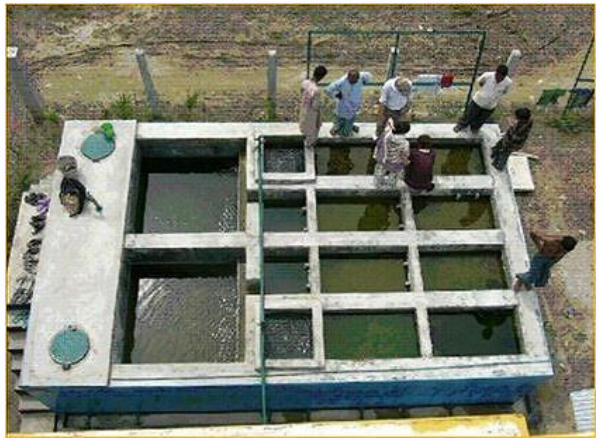
⑨ From Japan to the world by the social contribution.

⑨17 slides + NHK world
China EPS



Ecological Purification System for Safe Drinking Water

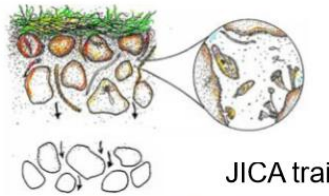
- Application of Natural Process -

Eco-friendly technique to make artificial spring water

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

August 2018

This is our technology.



JICA training

Microscopic organism is the key of EPS.

Biological activity was evaluated by the diurnal change of dissolved oxygen.

Ecological Purification System NAKAMOTO 2018

Toward Zero Waste World by Chemical-free System

Smart Treatment System to make artificial spring water by Eco-friendly technique.

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

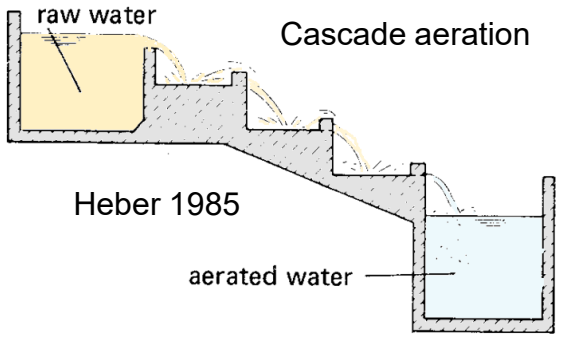
I cooperated with Yamaha Motor's social contribution activities by EPS technology.

There was a factory in Jakarta, Indonesia that manufactured engines for outboard motors, boats, motorcycles, and other automobiles.
Since it was related to water, they also manufactured water purifiers.

YAMAHA motor company in Indonesia made a purifier for clean and safe water in 1991.

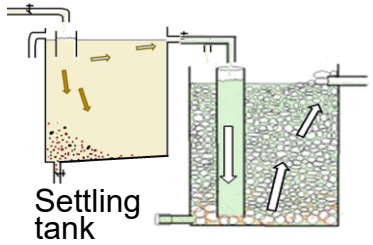
Mr. Yagi came to Shinshu Univ. He asked how to make safe drinkable water without chemical from unsuitable source of water.

Underground water contains iron and manganese in Jakarta plain. Well water was clear. But the brown colloidal particle was formed soon. They could make clear water using cascade aeration system without any chemical reagent.



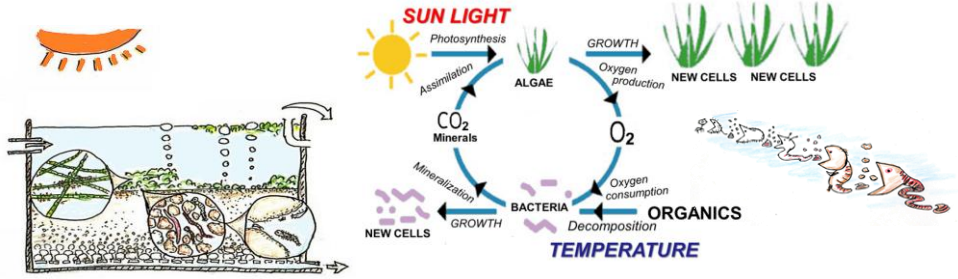
Iron and manganese are oxidized and form nearly insoluble hydroxide sludge. They can be removed in a settling tank (a coarse filter).

I advised we can make safe water by ecological purification system of wise use of natural phenomena.



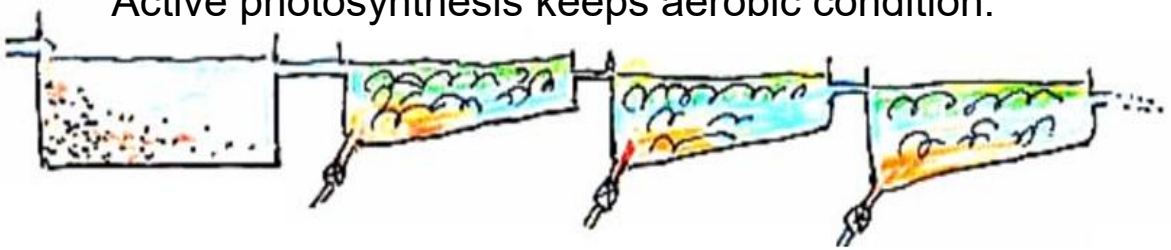
Raw water

Final water of cascade aeration steps.



