

Regulations and standards on decentralized domestic wastewater treatment in Thailand

Presented by

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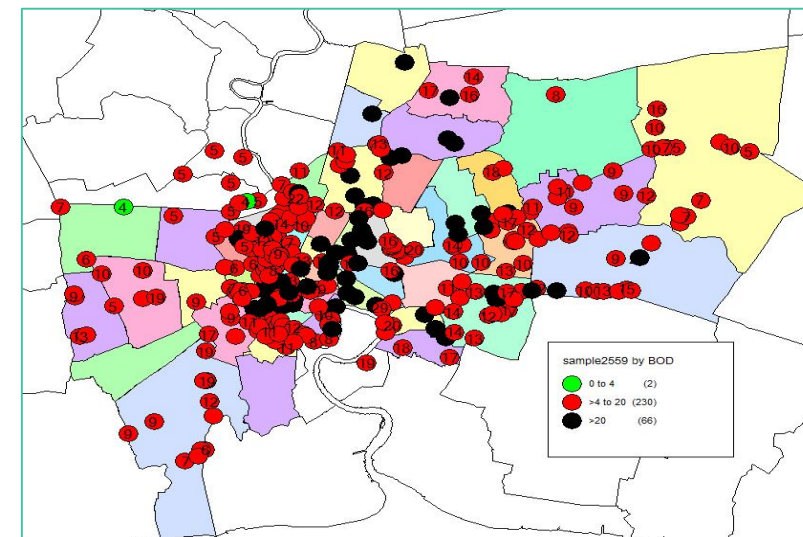
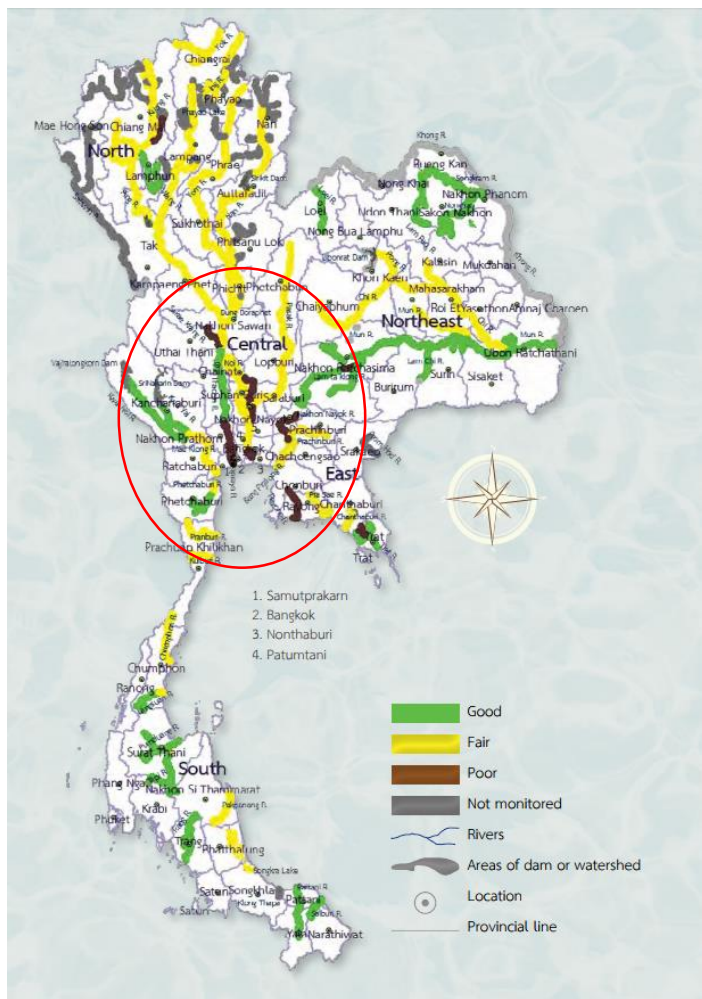
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Introduction

- Surface water quality in Thailand
- Number and capacity of municipal wastewater treatment system
- Domestic wastewater management and constrain
- Law and Regulation on onsite treatment
- Septic tank management and constrains

