

Introduction of Multistage Subsurface Flow Wetland Systems for Livestock Wastewater Treatment in Japan and Vietnam

@Trends of Policies and Measures for Improving Water Environment
in Vietnam and Japan's Technical Cooperation

15 December 2021

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Problems of wastewater from dairy milking parlors

The presence of milk, excreta and detergents in milking parlor wastewater makes its treatment difficult. Such a mixture can contaminate parts of the water system, including underground water and rivers.



The mixture may contain water used to wash milking lines and floors as well as excreta, detergent and disinfectants.



Swinery

Pig farm urine issues



Aeration facilities for urine



**Urine reservoir:
Continuous complaints from
neighbors despite coverage
with sheeting**

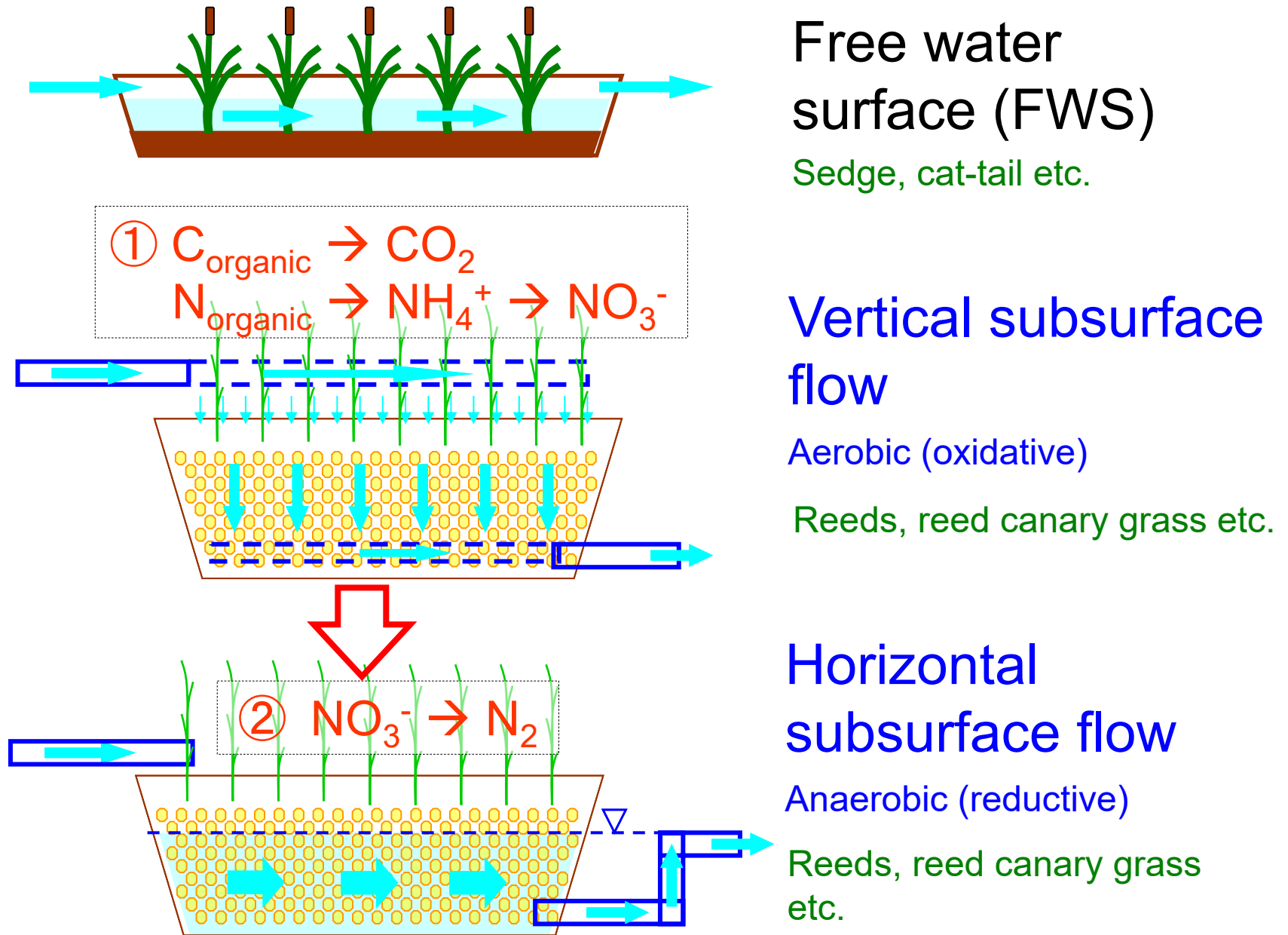


**Conventional
method: high cost**

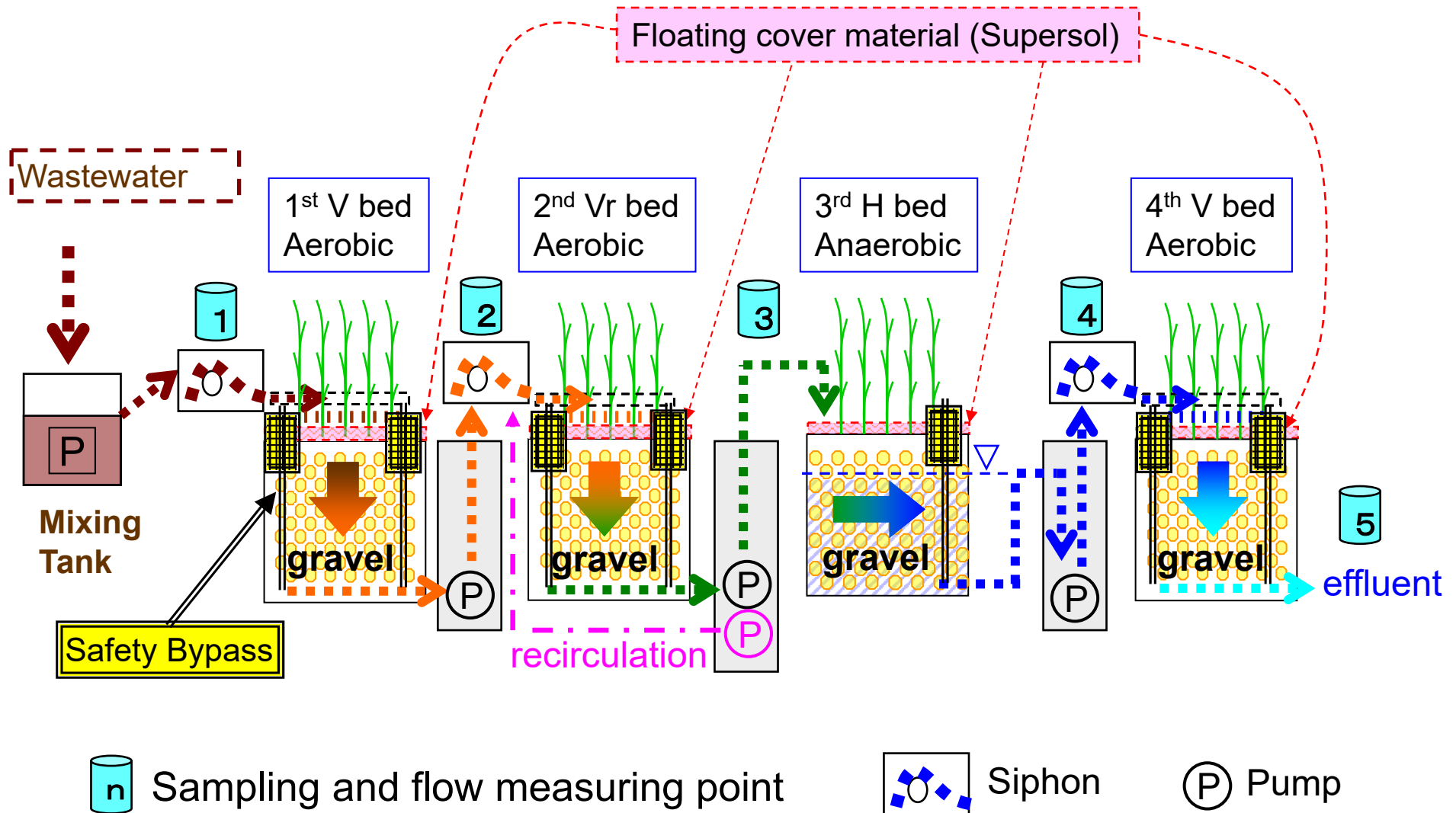
Activated sludge treatment

What is a hybrid constructed wetland system ?

Hybrid wetland system (① + ②)



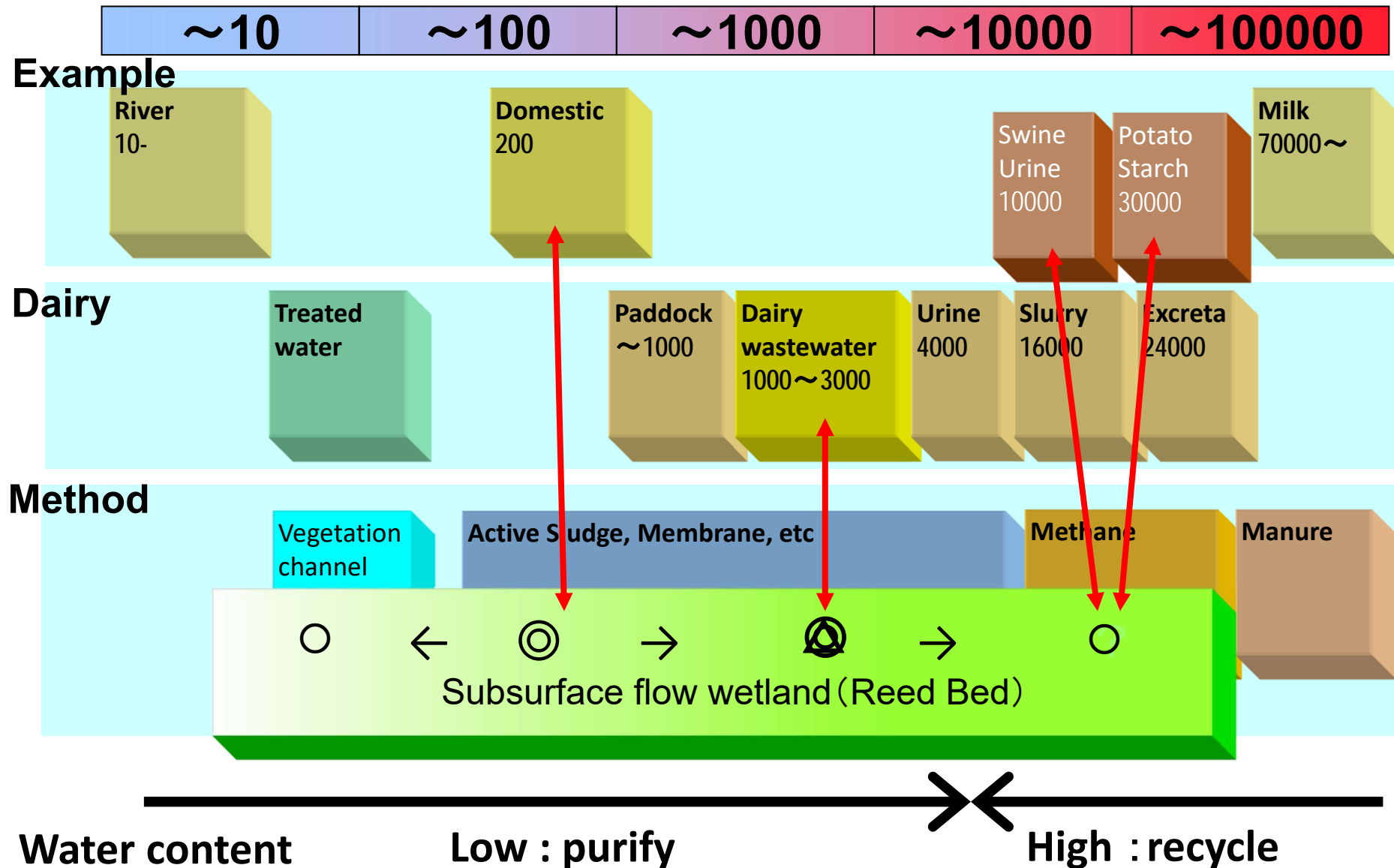
Types of constructed wetlands for wastewater treatment



A schematic diagram of a multi-stage hybrid wetland system
(Example; Dairy farm N)

