



Pig Wastewater Management in Asia

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Water Environmental Partnership in Asia (WEPA)

Recognizing the **improvement of water environmental governance** is essential to solve water pollution problems in the Asian region, the Water Environmental Partnership in Asia (WEPA) was launched in 2004 by the Ministry of the Environment, Japan. WEPA conducts its activity on a 5-year cycle and the third phase started in April 2014

WEPA consists of partners in **13** Asian countries

1. Democratic Socialist Republic of Sri Lanka (Sri Lanka)
2. Federal Democratic Republic of Nepal (Nepal)
3. Japan (Japan)
4. Kingdom of Cambodia (Cambodia)
5. Kingdom of Thailand (Thailand)
6. Lao People's Democratic Republic (Lao PDR)
7. Malaysia (Malaysia)
8. People's Republic of China (China)
9. Republic of Indonesia (Indonesia)
10. Republic of Korea (Republic of Korea)
11. Republic of the Philippines (Philippines)
12. Socialist Republic of Viet Nam (Viet Nam)
13. Union of Myanmar (Myanmar)



Focal Points of WEPA



Ministry of Environment , Cambodia



Ministry of Environmental Protection, China



Ministry of Environment, Indonesia



Ministry of the Environment, Japan



National Institute of Environmental Research,
Korea



Ministry of Natural Resources and Environment,
Lao PDR



National Hydraulic Research Institute of Malaysia



Ministry of Agriculture and Irrigation, Myanmar



Water and Energy Commission, Nepal



Department of Environment and Natural
Resources, Philippine



Ministry of Natural Resources and Environment,
Thailand



Central Environmental Agency, Sri Lanka



Vietnam Environment Administration, Vietnam

Purpose of WEPA (2004-2013)

1st Phase of WEPA:

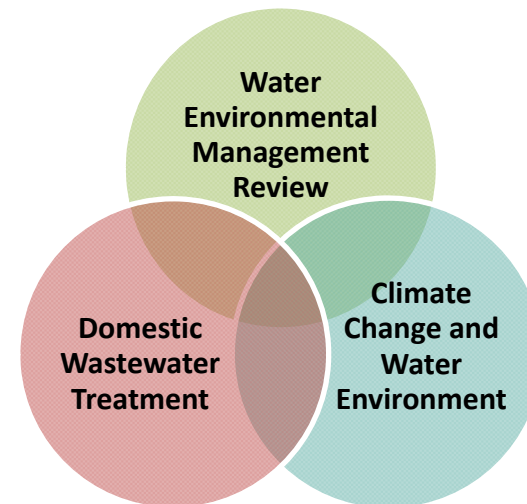
Development of Information Platform of Water Environmental Management



WEPA database www.wepa-db.net

2nd Phase of WEPA:

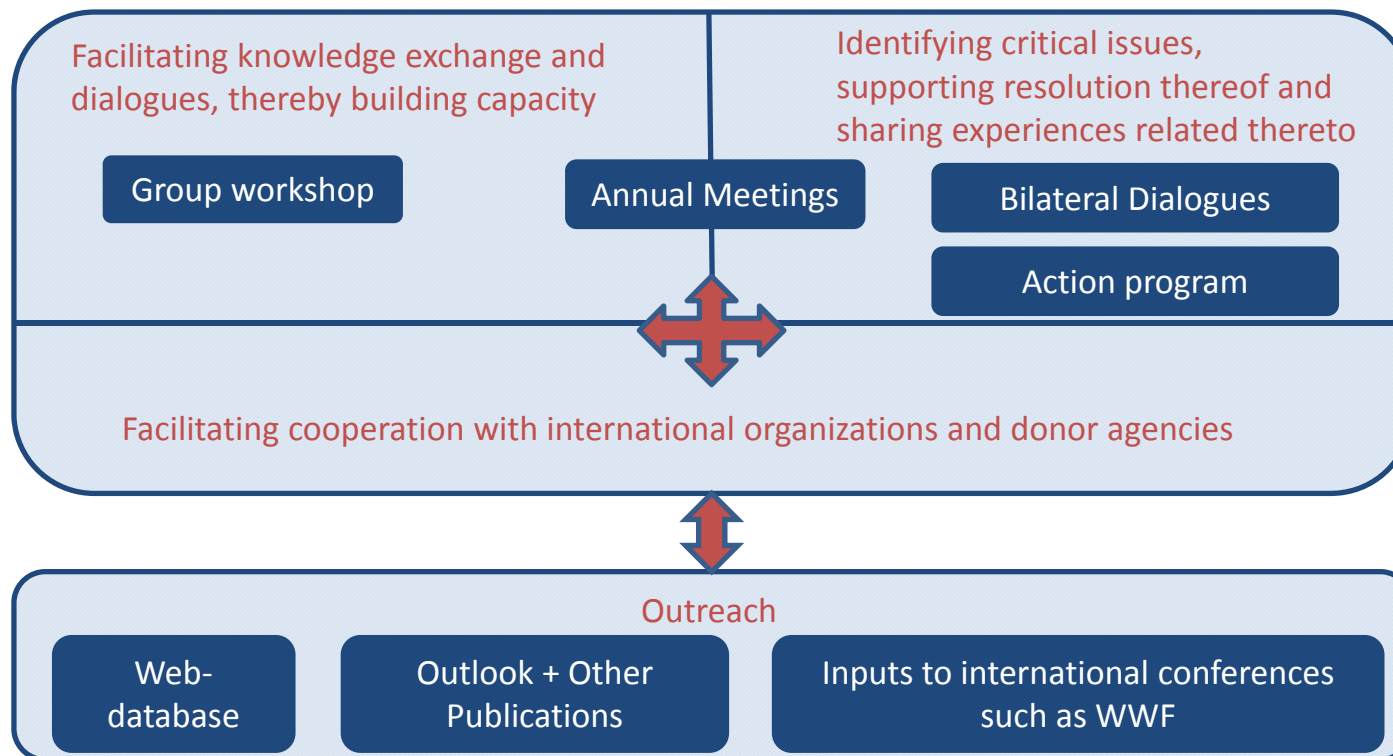
Knowledge Sharing for Solution Finding



Identified Issue for 2nd Phase

Purpose of WEPA (2014-)

3rd Phase of WEPA : Actions for Issue Solution



WEPA Action Program

- WEPA Action Programs are aimed to resolve specific problems and there by **improve water environmental conservation in a country**. With support from WEPA, an action program is developed **by WEPA partner country** and implemented during the third phase of WEPA.
- Practical lessons that the country learns from the program will **be shared with other WEPA partner countries**.

WEPA Action Program in Vietnam

Pig Farming Waste Management in Viet Nam

- The purpose of this program is to develop **Pollution Load Unit** for pig farm
- Survey and consultation meeting was conducted in 2105
- Follow-up survey is conducted in Vietnam in 2016
- Group workshop on pig wastewater management in Asia is organized on February, 2017 at Chiang Mai, Thailand to learn the situation and counter measures for pig wastewater in other WEPA countries