Small animals collect silt and colloid particles in dirty water by the food chain. Then water becomes clear.

Active growth of algae and grazing animals grow well in the channel.
Active photosynthesis keeps aerobic condition.



Slow sand filter

Sedimentation tank

Animals grazed particulate matter (living and non-living).

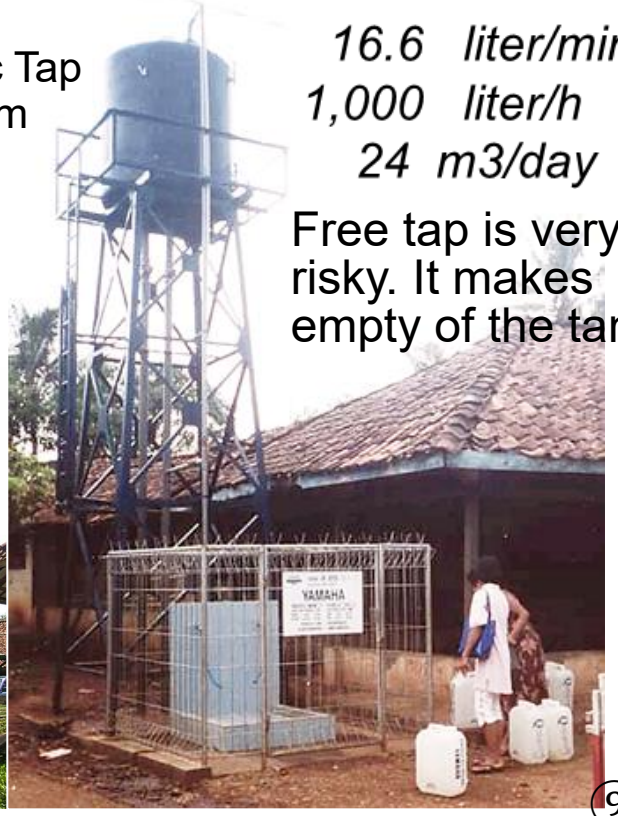
Periodical small drain to eliminate precipitate material and unhealthy organisms.

This is new idea of ecological pretreatment system without chemical to reduce silt and colloidal particle for sand filter instead of URF.

Public Tap System

16.6 liter/min
1,000 liter/h
24 m3/day

Free tap is very risky. It makes empty of the tank.



Indonesia 2000

Tap keeper collects money of filling the bottle for the maintenance cost of the plant.

Tap control is key. Lady collects the money for the amount of water.
Free water is not good. It is necessary to collect money for the maintenance of the plant.

Two bottles of 20 liters per 1 family.

This water is used for drinking and cooking only. This water is not used for bathing and washing hands.

The good quality of Yamaha clean water was also transmitted to neighboring villages. Delivery service has also started.

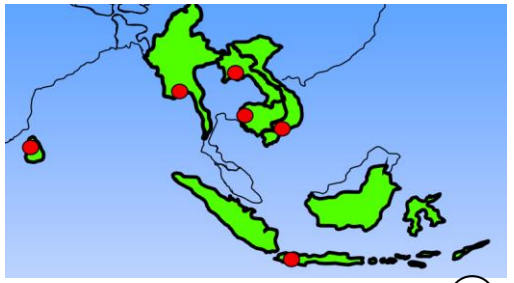
Diarrhea and eye sickness are disappeared. →Health village
→sanitary sense and its level are distributed among the villagers.
→This acts to protect naturally against sickness.

