

” The treasure of microalgae in industrial effluent management

Questions/issues	Masese (Men)	Kasenyi (Men)	Gaba (Men)	Kikondo (Women)
Do you know what algal blooms ”Mubiru” are?	They all know. They know from observation and indigenous knowledge. Others say the name, “Mubiru “ came from Mamba clan.	They all know what algal blooms are.	They are aware about algal blooms.	They all know about algal blooms since they use Lake water for domestic purpose.
During which season do you notice algal blooms?	They intimated that, “Mubiru is seasonal especially when the temperature of the water is high , a phenomena called “ kaliro”, then algal bloom is formed. This happens both during rainy/dry season. They don’t know what causes that high temperatures under water.	They indicated that high concentration used to be in March and July but now the blooms are not seasonal, though not permanent stays for at least 4-6 hours and there are no diurnal variations. However due to flower plantations near the shoreline, the concentration of algae has increased implying that the fertilisers, herbicides and	Algal blooms comes when the lake is stratified without that mixing wind locally termed ,”Mugunda”	Algal blooms are mainly seen in the period of Deceember, January, February, and March especially when there is a lot of heat in the water. Diurnal variation is not there so long as there is wind

	<p>The bloom can be there only lasting for 2-3 days then it disappears.</p>	<p>pesticides from the flower gardens proliferates algal blooms . They also intimated that pollution fro riparian factories has exacerbated algal blooms</p>		
<p>What do you think causes algal blooms ''Mubiru'' ?</p>	<p>They say algal bloom is not connected to wastes from factories only because even far offshore they exist. They say its proliferated by defeacation in the lake, throwing of wastes of all types in water (Plastic bags , plastic water bottles, domestic wastes , and fish offals),bathing, washing clothes/cars with soap/detergents. Irrespective of time of day, it can disappear and</p>	<p>Some fishers think algal blooms are due to submerged plants losing their green colours to the water and thence the green colour of water.</p> <p>Some fishers believe that there is a period when the water becomes hot ,''Kaliro''that is the onset of algal blooms.</p>	<p>Theory advanced for algal bloom is that its due to pollution of water and scarcity of papyrus plants that used to filter dirt from waste water that enters the Lake.</p> <p>They believe that Nakivubo channel discharges dirty/polluted water directly into the Lake through runoffs.</p> <p>They also believe that NWSC discharges its waste water</p>	<p>They believe algal blooms comes due to pollution from sewage that drains up to the landing sites.</p> <p>They also believe that when aquatic plants rot they also cause algal blooms.</p> <p>Others say its caused due to presence of municipal abbaitore,''Lufura'' that drains its wastes water from offals directly to the Lake hence forming algal blooms.</p>

	reappear after 2 months.		<p>into the lake after treatment.</p> <p>They also say the there are some people that throw wastes directly into the water system .</p> <p>There is stalk pile of firewood within the landing whose debris also find its way into water system</p> <p>There is also stalk pile of lake and pit sand for building both for inland and island purpose</p>	Another school of thought is that its caused due to terrestrial and municipal runoffs that enters the lake.
What are the major effects of algal bloom ''Mubiru'' in your livelihoods?	<p>The major effects of algal blooms on :</p> <p>1. Domestic source of drinking water.</p> <p>Algal blooms affects domestic source of</p>	<p>The major effects of algal blooms on :</p> <p>1. Domestic source of drinking water.</p> <p>Makes the water very dirty and many find it unfit for any domestic</p>	<p>The major effects of algal blooms on :</p> <p>1. Domestic source of drinking water.</p> <p>Makes the water very dirty and many find it unfit for any</p>	<p>The major effects of algal blooms on :</p> <p>1. Domestic source of drinking water.</p> <p>60% of women of Kikondo use lake water for</p>