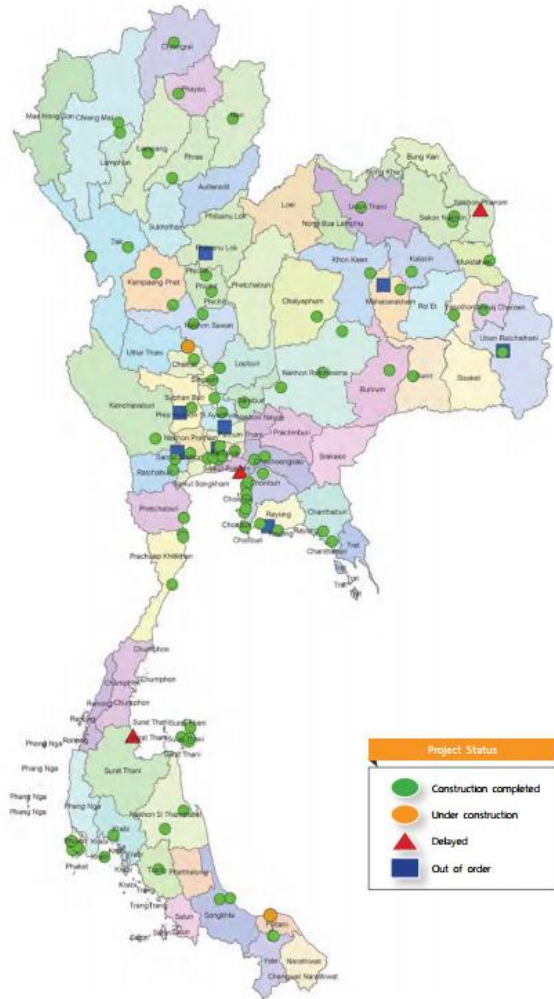
Surface water quality in Thailand



Water quality in Bangkok in 2016 (298 sampling points)

- BOD < 4 mg/l : 2 points
- BOD >4-20 mg/l : 230 points
- BOD > 20 mg/l : 66 points

Number and capacity of municipal wastewater treatment system



- Sewage volume = 9.6 million m³/day
- Treatment capacity = 2.7 m³/day (28%)
- The overall nationwide WWTP = 101 plants , in used 88 plant

- 68 plants belong to **Local Administrative Organization**
- 8 plants belong to **Bangkok Metropolitan Administration**
- 25 plants belong to **Wastewater Management Authority**
- Treatment Technology ; Stabilization pond, Aerated lagoon and Activated Sludge

Constraints in domestic wastewater management in Thailand

- Appropriated municipal **wastewater management**
- **Understanding** in wastewater problem and **awareness** to protect the environment
- LAO capacity for **managing of wastewater and treatment plant** (including treatment cost)
- **budget** for construction of collection system and treatment facilities