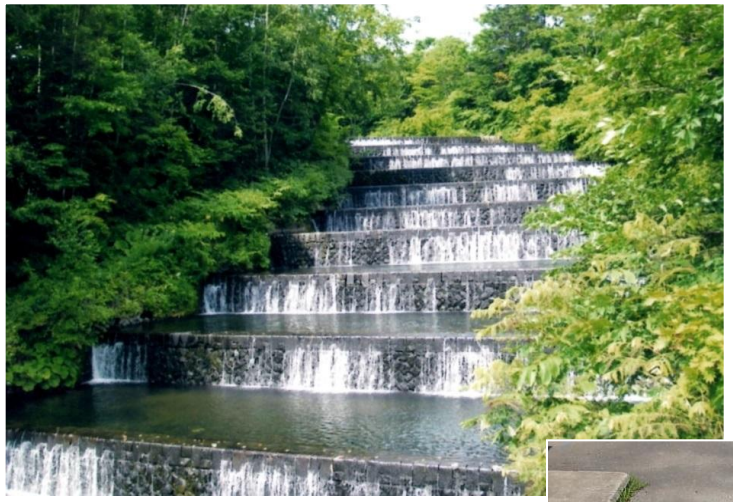
Acceptable Risk

1. Safe drinking water system which can maintain by local villagers as a **Social Contribution** of **Yamaha Motor Company**.
2. Pilot test plant with several public taps was donated from Yamaha Company to Kagawong village near Jakarta, Indonesia.
3. **Villagers discussed how to maintain this plant by villagers**.
4. Villagers decided to **collect money** from the users in order to stock for maintenance.
5. Water committee started a **delivery service** to other villages.
6. Water committee maintains more than **15 years without any trouble**.

This pilot plant developed to new Yamaha Clean Water Indonesia to Asia and Africa.

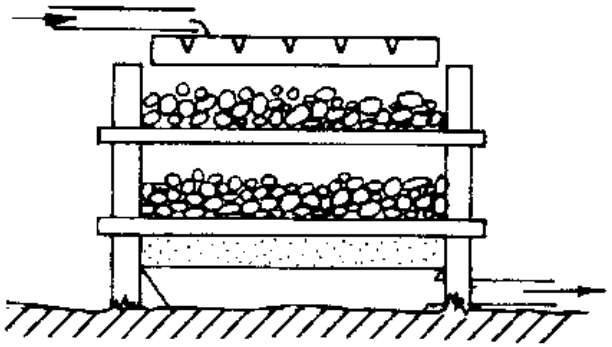
System in 2010 and distribute from Indonesia, Vietnam, Cambodia, Laos, Myanmar, Sri Lanka Senegal, etc.



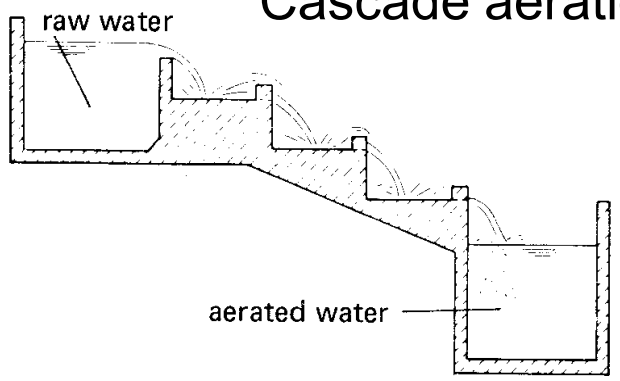


Wise use of natural phenomena for small organisms.