Range of density treating organic wastewater

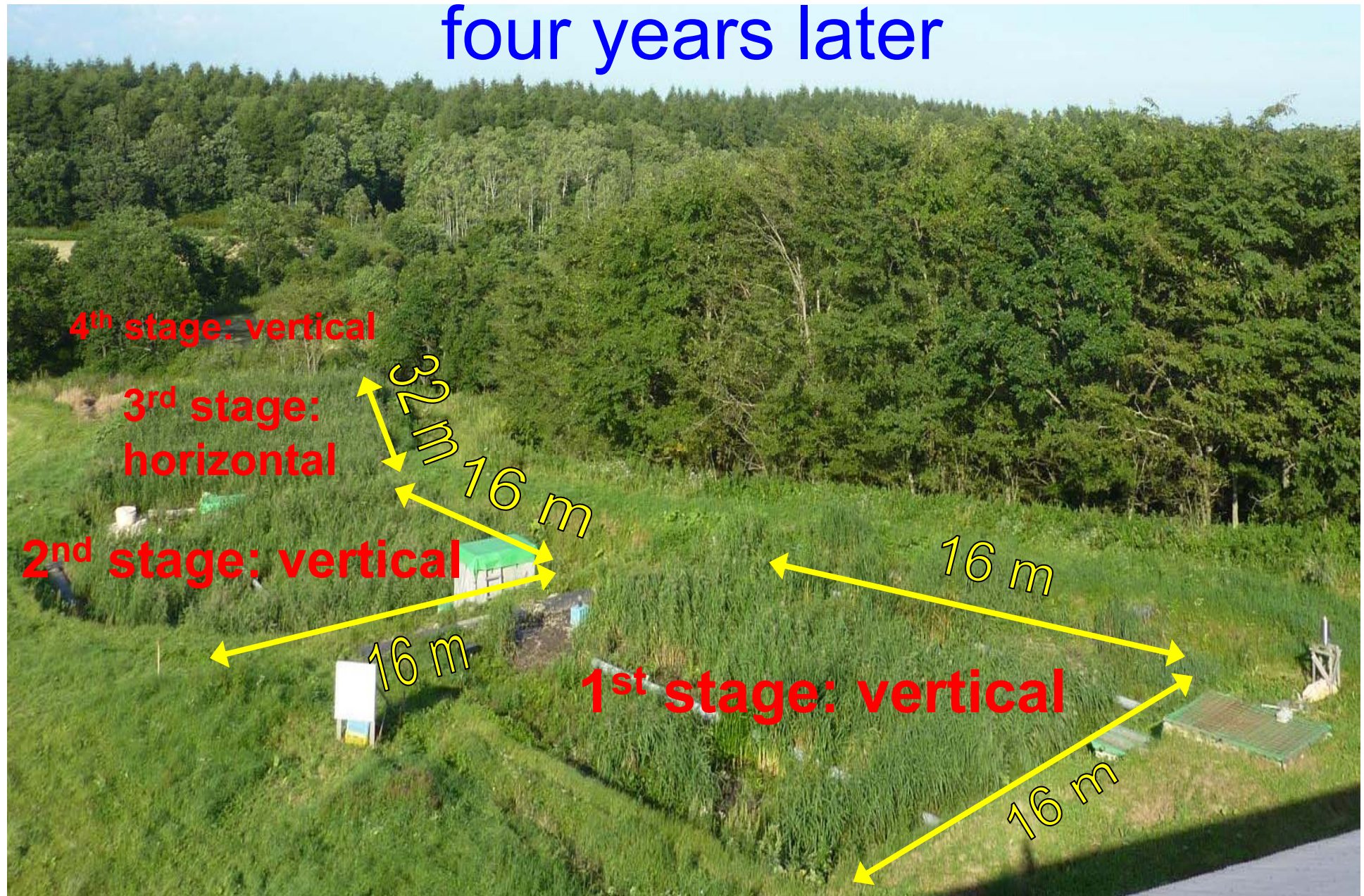
BOD (mg/L)



