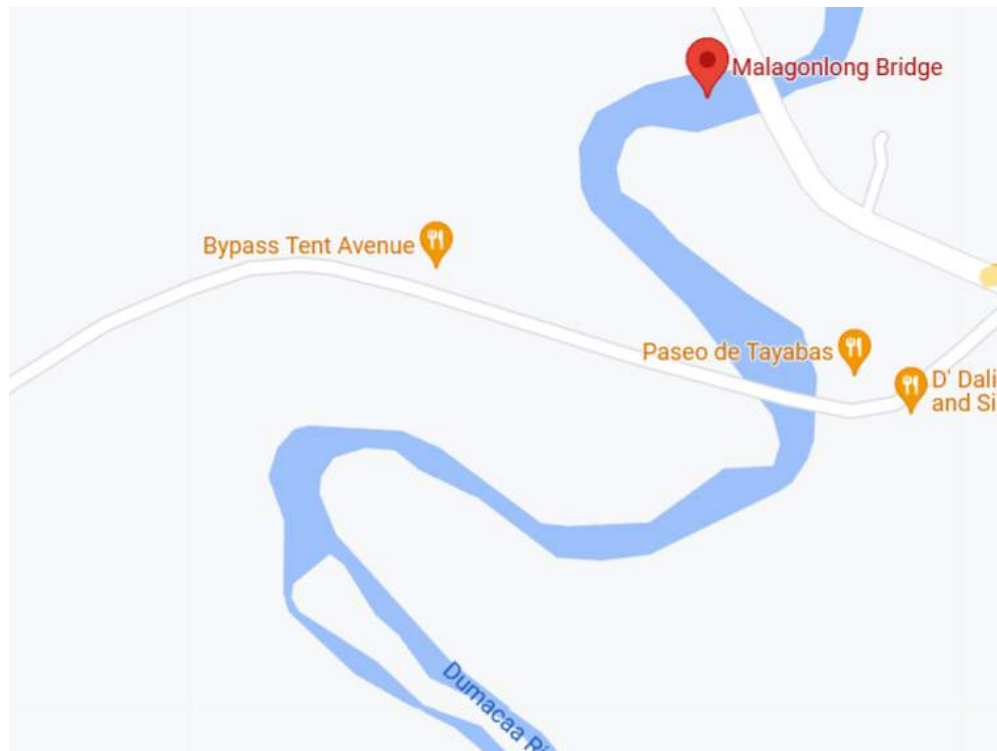


Geo tagging of river



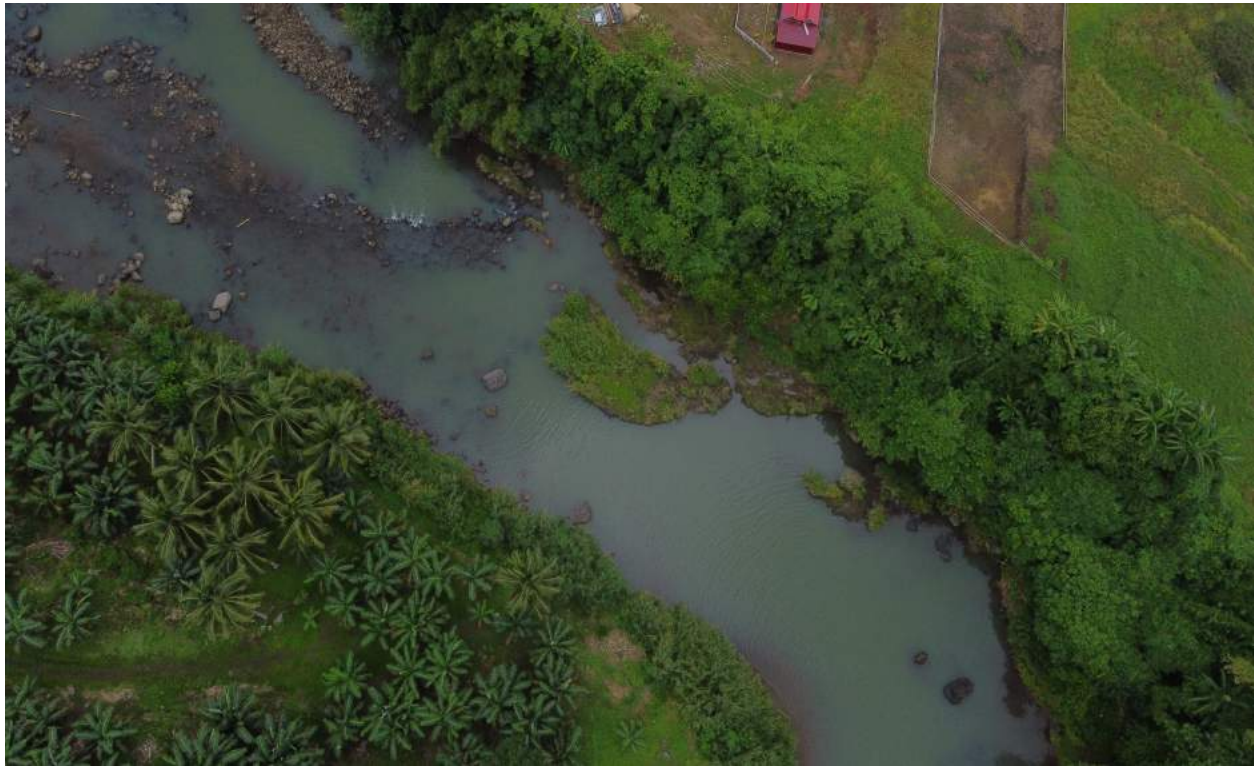
Upper middle part of the river [Section 1-9]