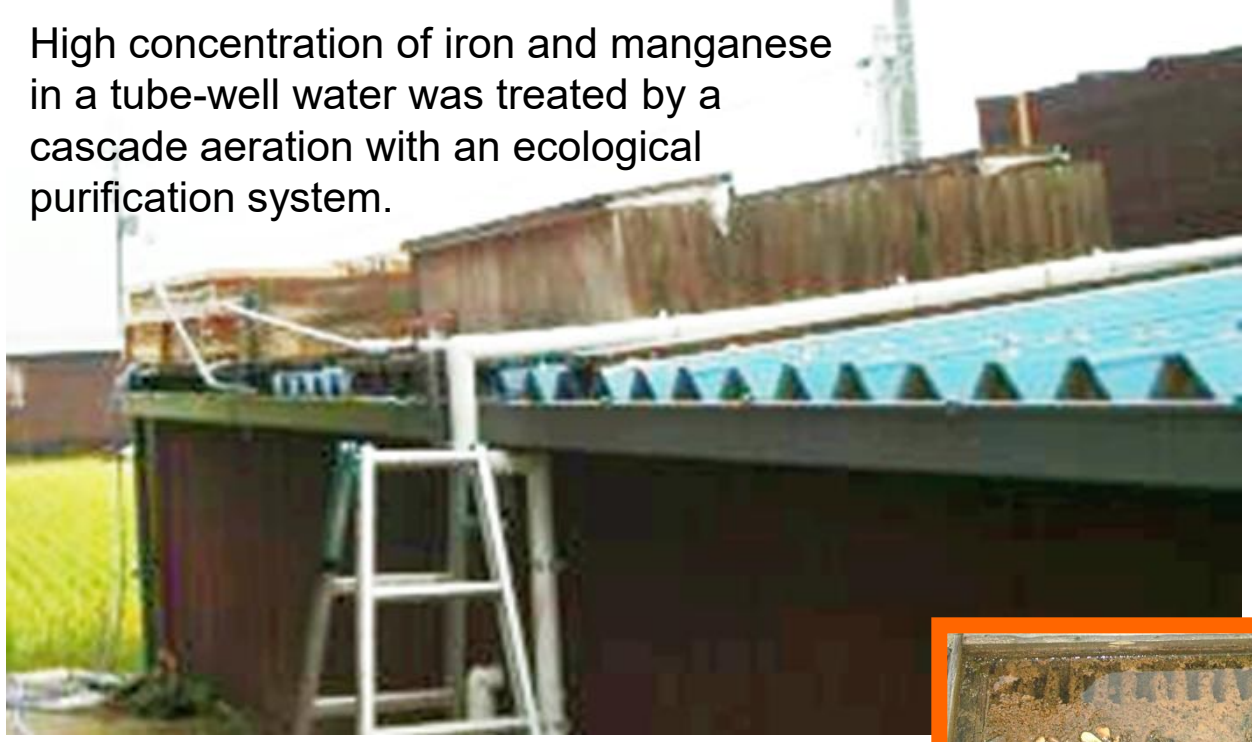
Aeration filter



Cascade aeration



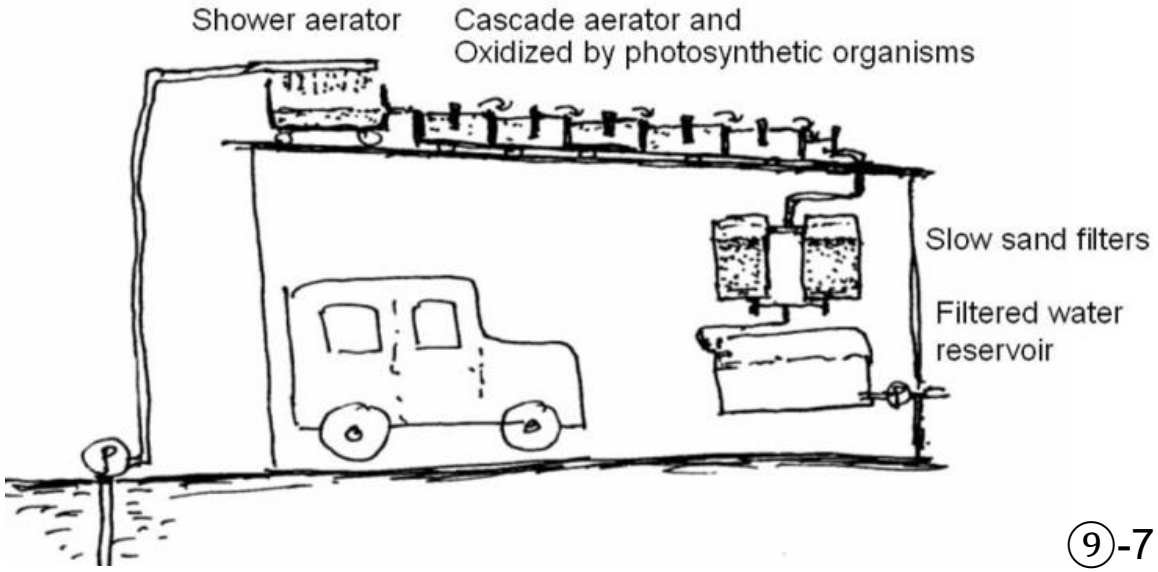
High concentration of iron and manganese in a tube-well water was treated by a cascade aeration with an ecological purification system.



Pre-treatment of cascade aerator using biological activity of bacteria, algae and animals.

Final treatment of slow sand filter.

Mr. Jun Kinoshita



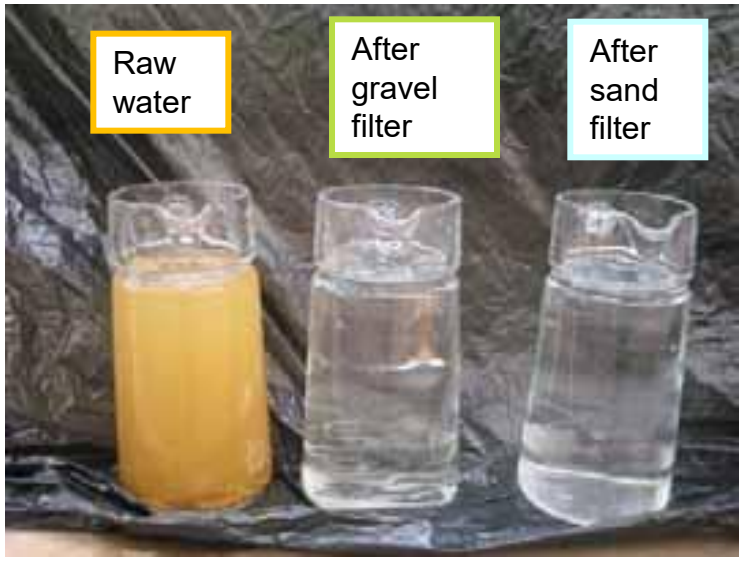
Use of natural slope, drinking water could be made by EPS, Bolivia, 2008