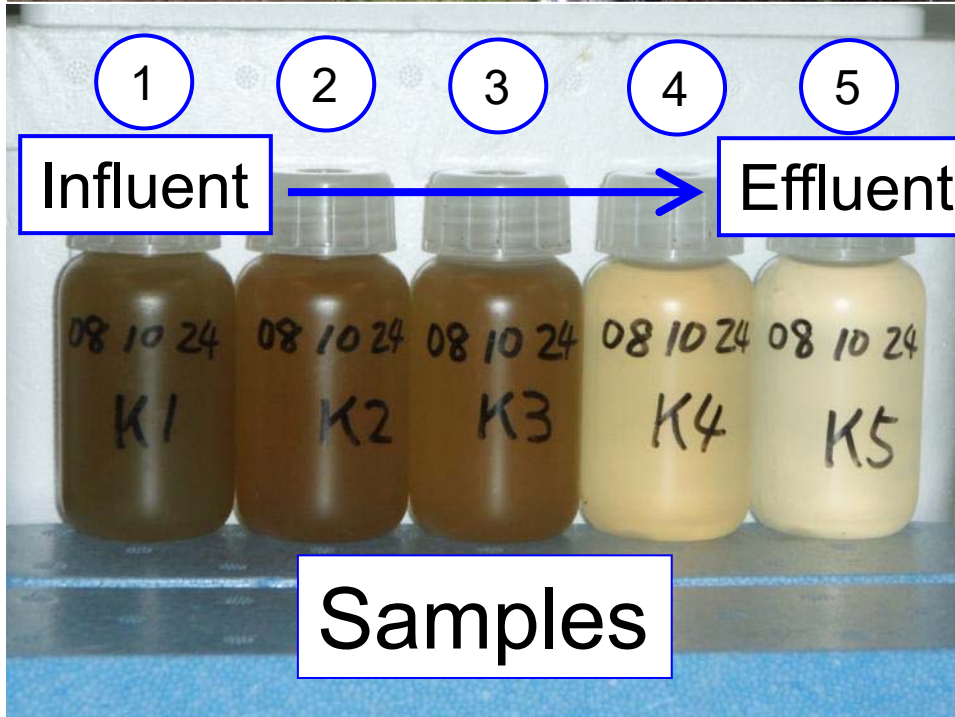
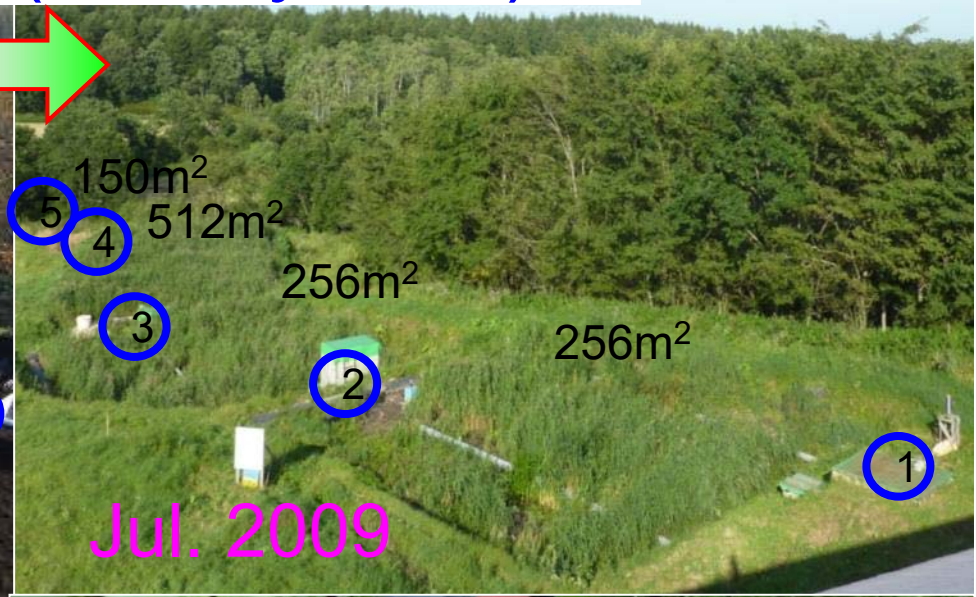
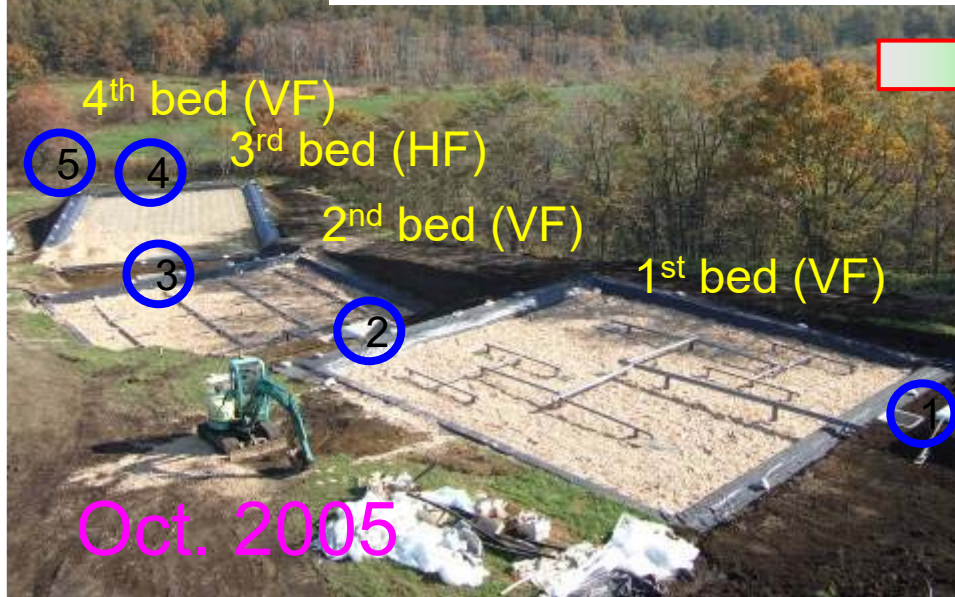
The first subsurface flow hybrid wetland system for dairy wastewater treatment in Betsukai-cho



First system in Betsukai-cho: four years later



Panoramic view (K dairy farm)



Sep. 2009

- Reed and earthworm
 - minimize clogging
- Earthworm (*Eiesenia fetida*)
 - decomposes excreta and straw

