

Evaluation of Water Quality of Buritis Lake

Renata Kikuda ¹, Raylane Pereira Gomes ², Aline Rodrigues Gama ², Junilsom Augusto De Paula Silva ¹, Adailton Pereira Dos Santos ², Keliane Rodrigues Alves ², Poliana Nascimento Arruda ³, Paulo Sérgio Scalize ³, Jose Daniel Vieira Gouveia ², Lilian Carla Carneiro ^{2,*} and Debora De Jesus Pires ¹

Table S1. Identification of isolated bacteria in the water of Buritis Lake.

Collect	Isolates	%
n = 40		
July 2017 (drought season)	<i>Acinetobacter lwoffii</i> (2)	5.0
	<i>Aeromonas</i> spp. (2)	5.0
	<i>Chromobacterium violaceum</i> (1)	2.5
	<i>Enterobacter aerogenes</i> (4)	10.0
	<i>Enterobacter cloacae</i> (1)	2.5
	<i>Enterobacter</i> spp.(1)	2.5
	<i>Hafnia alvei</i> (1)	2.5
	<i>Klebsiella</i> spp.(3)	7.5
	<i>Listeria</i> spp.(3)	7.5
	<i>Moraxella</i> spp.(2)	5.0
	<i>Pantoea agglomerans</i> (4)	10.0
	<i>Proteus vulgaris</i> (2)	5.0
	<i>Sphingomonas</i> spp.(3)	7.5
	<i>Staphylococcus auricularis</i> (1)	2.5
	<i>Staphylococcus capitis</i> (1)	2.5
	<i>Staphylococcus cohnii</i> (1)	2.5
	<i>Staphylococcus epidermidis</i> (1)	2.5
	<i>Staphylococcus equorum</i> (1)	2.5
	<i>Staphylococcus muscae</i> (2)	5.0
	<i>Staphylococcus pulvereri</i> (1)	2.5
	*Unidentified(3)	7.5
n = 38		
October 2017 (rainy season)	<i>Corynebacterium</i> spp.(5)	13,2
	<i>Enterobacter aerogenes</i> (4)	10.5
	<i>Enterobacter cloacae</i> (1)	2.6
	<i>Erysipelothrix</i> spp. (1)	2.6
	<i>Hafnia alvei</i> (1)	2.6
	<i>Klebsiella</i> spp. (2)	5.3
	<i>Listeria</i> spp.(3)	7.9
	<i>Moraxella</i> spp.(4)	10.5
	<i>Oerskovia turbata</i> (1)	2.6
	<i>Pantoea agglomerans</i> (1)	2.6
	<i>Plesiomonas</i> spp.(2)	5.3
	<i>Proteus mirabilis</i> (1)	2.6
	<i>Proteus</i> spp. (1)	2.6
	<i>Proteus vulgaris</i> (1)	2.6
	<i>Proteus vulgaris</i> (1)	2.6

