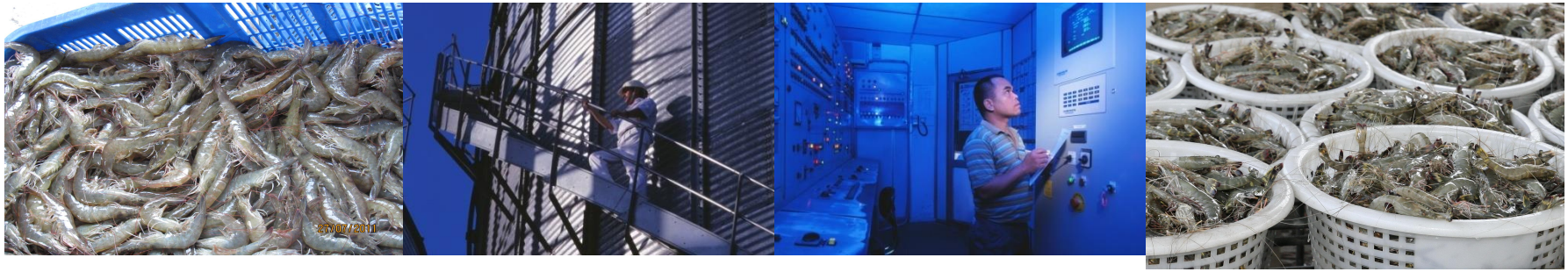
AQUA GROUP GOLD COIN



Disease Control with particular reference to White Spot Disease

Poh Yong Thong

2 Feb 2016 Chilaw, Sri Lanka

Everyone loves bountiful harvest

And laughing all the way to the bank….

Nobody wants to have heartaches like this……

What is WSSV?

White Spot Syndrome Virus (WSSV)

SYMPTOMS :

- **Parking along the bunds , swim near the surface**
- **Reduced feed intake**
- **White spots**
- **Reddish cuticle**

***Trigger*: Cold weather with temperature below 26^{0}C**

PL below 45 days are more susceptible

Usually results in mass mortality within days

How Does WSSV Spread?

Vertical:

Attached to the egg wall

Egg Disinfection in the hatchery

Horizontal:

CARRIER : wild shrimp, crabs, copepods

Water : The virus particles can live up to 3 to 4 days in water

Cannibalism:

1 ------> 10 ------> 100 -----> 1000 10x 10x 10x

Viability of WSSV virus particles after leaving hosts

When the host dies, the virus leaves the host

(analogous to a ship wreck with people swimming for survival)

WSSV particles can live up to 3 days outside of host, free swimming in water looking for new hosts

Virus particles looking for "mama"

Wow…wow…. Where are you mama….

Basics for Aquaculture Success

- Suitable water free of pollution
- Clean pond bottom
- Motivated people
- Quality PL
- Strict Biosecurity
- Quality feed and Superb Feed Management
- Suitable weather
- Understanding of Carrying Capacity

Basics for Aquaculture Success

- Suitable water free of pollution
- Clean pond bottom
- Motivated people
- Quality PL
- Understanding of Carrying Capacity
- Strict Biosecurity
- Quality feed and Superb Feed Management
- Suitable weather

Understanding of Carrying Capacity

- Different ponds have different carrying capacity
- Concrete & HDPE lined > Earthen pond on hard earth > earthen pond on mud
- New pond > old pond
- 20 aerators > 15 aerators > 10 aerators > 5 aerators
- New pond can harvest 1,000 kg/Hp
- Average 500 kg/Hp
- Old pond < 350 kg/Hp
- When the carrying capacity is reached, it is better to partial or total harvest the pond

What is Biosecurity?

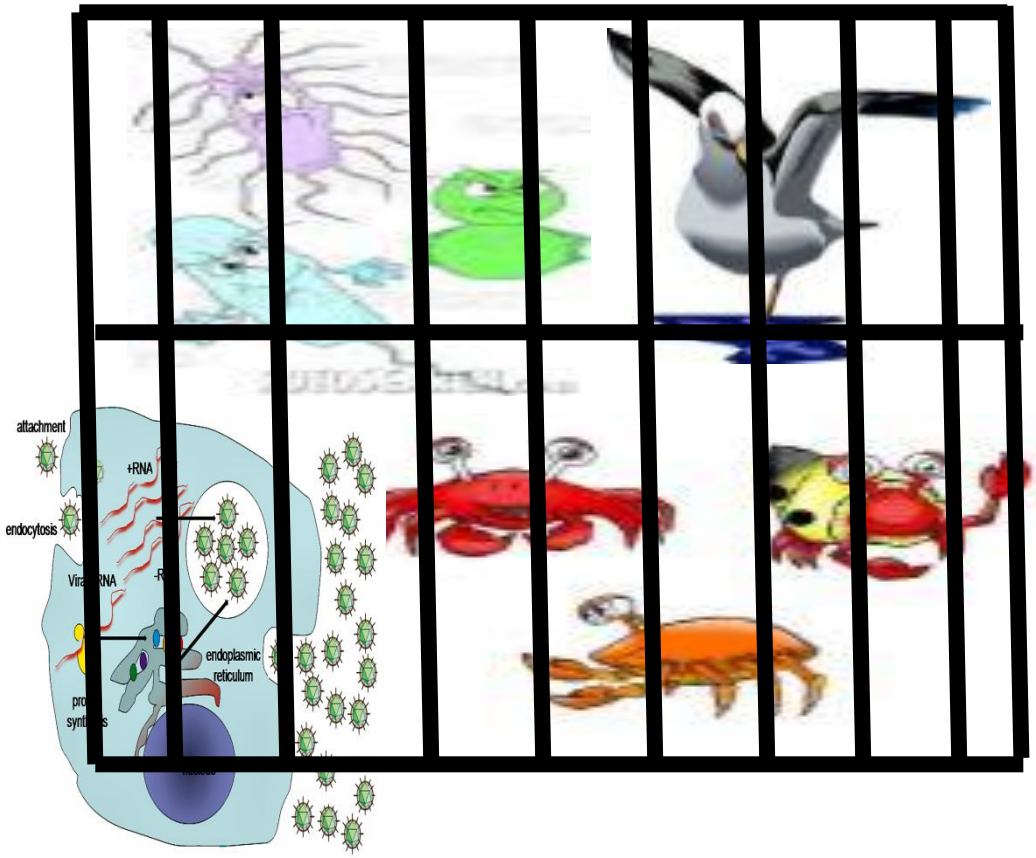
Biosecurity is the implementation of measures to:

a) Avoid the entrance of infection into the farm

b) Control the dissemination of an infection if one does enter the farm

c) Avoid spreading an infection to other farms.

Bio security



Priority in Preventing Entry of Pathogens

1. Treat Raw Water effectively and make sure no leakages (An example of re-engineering a farm to ensure biosecurity – Dr Nyan Taw's work) & water treatment strategies
2. Avoid entry of carriers especially crabs & wild shrimp (be careful of the main reservoir)
3. Use SPF or SPR postlarvae
4. Avoid contamination by human
5. Prevent spread and contamination by birds

1. Treat Raw water Effectively

1. Active chlorine at minimum 30 ppm or
2. Crustacide and then tea seed cake
3. Crustacides: Dichlorvos 50% = FOS 500 at 2 ppm
   Trichlorfon 97% = Dipterex/Synterex/Neguvon
   at 0.5 to 1 ppm
4. Water must be mixed well by sufficient number of paddlewheels