Lower part of the river (urbanize) [Section 10]

River name: Dumacaa River

Location: Lucena city, Quezon, Calabarzon



Section 1	Score	Remarks
Channel Condition	10	No dikes, no structures near
Hydrologic Alteration	10	No dams
Riparian Zone	8	Vegetation extends one active channel along bank
Bank Stability	7	Signs of path near river, banks are low
Water Appearance	3	Cloudiness, pea-green color?
Nutrient Enrichment	3	Greenish water along reach
Barriers to Fish Movement	8	Seasonal water withdrawals inhibit movement within the reach
Instream Fish Covers	3	Cobbles, overhanging vegetation
Pools	3	Less than 3 ft deep pools
Invertebrate Habitat	7	Cobble, boulders , leaf packs
Canopy Cover	3	20-50% shaded
Manure Presence	-	
Salinity	-	
Riffle Embeddedness	8	20-30% embedded cobbles
Macroinvertebrates Observed	-	



Section 2	Score	Remarks
Channel Condition	10	Natural channel, no evidence of dikes construction
Hydrologic Alteration	-	
Riparian Zone	10	Natural vegetation extends at least two active channel widths on each side.
Bank Stability	10	No visible signs of erosion, abundant roots from trees surrounding area
Water Appearance	7	Occasionally cloudy, but relatively clear
Nutrient Enrichment	10	Little algal growth present
Barriers to Fish Movement	10	No barriers present
Instream Fish Covers	3	Debris, cobbles/boulders, riffles
Pools	3	Less than 3 ft. deep
Invertebrate Habitat	7	Potential habitat exists
Canopy Cover	1	<20% of water reach is shaded
Manure Presence	-	
Salinity	-	
Riffle Embeddedness	5	30-40% embedded cobbles
Macroinvertebrates Observed	-	



Section 3	Score	Remarks
Channel Condition	10	Natural channel, no dikes and structures present
Hydrologic Alteration	-	
Riparian Zone	8	Natural vegetation extends one active channel width on each side of the stream
Bank Stability	7	Banks are low, less than 30% of eroding surface area is protected by roots
Water Appearance	3	Cloudy with a moderate odor of ammonia or rotten eggs
Nutrient Enrichment	3	Greenish water along entire reach, abundant algal growth
Barriers to Fish Movement	10	No barriers
Instream Fish Covers	3	Cobbles and deep pool are present
Pools	3	The pool is less than 3 feet deep
Invertebrate Habitat	-	
	-	
Canopy Cover	1	Less than 20% of water surface in reach shaded
Manure Presence	-	
Salinity	-	
Riffle Embeddedness	10	Riffles are less than 20% embedded
Macroinvertebrates Observed	-	