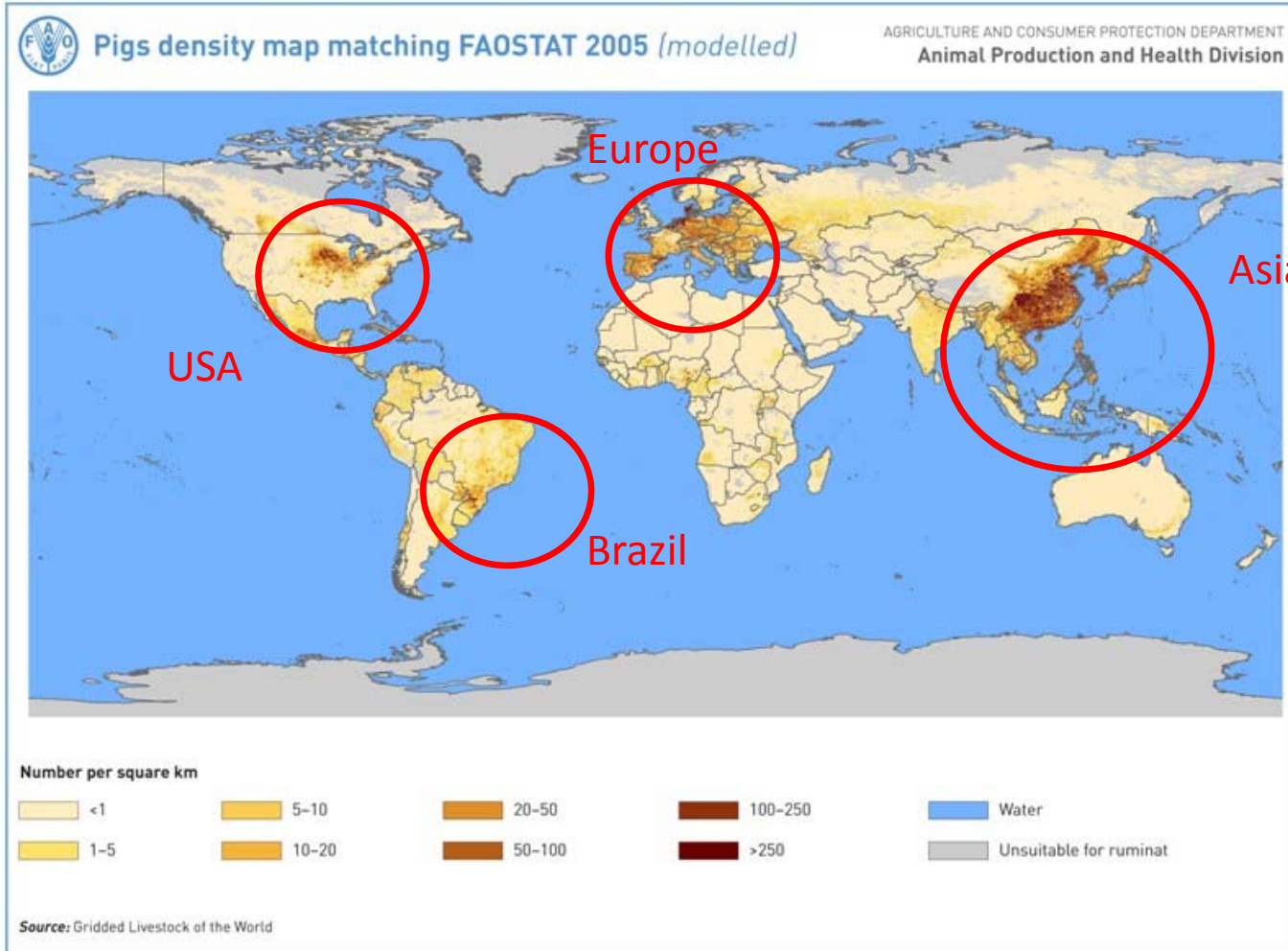
Purpose of this Group Workshop

Knowledge sharing of following topics on pig wastewater management considering the common and different situations (natural/social) in WEPA countries

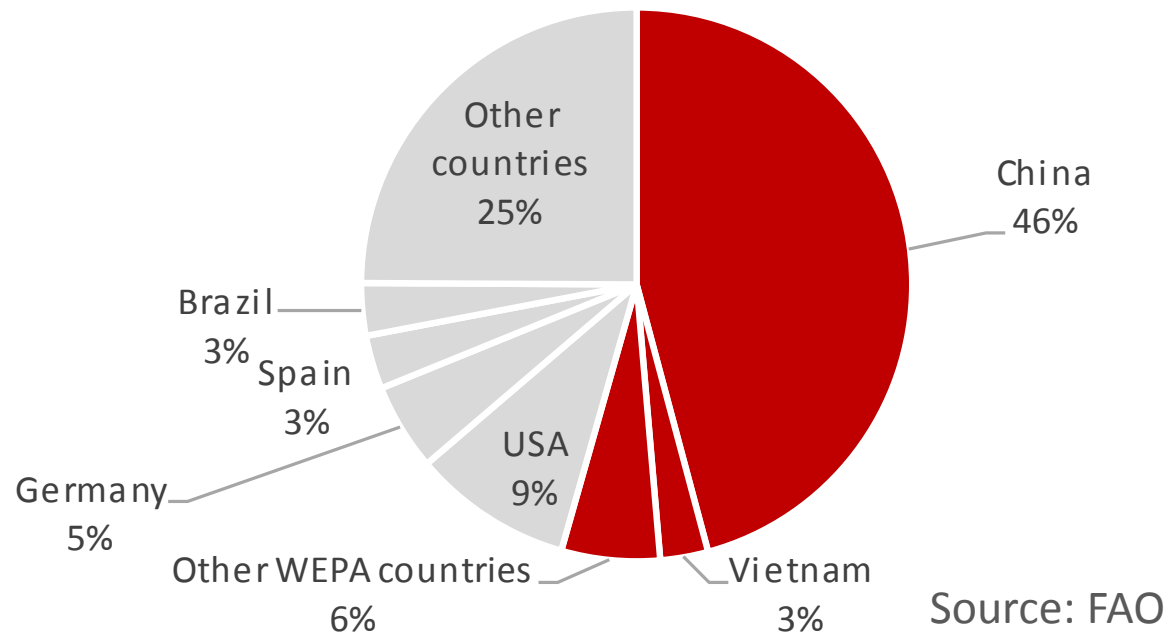
- Pig industry in WEPA countries
- Impacts of pig industry to water environment
- Uniqueness of pig wastewater management

Pig Industry in WEPA countries (Outlook)