	<p>drinking water as the water becomes green/ dirty, smelly and gelatinous-jelly like. They have to filter and boil it in order for it to be used for any domestic purposes. They fear that consumption of this water in the long run may have health impacts.</p> <p>2. Fish abundance catches and fish kills.</p> <p>The fishers believe around this time the catches of tilapia fish is high and that of Nile perch is low. This could be corroborated scientifically due to presence of food for the Tilapia and low oxygen</p>	<p>use.</p> <p>2. Fish abundance catches and fish kills.</p> <p>Though the catches may be high especially of tilapia fish, the rate of spoilage is high as well. The fish traders experience losses while processing the fish (smoking).The flesh of the fish crumbles during smoking process hence losses as fish is not whole.</p>	<p>domestic use.</p> <p>2. Fish abundance catches and fish kills.</p> <p>They indicated that during algal blooms which causes water to become hot fish catches become low and fish becomes scarce .With algal bloom the catches (CPUE) can be as low as 5</p>	<p>domestic purposes, but when algal bloom is present the water cannot be used for any domestic use like drinking for humans and domestic animals, bathing, cooking, brewing, and washing of clothes.</p> <p>During algal blooms other expensive alternative sources of waters are resorted to and one is spent on fuel sources like firewood and charcoal to boil water.</p> <p>Expenses in water purchase is increased, they have to buy each jerrycan for 500 shs . Each family</p>
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	<p>concentration to the Nile perch. They also say the catches are high because the fish become agitated due to low oxygen concentration heat and run into nets due to confused state of the mind.</p> <p>However, fish spoilage around that time is high due to the excessive heat, “Kaliro” within the water. So the fishers encounter loses. The numbers of fishing days is reduced from 7 to 4 days. The life span of net is reduced from 3 months to 1 month since the algae clogs on the net and has to be washed every now and then. They</p>	<p>During algal blooms a fisher can get 100 kg/ day and without can be 40 kg/ day.</p>	<p>kg per fisher per night, while without can be 100kg per fisher per night.</p> <p>Household fish consumption also reduces as fish are scarce and expensive (increased price of fish)</p> <p>Cost of fishing is increased as more fuel is needed to locate areas without algae</p> <p>When the bloom is thick, fishing activities is impeded in cover areas at least for 4 days till when wind blows it out from the bay.</p>	<p>spends from 2000/= to 5000shs everyday.</p> <p>For mukene fishers, when catches are delivered during algal blooms, the catches have to be washed before spread. Each basin of mukene takes approximately 2 jerrycans of water for washing and an average of 16 jerrycans of water is used to wash mukene per fisher costing an average of 8000/= per day per fisher</p> <p>2. Fish abundance, catches and fish kills.</p> <p>When there is no algal blooms one can get 30 basins of mukene per day in their</p>
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	<p>also experience fish kill which might be due to anoxic conditions and excessive heat.</p> <p>3. Recreational activities</p> <p>Recreational activities such as swimming is impeded as the water itches the skin and causes wound when in</p>	<p>3. Recreational activities</p> <p>(Same as for Masese)</p>	<p>Life span of fishing nets is reduced from 1 yr to 2 weeks as nets have to be washed all the time and clogging on the boat increases rotting of wood.</p> <p>Labour for washing nets is increased from 100,000 shs without algal bloom to 200,000/= with algal bloom</p> <p>Income accrued per day from fishing is reduced.</p> <p>3. Recreational activities</p> <p>Recreational activities such as swimming is impeded as the water itches the skin and causes wound when in contact</p>	<p>season. But with Blooms only 8 basins are caught</p> <p>Fishing expense is increased as more fuel is needed for engine and laps and yet the catches would be low.</p> <p>Where there is heavy density, it causes fish kills, and migration of fish to more offshore waters especially mukene.</p> <p>It also increases post harvest losses due to fast spoilage.</p> <p>3. Recreational activities.</p> <p>Swimming and bathing in the Lake water is impeded as the water becomes heavy and it itches the skin.</p>
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	<p>contact with skin surface. The fishers apply Vaseline on the skin surface to remedy the effect of itching, that is an extra cost to fishers and those carrying recreational activities.</p> <p>4. Presence of diseases. The fishers believe that the skin itching they get can transform to another disease. They also complain of stomach ache-typhoid when water is</p>	<p>4. Presence of diseases. (Same issue as Masese)</p>	<p>with skin surface. These reduces on the income accrued especially of people in tourism business (Beaches)</p> <p>4.Presence of diseases. The fishers believe that the skin itching they get can transform to another disease. They also complain of stomach ache-typhoid ,diarrhoea when water is consumed without</p>	<p>4.Presence of diseases. It causes skin itching, wounds on skin surface once in contact with. When consumed raw or boiled it causes stomach aches and diarrhoea</p>
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	<p>consumed without boiling. Others say that," mubiru" form a good habitat for snail carrying host for bilharzia.</p>		<p>boiling. Others say that," mubiru" form a good habitat for snail carrying host for bilharzia.</p> <p>Algal bloom is also associated with a unique macro-invertebrate leechlike that they believe kills fish and they stick on human skin</p> <p>Jelly like substance that forms inside the bloom causes ring worm like diseases on the skin</p>	
<p>Do people cultivate near the shoreline?</p>	<p>Yes, there is growing of Horticultural crops and vegetables along the shoreline. These all need</p>	<p>There is plantation agriculture (Flowers) along the shore line using all the agro-chemicals that end up in the water system</p>	<p>There is a lot of agricultural activities along the shoreline. There is growing of yams, tomatoes, carrots sugarcane,</p>	<p>There are agricultural activities along the shores and catchment areas</p>

