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Treatment Performance Of Modified Anaerobic Baffled Reactor With Media Filter For Communal Wastewater Treatment Plant

Evy Hendriarianti [1], Nieke Karnaningroem[2]
hendriarianti@yahoo.com[1]
National Institute of Technology[1],
Sepuluh Nopember Institute of Technology[1,2]

DOMESTIC WASTEWATER PROBLEM

Statement from deputy general secretary of UN
MARCH 25, 2013

"INDONESIA" INCLUDING IN STATES WITH WORST SANITATION IN THE WORLD

TEN STATES WITH WORST SANITATION IN THE WORLD

1. BURKINA FASO
2. NIGER
3. CHINA
4. NEPAL
5. SUDAN
6. NIGERIA
7. ETHIOPIA
8. PAKISTAN
9. INDONESIA
10. INDIA

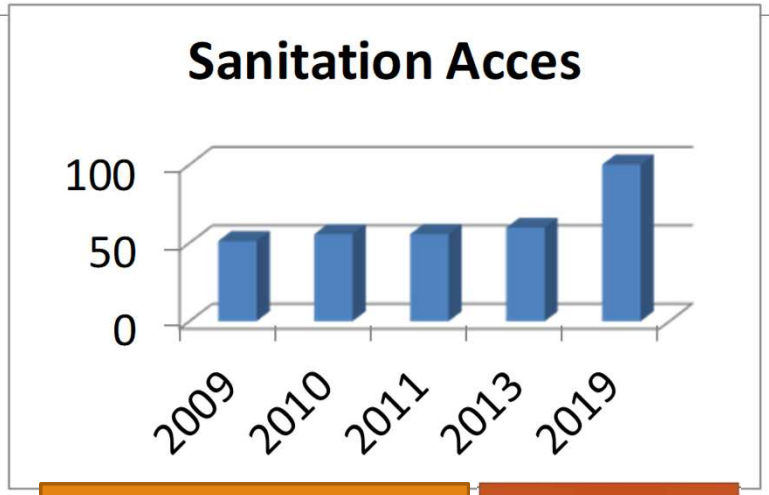
(1 = LESS BAD; 10 = WORST)
SOURCE: DETIK.COM - 2013

NR	STATE	% POPULATION HAVING SANITATION ACCES		EXPECTED OF ACHIEVEMENT MDG 2015
		1990	2008	
1	SINGAPURA	99 %	100%	FASTER
2	MALAYSIA	84%	96%	FASTER
3	THAILAND	80%	96%	FASTER
4	MYANMAR	49%	81%	FASTER
5	FILIPINA	58%	67%	ON PLAN
6	VIET NAM	35%	75%	FASTER
7	LAOS	18%	53%	ON PLAN
8	INDONESIA	33%	52%	LATE
9	TIMOR LESTE	32%	50%	ON PLAN
10	KAMBOJA	9%	29%	LATE

NEED TRANFORMATION OF WASTEWATER MANAGEMENT

ACTION OF UNIVERSAL ACCES OF 100% SANITATION ACCES IN 2019

ACCES SANITATION IN INDONESIA



2009: 51,19%
2010: 55,54%
2011: 55,60%
2013: 59,71%

(average: 2,13% /th)

Target 2019: 100%

(average): 8,06% /th)

NEED INNOVATIF STEPS

A.POLICY ACCES
B.INSTITUTIONAL ASPECT
C.COMMUNITY AND EDUCATION ASPECT
D. TECHNICAL ASPECT AND FINASIAL

COMMUNAL WWTP IN MALANG CITY

NR.	FUNDED BY	AMOUNTS	CAPACITY (KK)	SERVICED HOUSE (KK)	MANAGER*)	YEAR
1.	Swadaya	1	500	110	KSM	1986
2.	PKK Kota Malang	2	100	60	KSM	1998-1999
		1	150	100		
		1	200	150		
3.	APBN	1	150	60	KSM	1999
4.	Bank	1	6.000	800	LPPL	2000
	Dunia	1	10.000	1.550	KSM	2000
5.	DAK-APBN	22	100	30-170	KSM	2006-2014
6.	DAK APBN Propinsi	1	500	200	KSM	2011
7.	USRI	39	70	59-136	KPP	2011-2013
			Total users	19.040 KK, 37.030 person		

