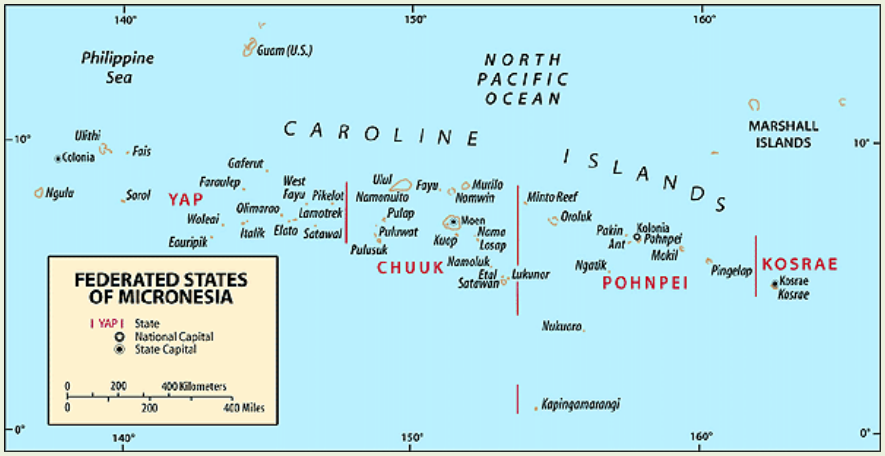
Wastewater in the FSM: Pilot test on Yap

Joseph D. Rouse, P.I., UOG, WERI



FSM population (est., 2010; SBOC): 108,000.

Yap, 12,000;	Chuuk, 53,000;	Pohnpei, 35,000;	Kosrae, 8,000
(Yap Is., 7,000)	(Lagoon, 40,000)	(Pohn. Is., 31,000)	(only one island)

WELCOME TO KOSRAE

KOSRAE-1

KOSRAE-2

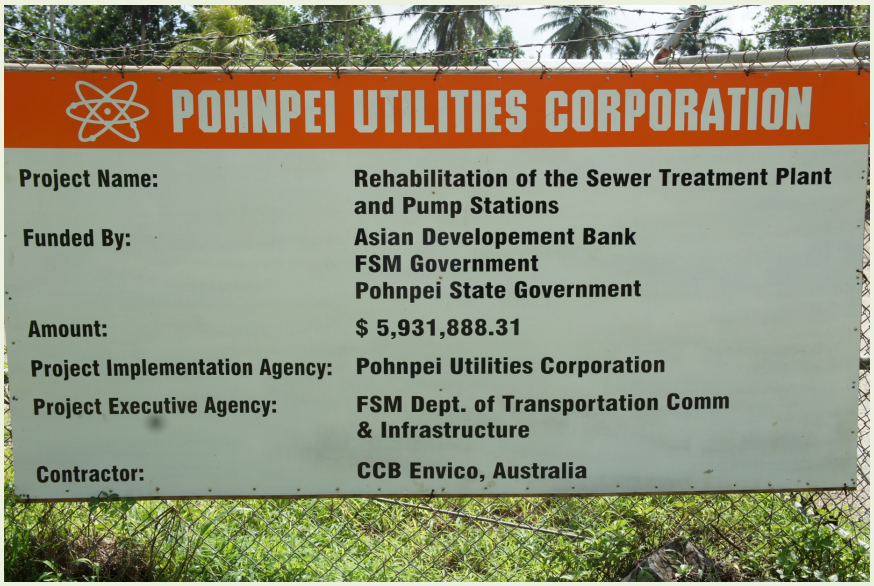
KOSRAE-3

WELCOME TO POHNPEI

POHNPEI-1

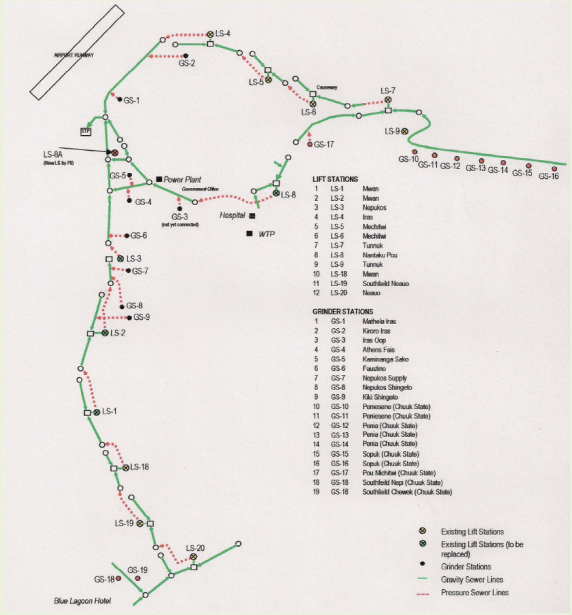
POHNPEI-2

POHNPEI-3



WELCOME TO CHUUK

CHUUK-1



CHUUK-2

CHUUK-3

WELCOME TO YAP

YAP-1

YAP-2

YAP-3

YAP-4

Septic Tanks, etc.
(one household = ca. 6 persons)