Volunteer JICA's report, Horie, T. 2009

Pump for groundwater and source water tank

3 gravel filters

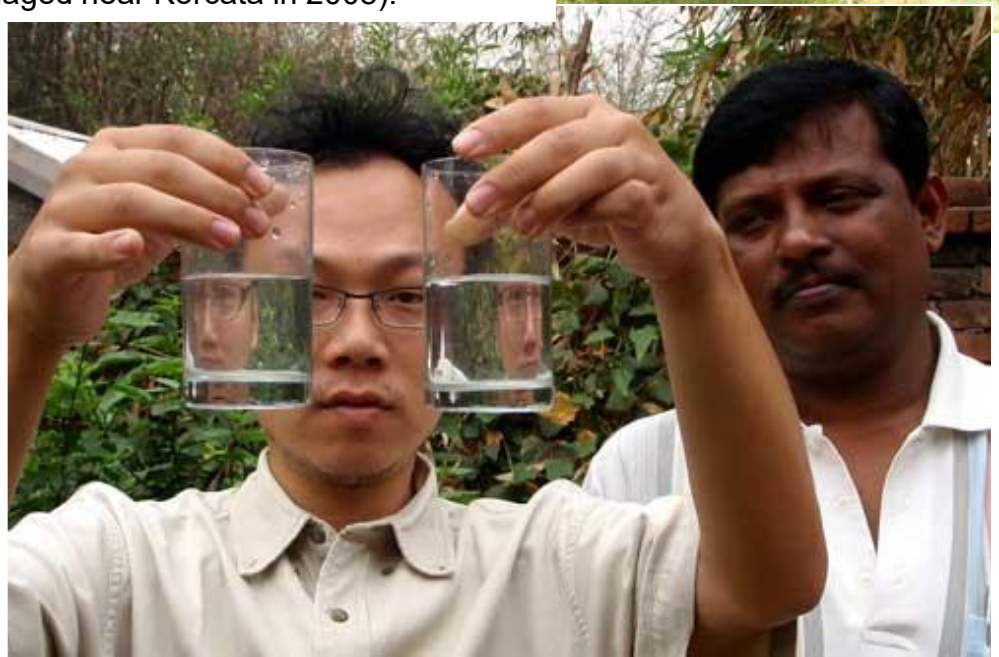
Use of natural slope, pour in sand filter



Filtered water tank

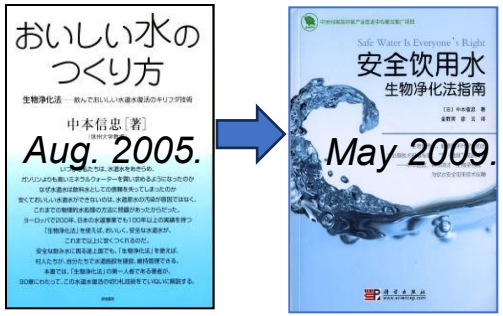
After 4 days, filtered water became clear. After one month, the water became drinkable water, in which coli-form bacteria form was not detected.

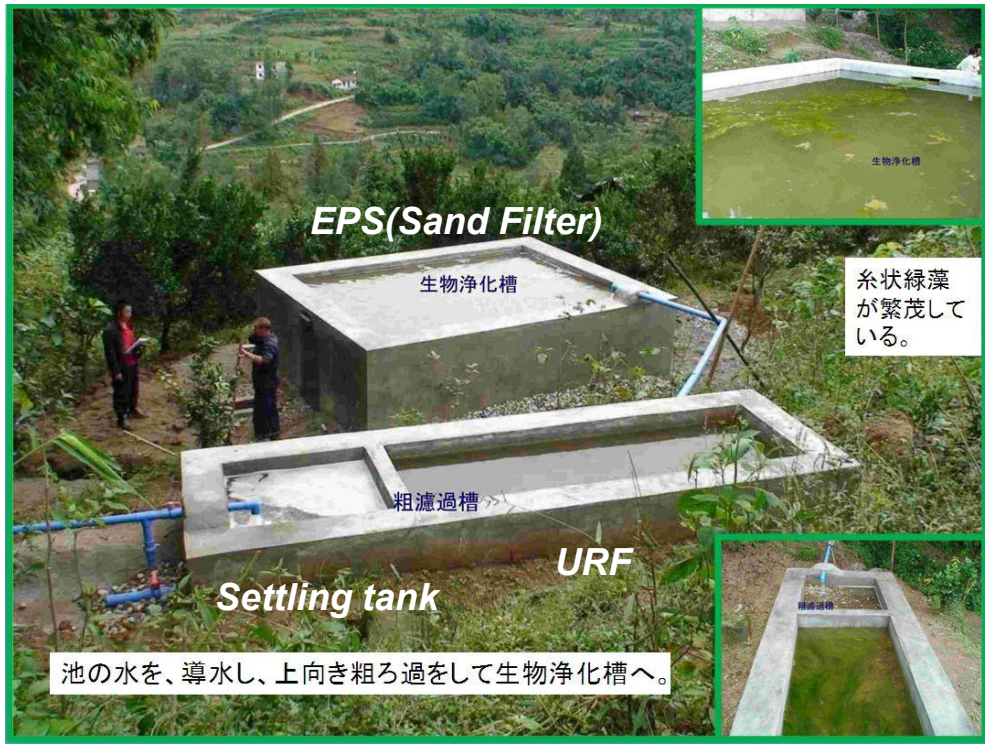
ApamNapat Art Project (Mr. Sohei Iwata managed near Korcata in 2008).