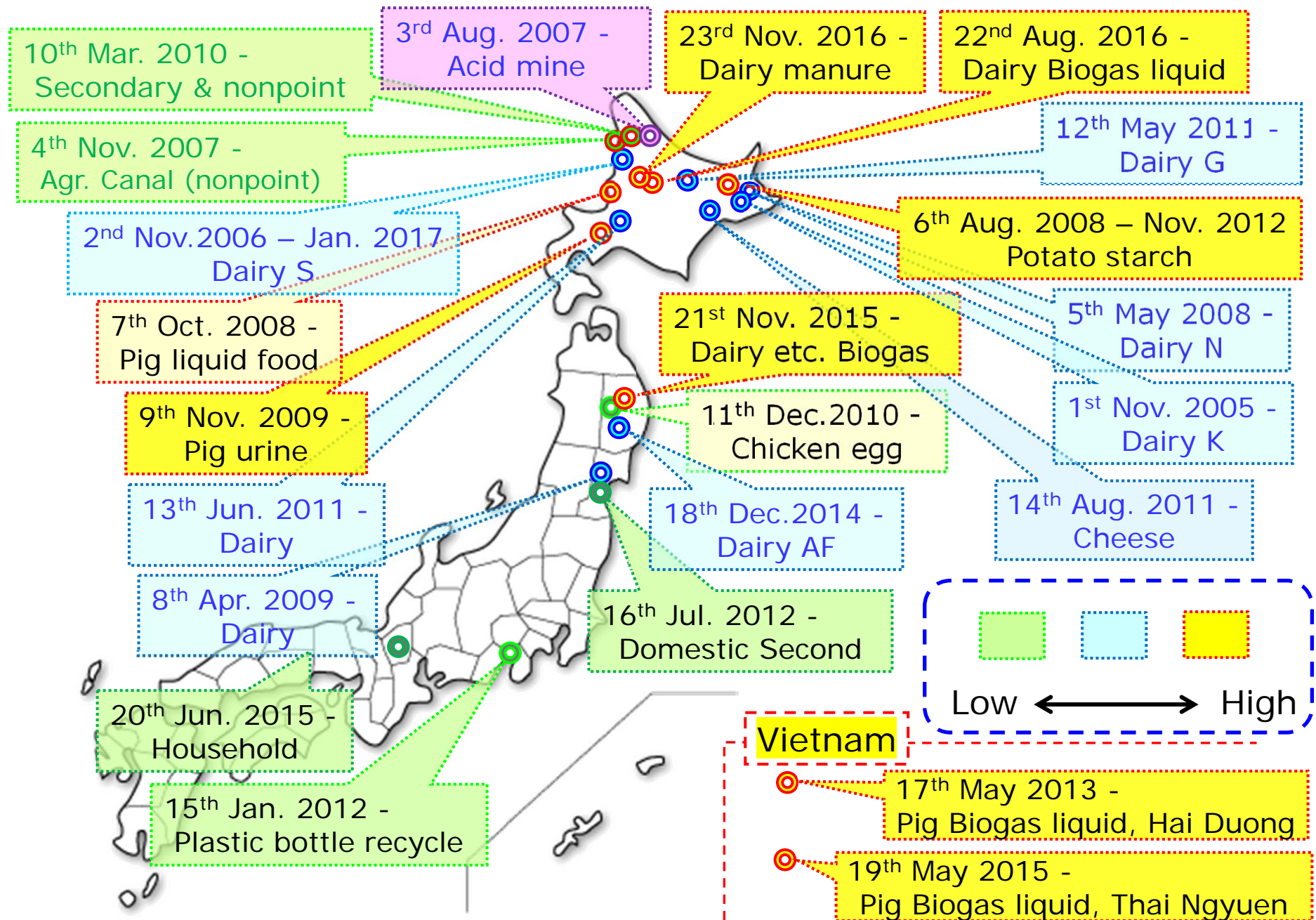


4th year
Dairy farm K

Reed and earthworm in the bed

Merits of multistage wetland system for wastewater treatment

- Low-priced (initial and running costs)
- Electricity-saving and Labor-saving
- Need small space compared from free water surface wetland system
- Prevent the spread of harmful insects as mosquito and horsefly
- Usable throughout years even in cold climates



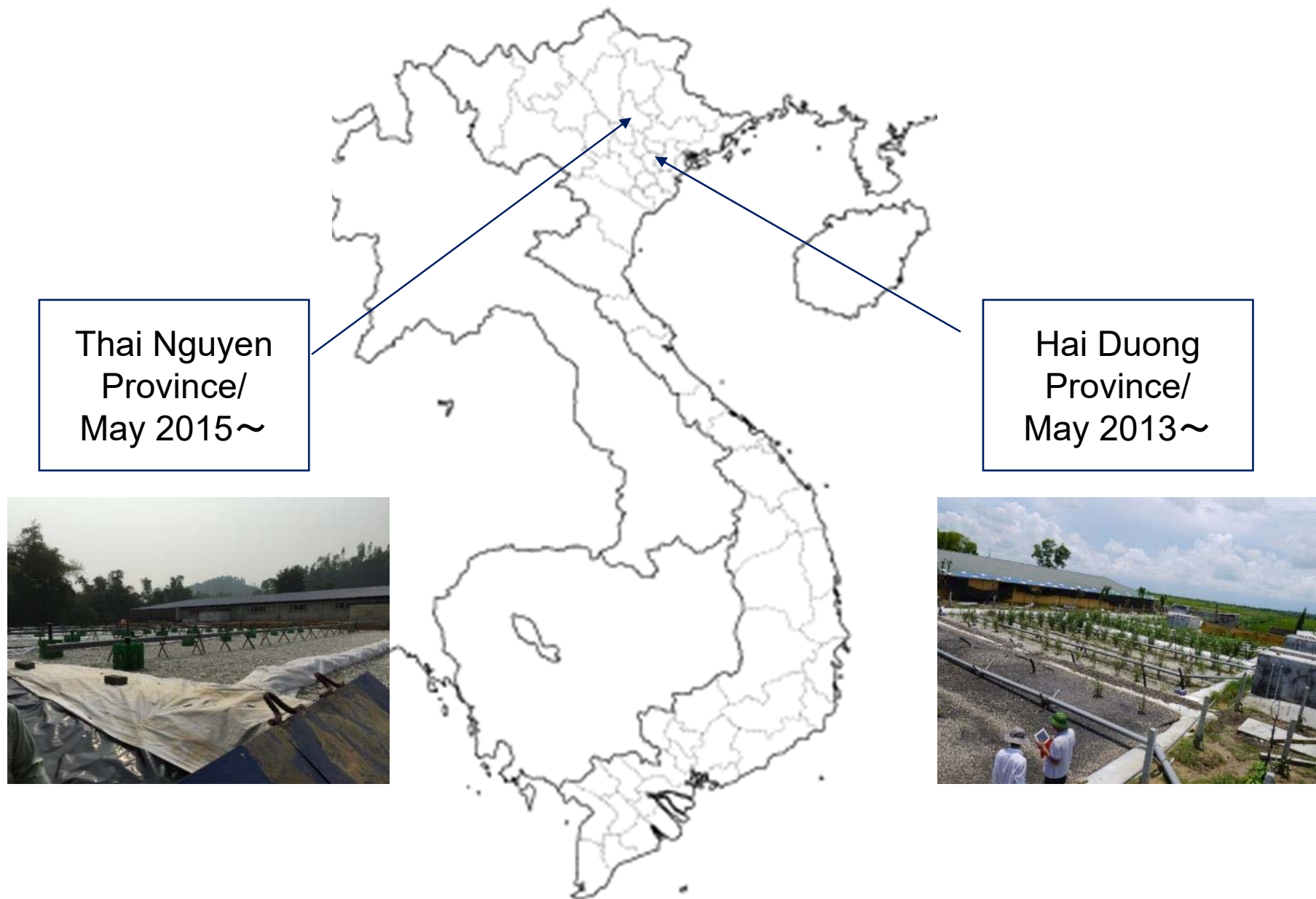
Our constructed wetlands in Japan and Vietnam