Items	YAP	CHUUK	POHNPEI	KOSRAE
Households	2,311	7,024	6,289	1,143
Sewer connection	12%	9%	17%	4%
Septic tanks	31%	31%	35%	94%
Other/none	57%	60%	48%	2%

Notes: + Chuuk: Sewer connections may increase soon with restoration of old sewage treatment plant.

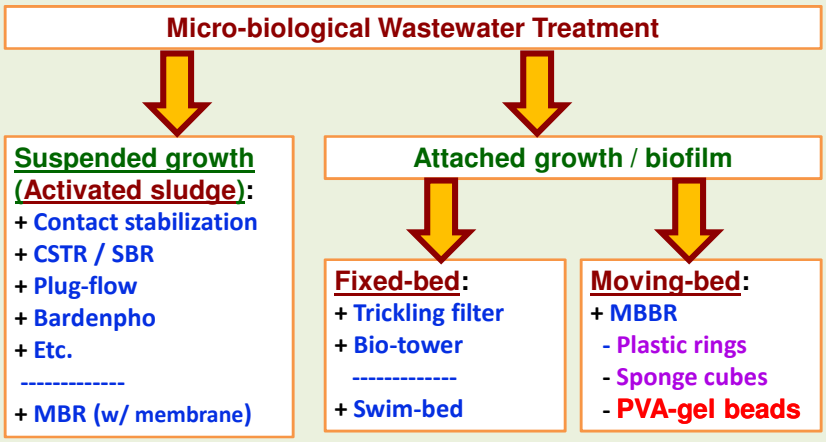
+ Kosrae: With 94% coverage, septic tank culture seems to be working well, though treatment ponds have a lot of unused capacity.

+ Yap, Chuuk, and Pohnpei: High "other/none" levels largely reflect unserviced outer islands.

What to do?

* **Excess sludge** – treatment and use?
  Class A biosolids required!
* **Localized** – or Centralized STPs?
  Cost effectiveness …
* **Monitoring** – flow, COD, NH4, …
  Loading rate studies …
* **Upgrade** – new plant or retrofit?
* **Pilot testing?** – Where?

Cultivation and Retention of Biomass



Pilot test on Yap

1. **Imhoff tanks** – only primary
2. **Simple retrofit** – attached growth?
3. **Testing methods** – needed
4. **Sludge treatment** – land application?
5. **Regulations** – now being developed
6. Etc.

Slime

EVENTS UPDATE

the international water association

>> IWA BioCluster Conference: The Perfect Slime – Nature, Properties, Regulation and Dynamics of EPS (10-12 September 2014, Essen, Germany)

Biofilm organisms are embedded in a matrix of extracellular polymeric substances (EPS) in which they lead

Attached Growth vs Suspended (Activated Sludge):

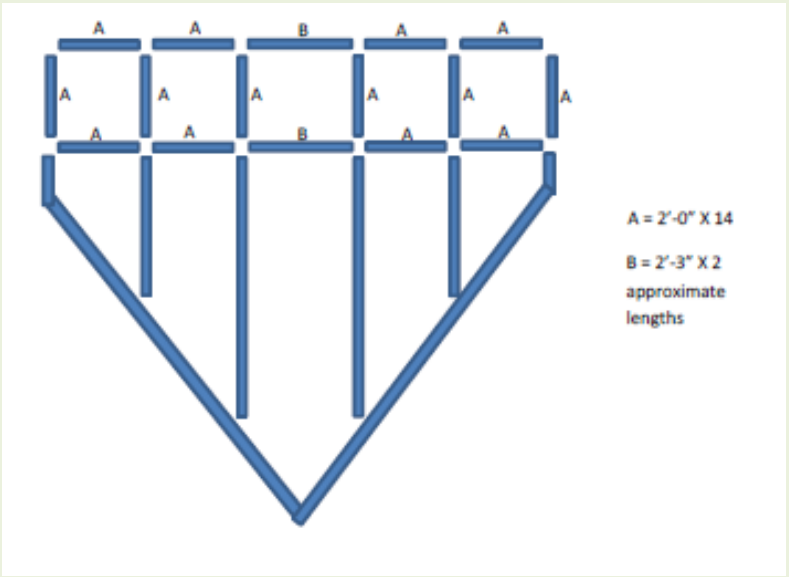
- **Smaller system footprint**
- **Lower capital and O&M cost**
- **Less excess sludge**
- **User friendly**
- **Adaptable (for retrofit)**
- **Greater resistance to toxins, temp changes, etc.**
- ***However*, longer startup time**

understanding of the functions, properties and characteristics of the matrix as well as the possibilities to strengthen or weaken it.