Mr. Jin Shengzhe, translator of Chinese version, made several water plants in China in 2008 after the Sichuan great earthquake, May 12. 2008.

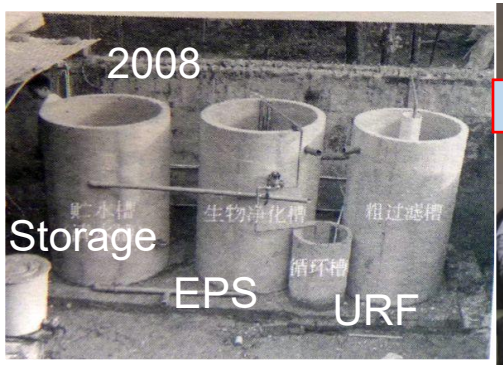
This is 30 tons per day.





金胜哲

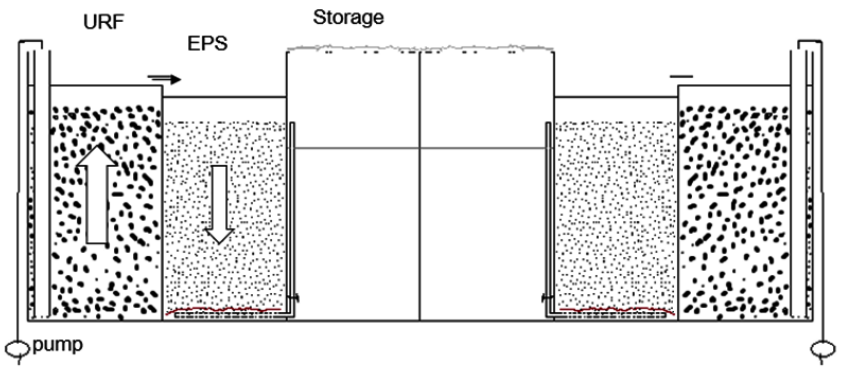
China: Mr. Huo Daishan 霍岱珊 and his sons built EPS to made safe drinking water. (helped by Mr. Jin Shengzhe 金胜哲)



6 t/d, 500 persons.
12 liter/person/d

Supply to owner's kitchen.

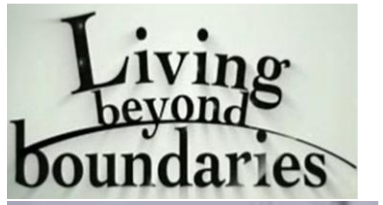
70-80 t/d, 4,600 villagers (246 students)
16 liter/person/d
Filter(2 m x 4 m) x 2 set of filters (URF+EPS)

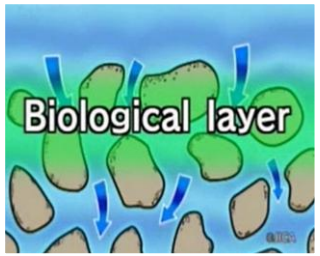


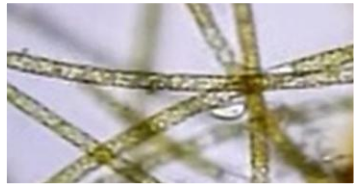
Public tap system for villagers

Mr. Huo and his sons made 40 plants of EPS by themselves.

NHK World　Living beyond boundaries　Dec. 13. 2014.







Huo Daishan constructed about 50 EPS Plants　for 80,000 villagers from 2008 to 2019 during 10 years.

EPS, which originated in Japan, has also begun to spread in China.

Since 2002, I have cooperated with the Asian Arsenic Network (AAN, NGO) activity in Bangladesh.