Aug. 2017

Introduction of Multistage Hybrid Wetland Systems in Vietnam



Multistage Hybrid Wetland Systems in Vietnam



Bui Huy Hanh Pig Farm in Hai Duong Province

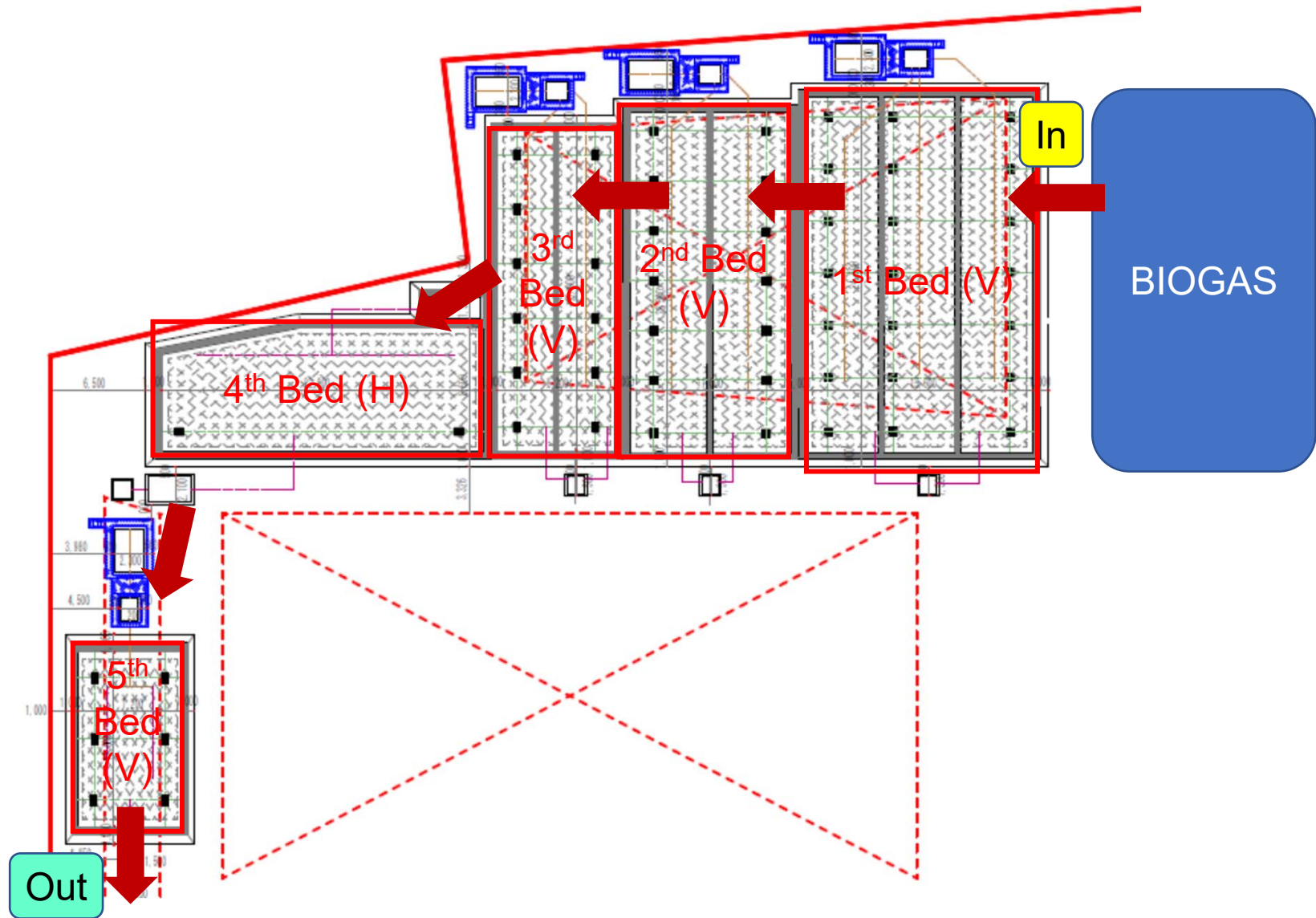
Total bed area : 1,220m²
Inflow rate : 80 m³/d

1,400 sows
(2,700 pigs equivalent)

Since 2013



Layout of MSHWS at Bui Huy Hanh Pig Farm in Hai Duong



Bui Huy Hanh Pig Farm in Hai Duong Province



Biogas



1st Bed

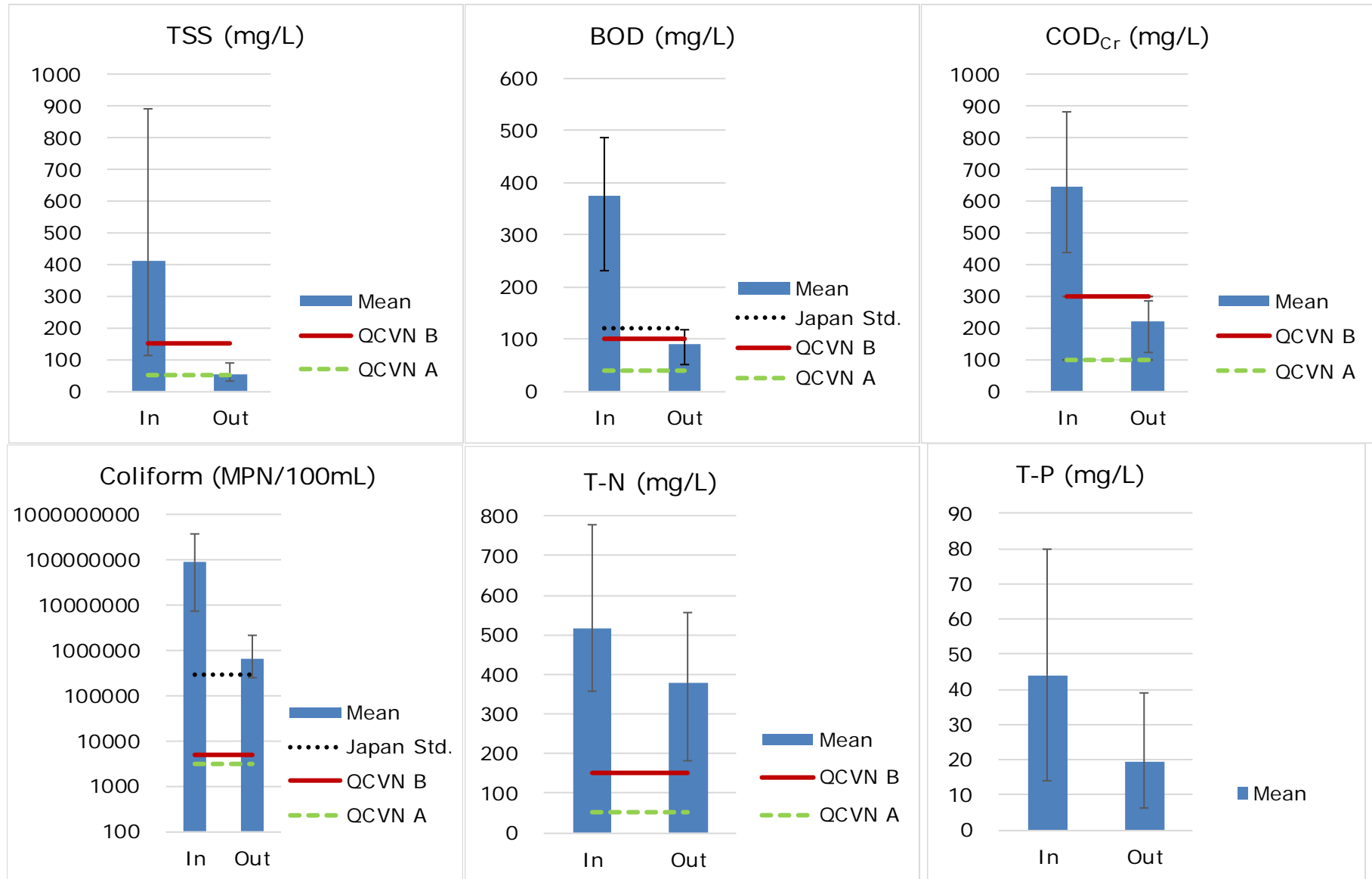


Self priming siphon



Water showering, 1st Bed

Inflow and Outflow Water Quality sampled at Bui Huy Hanh Pig Farm in Hai Duong Province (from 2018 to 2019, n=6)