**Make sure no leaking of raw water into pond (Dr. Nyan Taw)

- Untreated Raw water may contain virus

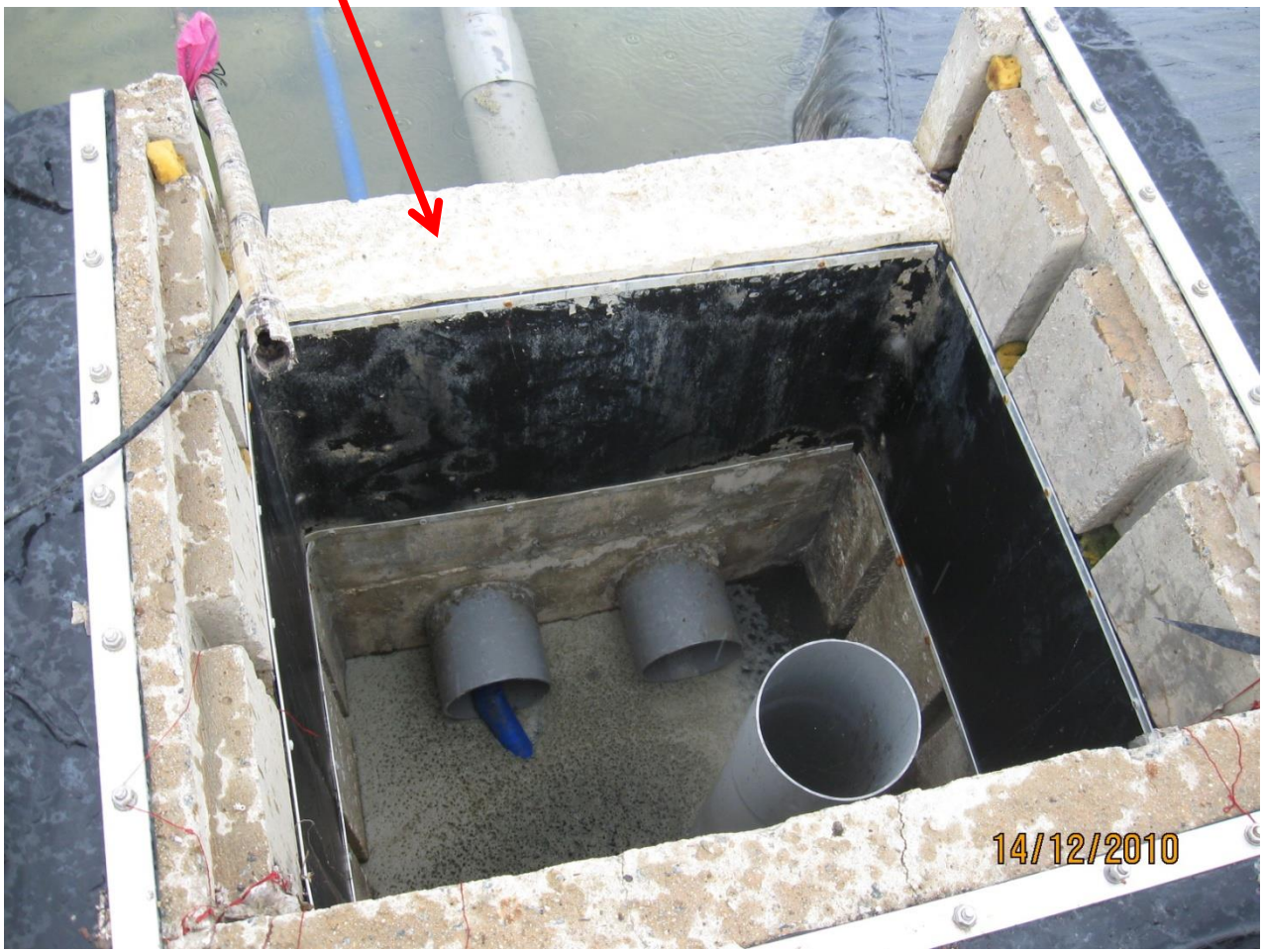
Before

Wooden outlet gate leaking

After

Wooden planks replaced by concrete

Concrete replaced wooden planks



**Make sure no leaking of raw water into sub-inlet

- Untreated Raw water may contain virus

Before

Wooden inlet gate leaking

After

Wooden planks replaced by concrete

Water use strategies

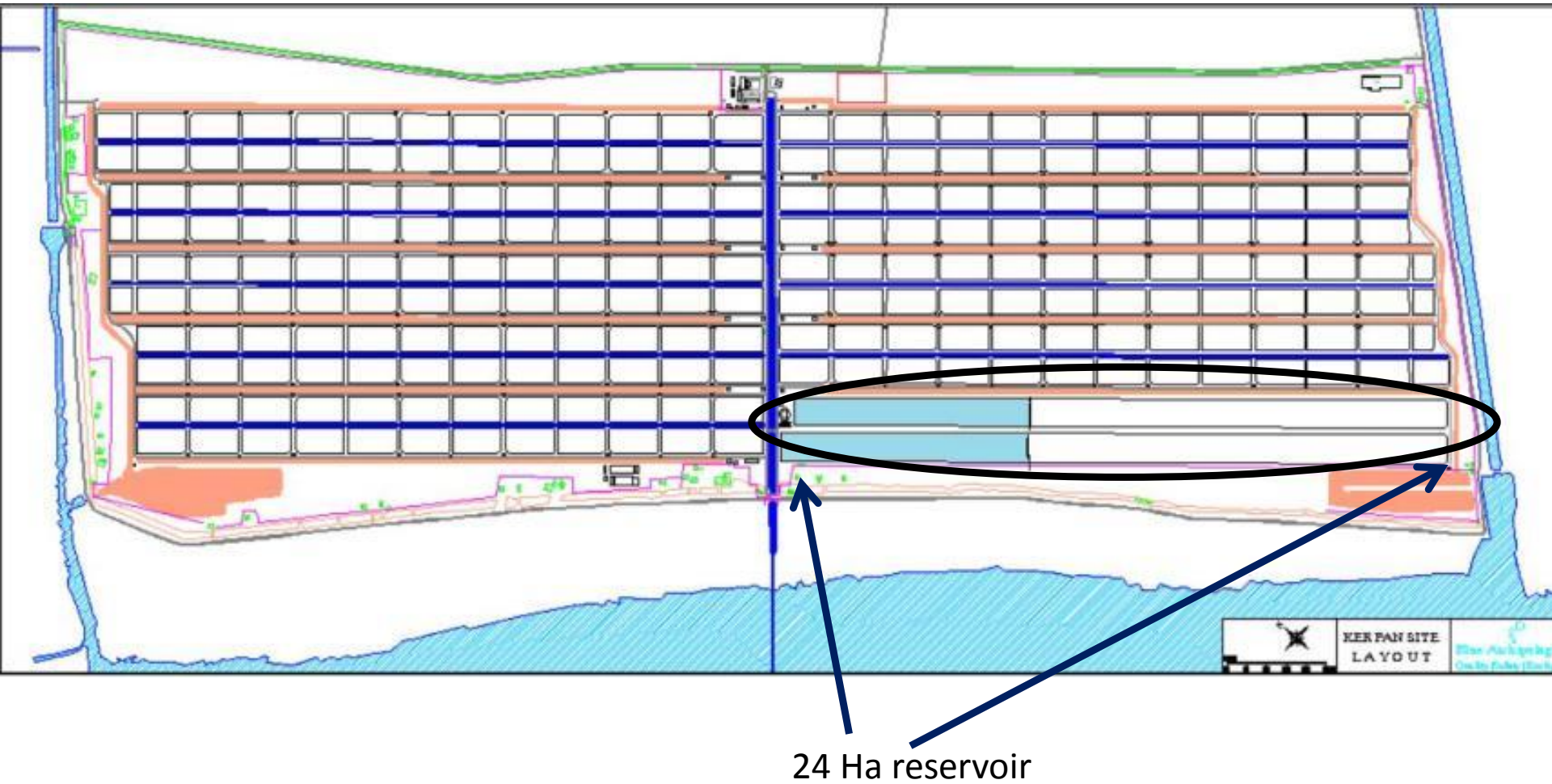
1. Before stocking, water to be treated with active chlorine at 30 ppm
2. DoC 1 to 45: only top up water in the ponds to compensate for evaporation
3. DoC 46 to 90, minimal water exchange to the ponds. Water has to be sterilised with active chlorine at 30 ppm
4. Above DoC 90, use water that has passed through filter of 250 microns (1mm = 1,000 microns)