Domestic wastewater treatment management system

- Central wastewater system

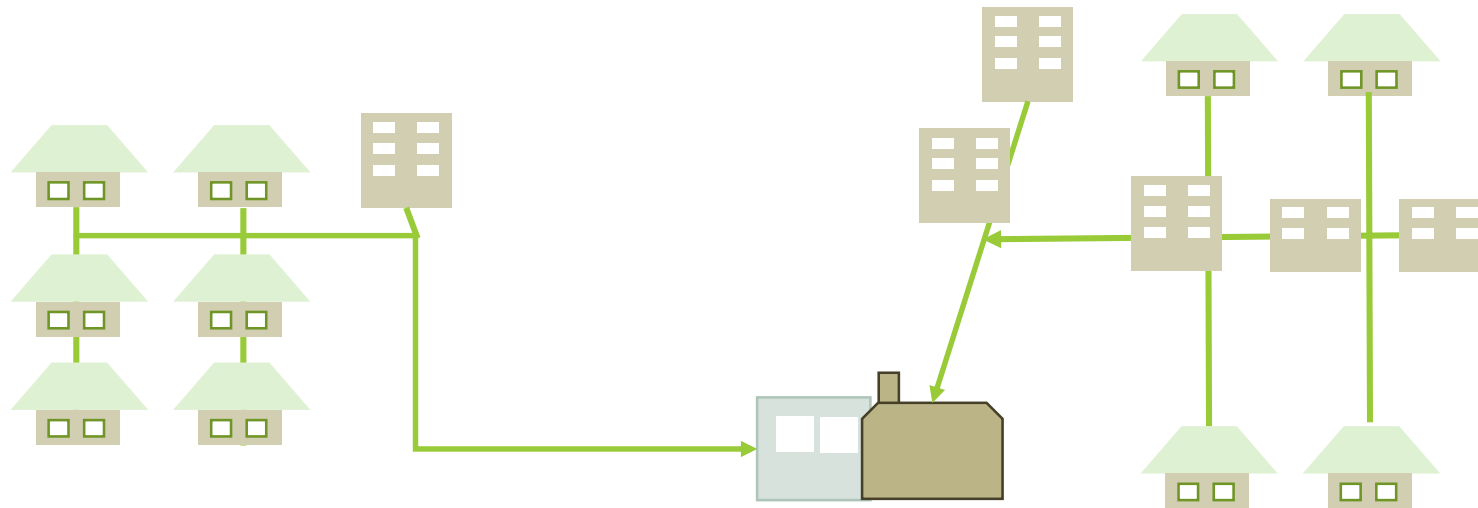
- **Cluster wastewater system**

- **Onsite wastewater system**



Decentralized system

Central wastewater treatment system



In Bangkok has 8 Centralized system the total capacity is about 2.8 million cu.m/d only 1.2 million cu.m/d go to WWTP.