	<p>fertilisers and herbicides.</p> <p>Sugar plantation that belong to Kakira extends up to the shoreline around Wairaka bay. They use fertilisers , herbicides and pesticides</p>	<p>when it rains.</p>	<p>and maize some of them use agro-chemicals.</p>	
<p>Is deforestation common around the catchment area?(Probe for charcoal burning, fire wood use)</p>	<p>Deforestation is there but the residual effect is from the opposite landing at Tongolo. Charcoal and firewood business is evident at the landing sites. There is huge stalk pile of charcoal wastes at the landing.</p>	<p>Deforestation is common as most vegetation are being removed to allow for constructions of houses, building of boats and for charcoal /firewood.</p>	<p>Stalk pile of firewood within the landing is evident of deforestation within and around the catchment area.</p>	<p>Deforestation is common due to charcoal burning, firewood house construction, and boat building</p>
<p>How many people are involved in brick making,/ sand mining</p>	<p>Immediately at the landing site, there are few brick makers but 2 k away there are a number of them.</p>	<p>Sand mining was very common along the shores but now has reduced</p>	<p>Sand mining is also common in the catchment areas and sand stalk pile is at the landing.</p>	<p>Sand mining is also common in the catchment areas and beyond.</p>

<p>Do domestic animals (cattle, pigs goats etc) graze/feed along the shore line?</p>	<p>Yes, they do graze around the shoreline and drink lake water. They include cattle, goats and pigs.</p>	<p>There are domestic animals that graze along the shoreline and drink lake water. They include cattle, goats and pigs.</p>	<p>There are domestic animals that graze along the shoreline and drink lake water. They include cattle, goats and pigs.</p>	<p>There are domestic animals that graze along the shoreline and drink lake water. They include cattle, goats and pigs</p>
<p>Are there municipal dumping places or landfills around this place?</p>	<p>There is municipal garbage collection point 100 m away from the landing and processing of fish frames, "mugongo wazi" done along the shoreline. Another municipal landfill is 3km away from the shoreline.</p>	<p>Municipal dumping places are not very near but there is plenty of domestic wastes from makeshift hotels that are thrown back into the water system.</p>	<p>Domestic wastes are thrown back into the water .</p>	<p>Domestic wastes are thrown back into the water .</p>
<p>How can pollution that causes algal bloom , "Mubiru" in water be controlled in this community</p>	<p>All those activities that affect the environment negatively should be stopped or monitored. But algal bloom may not be stopped since it is a natural phenomena caused by</p>	<p>All those activities that affect the environment negatively should be stopped or monitored. But algal bloom may not be stopped since it is a natural phenomena caused by , "Kaliro"</p>	<p>All those activities that affect the environment negatively should be stopped or monitored.</p>	<p>All those activities that affect the environment negatively should be stopped or monitored.</p>

	,"Kaliro"			
Are there any perceived benefits associated with presence of "mubiru" on water?	To a certain extent yes since the catches especially for Tilapia are high for reasons advanced above.	To a certain extent yes since the catches especially for Tilapia are high for reasons advanced above.	They don't see any benefits with the Algal blooms.	They don't see any benefits with the Algal blooms.