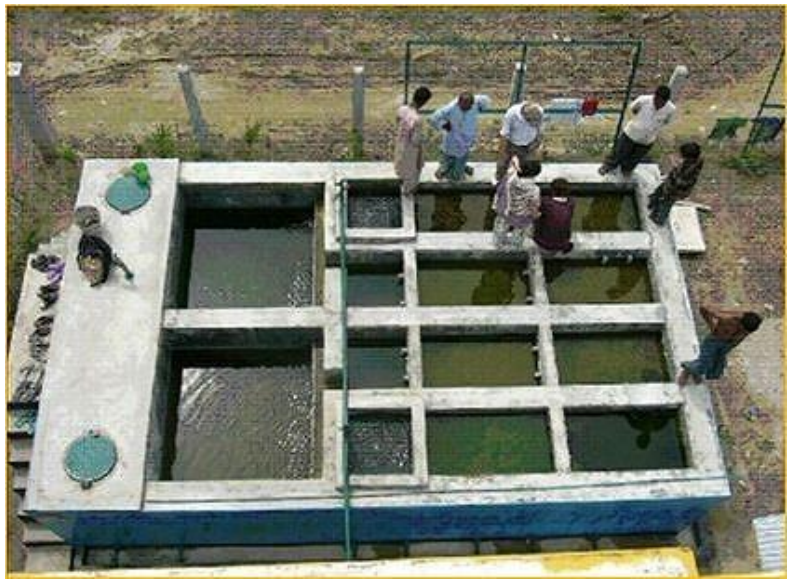
Surface water is polluted. The people use underground water. However, this water was contaminated Arsenic. AAN checked the Arsenate contamination.

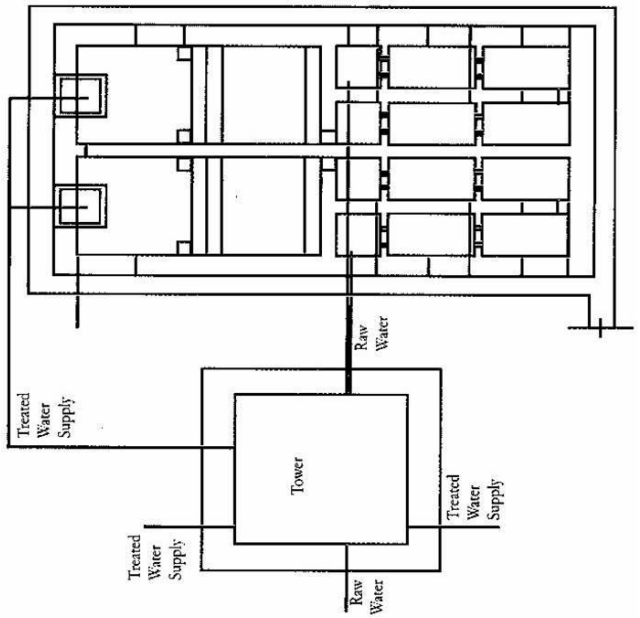
Wells contaminated with arsenic were painted red.

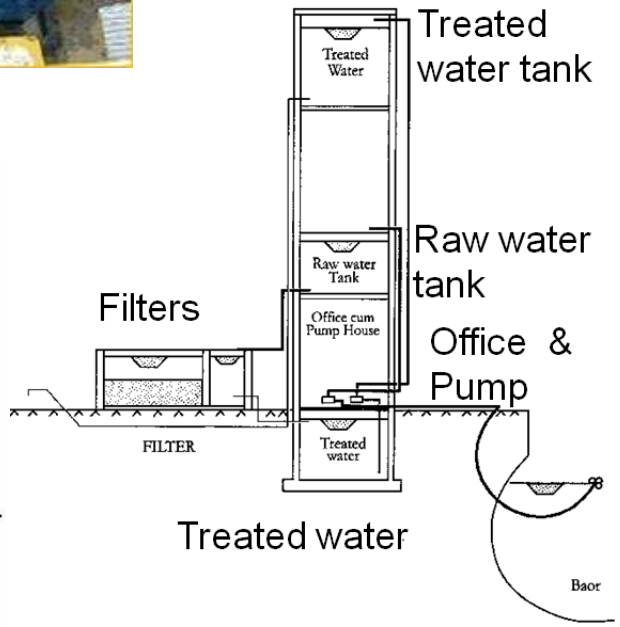
AAN made Slow Sand Filtration system for safe water. I advised better SSF system using biological activity to AAN.

Then, I was asked to consider a mechanism that can **decompose pesticides without using chemicals**.

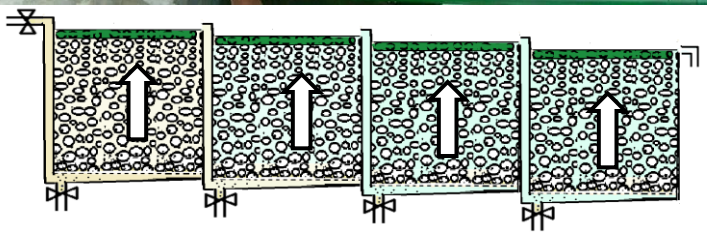
Repeated growth of algae and decomposition by grazing animals, and real decomposition of pesticides and herbicides under anerobic condition in fecal pellets.







AAN made new construction with UNICEF funding in 2019.



Repeated URF process of **algal growth and decomposition by animals in 4 times**. DO in water is necessary for animal activity in this system.

Mr. Kawahara said to me "This is not SSF". Then I proposed " This is Ecological Purification System" in Bangladesh in 2004.

In mountainous country like Nepal, many houses are scattered on the slope. They use natural spring on the slope. I visited Nepal in September, 2011.