	<i>Serratia marcescens</i> (1)	2.6
	<i>Sphingomonas</i> spp.(1)	2.6
	<i>Staphylococcus capitis</i> (1)	2.6
	<i>Staphylococcus epidermidis</i> (1)	2.6
	<i>Staphylococcus saprophyticus</i> (4)	10.5
	<i>Staphylococcus</i> spp.(1)	2.6
	<hr/>	
	n = 44	
	<i>Acinetobacter</i> spp.(1)	2.2
	<i>Aeromonas</i> spp.(3)	6.8
	<i>Bacillus</i> (1)	2.3
	<i>Bacillus barbaricus</i> (2)	4.5
	<i>Bacillus</i> spp.(6)	13.6
	<i>Chromobacterium violaceum</i> (2)	4.5
	<i>Corynebacterium diphtheriae</i> (1)	2.3
	<i>Enterobacter aerogenes</i> (2)	4.5
March 2018	<i>Enterobacter</i> spp.(2)	4.5
	<i>Enterococcus</i> spp.(4)	9.1
(rainy season)	<i>Listeria monocytogenes</i> (2)	4.5
	<i>Moraxella</i> spp.(1)	2.3
	<i>Pantoea agglomerans</i> (2)	4.5
	<i>Planococcus</i> spp.(1)	2.3
	<i>Plesiomonas</i> (1)	2.3
	<i>Serratia marcescens</i> (2)	4.5
	<i>Staphylococcus arlettae</i> (1)	2.3
	<i>Staphylococcus pulvereri</i> (1)	2.3
	<i>Staphylococcus</i> spp(1)	2.3
	<i>Streptococcus</i> spp.(2)	4.5
	*Unidentified (6)	13.6
	<hr/>	
	n = 46	
	<i>Aeromonas</i> (2)	4.3
	<i>Aeromonas</i> spp.(1)	2.2
	<i>Bacillus</i> spp. (1)	2.2
	<i>Burkholderia cepacia</i> (1)	2.2
	<i>Cellobioscoccus lentus</i> (1)	2.2
	<i>Chromobacterium violaceum</i> (2)	4.3
	<i>Citrobacter</i> spp.(1)	2.2
	<i>Corynebacterium afermentans</i> (2)	4.3
	<i>Enterobacter aerogenes</i> (2)	4.3
	<i>Enterobacter cloacae</i> (1)	2.2
	<i>Enterococcus</i> spp.(7)	15.2
	<i>Moraxella</i> spp.(1)	2.2
	<i>Pantoea agglomerans</i> (1)	2.2
June 2018	<i>Planococcus</i> spp.(2)	4.3
	<i>Plesiomonas</i> spp.(1)	2.2
(drought season)	<i>Providencia</i> spp. (1)	2.2
	<i>Pseudomonas luteola</i> (1)	2.2
	<i>Shigella dysenteriae</i> (1)	2.2
	<i>Shigella</i> spp.(1)	2.2
	<i>Shingomonas</i> spp.(2)	4.3

*Unidentified isolates as they have not grown.

Antimicrobials Used to Test Gram-Positive Bacteria	Antimicrobials Used to Test Gram-Negative Bacteria
Ciprofloxacin (5 µg/ disk)	Aztreonam (30 µg/ disk)
Clindamycin (2µg/ disk)	Amikacin (30 µg/ disk)
Erythromycin (15 µg/ disk)	Amoxicillin (10 µg/ disk)
Gentamycin (10 µg/ disk)	Amoxicillin / Clavulanic Acid (30 µg/ disk)
Linezolid (30 µg/ disk)	Ampicilin (10 µg/ disk)
Novobiocin (20 µg/ disk)	Ampicillin + Sulbactam (20 µg/ disk)
Penicillin (10 µg/ disk)	Cephepin (30 µg/ disk)
Rifampicin (5 µg/ disk)	Cefoxitin (30 µg/ disk)
Sulfazotrim (25 µg/ disk)	Ciprofloxacin (5µg/ disk)
Tetracycline (30 µg/ disk)	Cefotaxima (30 µg/ disk)
	Ceftazidime (30 µg/ disk)
	Chlorphenphenol (30 µg/ disk)
	Gentamycin (10 µg/ disk)
	Sulfazotrim (25 µg/ disk)
	Tetracycline (30 µg/ disk)

[illegible]

[illegible]