- **55** % of global pig production (2011)
- About **580 million** heads (as of live pig in 2014) in WEPA countries
- **Rapid increase of pig population** in China, Vietnam, Myanmar
- **Few exported pigs**: Most of pigs are consumed in each country. Pig production increase is supposed to be due to human population increase and change of food culture
- **Increase of large scale producer**: China, Japan, Thailand, Vietnam
- **High pig density around big cities**: China, Thailand, Vietnam, Philippine

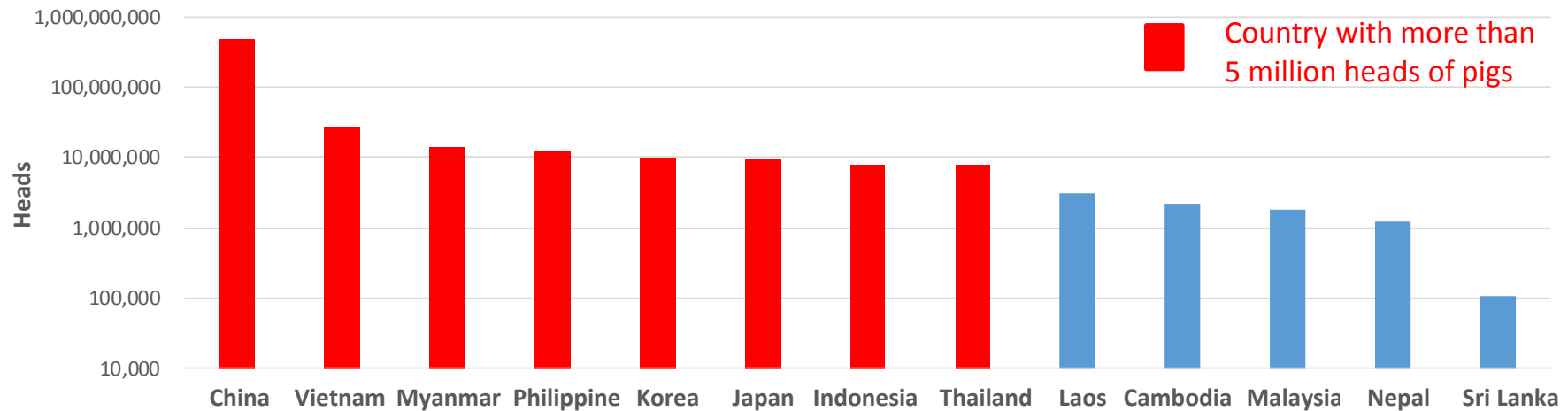


Global Pig Production in 2011



Total Production over the world: 110 million tones

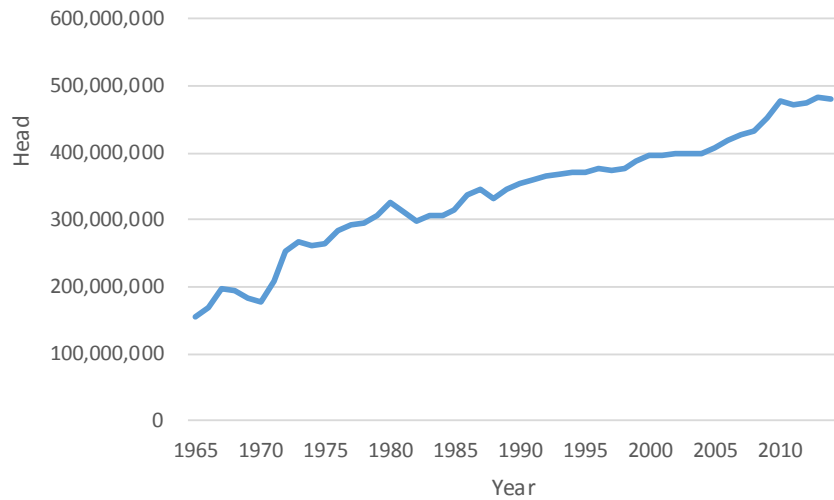
Number of Live Pig in WEPA Countries (2014)