These waters by natural purified process are always clear and safe to use.

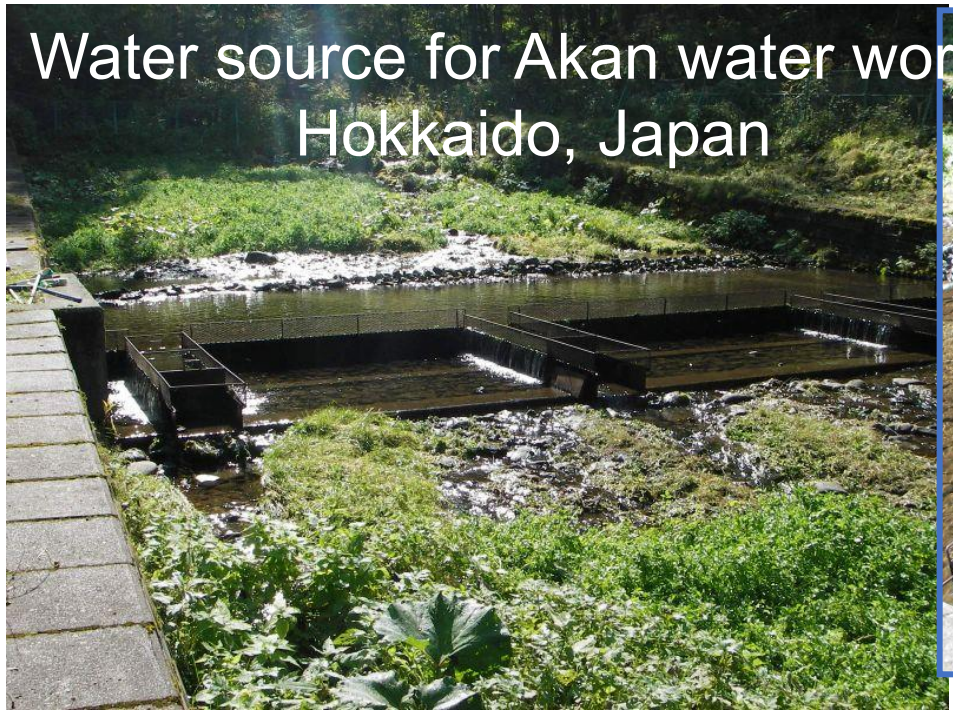
Nepal is a mountainous country with a lot of precipitation. They also used rainwater. Spring water is abundant, and it is drawn through pipes and used carefully. Because of the large difference in elevation, it is difficult to adjust the water pressure with large diameter water pipes. In a mountainous country like Nepal, it seems that using spring water is a good way.

I gave a talk on water purification to students at this university. I found a wonderful slogan in Professor Shiba Kumar Rai's room.

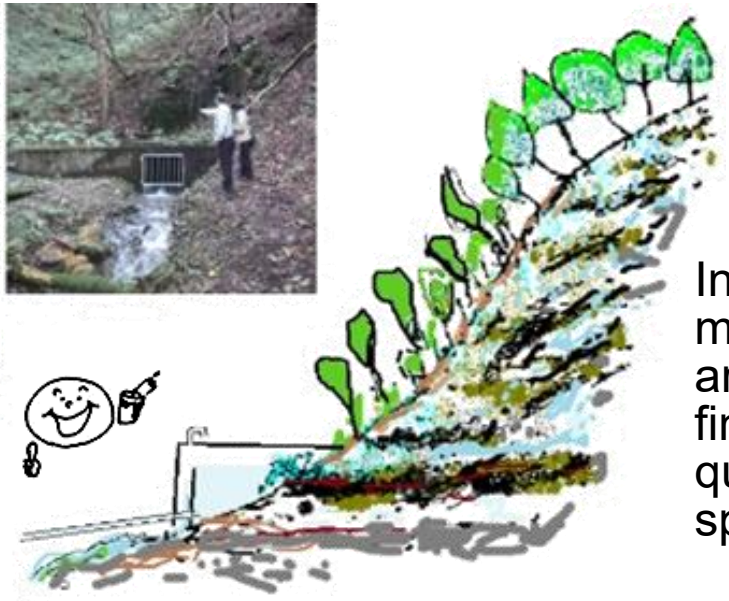
Professor & Research Director at Nepal Medical College
Prof. Dr. Shiba Kumar Rai

Three points worth to remember

1. Knowing is NOT enough, we must APPLY it to something useful *(von Geothe)*
2. Willingness is NOT enough, we must PUT it into the *PLAN* and *ACTION* (von Geothe)
3. Putting the PLAN into action is NOT enough, we must ACCOMPLISH the goals (Nakamura)



Porous pipes were placed under the gravel bed in a river. Almost suspended free water is taken for a slow sand filter plant. This is an intake of an artificial subsurface water.



In case of mountain area, we can find a good quality of spring water.

Wise use of natural purified water is the best.