1,000 micron (1.0 mm) filter for water into main canal

Main canal

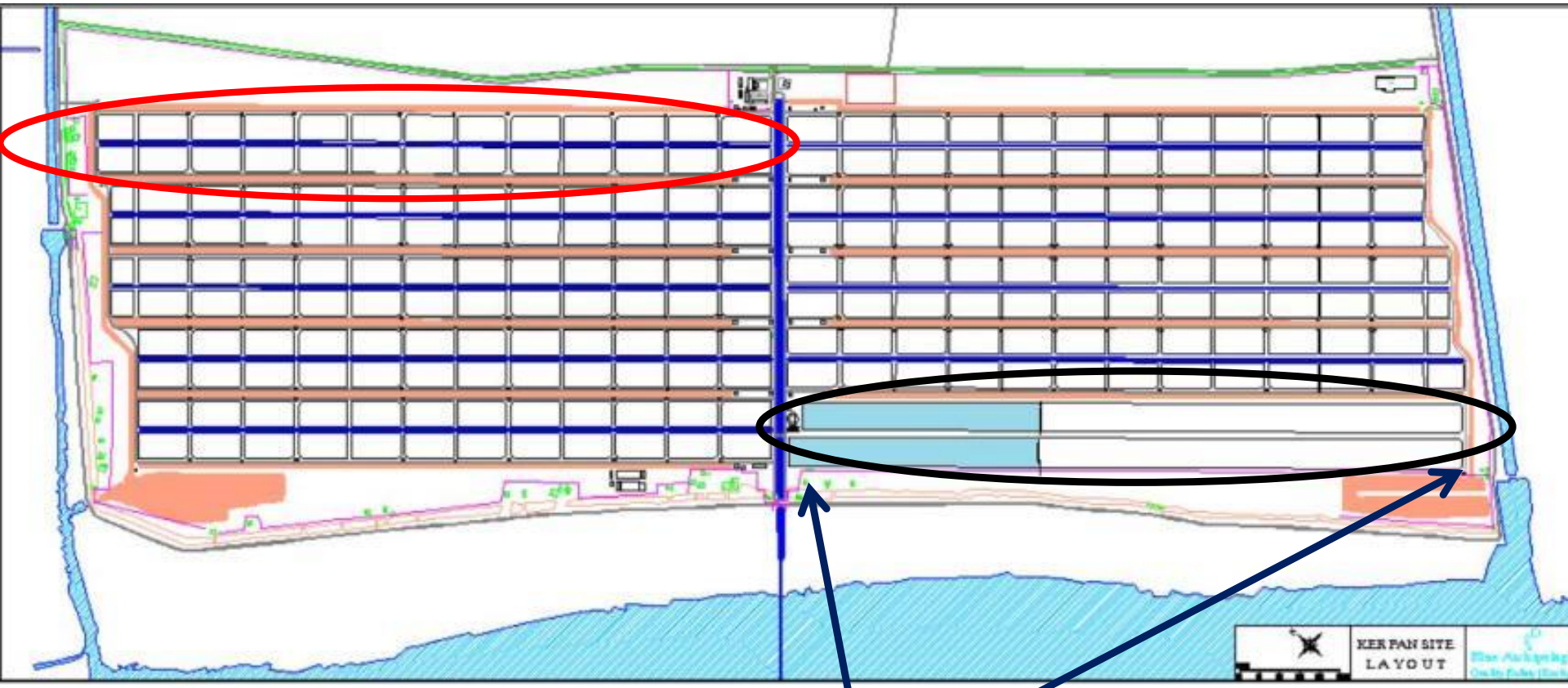
250 micron (0.25 mm) filter sandwiched between inner and outer layers of 1,000 micron filter for sub-inlets

2. Practise Modular System



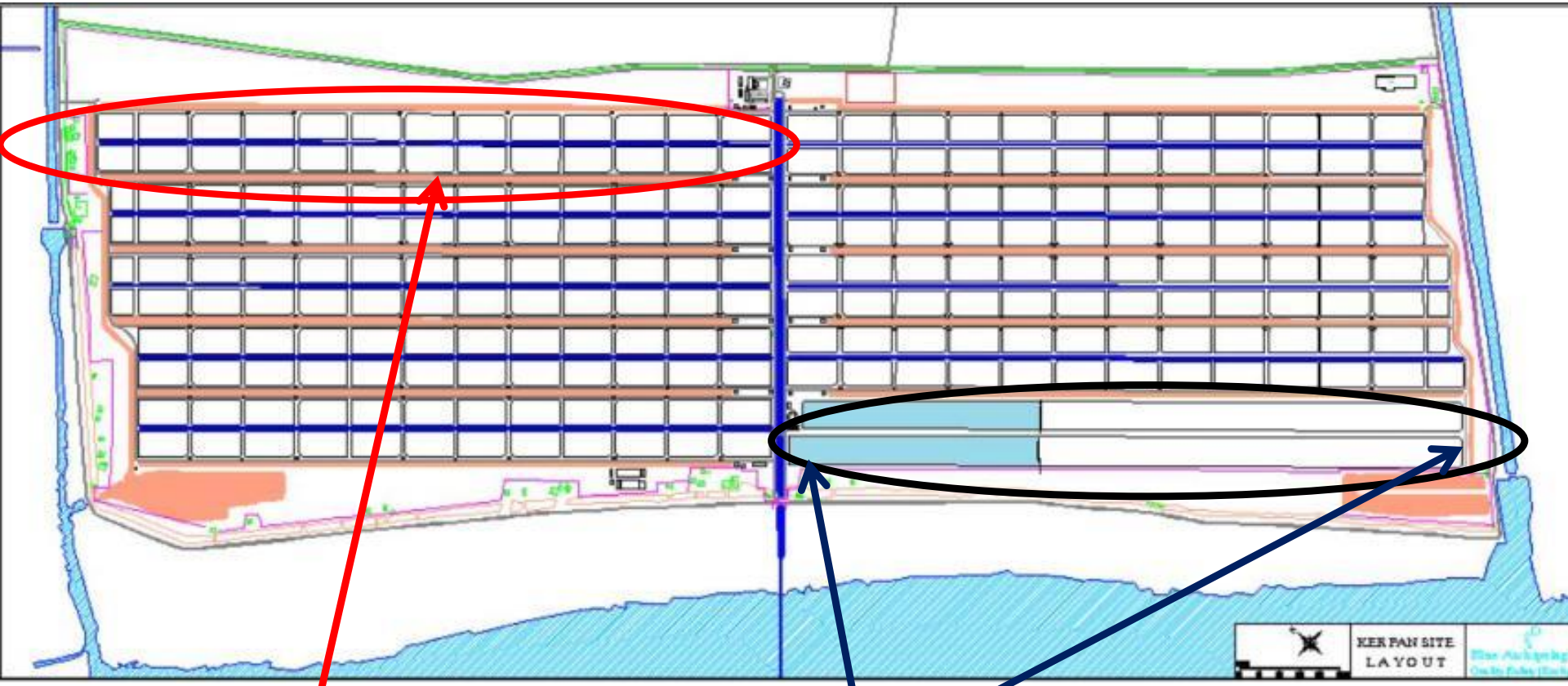
24 Ha reservoir

Modular System



24 Ha reservoir

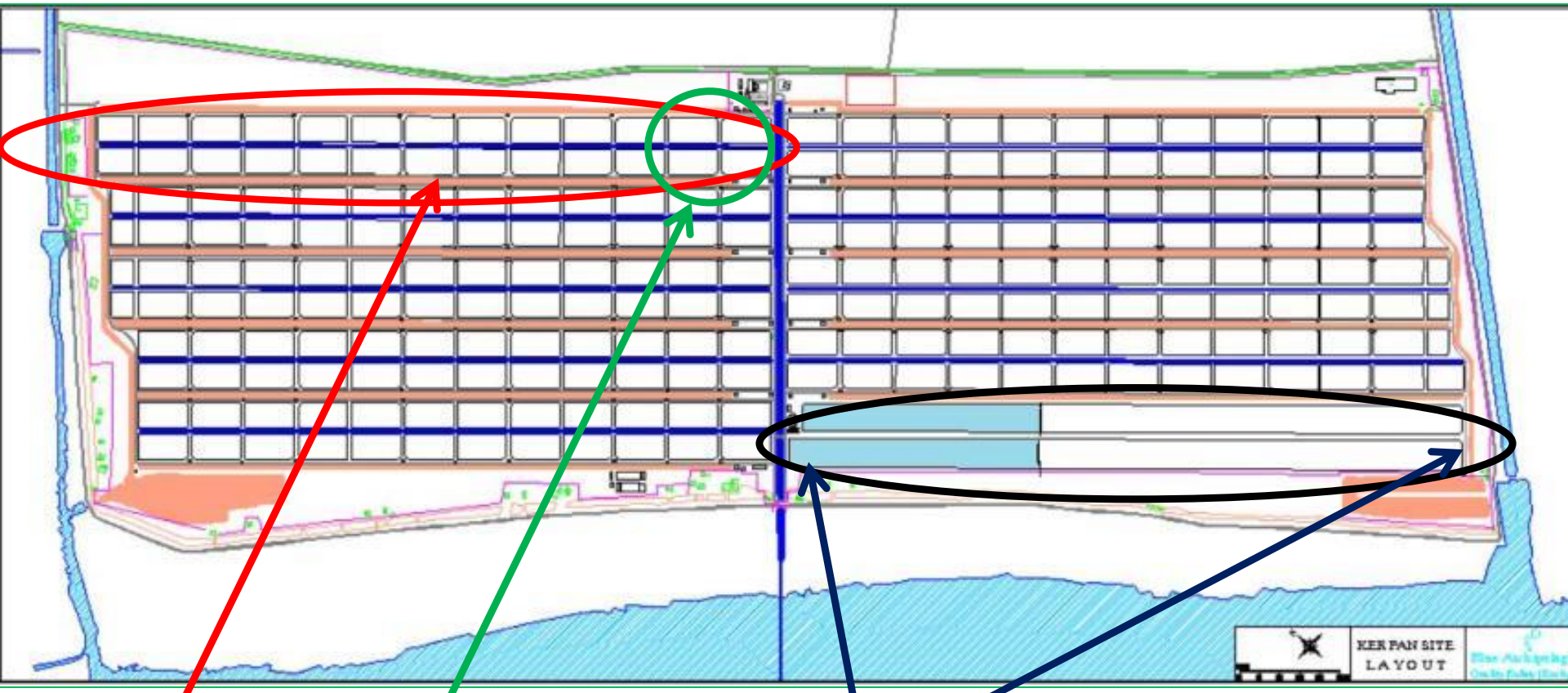
Modular System



1 module

24 Ha reservoir

Modular System



1 module

4 treatment ponds

24 Ha reservoir

Advantages of Modular System

1. All shrimp about the same age, easier to manage feed and water exchange
2. Nearer transfer of equipment during harvest
3. Subinlet and suboutlet can be sterilised and dried after harvest