Bangsue WWTP , Bangkok

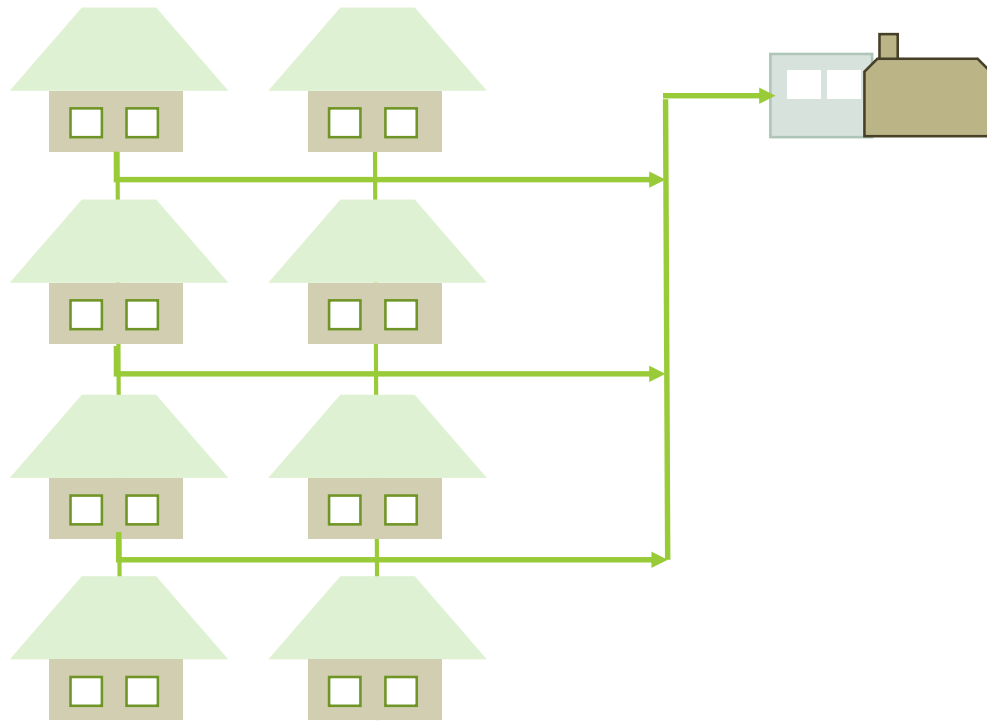


Dindang WWTP , Bangkok



WWTP , Chachoengsao province

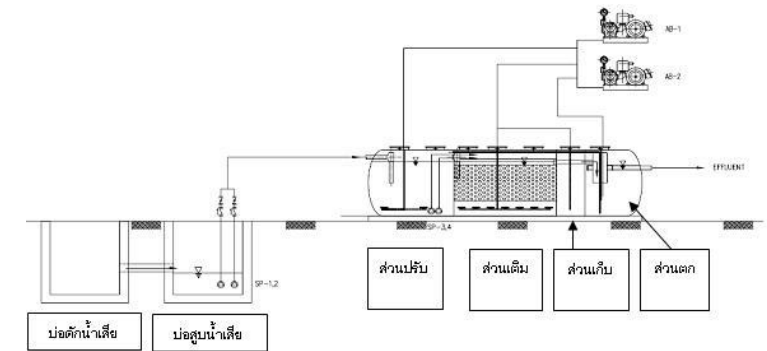
Cluster wastewater treatment system



Pitsanulok Province



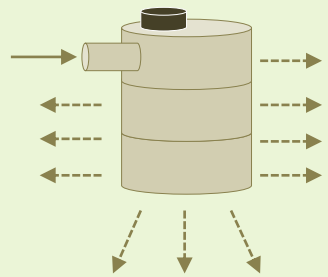
Udtaradit Province



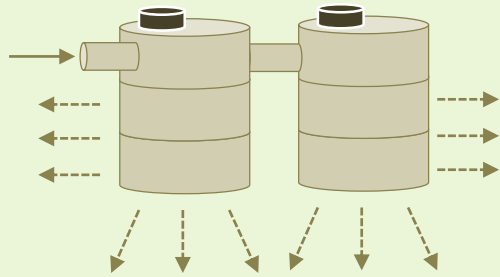
Udtaradit Province

However, construction of centralization system is sometime not so appropriate in some areas. Thus, decentralization is better solution. For example, a group of housing. So it called “Cluster WWTP”

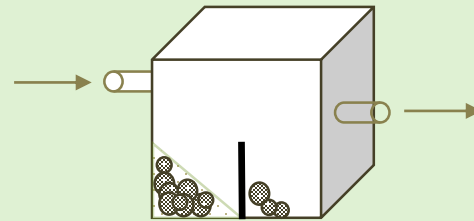
Onsite wastewater system (household)



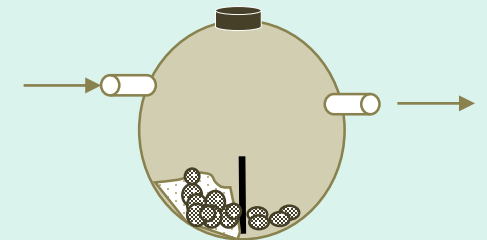
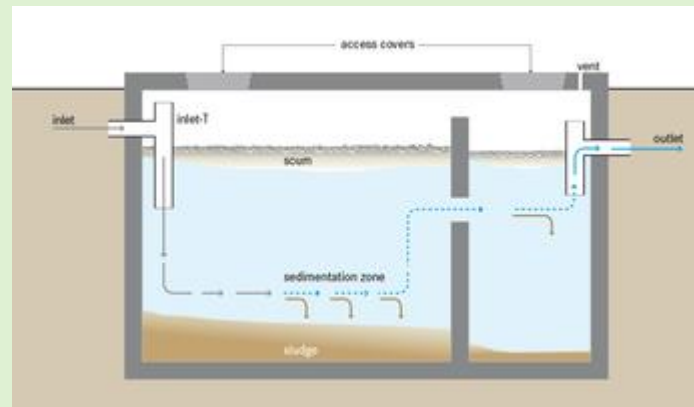
One cesspool



Two cesspool



Septic Tank



Commercial septic Tank



Onsite wastewater system (Condominium, Apartment)