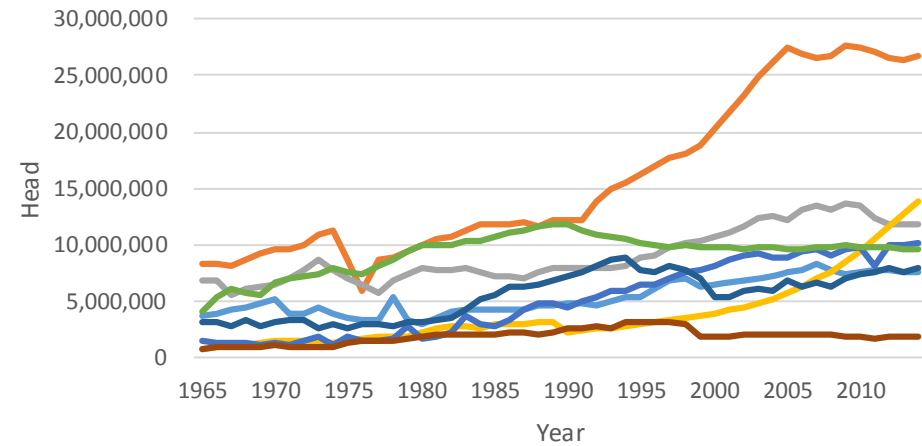
Source: FAO

WEPA total: About 580 million heads

Change in Number of Live Pig in WEPA Countries



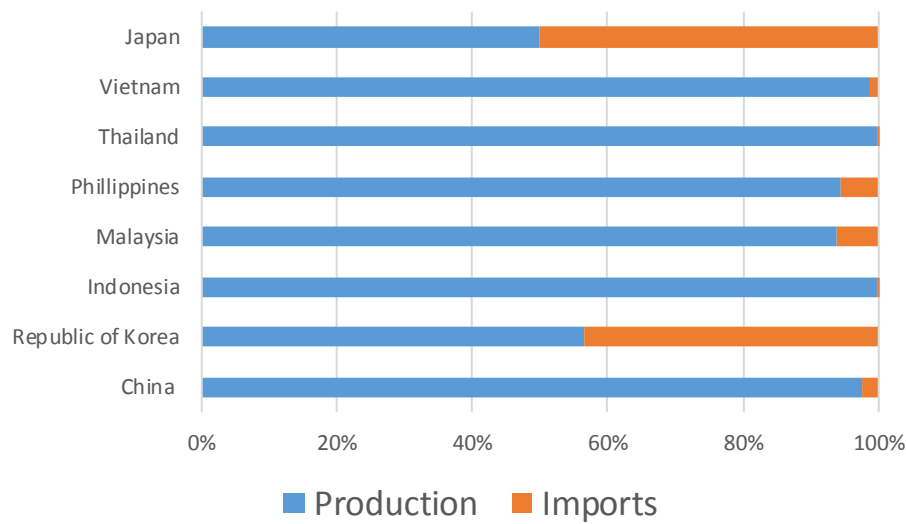
China



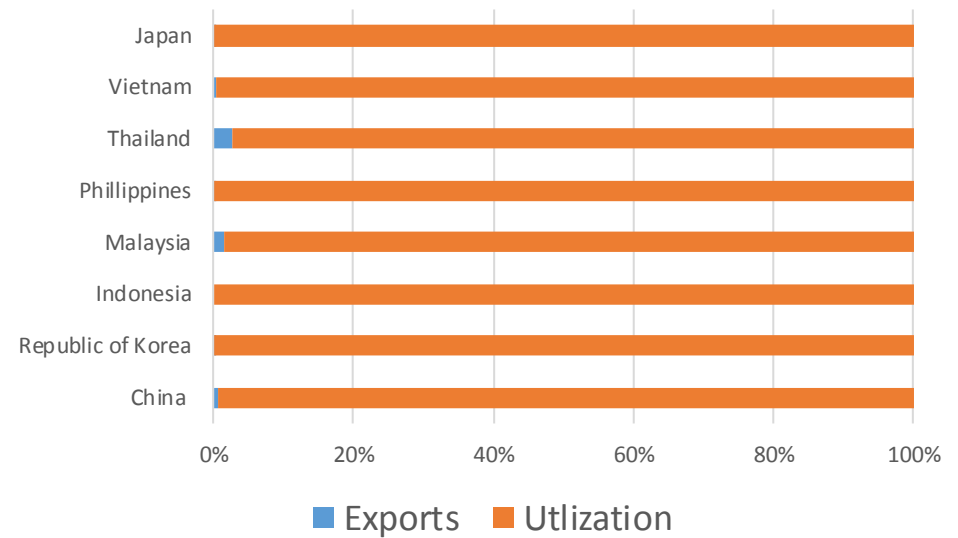
Other selected WEPA countries

Source: FAO

Pig meat import/export in WEPA countries (2011)