Phuoc Tien Pig Farm in Thai Nguyen Province

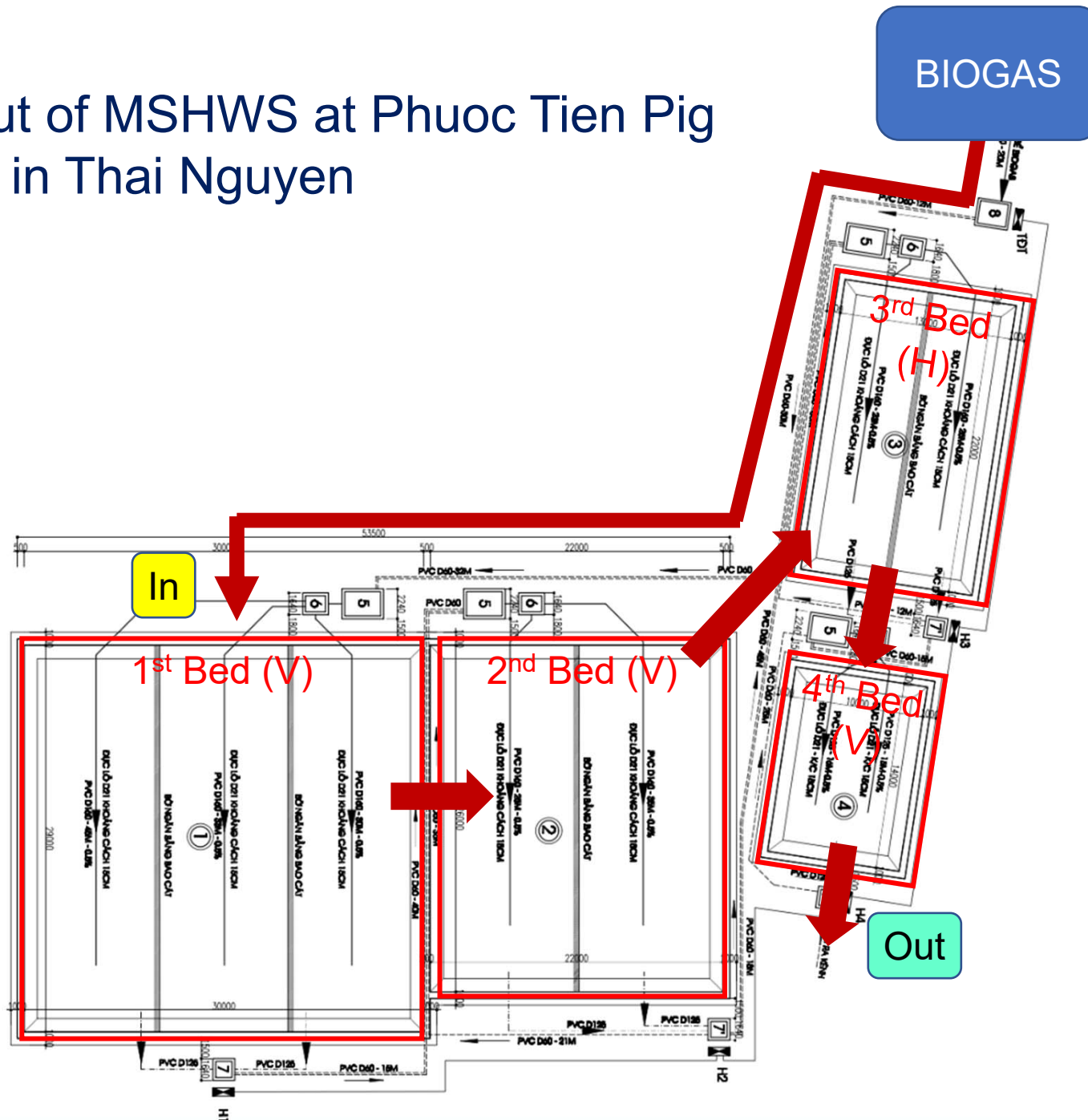
Total bed area : 1,868m²
Inflow rate : 180 m³/d