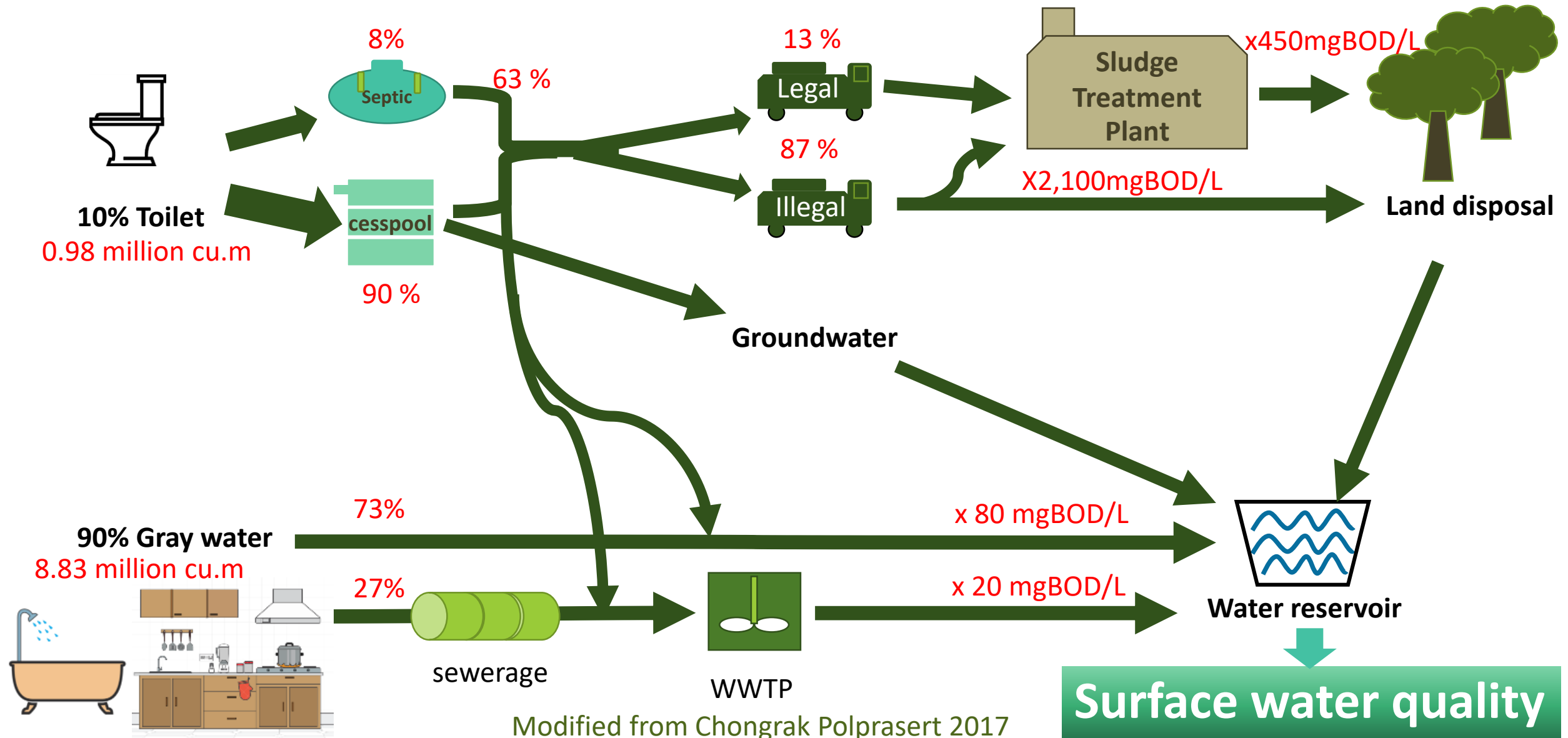
Source: <http://www.envire.co.th>



Source: <http://www.iseehomecomplex.com/2015/04/condo-water-supply.html>



Domestic WW production



Modified from Chongrak Polprasert 2017

Surface water quality

Characteristics of Influent (black water)

Parameter	Type of on-site sanitation			
	One cesspool	Two cesspool	Commercial package	Japanese Johkasou
TS (mg/L)	8,800	11,000	11,540	25,000-32,000
TCOD (mg/L)	15,000	20,700	17,580	8,000-15,000
BOD ₅ (mg/L)	3,900	5,600	5,940	4,000-12,000
TN (mg/L)	930	1,330	2,710	
TP (mg/L)	480	183	440	800-1,200
Fecal coliform (MPN/100 mL)	2.85E+09	4.21E+09	1.20E+08	
<i>E.coli</i> (MPN/100 mL)	1.90E+09	2.07E+09	3.88E+07	1E+06-1E+07

Law and regulation on decentralized wastewater treatment

Ministry of Natural Resources and Environment

National Environmental Quality Act 1992

- Policy
 - Environmental fund
 - Standards
 - Laws
 - Educations
 - Training
- Sewage tariffs

Effluent quality control

Ministry of Public Health

Public Health Act 1992

- Standards
 - Laws
- Septage collection and charging system (250THB/m³)



Septage control

Ministry of Interior

Building Control Act 1979

- Standards
- Laws

- Classified building into type **A, B, C, D and E**
- Onsite treatment installation