Priority in Preventing Entry of Pathogens

1. Treat Raw Water effectively and make sure no leakages (An example of re-engineering a farm to ensure biosecurity – Dr Nyan Taw's work) & water treatment strategies
2. Use Modular system for efficiency
3. Avoid entry of carriers especially crabs and wild shrimp (be careful of the main reservoir)
4. Use SPF or SPR postlarvae
5. Avoid contamination by human
6. Prevent spread and contamination by birds

3. Avoid entry of carriers(crabs & wild shrimp)

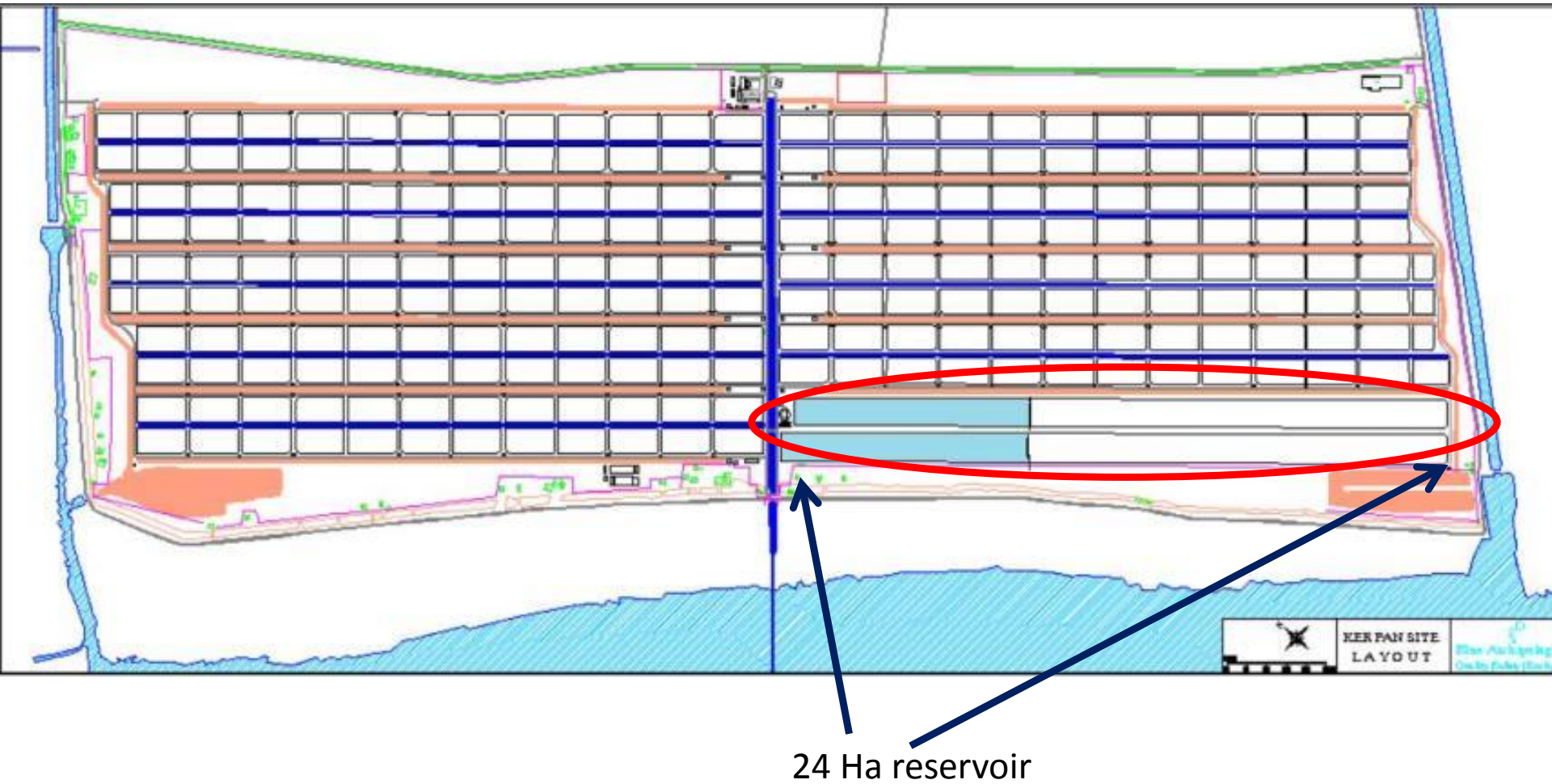
Fence to avoid entry of crabs, biawak, otters

Caution! Main Reservoir

The safest place is also the most dangerous place

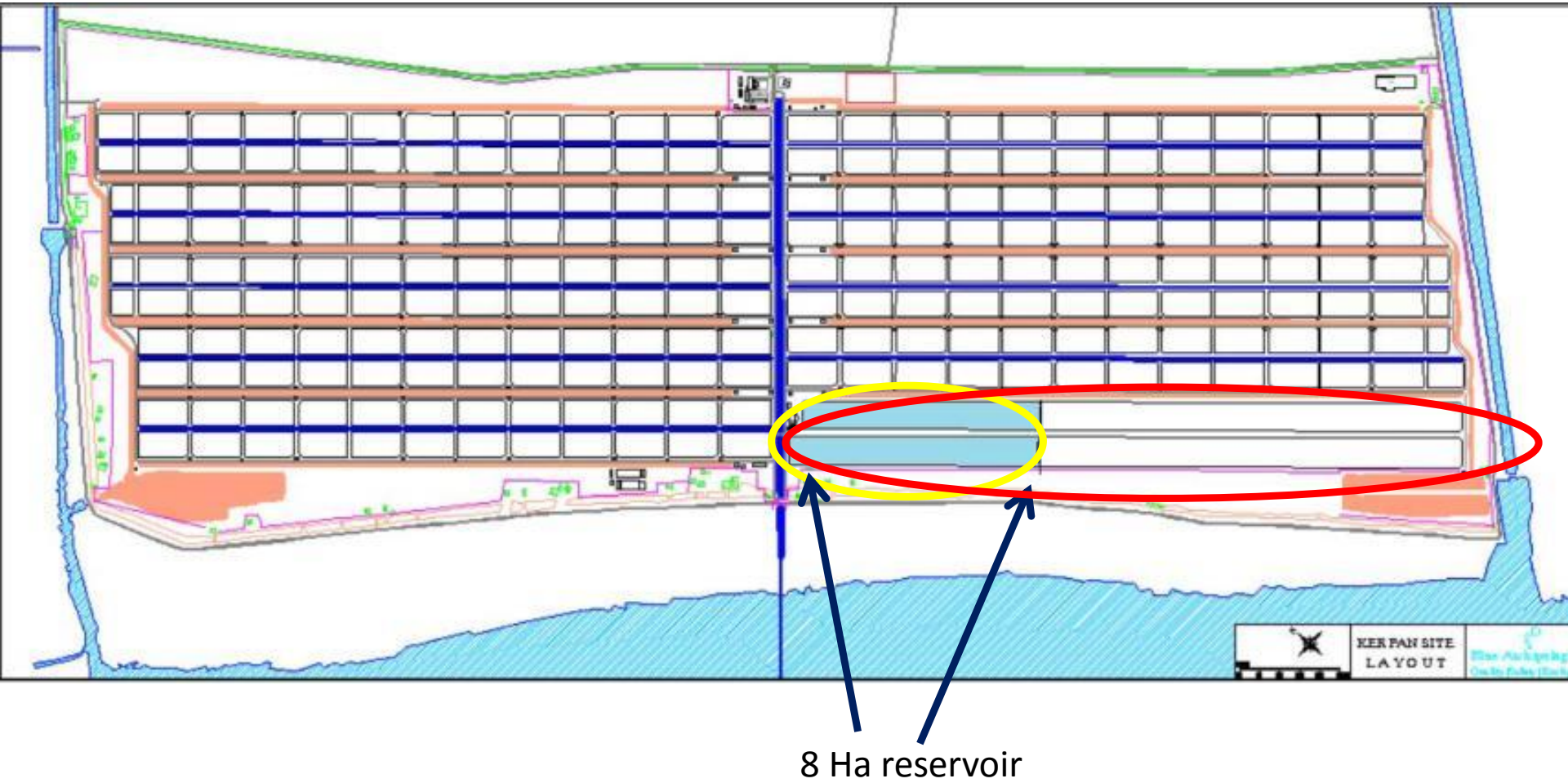
Dead shrimp with WSSV found in Main Reservior