4,000 pigs

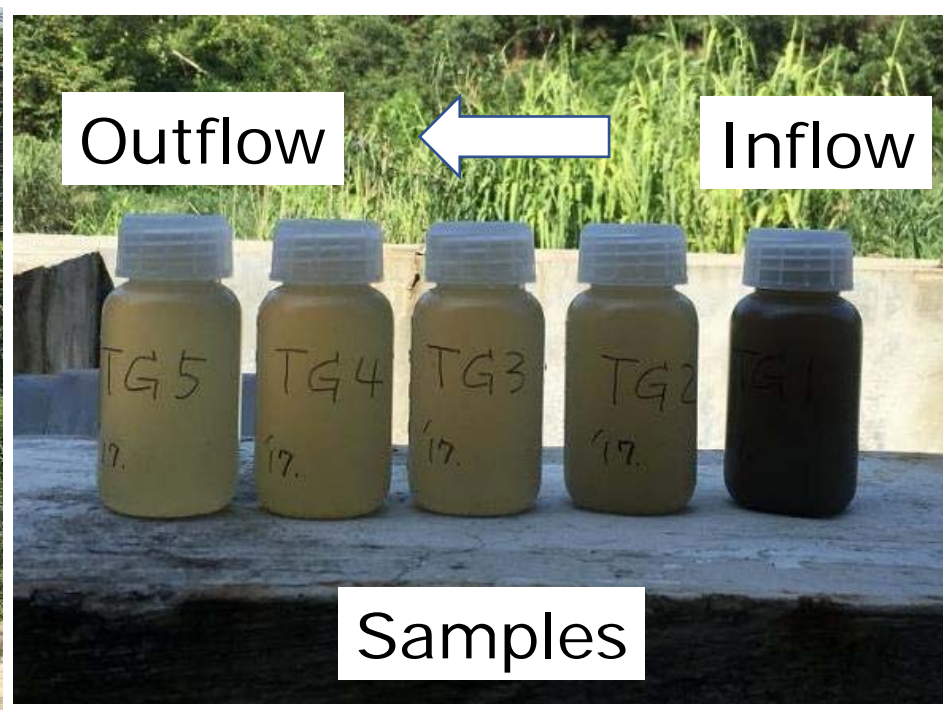
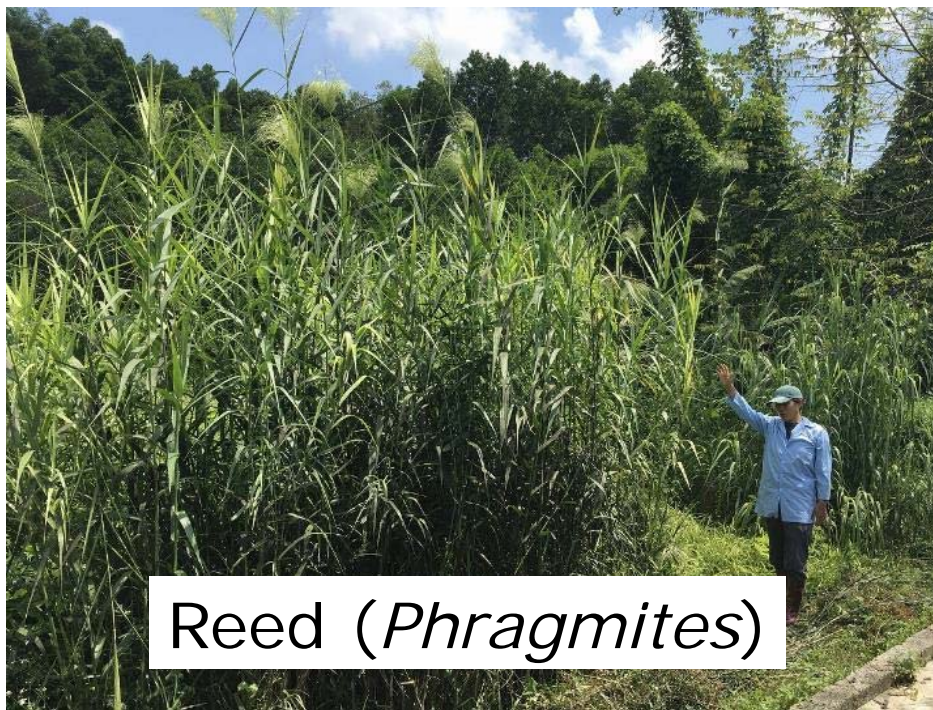
Since 2015



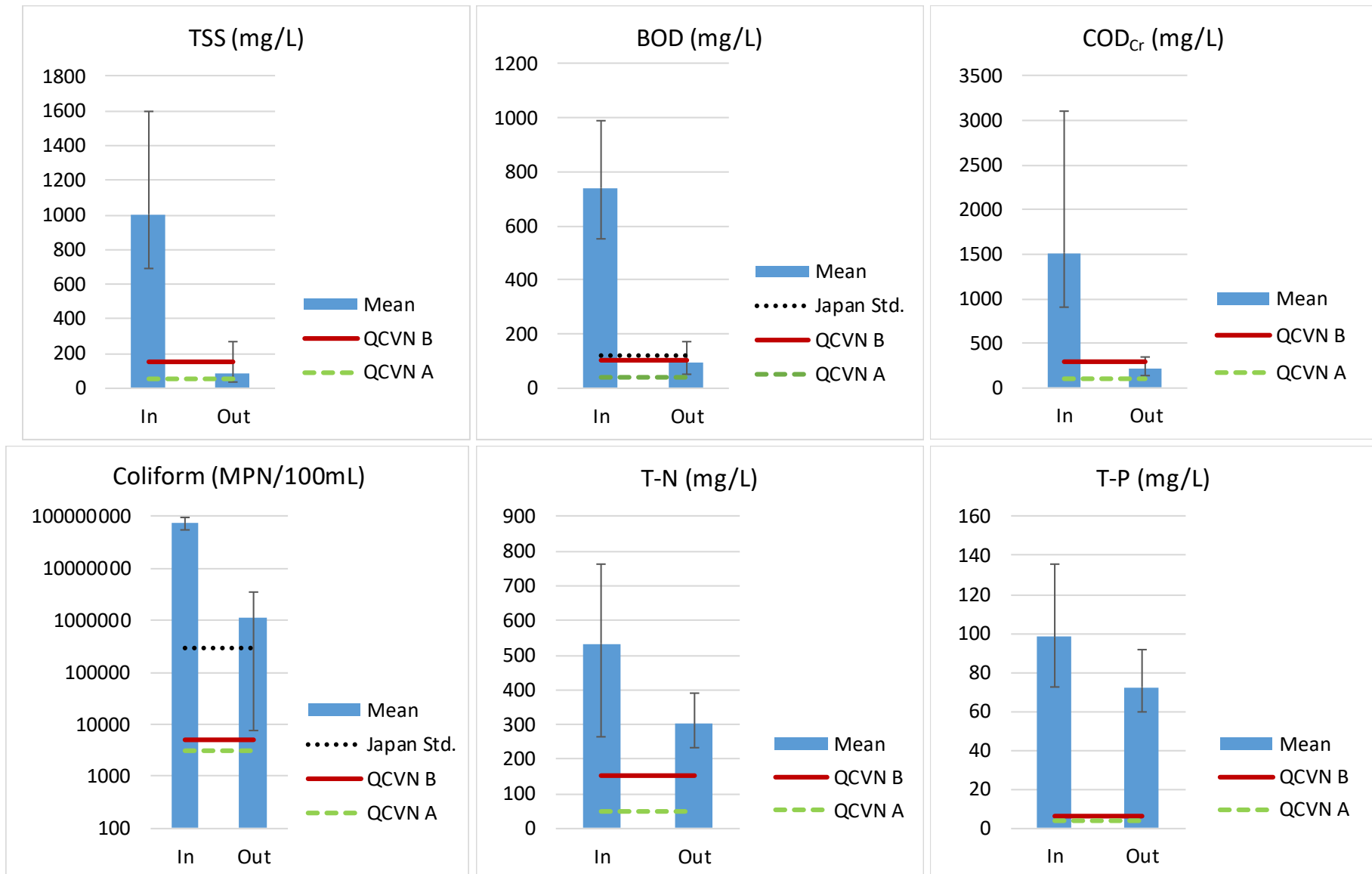
Layout of MSHWS at Phuoc Tien Pig Farm in Thai Nguyen



Phuoc Tien Pig Farm in Thai Nguyen Province



Influent and Effluent sampled at Phuoc Tien Pig Farm in Thai Nguyen Province (from 2016 to 2018, n=9)





Thank you for your attention !

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Pig farm O