Construction

Decentralization Act 1999

- Budgeting
- Laws

- Wastewater Tariff

Tariff, Fine, Control

Effluent Standard - National Environmental Quality Act 1992

Laws/Regulations	Ministry of Natural Resources and Environment (MNRE)	
	Notification on Community Wastewater Treatment Plant Effluent Standard 2010	Notification on Housing Estate Effluent Standard 2005
Applicable to Household	Domestic Wastewater Treatment Plant	Housing estate no. of land > 100 unit
pH	5-9	5.5-9.0
BOD (mg/L)	< 20	< 30
SS (mg/L)	< 30	< 40
TDS (mg/L)	-	< 500
Settleable Solids (mg/L)	-	< 0.5
TKN (mg/L)	<20 (Total N)	< 35
Organic Nitrogen (mg/L)	-	-
Ammonia Nitrogen (mg/L)	-	-
Oil and Grease (mg/L)	< 5.0	< 20
Sulfide (mg/L)	-	< 1.0

Effluent Standard - Building Control Act

	Building > 500 rooms, Hotel >200 rooms, Hospital > 30 beds, Institute >25,000 m ²	Building 100- <500 rooms, Hotel 60- <200 rooms, Hospital 10-<30 beds, Institute 5,000-<25,000 m ²	Building <100, Hotel <60 rooms	Dormitory 10-<50 rooms, Hospital < 10 beds, Institute < 5,000 m ² , Department store <1,000 m ² , market 500-<1,000 m ² , Condominium < 2,000 m ²	Restaurant < 100 m ²
pH	5-9	5-9	5-9	5-9	5-9
BOD (mg/L)	< 20	< 30	< 40	< 50	200
SS (mg/L)	< 30	< 40	< 50	< 50	<60
TDS (mg/L)	< 500	< 500	< 500	< 500	-
Settleable Solids (mg/L)	< 0.5	< 0.5	< 0.5	< 0.5	-
TKN (mg/L)	< 35	< 35	< 45	< 40	-
Organic Nitrogen (mg/L)	< 10	< 10	< 15	< 15	-
Ammonia Nitrogen (mg/L)	-	-	25	< 25	-
Oil and Grease (mg/L)	< 20	< 20	< 20	< 20	-
Sulfide (mg/L)	1.0	1.0	3.0	< 4.0	100

Decentralization Act 1999

Propose to decentralize responsibility and authority to localities and municipalities for planning, managing and solving problems in the areas

Local organization

Provincial Administrative Organization

Tambon Administrative Organization

Municipality

Bangkok

Pattaya

Online monitoring system for WWTP

ลำดับ	หน่วยงาน	จังหวัด	จำนวนระบบ	จุลปริมาณ (ล้านบาท)	ปริมาณบำบัดเสีย (ลบ.ม./วัน)	ที่ก่อสร้างจริง	เข้าระบบ	% เข้าระบบ
1	สสค.1	เชียงใหม่	1	759.55	326,510	36,030	-	11.03
2	สสค.1	ลำพูน	2	686.90	145,689	35,588	-	24.43
3	สสค.1	เชียงใหม่	3	782.31	645,264	3	-	-
4	สสค.2	สุโขทัย	1	277.00	108,506	62,473	-	57.58
5	สสค.2	ลำปาง	1	632.00	137,610	1,726	-	1.25
6	สสค.2	พะเยา	1	203.28	87,682	1,784	-	2.03
7	สสค.3	อุดรธานี	1	5.00	83,331	-	-	-
8	สสค.3	น่าน	1	494.00	85,611	1,777	-	2.08
9	สสค.3	พิษณุโลก	4	638.46	608,804	-	-	-
10	สสค.3	พิจิตร	2	304.00	199,149	27,955	-	14.04
11	สสค.4	นครสวรรค์	3	789.76	579,349	12,449	-	2.15
12	สสค.4	อุทัยธานี	1	959.22	59,017	-	-	-
13	สสค.4	กำแพงเพชร	2	257.10	261,665	-	-	-
14	สสค.4	ตาก	2	657.57	187,078	12,617	-	6.74
15	สสค.5	ชัยนาท	2	449.81	134,168	1,421	-	1.06
16	สสค.5	สุพรรณบุรี	2	648.99	337,836	1,926	-	0.57
17	สสค.5	นครปฐม	1	368.15	170,285	2,778	-	1.63
18	สสค.5	สมุทรสาคร	2	6.58	193,842	-	-	-
19	สสค.6	บึงกาฬ	1	741.00	215,614	565,750	-	262.39
20	สสค.6	ปทุมธานี	1	340.00	191,275	-	-	-
21	สสค.6	พระนครศรีอยุธยา	2	791.56	310,063	128,088	-	41.31
22	สสค.6	อ่างทอง	1	184.13	56,961	785	-	1.38
23	สสค.7	ลพบุรี	1	5.92	150,890	1,183	-	0.78
24	สสค.7	สระบุรี	1	377.43	122,541	-	-	-