24 Ha reservoir

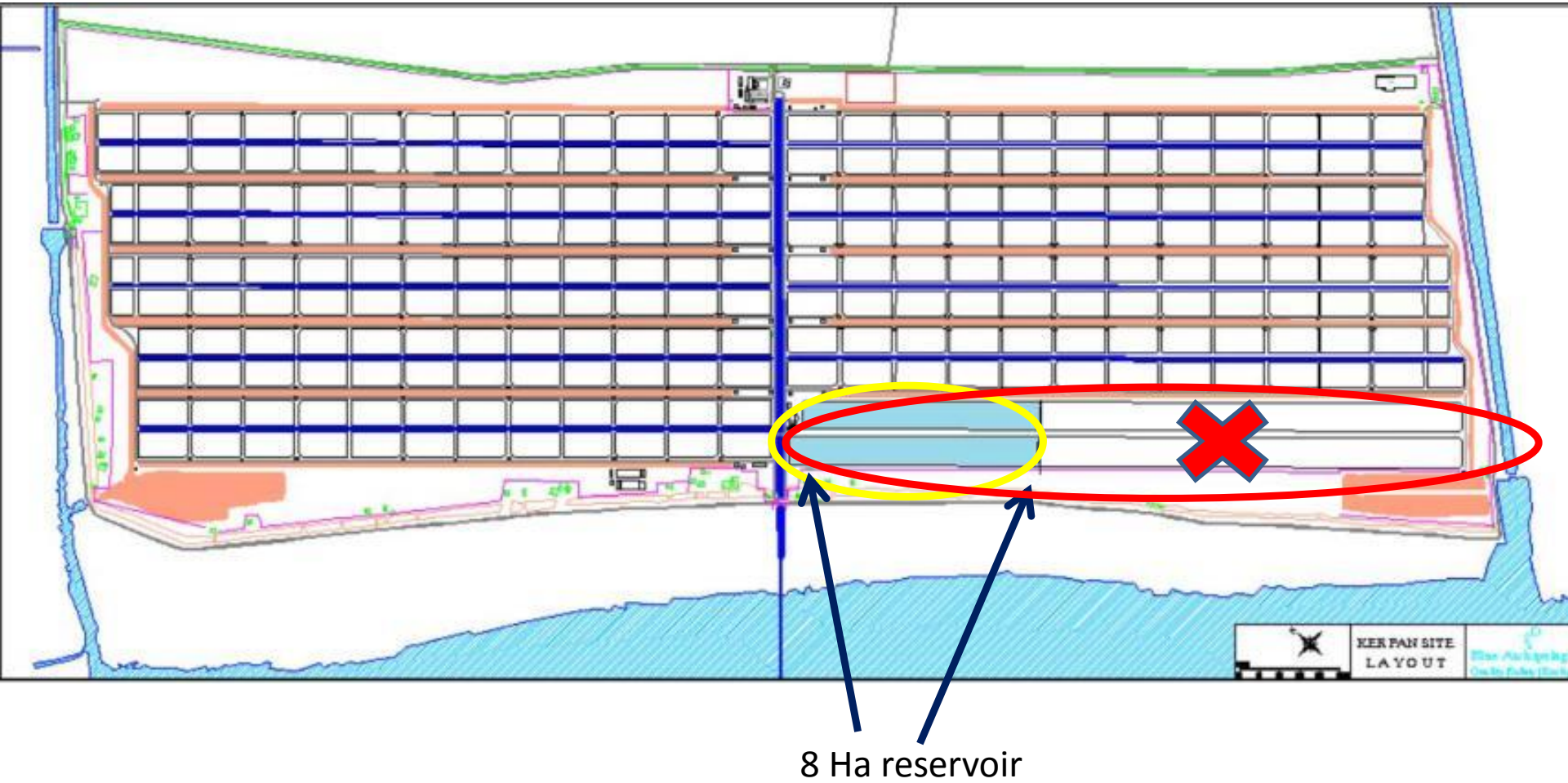


24 Ha reservoir

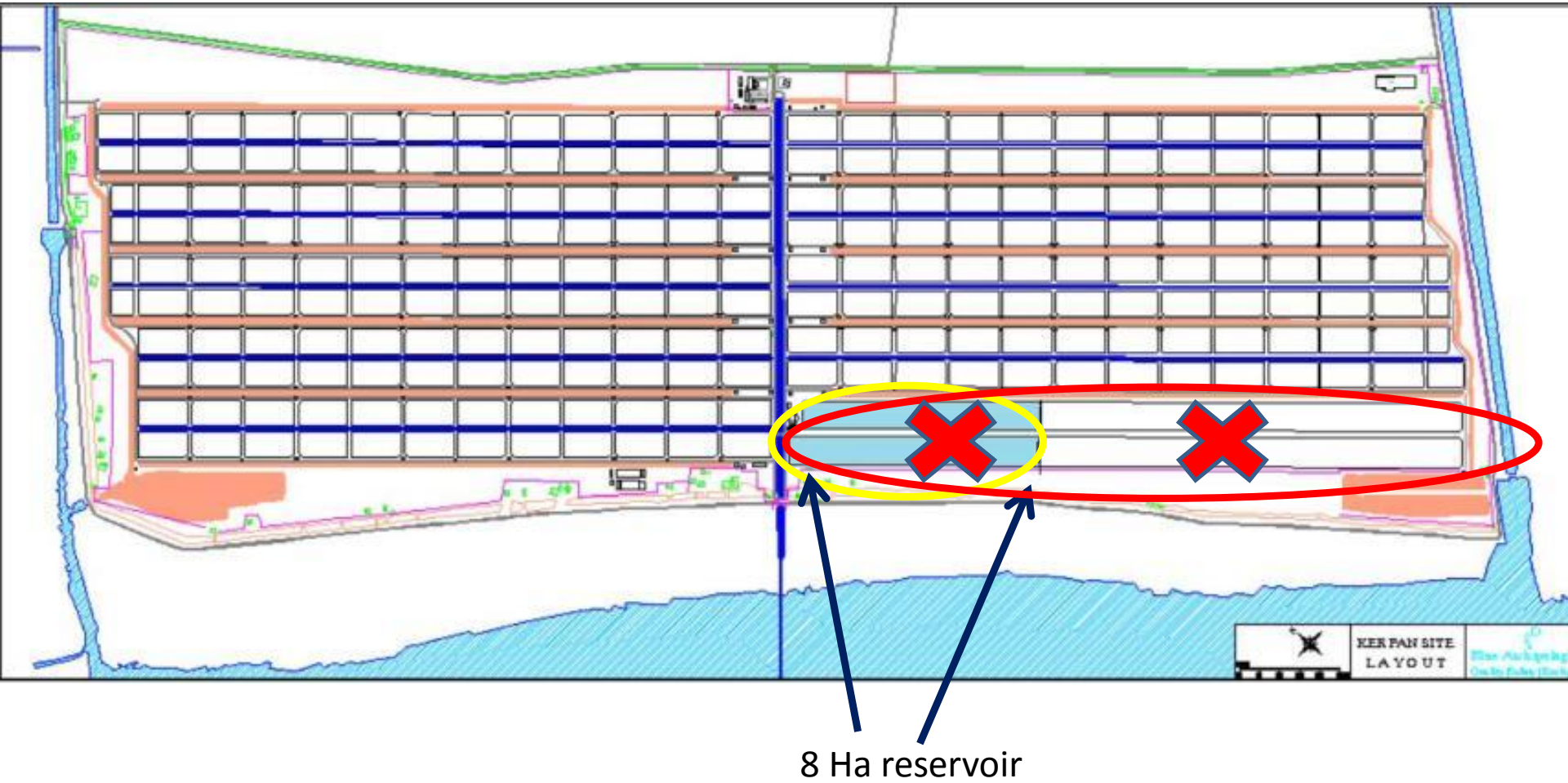
24 Ha reservoir reduced to 8 Ha



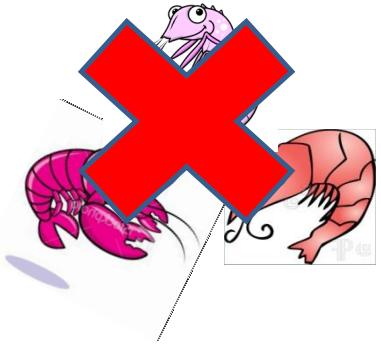
24 Ha reservoir to 8 Ha

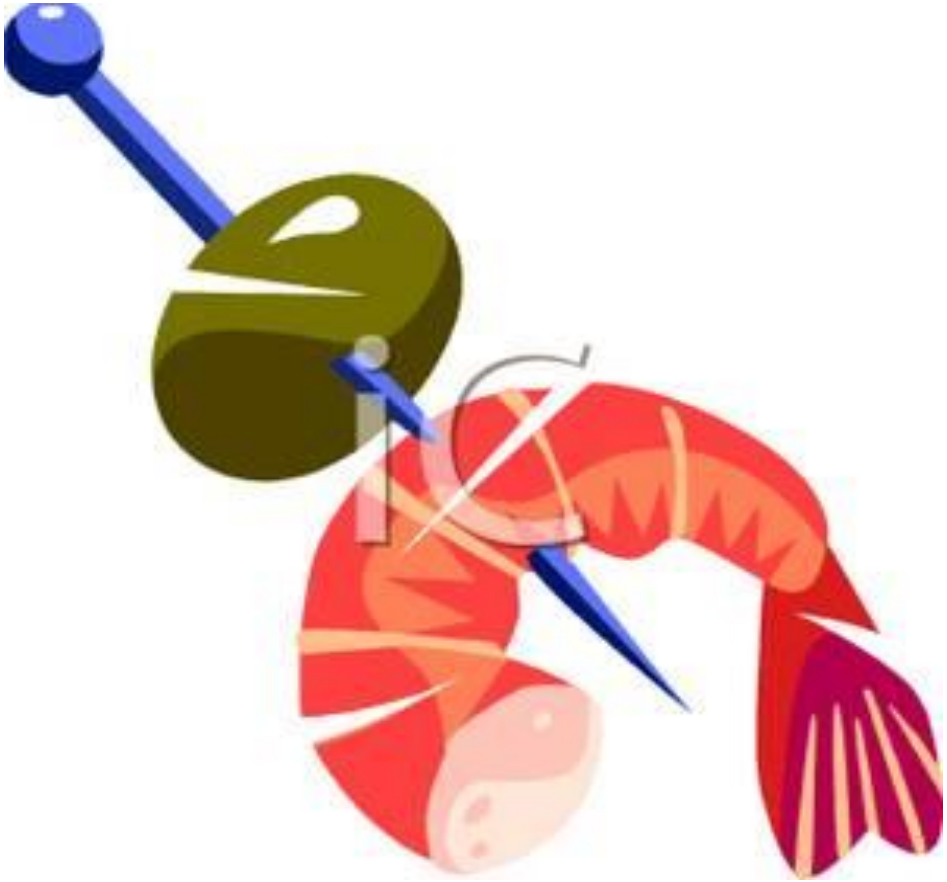


Finally the whole reservoir is not used



Main canal has to be sterilised at least once in 3 weeks





Priority in Preventing Entry of Pathogens

1. Treat Raw Water effectively and make sure no leakages (An example of re-engineering a farm to ensure biosecurity – Dr Nyan Taw's work) & water treatment strategies
2. Use Modular system for efficiency
3. Avoid entry of carriers especially crabs and wild shrimp (be careful of the main reservoir)
4. Use SPF or SPR postlarvae
5. Avoid contamination by human
6. Prevent spread and contamination by birds

4. Use of only SPF or SPR postlarvae

Ask for certificate or results of PCR tests. Must be free from:

1. WSSV
2. EMS
3. Myo (IMNV) – for Indonesia
4. TSV

Which one do you want?

This one?

Or This one?

Priority in Preventing Entry of Pathogens

1. Treat Raw Water effectively and make sure no leakages (An example of re-engineering a farm to ensure biosecurity – Dr Nyan Taw's work) & water treatment strategies
