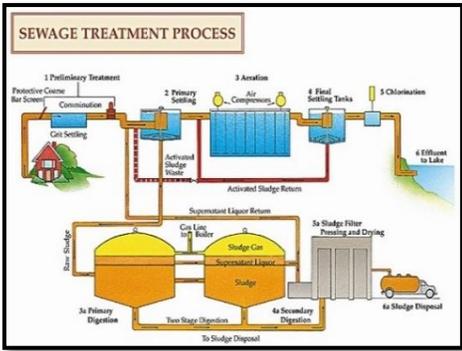
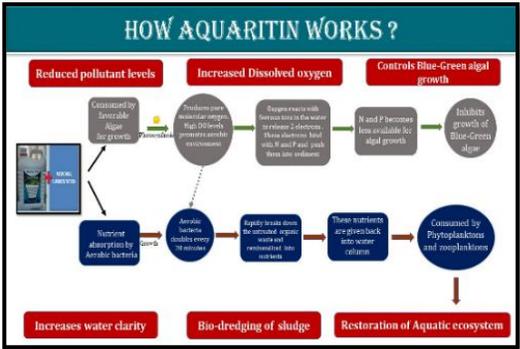
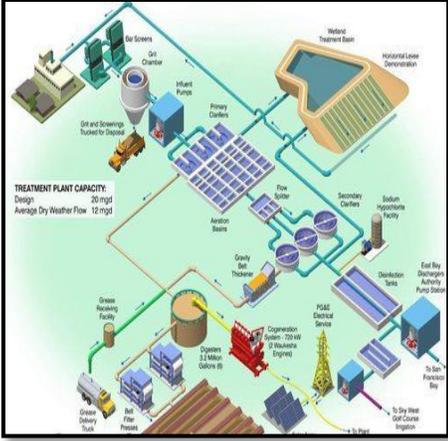


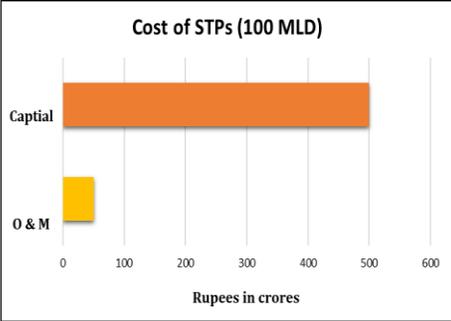
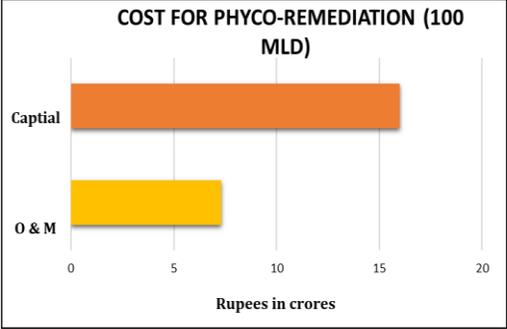
COMPARISON OF WASTEWATER TREATMENT BY

SEWAGE TREATMENT PLANT V/S PHYCO-REMEDICATION

This Table gives a brief comparison of wastewater treatment executed by Sewage Treatment Plants (*Ex Situ*) versus Phyco-remediation (Treating wastewater by using algae, *In situ*). In this case, we use 4th Generation Nano-nutrient intervention (Aquaritin) to promote the growth of Diatom algae and restore the base of the Aquatic food web.

Ser. No	ATTRIBUTE	SEWAGE TREATMENT PLANTS	PHYCO-REMEDICATION
1.	TREATMENT PROCESS	<ul style="list-style-type: none"> STPs remove contaminants from wastewater, including household sewage and effluents. It includes physical, chemical, and biological processes to remove contaminants. Its objective is to produce an environmentally safe fluid waste stream (or treated effluent) and a solid waste (or treated sludge) suitable for disposal or reuse.  <p>The diagram illustrates the Sewage Treatment Process, starting with Preliminary Treatment (1) involving coarse bar screens and comminution, followed by Primary Treatment (2) with primary settling tanks. It then moves to Aeration (3) with air compressors, then to Final Settling Tanks (4) where activated sludge is returned. The process concludes with Chlorination (5) and Effluent to Lake. A separate path shows Sludge Handling: Primary Sludge (3a) goes to Primary Digestion, while Secondary Sludge (4a) goes to Secondary Digestion. Both paths lead to Sludge Thickening (5a), Sludge Filter Pressing and Drying, and finally Sludge Disposal.</p>	<ul style="list-style-type: none"> Phyco-remediation removes contaminants from waste-water through restoration of phytoplankton spectrum at the base of aquatic food web. Such restoration induces molecular oxygen in the wastewater which supports rapid degradation of organic matter.  <p>The flowchart 'HOW AQUARITIN WORKS?' shows a cycle: Aquaritin (containing traceable algae for growth) is added to wastewater. This leads to 'Increased Dissolved oxygen' as algae produce oxygen. Simultaneously, 'Reduced pollutant levels' occur as algae consume pollutants. The process also 'Controls Blue-Green algal growth' by inhibiting their growth. Finally, 'Restoration of Aquatic ecosystem' is achieved as phytoplankton and zooplankton consume the algae, leading to 'Bio-tredling of sludge' and 'Increases water clarity'.</p>
2.	TREATMENT CAPABILITY	<ul style="list-style-type: none"> Treatment through STPs generally improves water quality (BoD and CoD), but lacks in treating Ammonia, Nutrients (Nitrogen & Phosphorus), Sludge and Heavy metals. 	<ul style="list-style-type: none"> Phyco-remediation results not only in improvement of water quality but also leads to reduction of Ammonia, Nutrients (Nitrogen & Phosphorus), precipitation of metals, as well as absorption of heavy metals by Diatoms. It also progressively