Production/Imports



Utilization/Exports

Source: FAO

Size of Pig Industry in WEPA countries

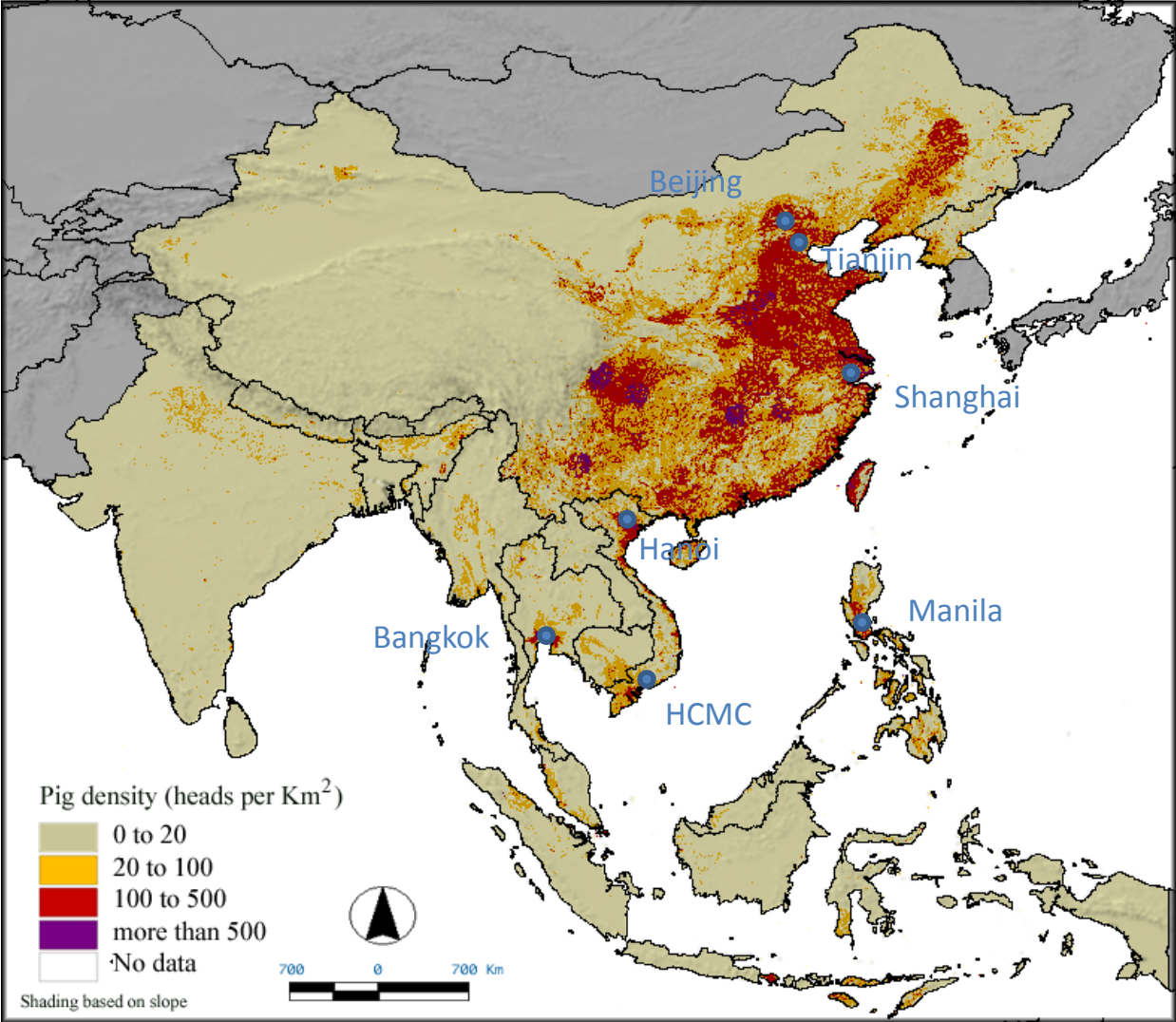
Share of pigs slaughtered by farm size in Thailand (1993 and 2013)

Number of pigs slaughtered	Pigs slaughtered by farm size (%)	
	1993	2013
1-500	73	25
>500	27	75

Source: Agricultural Census and FAO

Same trend in China, Japan and Vietnam

Pig Density in Asia



Source: FAO, LEAD Project

Supposed Issues caused by Pig Industry related with Water Environment

- **Pollution load increase** from pig industry to water environment
- **Change in pattern of pollution loading** from pig industry to water environment
- **Severe negative environmental/social impact** from pig industry **in the city near high pig density area** in addition to pollution from domestic wastewater

Cases of Water Environmental Pollution caused by Pig Industry reported in WEPA Countries

Thailand

- According to Pollution Control Department in 1999, 23 % of BOD loading in **Tha Chin River (western part of Bangkok city)** was caused by pig industry. In 2000, water quality at Tha Chin River became critical as the level of DO has dropped to near zero in the most part of the river. In addition, there was complaint that pig production is a cause of water pollution in **Bangpakong River** in the eastern region. Consequently, in 2001, PCD added the pig industry in the regulated list (source : FAO).