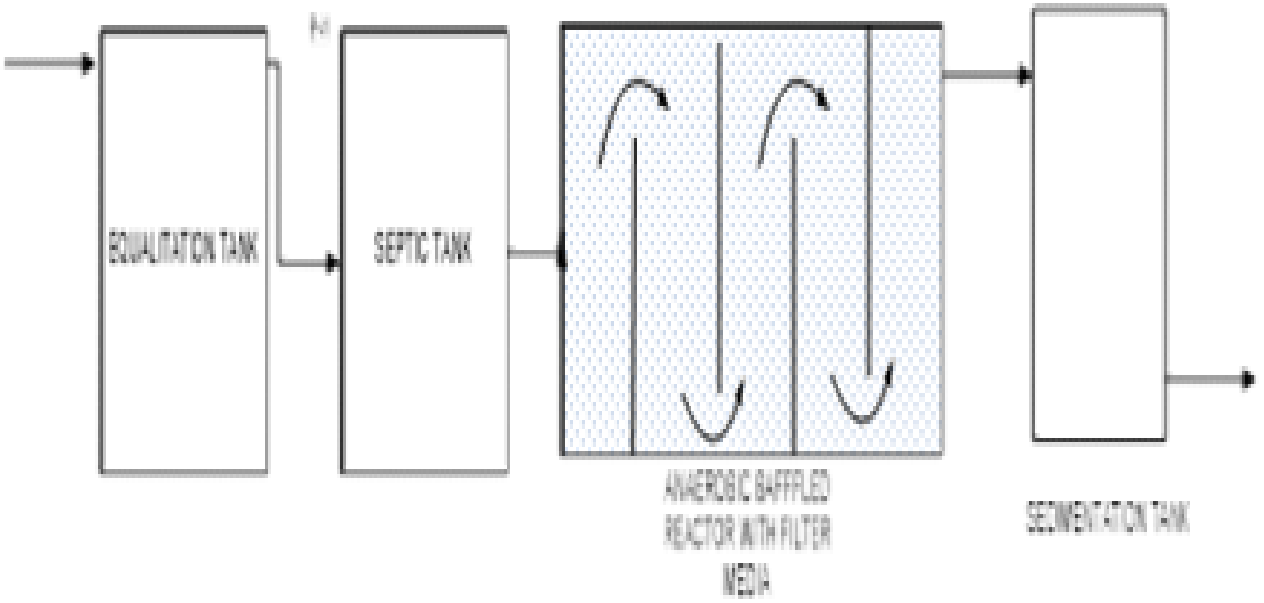
Schematic Processing Unit

DEWATS system

- **sedimentation unit**
- **anaerobic Baffled Reactor**
- **anaerobic filter**

(Borda, 2015)

✓ Septic tank
✓ ABR with filter media



General description Communal WWTP

NR.	LOCATION	OPERATION STARTED	OPERATION CAPACITY (%)
1.	RT6 & RT7 RW2 Balearjosari	2012	65
2.	RW9 Bandungrejosari Janti	2010	123
3.	RW3 Pisangcandi	2013	62
4.	RW7 Kota Lama	2013	170