2. Use Modular system for efficiency
3. Avoid entry of carriers especially crabs and wild shrimp (be careful of the main reservoir)
4. Use SPF or SPR postlarvae
5. Avoid contamination by human
6. Prevent spread and contamination by birds

5. Avoid contamination by Human!!

Man is an important carrier!!

Man is an important carrier!!

- Ban anyone to enter the farm if he has visited another farm/hatchery/processing plant/fish market in the last 3 days

Man is an important carrier!!

1. Do not allow free access of vehicles and people

   Use wash trough for vehicle or spray steriliser to vehicle wheels

Wear boot and dip in sterilising agent

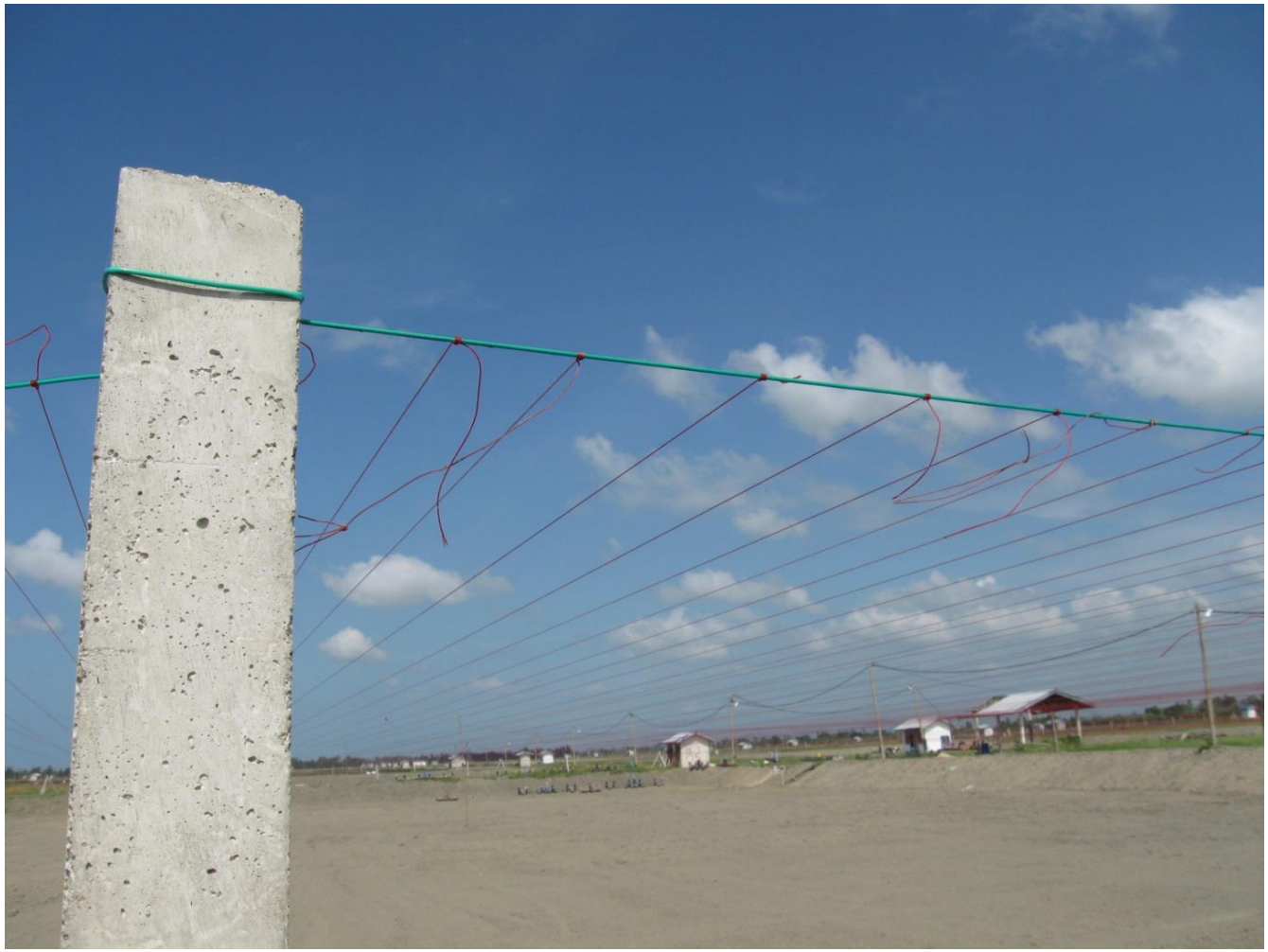
Wash hands with soap

Priority in Preventing Entry of Pathogens

1. Treat Raw Water effectively and make sure no leakages (An example of re-engineering a farm to ensure biosecurity – Dr Nyan Taw's work) & water treatment strategies
2. Use Modular system for efficiency
3. Avoid entry of carriers especially crabs and wild shrimp (be careful of the main reservoir)
4. Use SPF or SPR postlarvae
5. Avoid contamination by human
6. Prevent spread and contamination by birds