Section 4	Score	Remarks
Channel Condition	7	Evidence of past channel alterations
Hydrologic Alteration	10	No dams, dikes, or other structures
Riparian Zone	10	Natural vegetation extends at least 2 active channel widths
Bank Stability	7	Moderately stable
Water Appearance	3	Considerable cloudiness
Nutrient Enrichment	3	Greenish water along entire reach
Barriers to Fish Movement	8	Seasonal water withdrawals inhibit movement
Instream Fish Covers	3	boulders/cobbles, overhanging vegetation
Pools	3	Pools present but shallow
Invertebrate Habitat	-	
Canopy Cover	1	<20% of water is shaded
Manure Presence	-	
Salinity	-	
Riffle Embeddedness	5	Gravel or cobble particles are 30-40% embedded
Macroinvertebrates Observed	-	



Section 5	Score	Remarks
Channel Condition	7	Evidence of past channel alterations
Hydrologic Alteration	-	
Riparian Zone	8	Natural vegetation extends one active channel
Bank Stability	7	Banks are low
Water Appearance	7	Occasionally cloudy
Nutrient Enrichment	7	Fairly clear or slightly greenish water along reach
Barriers to Fish Movement	8	Seasonal water inhibit movement
Instream Fish Covers	5	Boulders, overhanging vegetation, riffles, Thick root mats
Pools	1	Bottom is discernible
Invertebrate Habitat	3	Cobble, boulders
Canopy Cover	1	<20% of the water is shaded
Manure Presence	-	
Salinity	-	
Riffle Embeddedness	5	Gravel or cobble particles are 30-40% embedded
Macroinvertebrates Observed	-	



Section 6	Score	Remarks
Channel Condition	7	Evidence of past channel alteration (change in water elevation)
Hydrologic Alteration		
Riparian Zone	8	At least one active channel width vegetation on each side
Bank Stability	10	Stable low banks, no sign of erosion abundant trees along banks
Water Appearance	3	Greenish water color/appearance
Nutrient Enrichment	3	Greenish water along water reach,
Barriers to Fish Movement	5	Shallow drop present (<1 ft)
Instream Fish Covers	5	Overhanging vegetation, cobbles, pools, thick roots, riffles
Pools	7	At least 3 ft deep pools
Invertebrate Habitat	7	Cobble, boulders, coarse gravel
Canopy Cover	-	
Manure Presence	-	
Salinity	-	
Riffle Embeddedness	8	Cobbles/gravel are 20-30% embedded.
Macroinvertebrates Observed	-	



Section 7	Score	Remarks
Channel Condition	10	Natural channel; No dikes or structures nearby
Hydrologic Alteration	7	Limited channel incision
Riparian Zone	8	Natural vegetation extends one active channel width on each side
Bank Stability	7	Banks are low
Water Appearance	3	Objects are visible to depth 0.5 to 1.5 ft
Nutrient Enrichment	3	Greenish water along entire reach
Barriers to Fish Movement	8	Seasonal water withdrawals
Instream Fish Covers	3	Cobbles, isolated backwater pools
Pools	3	Pools present but shallow
Invertebrate Habitat	-	
Canopy Cover	1	<20% of water is shaded
Manure Presence	-	
Salinity	-	
Riffle Embeddedness	8	20-30% embedded
Macroinvertebrates Observed	-	



Section 8	Score	Remarks
Channel Condition	7	Evidence of past channel alteration due to built structure along the reach
Hydrologic Alteration	-	
Riparian Zone	8	Natural channel extends one active channel width on each side
Bank Stability	10	Banks are low, more than 33% is protected by roots
Water Appearance	3	Considerable cloudiness, moderate odor of ammonia
Nutrient Enrichment	3	Greenish water along reach, abundant algal growth
Barriers to Fish Movement	5	Drop structure is present
Instream Fish Covers	3	Riffles and cobbles are present
Pools	3	Pools are less than 3 feet deep
Invertebrate Habitat	3	Cobbles and boulders are present
	-	
Canopy Cover	-	
Manure Presence	-	
Salinity	-	
Riffle Embeddedness	5	Cobbles are 30% to 40% embedded
Macroinvertebrates Observed	-	