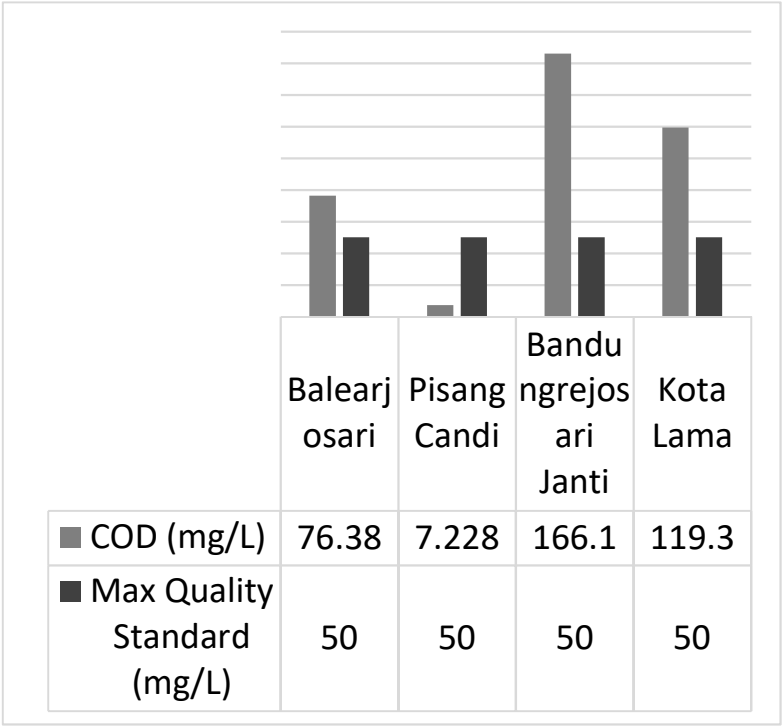
ANAEROBIC PROCESS

- Anaerobic process is economically attractive (Samb, 1996; Chernicharo, 1998)
- easily built
- investment and operating costs are lower
- easier to operate
- separation efficiency is relatively high for organic material , nutrients , solids and pathogens at ambient temperature (Mahcdar, 1997)

(Palmer 2001)

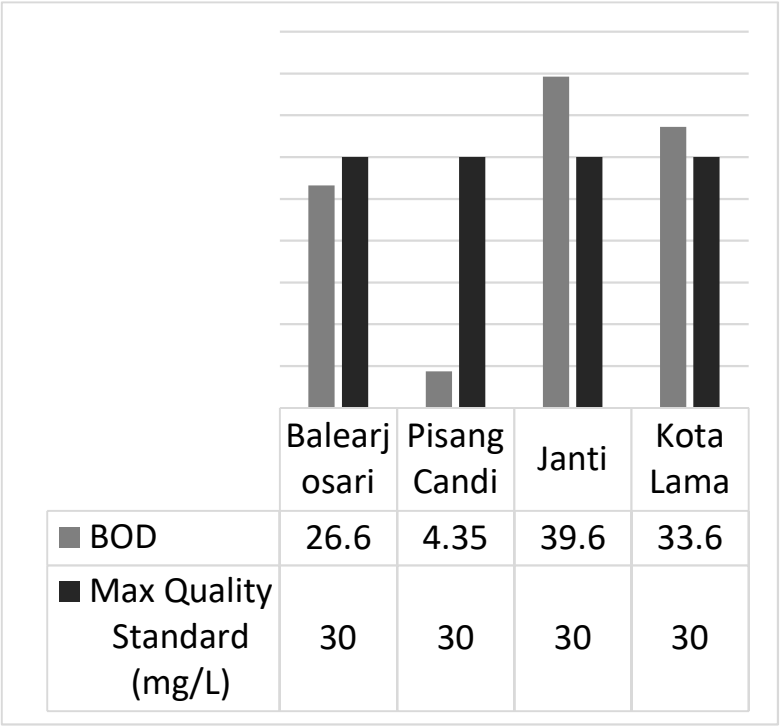
effluent concentrations

PARAMETERS COD



	Balearjosari	Pisang Candi	Bandungrejosari Janti	Kota Lama
COD (mg/L)	76.38	7.228	166.1	119.3
Max Quality Standard (mg/L)	50	50	50	50

