

## River Remediation

### Sungai Merlimau, Malaysia

#### Background

Pollution in the Sungai Merlimau has been an ongoing problem and is impacting fish harvests, making it difficult for fisherman in the area to make a living.

The primary pollutant in the Sungai Merlimau is oil and grease contamination on the river's surface, which is impacting a number of key water quality parameters. Prior to treatment, the dissolved oxygen (DO) saturation parameter at the sampling location was only 6.8%, indicating a heavy organic pollutant load. There are several sources of pollution in the river, including surface runoff from both a factory and a university located upstream from the sampling location.

In an effort to improve the water quality in the river, FastTrack Resources carried out a validation program using BiOWiSH™-Aqua FOG. FastTrack used BiOWiSH™-Aqua FOG to enhance the oxidative capacity of the river system's existing biology. For the trial they filled small bags with BiOWiSH™-Aqua FOG and hung them from wooden sticks in the river. FastTrack measured oil and grease levels, Ammonia Nitrogen (NH<sub>3</sub>-N) levels and DO levels at both the inlet and outlet points before treatment began and again every two weeks during the treatment period. All indicators, including aesthetics, showed improvements during the testing period.



*Oil and grease contamination on the river's surface*

#### About BiOWiSH™-Aqua FOG

BiOWiSH™-Aqua FOG effectively digests fat, oil and grease along with suspended solids, nitrogenous waste and a wide range of contaminants, providing a cost effective platform for the remediation of polluted waterways.

BiOWiSH™-Aqua FOG is highly recommended for waterways with high concentrations of fats, oils, greases or hydrocarbons.

#### Benefits

- Breaks down hydrocarbon film on water bodies
- Improves water quality
- Removes, does not mask, odors
- Long shelf life
- 100% natural and non-toxic

#### Available Sizes

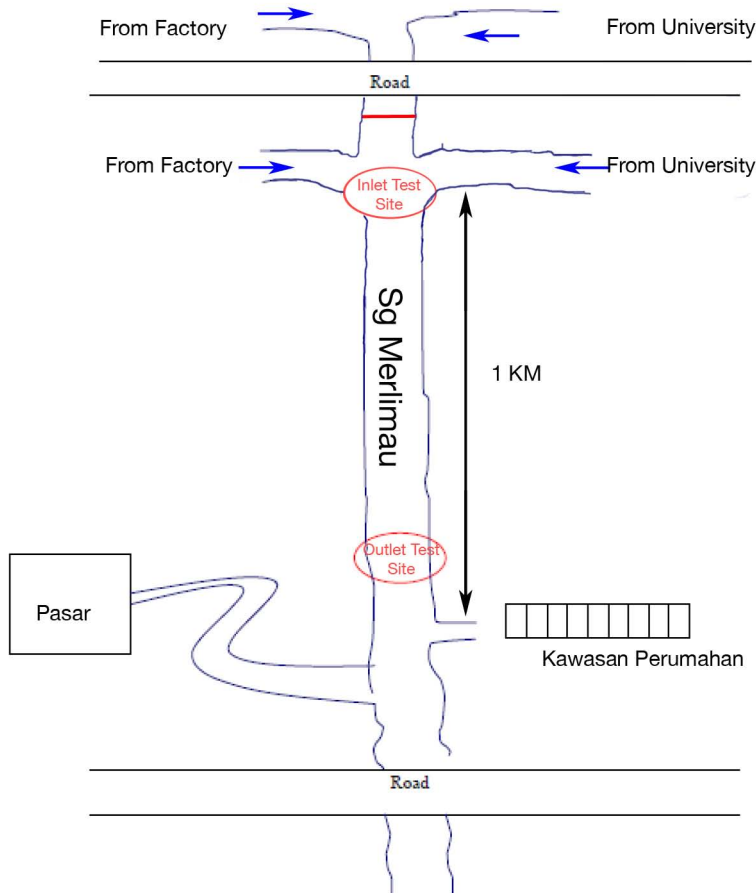
- 100g
- 1kg



## Objectives

Improve the overall water quality of the Sungai Merlimau by

- reducing oil and grease (O&G)
- reducing Ammonia Nitrogen (NH<sub>3</sub>-N)
- using microbial activity to reduce organic waste currently covering the river.



## Solution

BiOWiSH™ is a powerful composite biocatalyst that helps enhance the oxidizing capacity of existing bacteria to degrade pollutants in rivers and other waterways. The net result is enhanced water quality parameters. Developed using the core BiOWiSH™ technology, BiOWiSH™-Aqua FOG is a water treatment product that enhances complex biological pathways and thus enables substrate oxidation much faster than independent biological or enzymatic remedies. Additionally, the biocatalysts are significantly more robust in the treatment of multiple substrates.

BiOWiSH™-Aqua FOG is also 100% natural and safe to handle, activate and dose.