Collect	Sampling point	Identification number	Isolateds	Amoxicillin	Ampicillin	Cefepime	Cefoxitin	Ceftazidime	Ceftriaxone	Aztreonam	Ciprofloxacin	Imipenem	Amikacin	Tetracycline	Sulfazotrim	Gentamycin	Amp+ Sulb	Piperacyclin	Amo+Clav	Chlorphenphenol	Penicillin	Rifampicin	Clindamycin	Erythromycin	Linezolid	Novobiocin
October 2017 (drought season)	2	2.15	<i>Hafnia alvei</i>	-	S	S	-	S	S	S	S	S	S	S	S	S	-	S	-	-	-	-	-	-	-	-
	2	2.17	<i>Moraxella</i> spp.	-	-	S	-	S	-	-	S	S	S	-	-	R	-	S	-	-	-	-	-	-	-	-
	2	2.19	<i>Pantoeaagglomerans</i>	-	R	S	-	S	S	S	S	S	S	S	S	R	-	S	-	-	-	-	-	-	-	-
	2	2.38	<i>Plesiomonas</i>	-	R	S	-	S	S	S	S	S	R	S	I	S	-	S	-	-	-	-	-	-	-	-
	2	2.39	<i>Serratia marcescens</i>	-	S	S	-	S	S	S	S	S	S	I	S	I	-	S	-	-	-	-	-	-	-	-
	2	2.16	<i>Moraxella</i> spp.	-	-	-	-	S	-	-	S	S	S	-	-	R	-	S	-	-	-	-	-	-	-	-
	2	1.18	<i>Sphingomonas</i> spp.	-	-	S	-	S	-	-	S	S	S	-	-	R	-	S	-	-	-	-	-	-	-	-
	3	2.4	<i>Staphylococcus</i> spp.	-	-	-	-	-	-	-	S	-	-	S	S	S	-	-	-	-	S	S	R	S	S	S
	3	2.5	<i>Staphylococcus capitis</i>	-	-	-	-	-	-	-	S	-	-	S	S	S	-	-	-	-	R	R	R	S	S	S
	3	2.21	<i>Proteus vulgaris</i>	-	S	S	-	I	S	S	R	S	S	R	S	R	-	S	-	-	-	-	-	-	-	-
	3	2.22	<i>Proteus Mirabilis</i>	-	S	S	-	I	S	S	R	S	S	R	S	R	-	S	-	-	-	-	-	-	-	-
	3	2.23	<i>Proteus Vulgaris</i>	-	R	S	-	S	S	S	S	S	S	R	S	R	-	S	-	-	-	-	-	-	-	-
	3	2.41	<i>Plesiomonas</i>	-	R	S	-	S	S	S	S	S	R	S	I	S	-	S	-	-	-	-	-	-	-	-
	3	2.42	<i>Klebsiella</i> spp.	-	S	S	-	S	S	S	S	S	S	S	S	S	-	S	-	-	-	-	-	-	-	-
	4	2.6	<i>Staphylococcus saprophyticus</i>	-	-	-	-	-	-	-	S	-	-	R	S	S	-	-	-	-	R	S	S	S	S	R
	4	2.25	<i>Staphylococcus saprophyticus</i>	-	-	-	-	-	-	-	S	-	-	S	S	S	-	-	-	-	R	R	R	R	R	R
	4	2.43	<i>Klebsiella</i> spp.	-	R	R	-	R	R	S	I	S	S	S	S	S	-	S	-	-	-	-	-	-	-	-
	4	2.44	<i>Enterobacter aerogenes</i>	-	R	S	-	S	S	S	S	S	S	S	S	S	-	S	-	-	-	-	-	-	-	-
	5	2.9	<i>Staphylococcus saprophyticus</i>	-	-	-	-	-	-	-	S	-	-	S	S	S	-	-	-	-	R	S	S	S	S	R
	5	2.1	<i>Staphylococcus epidermidis</i>	-	-	-	-	-	-	-	S	-	-	S	S	S	-	-	-	-	S	S	S	I	S	S
	5	2.31	<i>Moraxella</i> spp.	-	-	S	-	S	-	-	S	S	S	-	-	R	S	S	-	-	-	-	-	-	-	-
	5	2.29	<i>Proteus</i> spp.	-	S	S	-	S	S	S	S	S	S	R	S	S	S	S	-	-	-	-	-	-	-	-
	5	2.32	<i>Enterobacter aerogenes</i>	-	R	S	S	S	S	S	S	S	S	S	S	S	-	S	-	-	-	-	-	-	-	-
	6	2.13	<i>Staphylococcus saprophyticus</i>	-	-	-	-	-	-	S	-	-	R	S	S	-	-	-	-	-	R	S	S	S	S	R
	6	2.35	<i>Moraxella</i> spp.	-	-	S	S	-	-	S	S	S	-	-	R	S	-	S	-	-	-	-	-	-	-	-