PARAMETERS BOD

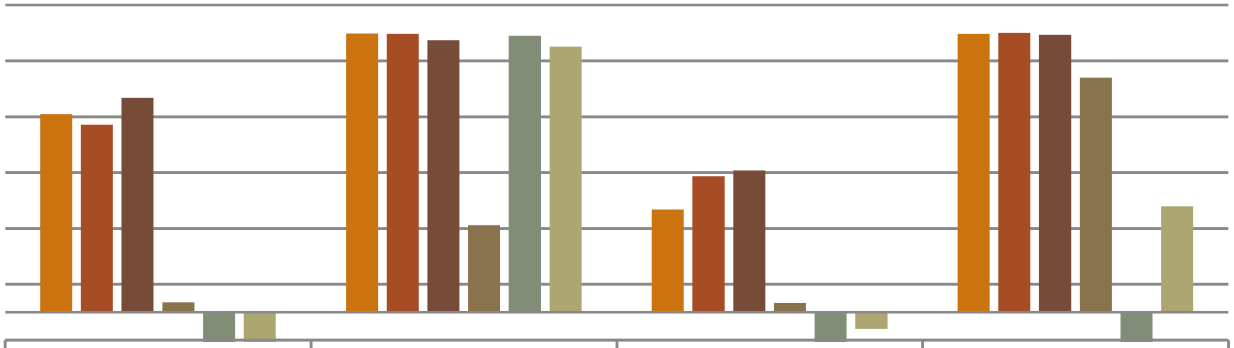


	Balearjosari	Pisang Candi	Janti	Kota Lama
BOD	26.6	4.35	39.6	33.6
Max Quality Standard (mg/L)	30	30	30	30

Ratio of BOD-COD

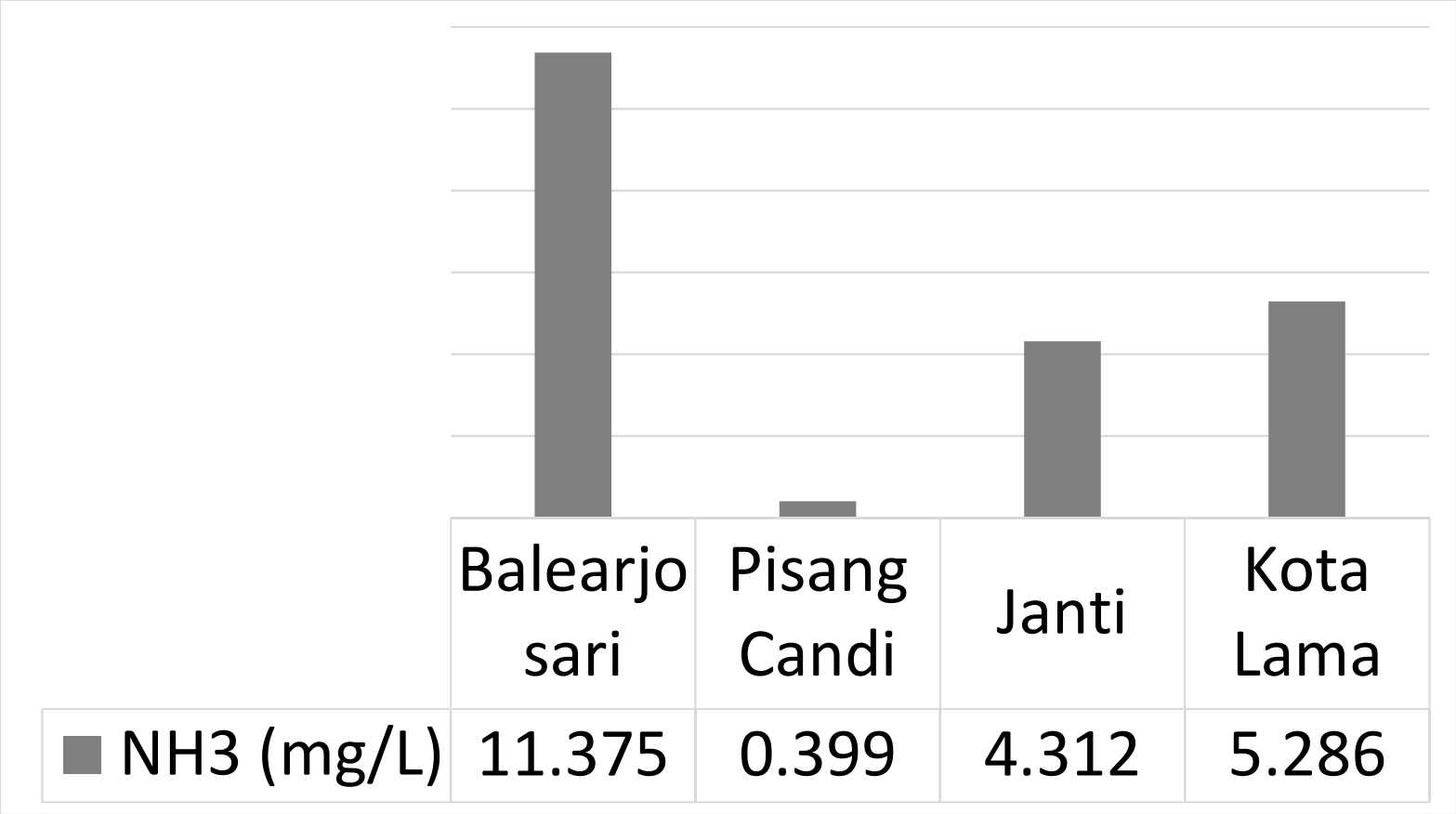
Communal WWTP	BOD/COD	
	Inlet	Outlet
Balearjosari	0,31	0,35
Pisangcandi	0,37	0,60
Balearjosari Janti	0,29	0,24
Kota Lama	3,44	0,28