6. Prevent contamination by birds

- Set up bird scare line or netting to prevent entry of birds



Control spread of diseases to other ponds

Control Dissemination to other pond

1. Immediately seal off the infected pond
2. Quickly make decision to harvest or to exterminate the pond (for WSSV)

   If harvest, treat with Virkon at 1.5 ppm before discharging the water OR

   Cast net / drag net the pond without discharging water and treat the remaining shrimp with 30 ppm active chlorine
3. Equipment used in must be sterilised immediately

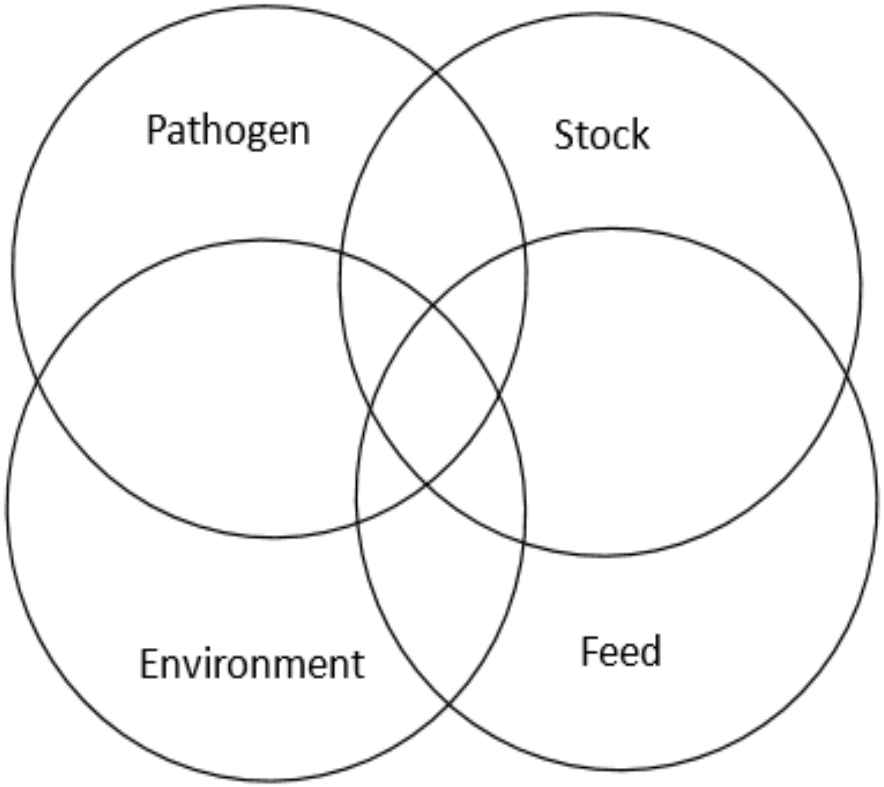
4. Workers must bathe with soap and clothings rinsed in 30 ppm active chlorine immediately after harvest near the infected pond
5. Any remaining dead shrimp must be collected, dowsed with 100 ppm active chlorine and buried

Bio security & Disiplin

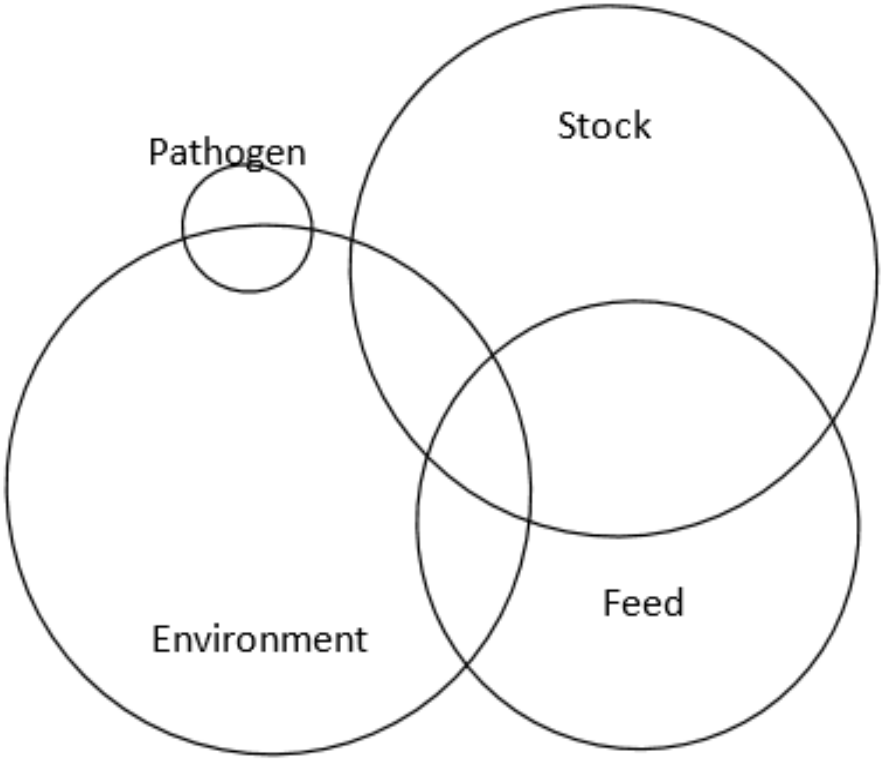
Managing WSSV through Feeding Management

- In the zeal to speed up growth, there are frequent overfeeding
- Overfeeding results in excessive organic matter
- Produces high ammonia, hydrogen sulphide and carbon dioxide
- Encourages growth of pathogenic bacteria such as vibrios
- Vibrios are known to be precursors of many shrimp diseases such as WSSV, EMS, IMNV
- Feed Management is the 4th dimension in Disease Control in shrimp Farming

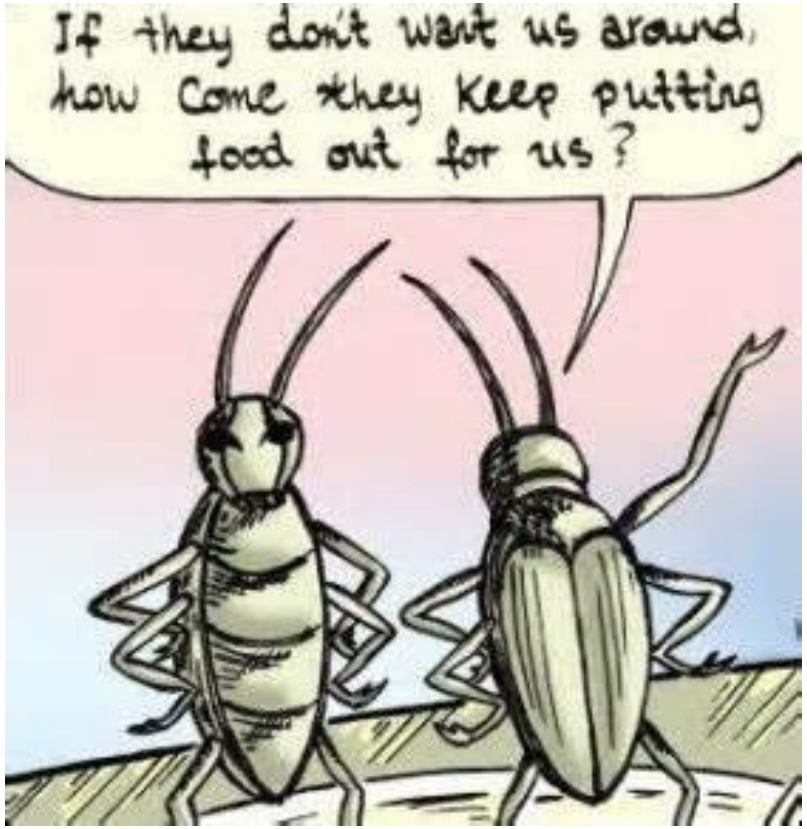
Feed Management as the 4th Dimension in Disease Control on top of Snieszko's epidemiological triad



The ultimate aim in shrimp health management is to reduce or dwarf the growth of the pathogen by reducing excessive nutrient loading to the ecosystem through stringent feed management while optimizing the quality of the environment as well as safeguarding the health status of the stock via genetics and nutrition.