Collect	Sampling point	Identification number	Isolates	Amoxicillin	Ampicillin	Cefepime	Cefoxitin	Ceftazidime	Ceftriaxone	Aztreonam	Ciprofloxacin	Imipenem	Amikacin	Tetracycline	Sulfazotrim	Gentamycin	Amp+ Sulb	Piperacilin	Amo+Clav	Chlorphenphenol	Penicillin	Rifampicin	Clindamycin	Erythromycin	Linezolid	Novobiocin
March 2018 (rainy season)	6	2.49	<i>Enterobacter aerogenes</i>	-	R	S	S	S	S	S	S	S	S	S	S	S	-	S	-	-	-	-	-	-	-	-
	6	2.5	<i>Enterobacter cloacae</i>	-	S	S	R	R	R	I	S	R	S	R	I	R	-	S	-	-	-	-	-	-	-	-
	6	2.52	<i>Enterobacter aerogenes</i>	-	R	S	S	S	S	S	S	S	S	S	S	S	-	S	-	-	-	-	-	-	-	-
	2	3.2	<i>Plesiomonas</i>	-	R	R	-	R	I	S	S	S	S	S	R	S	-	S	R	-	-	-	-	-	-	-
	2	3.4	<i>Enterococcus spp.</i>	-	-	-	-	-	-	-	R	-	-	-	S	S	-	-	-	-	R	R	R	R	R	R
	2	3.18	<i>Streptococcus spp.</i>	-	-	-	-	-	-	-	S	-	-	S	S	-	-	-	-	S	R	R	R	R	R	R
	3	3.6	<i>Serratia marcescens</i>	-	S	I	-	S	I	S	S	R	R	R	R	R	-	S	R	-	-	-	-	-	-	-
	3	3.7	<i>Staphylococcus spp</i>	-	-	-	-	-	-	-	R	-	-	S	R	S	-	-	-	-	R	S	-	S	S	R
	3	3.8	<i>Enterococcus spp.</i>	-	-	-	-	-	-	-	I	-	-	S	S	S	-	-	-	-	R	R	R	R	R	R
	3	3.9	<i>Streptococcus spp.</i>	-	-	-	-	-	-	-	S	-	-	-	R	-	-	-	-	-	-	S	R	S	R	R
	3	3.22	<i>Enterococcus spp.</i>	-	-	-	-	-	-	-	S	-	-	S	R	S	-	-	-	-	R	R	R	R	R	R
	3	3.23	<i>Enterococcus spp.</i>	-	R	S	-	R	-	S	S	S	S	S	S	S	-	-	-	-	S	-	-	-	-	-
	4	3.1	<i>Staphylococcus pulvereri</i>	-	-	-	-	-	-	-	R	-	-	S	S	S	-	-	-	-	R	R	R	R	R	R
	4	3.26	<i>Aeromonas spp.</i>	-	-	R	-	S	S	-	S	S	S	S	S	S	-	S	-	-	-	-	-	-	-	R
	4	3.27	<i>Aeromonas spp.</i>	-	R	R	-	S	S	S	S	S	-	S	S	S	-	S	R	-	-	-	-	-	-	-
	5	3.28	<i>Enterobacter aerogenes</i>	-	R	R	-	S	-	S	S	S	S	S	-	S	-	S	R	-	-	-	-	S	-	-
	5	3.31	<i>Pantoea agglomerans</i>	-	R	R	-	S	-	S	S	S	S	S	R	S	-	S	S	-	-	-	-	-	-	-
	6	3.32	<i>Enterobacter spp.</i>	-	S	R	-	S	R	S	S	S	S	S	S	I	-	-	S	-	-	-	-	-	-	-
	6	3.33	<i>Enterobacter aerogenes</i>	-	S	R	-	S	-	S	S	S	S	S	S	S	-	S	R	-	-	-	-	-	-	-
	6	3.34	<i>Planococcus spp.</i>	-	-	-	-	-	-	-	S	-	-	S	I	I	-	-	-	-	R	R	R	S	R	R
	6	3.35	<i>Staphylococcus arlettae</i>	-	-	-	-	-	-	-	S	-	-	R	R	S	-	-	R	-	R	R	R	R	R	R
June 2018 (rainy season)	2	4.8	<i>Pantoea agglomerans</i>	-	R	S	-	S	S	S	S	S	S	S	S	S	-	S	S	-	-	-	-	-	-	-
	3	4.1	<i>Aeromonas</i>	-	R	S	-	S	S	S	S	S	S	S	S	S	-	S	R	-	-	-	-	-	-	-
	3	4.11	<i>Chromobacterium violaceum</i>	-	R	S	-	R	R	I	S	I	S	S	S	R	-	S	R	-	-	-	-	-	-	-