Communal WWTP Performance



	Balearjosari	Pisang Candi	Bandungrejosari Janti	Kota Lama
COD	71%	100%	37%	100%
BOD	67%	100%	49%	100%
TSS	77%	97%	51%	99%
NO3	3%	31%	3%	84%
PO4	-97%	99%	-127%	-181%
NH3 (mg/L)	-130%	95%	-6%	38%

Ammonia Effluent



	Balearjo sari	Pisang Candi	Janti	Kota Lama
NH3 (mg/L)	11.375	0.399	4.312	5.286

METHODS

- Data collection and processing operations Communal WWTP comprising of **operations and process design dat**a of the cleanliness and landscaping services Dinas Kebersihan dan Pertamanan Kota Malang) and community sanitation groups (KSM) as manager of the Communal WWTP.
- Sampling and analysis of influent and effluent quality parameters in any communal wastewater treatment unit that includes the concentration of **BOD, COD, TSS, NO_3, and PO_4**. Sampling of wastewater was conducted by **moment sampling (grab sampling) in accordance with SNI 6989.57: 2008 on Method of Wastewater Sampling.**

METHODS

Analysis of the quality of wastewater samples carried out by the Water Quality Laboratory PJT I

Parameter Wastewater Analytical Methods

No.	Parameter	Unit	Analysis Method
1.	BOD	mg/L	APHA.5210 B-1998
2.	COD	mg/L	QI/LKA/19 (Spektrofotometri)
3.	TSS	mg/L	APHA.2540 D-2005
4.	NO_3	mg/L	QI/LKA/65
5.	PO_4	mg/L	SNI 19-2483-

DISCUSSION- anaerobic process

- SRT separate from HRT to maximize performance of pollutants processing by anaerobic bacteria that slow (Nguyen, 2010)
- The strength characteristics of wastewater
- The anaerobic bacteria are a group of bacteria metabolic consisting of microorganisms hydrolytic, fermentative, syntrophic and methanogenic which outlines the complex organic compounds in the process of anaerobic degradation (Satoh, 2007).

DISCUSSION- biofilter

mechanism of processing using a biofilter (Chaudhary, 2003)

1. attachment of biomass,
2. The use of the substrate and the growth of biomass and
3. Sloughing of biomass.
   - Strong **attachment process and colonization of biomass** depends on the **influent characteristics (**eg organic and concentration) and the **surface properties** of the filter media.
   - **the amount of the growth and physical factors** that affect the release of biofilm.
   - the loss of biomass only because of the **shear stress of the fluid**

DISCUSSION-The existence of ammonia

- Ammonium is an important nutrient for the growth of methanogens,
- The excess of free ammonia will disrupt the process of methanogenesis

$$Norg \rightarrow NH_4 + + OH^- \leftrightarrow NH_3 + H_2O$$

CONCLUSION

1. Technology choice of Septic Tank and ABR with media filter reactor proved capable of processing organic matter of BOD and COD with the levels of allowance respectively by 49% -67% and 37% -100%. Parameter TSS, NO_3 and PO_4 have the ranges of allowance respectively by 51% - 99%, 3% - 84%, (181%) - 99%.
2. The value of the ratio of BOD / COD WWTP Communal of the influent on the object of study ranged from 0.29 to 3.44.
3. From the evaluation shows that the high concentrations of organic matter in influent in line with the high of HRT and operation time will result in a higher allowance level. With the organic loading that is too low cause biomass limited to degrade organic matter and result low levels of organic material separation. The presence of ammonia in anaerobic degradation should be treated to produce biogas and nutrient-N.


THANK YOU
AND
KEEP FOR SUSTAINABILITY