			<p>reduces sludge (in-situ) and therefore reducing cost for deploy for dredging.</p> 
3.	GESTATION PERIOD	<ul style="list-style-type: none"> New STPs may take many years for Conceptualization, Preparation of DPR & PBC, and then setting to work. Whereas Indian infrastructure requires timeline well beyond 5 years. 	<ul style="list-style-type: none"> period is low and remitted to mobilization of men & material may be 2-4 weeks only. The water body would have achieved significant improve in water quality and its ecosystem even before STP would set to work. 
4.	COST	<ul style="list-style-type: none"> Cost for setting up of STP would include machines, installation, maintenance, civil works, labour and power supply for running the STP. Such cost may exceed Rs. 5 Crore/MLD. Wherein Indian infrastructure involved cost may go high significantly. For example: Consider setting up a STP having capacity of 	<ul style="list-style-type: none"> For Phyco-remediation, the capital cost is limited to few dosing & lighting station along the length of the River/Drain at precision of dosing vehicle and equipment. For example: Consider Phyco-remediation of 100 MLD River/Drain. The capital and mobilisation cost would be less than Rs. 16 crores. The O&M cost is about Rs.7.3 crore for a 100MLD waste

		<p>treating 100 MLD wastewater the Capital cost would be Rs.500 crores, and O&M cost of 10% which is Rs.50 crore/Year.</p>  <table border="1"> <caption>Cost of STPs (100 MLD)</caption> <thead> <tr> <th>Category</th> <th>Cost (Rupees in crores)</th> </tr> </thead> <tbody> <tr> <td>Capital</td> <td>500</td> </tr> <tr> <td>O & M</td> <td>50</td> </tr> </tbody> </table>	Category	Cost (Rupees in crores)	Capital	500	O & M	50	<p>water volume.</p>  <table border="1"> <caption>COST FOR PHYCO-REMEDICATION (100 MLD)</caption> <thead> <tr> <th>Category</th> <th>Cost (Rupees in crores)</th> </tr> </thead> <tbody> <tr> <td>Capital</td> <td>16</td> </tr> <tr> <td>O & M</td> <td>7</td> </tr> </tbody> </table>	Category	Cost (Rupees in crores)	Capital	16	O & M	7
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<p>5.</p>	<p>PUBLIC PERCEPTION ON WATER TREATMENT</p>	<ul style="list-style-type: none"> The wastewater generated has to travel through/around residential area carrying all the contaminants to reach the STPs. This bothers public as the drain becomes source for mosquitoes to breed, emanates odour causing breathing problems.  <p>BINDAL RIVER, DEHRADUN</p>	<ul style="list-style-type: none"> Phyco-remediation technique allows to treat wastewater from the source point. So, people living nearby drains need not to suffer/bother regarding health issues. <p>"I am happy with the fact that the foul odour has disappeared. Now we feel relieved that we don't have a bad smell to counter at home. As far as the number of mosquitoes is concerned, I feel that there has been a 99% reduction in their number. Now, we don't feel so concerned for our kids getting infected with some vector borne disease." (Mr. Sanjay, R/O RZ-162A, Bharamपुरi, East Sagarpur, New Delhi). – PANKHA DRAIN</p>												
<p>6.</p>	<p>IMPACT ON ENVIRONMENT</p>	<ul style="list-style-type: none"> Strong odour from the STP: The smell is often very strong and quite often unbearable. Very high noise levels from the STP: The noise is due to the operation of electrical motors driven equipments such as pumps, air blowers, air compressors, etc. Power consumption: For running the STPs power is 	<ul style="list-style-type: none"> Phyco-remediation balances the excess nutrients in the aquatic ecosystem by enabling the growth of diatoms. The treated water (Type C) can be reused for agricultural purpose. Removes Carbon-Di-Oxide (CO₂) leads to mitigation of the problem of acidification of water. 												

		required.	
7.	IMPACT ON AQUATIC LIFE	<ul style="list-style-type: none"> No direct impact on aquatic life. 	<ul style="list-style-type: none"> Diatoms are natural food for fish. Fish population, protein level and fish mass increases manifold. Aquatic biodiversity index increases. Such bio diversity is critical for rivers.
8.	AMOUNT OF OXYGEN PRODUCED	<ul style="list-style-type: none"> Air is infused into waste water using aerators. Because air contains Nitrogen and carbon dioxide apart from oxygen. Hence pure oxygen is not infused. Oxygen is at macro level. 	<ul style="list-style-type: none"> Pure oxygen at nano scale is generated as a result of photosynthesis performed by the diatoms. A minimum of 200 million mg of pure oxygen is been infused by per liter of Aquaritin. 