Section 9	Score	Remarks
Channel Condition	10	Natural channel; no structures, dikes.
Hydrologic Alteration	7	Limited channel incision; withdrawals, although present, do not affect available habitat for biota
Riparian Zone	8	Natural vegetation extends one active channel width on each side
Bank Stability	7	Moderately stable; banks are low (at elevation of active flood plain)
Water Appearance	3	Considerable cloudiness most of the time; objects visible to depth 0.5 to 1.5 ft;
Nutrient Enrichment	3	Greenish water along entire reach
Barriers to Fish Movement	8	Seasonal water withdrawals inhibit movement within the reach
Instream Fish Covers	3	Boulders/cobble, isolated/backwater pools
Pools	3	Pools present, but shallow
Invertebrate Habitat	-	
	-	
Canopy Cover	-	
Manure Presence	-	
Salinity	-	
Riffle Embeddedness	8	Gravel or cobble particles are 20 to 30% embedded.
Macroinvertebrates Observed	-	



Section 10	Score	Remarks
Channel Condition	7	Past channel alteration with the presence of dikes
Hydrologic Alteration	-	
Riparian Zone	1	Filtering function is severely compromised
Bank Stability	7	Moderately stable banks, less than 33% of eroding area is protected by roots
Water Appearance	7	Occasionally cloudy with slight green color
Nutrient Enrichment	7	Fairly clear and slightly greenish water
Barriers to Fish Movement	8	Seasonal water withdrawals are inhibited
Instream Fish Covers	3	Deep pool and cobbles present
Pools	10	Deep and shallow pools abundant, at least 5 feet deep
Invertebrate Habitat	3	Cobbles are present
Canopy Cover	1	Less than 20% of water surface in reach shaded
Manure Presence	-	
Salinity	-	
Riffle Embeddedness	1	Riffle is completely embedded
Macroinvertebrates Observed	2	Community is dominated by tolerant species

Criteria	Section										Average
	1	2	3	4	5	6	7	8	9	10	
Channel Condition	10	10	10	7	7	7	10	7	10	7	8.5
Hydrologic Alteration	10	-	-	10	-	-	7	-	7	-	8.5
Riparian Zone	8	10	8	10	8	8	8	8	8	1	7.7
Bank Stability	7	10	7	7	7	10	7	10	7	7	7.9
Water Appearance	3	7	3	3	7	3	3	3	3	7	4.2
Nutrient Enrichment	3	10	3	3	7	3	3	3	3	7	4.5
Barriers to Fish Movement	8	10	10	8	8	5	8	5	8	8	7.8
Instream Fish Covers	3	3	3	3	5	5	3	3	3	3	3.4
Pools	3	3	3	3	1	7	3	3	3	10	3.9
Invertebrate Habitat	7	7	-	-	3	7	-	3	-	3	5
Canopy Cover	3	1	1	1	1	-	1	-	-	1	1.3
Manure Presence	-	-	-	-	-	-	-	-	-	-	
Salinity	-	-	-	-	-	-	-	-	-	-	
Riffle Embeddedness	8	5	10	5	5	8	8	5	8	1	6.3
Macroinvertebrates Observed	-	-	-	-	-	-	-	-	-	2	2

Overall Average: **5.5 (Poor)**

Suspected Causes of Observed Problems

1. There are very limited fish covers available for habitat. Cobbles/boulders and riffles are the only observed forms of fish cover along the river.
2. Pools present in the river are too shallow to serve as resting and feeding sites for fishes.
3. Greenish water is also observed in the stream which can be attributed to the excessive nutrients such as nitrogen and phosphorus being washed into the river that promotes algal growth.

Recommendations

1. Construct wetlands to remove nitrate through denitrification.
2. Controlling the drainage system may reduce the amount of water drained, thus minimizing the amount of nitrate transported in the water.
3. Clearing the body of water of obstructions and pollutants can aid the amount of water it is able to discharge.
4. Proper waste management for urban settlements within the vicinity of the river