http://mews.onep.go.th/wwt_province.aspx?id=0

Sewage Tariffs in Thailand

- The National Environmental Quality Act, B.E. 2535 (NEQA 1992)- Polluter Pay Principle
- Decentralization Act 1999



Delay

Success

Excluding : **Bangkok** and **Pattaya city**

3.5-11.2 THB/m³

Operation and monitoring of septic tank in Thailand

Public Health Act, B.E. 2546

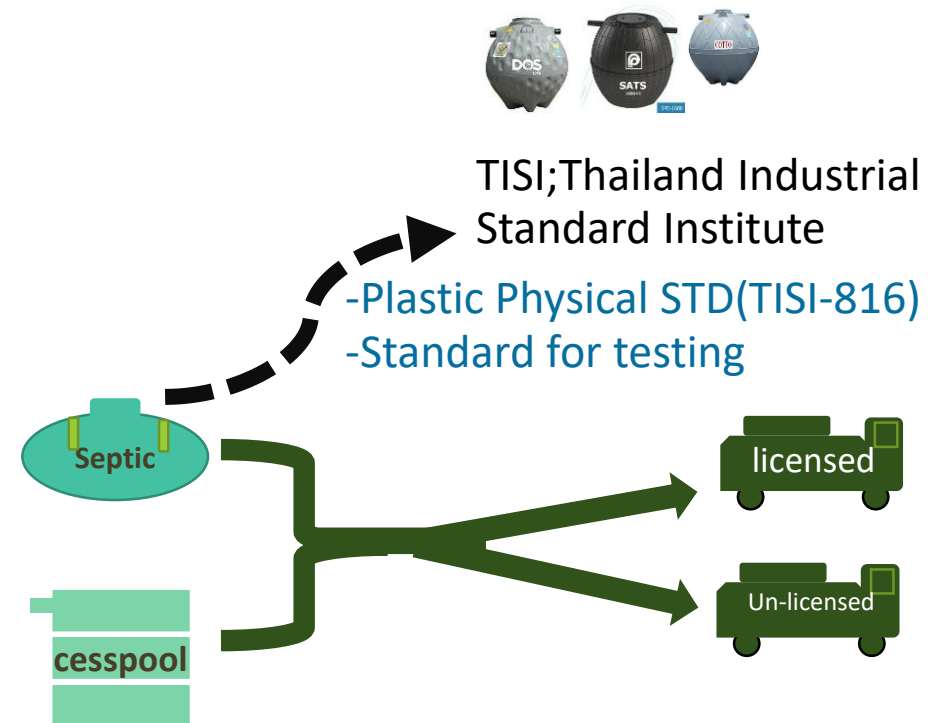


Septage must be properly collected and treated before disposal

No requirement for regular maintenance of on-site treatment facilities

- Local Government Organizations (LGOs)
(office of Public Health and Environment or private sector)

- Bangkok Metropolitan Authority (BMA) → Department of Environment
- Pattaya city → Department of Environment



Constrain on septic tank management system

- Thailand has no enforcement on septic tank operation and maintenance
- No standard for **commercial septic tank** design criteria
- No monitoring program on septic tank effluent quality



<http://www.naibann.com/house-checklist-review-by-satan-boat/>

For larger scale onsite treatment systems i.e. those in Condominium, the effluent have been controlled by Building Code 1979 Act and Notification on Building Effluent Standard 1994

Conclusion

Decentralization Act

Individual Household

-Building/
Hotel/
Condominium



Installation of onsite treatment
Effluent quality

-House



Installation of **TISI-816** septic tank

Building Control Act



Public Health Act



Community/Cluster

-Housing Estate

-Community
Wastewater
Treatment Plant

-National Environmental Quality Act 1992

-Notification on Housing Estate Effluent Standard 2005

-Notification on Community Wastewater Treatment Plant Effluent Standard 2010

Thank you for your attention