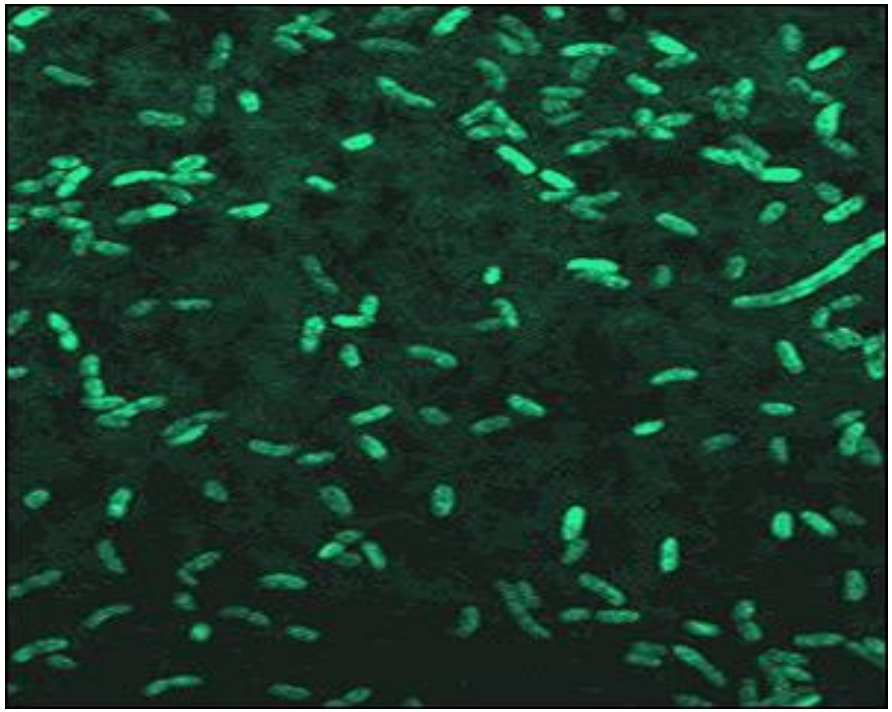


Excessive food attracts disease vectors



A lot of cockroaches in the kitchen if a lot of food remains

A lot of pathogenic bacteria in the pond if a lot of organic matters



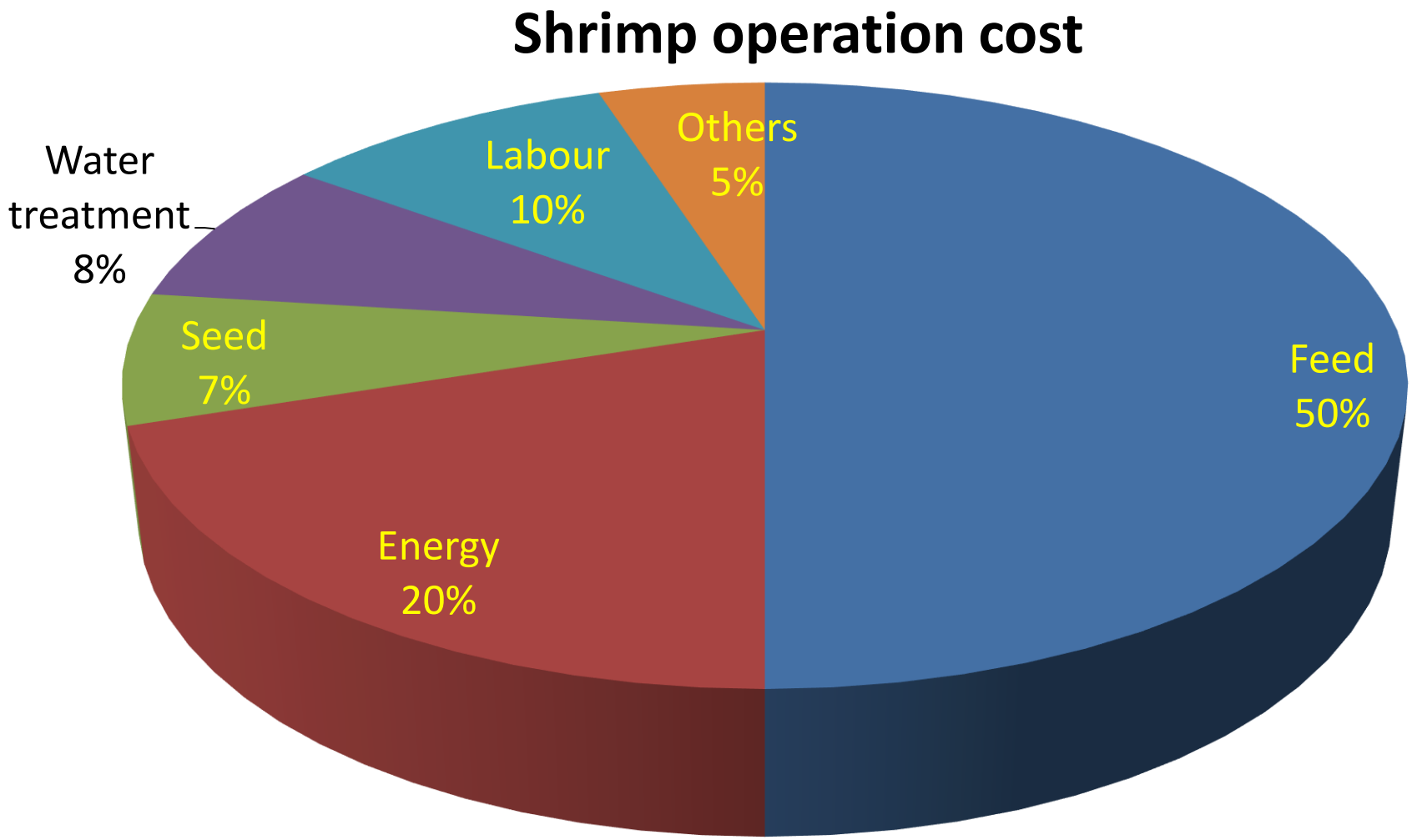
Why is Feeding Shrimp a big challenge?

Cannot see the shrimp,
cannot see the feed

Too little feed?? Too much feed??

Proper Feed Management is Important because:

- Feed cost is >50% of total operation cost



If underfeeding……

Proper feed management is Important because:

- Feed > 50% operation costs
- If underfeeding:

  = grow slow, “loose shrimp”

  = potential of disease because of under-nourishment

  = need more days to achieve the same growth,

  so higher FCR

- If overfeeding:

  = organic wastes accumulate & > carrying capacity of the pond

  = pollute the pond bottom and water, high H_2S, NH_3 , High bacteria, low DO

  = mortality, high FCR

Understanding Shrimp Feed

Feed	Shrimp Eat	Shrimp use
100kg	95kg	67kg

Uneaten 5kg

Faeces 28kg

Total organic waste 33 kg

13kg protein

14kg carbohydrate

1.9kg fat

0.1kg mineral

0.1kg vitamin

1.1kg fibre

2.4kg others

Total organic waste 33 kg

13kg protein, 14kg carbohydrate, 1.9kg fat
0.1kg minerals, 0.1kg vitamins, 1.1kf fibre,2.4kg others

becomes

↓

1. harmful gases : ammonia, nitrite, hydrogen sulphide, carbon dioxide
2. poor water quality : high and low pH
3. food for pathogenic bacteria such as vibrio
4. blue green algae

This may be the result of overfeeding!

Vannamei is a greedy eater

Vannamei eats more during hot weather

Main conclusions:

Avoid excessive feeding when water is ≥32oC (feed at cooler/different time of day) and reduce feeding if water is too hot.

Do not rely too much on feed tray at ≥32oC.

Ideal nutrient utilisation, feed efficiency when water temperature is between 29° and 31°C.

May 13, 2012

Thailand

Temperature and Feed Consumption in White Shrimp

In this study, researchers from Kasetsart University looked at the relationship between temperature and feed consumption in white shrimp under laboratory conditions. They also looked at feed consumption from feed trays at different temperatures on an intensive shrimp farm. Results suggested that shrimp **consumed feed much faster when temperatures were above 32°C**. Feeding trays, however, may not be a useful feed management tool when temperatures are above 31°C because all the feed is consumed within an hour of application.

Temperature and Feed Management

- Use 30^0 C as standard for checking tray if water temperature is above 30^0 C

Good Tip to preserve water quality:

Fasting or interrupted Feeding

- It is good to practise occasional fastings (3 or 4 meals a week) when shrimp is above 60 days to allow shrimp to clean up the pond bottom
- Many farms in Indonesia, Malaysia and Thailand stop feeding after 1800 hrs. This is beneficial in farms with mediocre facilities because most pond have lower DO at night; in addition, in the absence of feeding, the shrimp will scavenge to clean up the organic matter in the pond bottom
- Stop feeding for 1 to 2 meals or even the whole day if the weather is cold and the feed in the tray is not finished

Shrimp that have not been fed 12 hours in a concrete tank

Shrimp that have not been fed 12 hours in a earthen pond

Take Home Message:

- **Overfeeding** is the main cause for **poor water quality** and **diseases** in shrimp farming
- **Feed the shrimp 90% satiated for safe farming**
- Occasional fasting when shrimp appetite is poor is BENEFICIAL

Thank You