Collect	Sampling point	Identification number	Isolates	Amoxicillin	Ampicillin	Cefepime	Cefoxitin	Ceftazidime	Ceftriaxone	Aztreonam	Ciprofloxacin	Imipenem	Amikacin	Tetracycline	Sulfazotrim	Gentamycin	Amp+ Sulb	Piperacilin	Amo+Clav	Chlorphenphenol	Penicillin	Rifampicin	Clindamycin	Erythromycin	Linezolid	Novobiocin
	3	4.16	<i>Pseudomonas luteola</i>	-	-	S	-	S	-	S	-	S	S	-	-	S	-	S	-	-	-	-	-	-	-	-
	3	4.17	<i>Staphylococcus arlettae</i>	-	-	-	-	-	-	-	S	-	-	S	S	S	-	-	-	S	S	S	S	S	S	S
	3	4.18	<i>Planococcus</i> spp.	-	-	-	-	-	-	-	S	-	-	S	S	S	-	-	-	S	R	R	R	-	R	R
	3	4.2	<i>Enterococcus</i> spp.	-	-	-	-	-	-	-	S	-	-	S	S	S	-	-	-	S	R	R	R	R	R	R
	3	4.21	<i>Aeromonas</i> spp.	-	-	S	-	S	-	S	S	S	S	S	-	-	-	-	I	-	-	-	-	-	-	-
	4	4.22	<i>Staphylococcus</i> spp.	-	-	-	-	-	-	-	S	-	-	S	S	S	-	-	-	S	R	R	R	R	R	R
	4	4.24	<i>Shigella dysenteriae</i>	-	R	S	-	S	S	S	S	S	S	S	S	S	-	S	R	-	-	-	-	-	-	-
	4	4.25	<i>Citrobacter</i> spp.	-	S	S	-	S	S	S	S	S	S	S	S	S	-	S	S	-	-	-	-	-	-	-
	4	4.28	<i>Enterobacter cloacae</i>	-	I	S	-	S	S	S	S	S	S	S	S	S	-	S	S	-	-	-	-	-	-	-
	4	4.29	<i>Enterobacter aerogenes</i>	-	I	S	-	S	S	S	S	S	S	S	S	S	-	S	S	-	-	-	-	-	-	-
	5	4.3	<i>Cellobioscoccus lentus</i>	-	-	-	-	-	-	-	S	-	-	S	S	S	-	-	-	S	R	R	R	R	R	R
	5	4.31	<i>Enterobacter aerogenes</i>	-	-	S	-	S	S	S	S	S	S	S	S	S	-	S	-	-	-	-	-	-	-	-
	5	4.32	<i>Aeromonas</i>	-	-	S	-	S	-	S	S	S	S	S	-	-	R	-	-	S	-	-	-	-	-	-
	5	4.33	<i>Chromobacterium violaceum</i>	-	R	I	-	R	R	S	S	I	S	S	S	R	-	S	R	-	-	-	-	-	-	-
	5	4.34	<i>Planococcus</i> pp.	-	-	-	-	-	-	-	S	-	-	S	S	R	-	-	-	S	R	R	R	R	R	R
	5	4.35	<i>Staphylococcus pulvereri</i>	-	-	-	-	-	-	-	S	-	-	S	S	S	-	-	-	S	R	R	R	R	R	R
	5	4.37	<i>Enterococcus</i> spp.	-	-	-	-	-	-	-	S	-	-	S	S	R	-	-	-	S	R	R	R	R	R	R
	5	4.38	<i>Enterococcus</i> spp.	-	-	-	-	-	-	-	S	-	-	S	S	S	-	-	-	S	R	R	R	R	R	R
	6	4.39	<i>Enterococcus</i> spp.	-	-	-	-	-	-	-	S	-	-	S	S	S	-	-	-	S	R	R	R	R	R	R
	6	4.4	<i>Providencias</i> spp.	-	R	S	-	S	S	S	S	S	S	S	S	S	-	S	R	-	-	-	-	-	-	-
	6	4.41	<i>Enterococcus</i> spp.	-	-	-	-	-	-	-	S	-	-	S	S	S	-	-	-	-	R	R	R	R	R	R
	6	4.42	<i>Enterococcus</i> spp.	-	-	-	-	-	-	-	S	-	-	S	S	S	S	-	-	R	R	R	R	R	R	R
	6	4.43	<i>Shigella</i> spp.	-	R	S	-	S	S	S	S	I	S	S	S	S	-	S	R	-	-	-	-	-	-	-
	6	4.44	<i>Enterococcus</i> spp.	-	-	-	-	-	-	-	S	-	-	S	S	S	-	-	-	S	S	R	S	S	S	S
	6	4.45	<i>Staphylococcus muscae</i>	-	-	-	-	-	-	-	S	-	-	S	S	S	-	-	-	S	S	S	S	S	S	S