Philippine

- In **Balanac River, which is a tributary of Laguna de Bay** and Benig River in Tarlac located in Luzon, water pollutions caused by pig industry were reported, and therefore DENR investigated these rivers. In addition, river waters in Lantapan, Bukindo in Mindanao have also become polluted with E.coli and there was suspicion that the pollutants must have come from human and livestock waste (source: FAO)

Cases of Water Environmental Pollution caused by Pig Industry reported in WEPA Countries

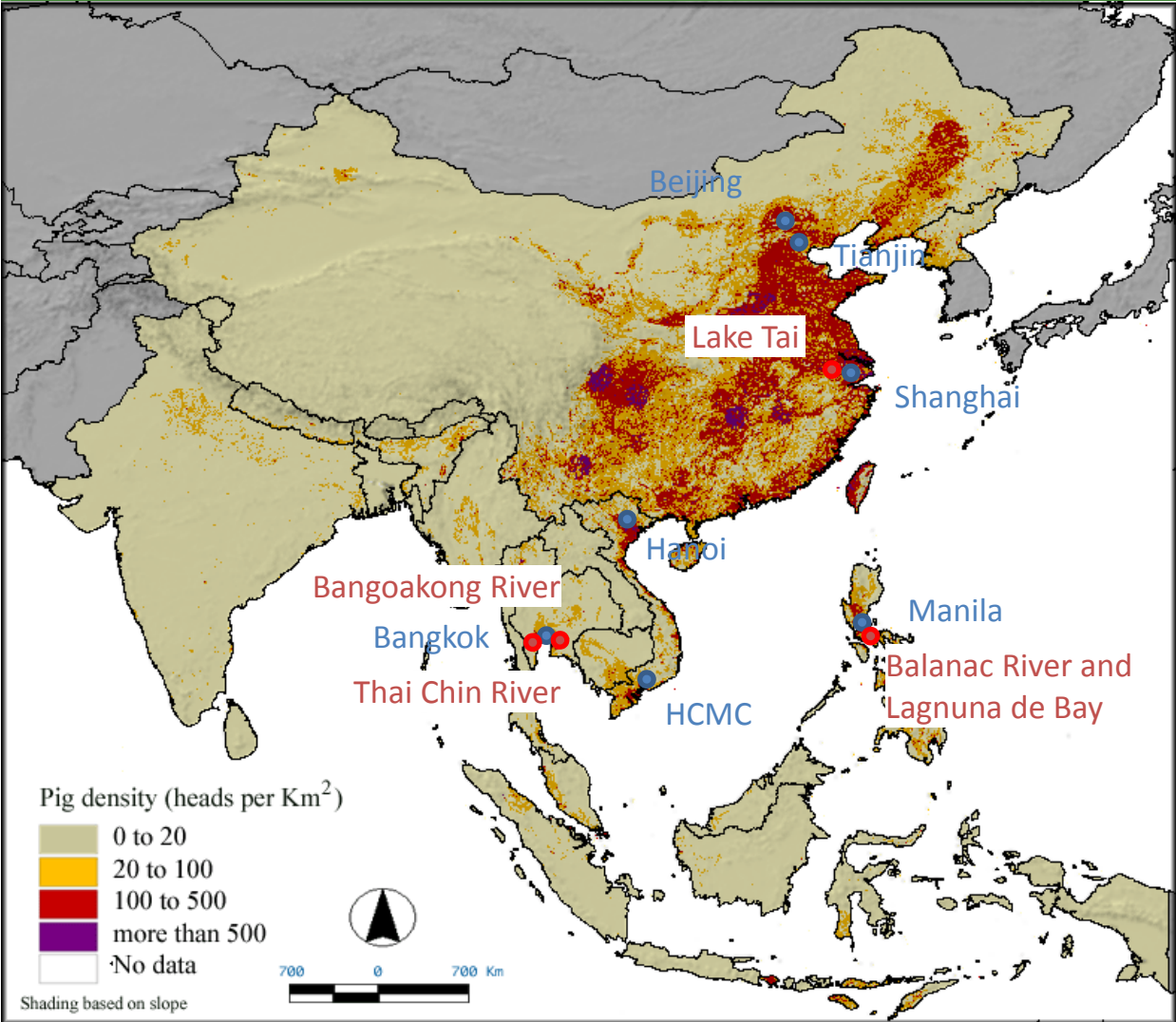
China

- According to 12th National Five Years Plan of Livestock Pollution Prevention, 59 % of total pollution load to **Lake Tai** is reported to be caused by agricultural sector, mainly from livestock industry. In addition, Chinese government conducted national pollutant inventory survey in 2009 and 2010. The result of the survey in 2010 illustrated that 45% of COD load and 25 % of NH3 load were from livestock industry. Consequently, Chinese government started to intensify livestock pollution prevention from 12th National Five Years Plan.