Slime: 1 week (Guam)

Slime: 3 weeks (Guam)

Framework for biocarrier



April 2014 - a

April 2014 - b

April 2014 - c

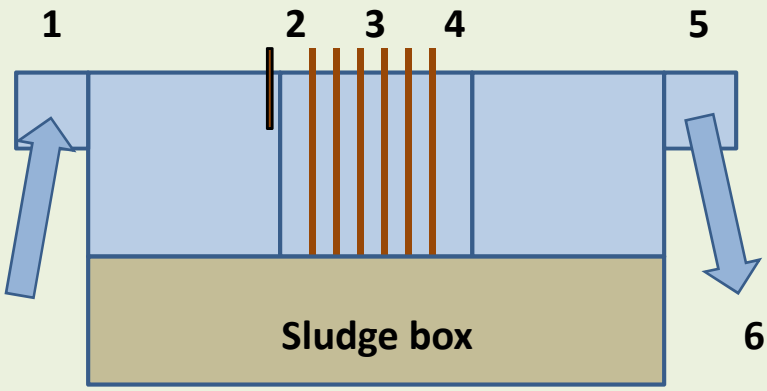
April 2014 - d

June 2014 - e

June 2014 - f

Later

Sampling Plan



June 2014 - g

COD Time course

2014	1	2	3	4	5	6	
6/12		572		546			No flow
6/13	1087	551		594	487		
6/14	1255				742	665	
6/15		773		746	829		
6/16	757	735		789			No flow
6/17	1012	763		732	818		
6/23	750	306	324				
7/4	158	99	123	100	133		Rain?
7/11	1015				403		
7/18	139	123		101	115		
7/25	173	97		93	94		Rain!
8/1	378	386		319	309		
8/12	230	171		153	198		Rain?
8/22	357	262		225	200		

COD Time course

2014	1	2	3	4	5	6	
9/5	62	5		107	53		Rain!
9/25	511				415		
10/17	101	59		39	120		Rain
12/9	308	209		206	226		
2015	**open**	**channel**	**(no**	**Biofilm)**			
1/23	331	273			234		
1/30	328	290			285		
2/6	256	272			254		
2/11	330	300			340		
2/13	297	305			295		
3/27	355	425			383		

Inspection – Dec. 2014 - A

Inspection – Dec. 2014 - B

What's Next?

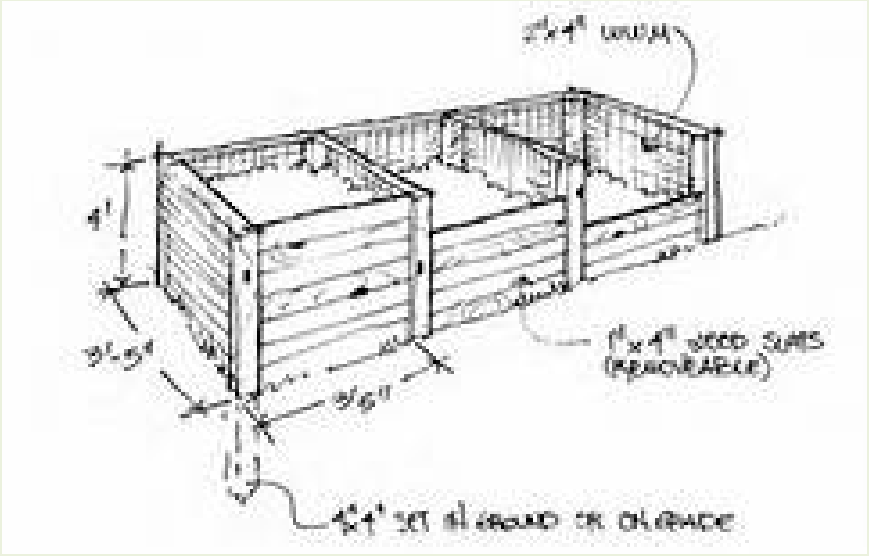
1. Continue pilot testing (ongoing)
- Continue with COD (pilot + baseline)
- Also Nitrogen (TN, TKN, NH_4^+, NO_3^-)
- Also flow (gal/day?)
- Full-scale application? (cost?)

2. Start test for composting
- Monitor for TC, E coli, Enterococcus
- Apply to crops, or repair badlands

Excess sludge ?

1 g sludge

Sludge -> Compost



THANK YOU

Happy Hour!