Collect	Sampling point	Identification number	Isolateds	Amoxicillin	Ampicillin	Cefepime	Cefoxitin	Ceftazidime	Ceftriaxone	Aztreonam	Ciprofloxacin	Imipenem	Amikacin	Tetracycline	Sulfazotrim	Gentamycin	Amp+ Sulb	Piperacilin	Amo+Clav	Chlorphenphenol	Penicillin	Rifampicin	Clindamycin	Erythromycin	Linezolid	Novobiocin
6	4.46	<i>Staphylococcus muscae</i>	-	R	S	-	S	S	S	S	S	S	S	S	S	S	-	S	I	-	-	-	-	-	-	-

Legend: R- Resistant; I- Intermediate; S- Sensible.

Table S4. Analyte, flame, laps, wavelength and LOD studied in this work.

Analyte	Flame	Laps	Wavelength ^a (nm)	LOD (Limit of Detection) ^b (µg/L)
Fe	air/ acetylene	Multi element hollow Cathode lamp (Fe; Cr, Cu, Ni and Mn)	248.3	6.2
Cd	air/ acetylene	Multi element hollow Cathode lamp (Cd and Pb)	228.8	3.4
Cr	air/ acetylene	Multi element hollow Cathode lamp (Fe; Cr, Cu, Ni and Mn)	357.9	6.1
Cu	air/ acetylene	Multi element hollow Cathode lamp (Fe; Cr, Cu, Ni and Mn)	324.7	5.4
Pb	air/ acetylene	Multi element hollow Cathode lamp (Cd and Pb)	283.3	42
Li	air/ acetylene	Lithium hollow Cathode lamp	670.8	3.7 ^c
Mg	air/ acetylene	Magnesium hollow Cathode lamp	285.2	30

^a The wave lengths listed are recommended because of their sensitivity and overall acceptability. Other wavelengths may be substituted IF they can provide the needed sensitivity and are treated with the same corrective techniques for spectral interference.

^b These estimated 3-sigma instrumental detection limits¹⁶ are provided only as a guide to instrumental limits. The method detection limits are sample dependent and may vary as the sample matrix varies. Detection limits for solids can be estimated by dividing these values by the grams extracted per liter, which depends upon the extraction procedure. Divide solution detection limits by 10 for 1 g extracted to 100 mL for solid detection limits.

^c Calculated from 2-sigma data.