## About Dissolved Oxygen (DO)

A Dissolved Oxygen (DO) reading is an important way of determining the health of an aquatic ecosystem. All aquatic life depends on oxygen for survival; therefore an acceptable DO level is necessary to maintain a thriving waterway.

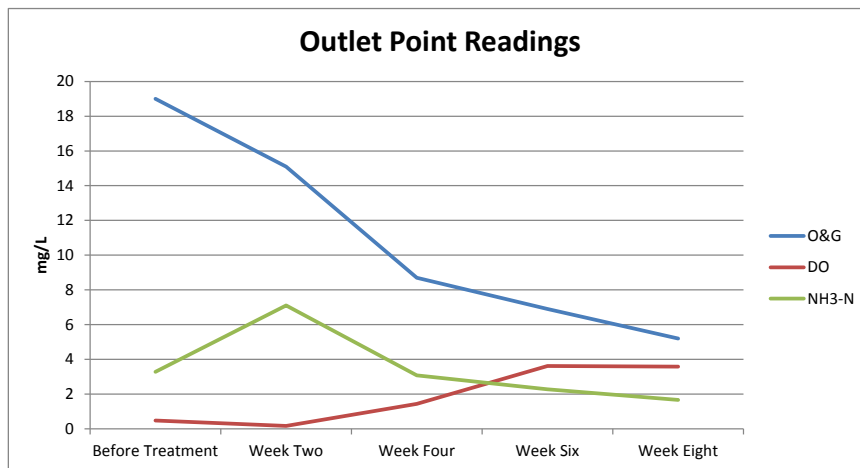
In a healthy stream, the DO measurement is typically between 5 and 12 mg/l. It is normal for this reading to fluctuate in a 24 hour period by as much as 10 mg/l. A higher number is better when it comes to DO measurements. Aquatic life can be compromised if the DO drops below 5 mg/l. A DO level below 2 mg/l can result in large-scale fish kills in just a few hours.

## Results

After two months of treatment, BiOWiSH™-Aqua FOG improved the water quality index in the river system by up to 55 % (based on the WQI data), improving to Class III based on the Water Quality Standards index. The O&G parameter, NH3-N levels and DO levels all showed improvement.

Comparison Water Quality Index								
Parameter Outlet point								
	pH	BOD	COD	TSS	NH3-N	DO%	WQI	Class
<b>Before Treatment</b>	5.83	20.5	37.5	26	3.28	6.80%	40	IV
<b>After 8 Weeks</b>	6.00	14	18.7	15	1.67	49.00%	62	III
<b>Efficiency</b>	Nil	-32%	-50%	-42%	-49%	+620%	+55%	

## Key Parameters



Parameter Outlet	O&G	DO	DO%	NH3-N
<b>Before Treatment</b>	19	0.48	6.80%	3.28
<b>Week Two</b>	15.1	0.17	2%	7.1
<b>Week Four</b>	8.7	1.44	18%	3.08
<b>Week Six</b>	6.9	3.62	50.70%	2.28
<b>Week Eight</b>	5.2	3.58	49%	1.67

Water Quality Index					
Class	I	II	III	IV	V
<b>Ammonical Nitrogen</b>	< 0.1	0.1 - 0.3	0.3 - 0.9	0.9 - 2.7	> 2.7
<b>BOD</b>	< 1	1 - 3	3 - 6	6 - 12	> 12
<b>COD</b>	< 10	10 - 25	25 - 50	50 - 100	> 100
<b>Dissolved Oxygen (mg/L)</b>	< 7	5 - 7	3 - 5	1 - 3	< 1
<b>pH</b>	< 7	6 - 7	5 - 6	< 5	> 5
<b>Total Suspended Solids</b>	< 25	25 - 50	50 - 150	150 - 300	> 300
<b>Water Quality Index</b>	> 92.7	76.5 - 92.7	51.9 - 76.5	31.0 - 51.9	< 31.0

## Dosing & Implementation

BiOWiSH™-Aqua FOG powder was placed into porous bags and held in place in the river using wooden sticks.



A retention treatment area was set up to increase the micro-retention rate and air blowers were brought in to increase oxidation in the river and to enhance the digestion process of organic waste.



*Retention treatment area allows more time for the biocatalysts to break down pollutants*



*Air blowers create more oxygen for the biocatalysts to digest waste*

**BiOWiSH™**

The World's most powerful Biocatalyst

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## Conclusion

After two months of treatment, BiOWiSH™-Aqua FOG improved the water quality index in Sungai Merlimau, demonstrating the efficacy of BiOWiSH™ technology in assisting in river remediation projects. The river sampling test results indicated improvement in every measured water quality parameter compared to measured baseline data. Unfortunately the low retention time between the between the inlet and outlet measuring points limited the ability of the sampling program to capture the full benefit to the river system. It is important to note that the biocatalysts will continue to enhance the ability of the existing biology to degrade the organic waste well past the second sampling point. Even so, the limited retention time was enough to allow significant enhancement of the river water quality parameters, moving from a level IV to a level III WQI quality level.

## Contacts

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