Vietnam

- ????

Pig Density in Asia



Source: FAO, LEAD Project

How to manage pig wastewater?

Today's Program

10:20-11:20

Session 1: Impact of Pig Wastewater to Water Environment

4 Presentations from Vietnam, Thailand, China and Philippines

11:20-13:00

Lunch Break

13:00-17:10 (including coffee break)

Session 2: Pollution Control Measures and Policy Measures for Pig Wastewater

9 Presentations from Japan, Vietnam, Thailand, Philippines, Indonesia, Myanmar, Cambodia, and Sri Lanka

Contents of Presentation

Session 1

Impact of Pig Wastewater to Water Environment

- Pollution load of pig wastewater to water environment
- Calculation methodology of pollution load from pig wastewater
- Monitoring system for pig wastewater

Contents of Presentation

Session 2

Pollution Control Measures and Policy Measures for Pig Wastewater

- Legal framework for pig wastewater management
- Effluent Standard
- Pollution control measures to prevent and mitigate the impact of pig wastewater to water environment

Consideration Points in Sharing of Knowledge on Pig Wastewater Management among WEPA Countries

- **Difference of Pollution Loading** by Different **Pig Sizes** and Different **Breeding Methods** in Different Countries
- **Uniqueness** of counter measures in different countries

Pollution Load Unit by Different Pig Types (Thailand)

Country	Pig Type	Manure Volume (l/head/day)	BOD (mg/l)	COD (mg/l)	SS (mg/l)	TKN (mg/l)
Thailand	Breeder	64	800	1,700	900	350
	Fattener	24	3,500	7,400	4,700	700
	Nursery	20	2,500	5,400	3,000	350

Source: Pollution Control Department, MONRE, Thailand

Pollution Load Unit by Different Breeding Methods (Japan/WHO)

Country	Breeding Method	Manure Volume (l/head/day)	BOD (mg/l)	COD (mg/l)	SS (mg/l)	TN (mg/l)
Japan	Pig House with Water Washing	118	1,927	1,378	1,268	456
	Pig House without Water Washing	3	14,848	7,879	17,576	7,273
WHO	Solid Floor/Water Washed	40	2,253	-	5,000	500
	Slotted Floor/Pit Manure	8	11,750	-	8,571	2,607

Source: Ministry of Land, Infrastructure, Transport and Tourism (Japan) , WHO

Effluent Standard in Thailand

Parameter	Units	Maximum Permitted Values	
		Standard A	Standard B
pH	-	5.5-9	5.5-9
BOD	mg/l	60	100
COD	mg/l	300	400
SS	mg/l	150	200
TKN	mg/l	120	200

Remarks:

For large and medium farm will be effective on February 24, 2002.

Large farm is more than 600 Livestock Unit (LU.)

Medium farm is 60-600 LU.

Small farm is 6 - < 60 LU.

1 LU. = 500 kg.

Weight of breeding pig = 170 kg./head

Weight of fattened pig = 60 kg./head

Weight of nursling pig = 12 kg./head

Effluent Standard in Japan

Hazardous Indicator

Parameter	Unit	Value
Ammonia, Ammonia compound, nitric compound and nitrous acid compound	mg/l	600*

Remarks:

1. The effluent standards listed in this table apply to the effluents of pig house with 50 m² or more of area

* This is provisional standard until June 2019

Effluent Standard in Japan

Other Indicator

Parameter	Unit	Value
pH	-	5.8-8.6 (discharge to except marine area) 5.0-9.9(discharge to marine area)
BOD or COD	mg/l	160
SS	mg/l	200
Cu	mg/l	3
Zn	mg/l	2
Coliforms	/cm ³	3000 as of daily average
N	mg/l	120 (discharge to specified lakes)* /170
P	mg/l	16 (discharge to specified lakes)* /25

Remarks:

1 The effluent standards listed in this table apply to the effluents of pig house with 50 m² or more of area which discharge 50 m³ or more of effluent per day on average.

2 The effluent standards for biochemical oxygen demand (BOD) apply exclusively to the effluents discharged in public waters other than the seas and lakes; the effluent standards for chemical oxygen demand (COD) apply exclusively to the effluents discharged in sea and lake areas.

*Regarding Value of N and P discharging to specified lakes is provisional standard until September 2018

Thank you in advance for your active discussion