VETIVER PONTOONS
FOR WASTEWATER TREATMENT
IN STORAGE PONDS

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INTRODUCTION

Research conducted in several countries has demonstrated that vetiver grass has a very high rate of nutrient uptake under both dry land and wetland conditions.

In addition, due to its origin as a wetland species, vetiver grass also flourishes under hydroponic conditions, where its fine and extensive root system is very active in absorbing nutrients particularly Nitrogen and Phosphorus.

Taking advantage of these unique characteristics, Veticon Consulting has developed a floating system to purify polluted or contaminated water since 1995.

To date the technique of using floating pontoons to treat polluted water has been used successfully in several countries in Australia, Asia and Africa.

In Australia the pontoon system has been used successfully to treat sewage effluent and industrial wastewater.

In China it was used to treat polluted water in lakes and rivers polluted with N and P. In China and Vietnam it was used very effectively to treat piggery effluent.
Vetiver roots under hydroponic conditions

**Left**, A young (2 months) vetiver root system

**Right**, the same root when mature at 6 months.

**Below**, old roots in ponds, normally no longer than 75cm.
SOME EXAMPLES OF PONTOON APPLICATIONS IN AUSTRALIA AND OTHER COUNTRIES
<table>
<thead>
<tr>
<th>Analytes</th>
<th>Untreated Levels (mg/L)</th>
<th>Vetiver Treated Pond Levels (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>9.0 to 9.7</td>
<td>9.4 to 9.7</td>
</tr>
<tr>
<td>Ammonia (N)</td>
<td>1.7 to 9.1 mg/L</td>
<td>0.07 to 0.57 mg/L</td>
</tr>
<tr>
<td>Total Nitrogen (N)</td>
<td>13 to 20 mg/L</td>
<td>6.7 to 7.3 mg/L</td>
</tr>
<tr>
<td>Total Phosphorous (P)*</td>
<td>4.6 to 8.8 mg/L</td>
<td>1.2 to 2.1 mg/L</td>
</tr>
<tr>
<td>Dissolved Oxygen</td>
<td>12.5 to 20 mg/L</td>
<td>9.3 to 20 mg/L</td>
</tr>
<tr>
<td>BOD (5 day)</td>
<td>29 to 70 mg/L</td>
<td>32 to 42 mg/L</td>
</tr>
<tr>
<td>Faecal Coliforms</td>
<td>60 to 800 counts / 100 ml</td>
<td>13 to 580 counts / 100 ml</td>
</tr>
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Australia
Sewage effluent pond
Australia
Sludge leachate pond, Seven months after planting
Australia

Pond on private property in Brisbane, before and 3 months after with Vetiver rafts
Australia

Wastewater pond on a fertilizer factory in Brisbane, Vetiver growth after 3 months
Australia
Wastewater pond on a fertilizer factory in Brisbane, Vetiver growth after 3 months
TREATMENT OF PALM OIL MILL EFFLUENT (POME) SUPERNATANTS

The palm oil industry, apart from being a major foreign exchange earner for Malaysia, is also identified as the single largest source of water pollution. It produces a large volume of highly polluting effluents, for instance, 2.5 tonnes of Palm Oil Mill Effluent (POME) is generated for every tonne of crude palm oil produced.

POME typically has very high total N, averaging 770mg/L (ranging 180-1 820mg/L), low pH 4.1 (3.8-4.5), very high in COD, BOD and Total Suspended Solids

Humibox Sdn Bhd of Malaysia is testing the effectiveness of Vetiver pontoons in treating POME. Results to date are very encouraging:
• Vetiver has thrived in this highly contaminated effluent
• With this growth rate a substantial amount of N would be removed from the effluent
Advanced vetiver plants are used in this specially designed pontoons.
Excellent growth one month after planting
Left, General view of a piggery effluent pond treated with vetiver pontoons and

Right, one month old vetiver growing under nutrient rich piggery effluent
China
Piggery effluent

Madagascar
Polluted urban drain
SOME EXAMPLES OF PONTOON DESIGNS IN AUSTRALIA
RECYCLE PLASTIC MATERIAL, AVOID USING METALLIC PARTS AS THEY WILL RUST (old design)
3 month old plants in pots

The crown
Use only those with good roots and make sure only the roots are in water, the crown has to be above water level.
Australia

Vetiver growth after 3 months on old design pontoons
New pontoons design with recycled synthetic grid bottom and pipes. All are water proof and UV resistant. No metallic parts.

The crown
Put strings on the frame to hold up the plants, leave a gap in between vetiver plants for them to grow into the space. They grow very fast in dirty water.
Australia

Vetiver growth after 3 months on new design pontoons
Australia

Vetiver growth after 3 months on new design pontoons
Bad design, no good, no support for plants and water level too high
Vietnam

Pontoons using bamboo slats and tubes