Objective

Market Size
- 300,000 individuals in local Balt/D.C. area
- Target market size is 80,000 individuals with 2,000 units

Constraints
- Size & dimensions
- Oxygen requirements
- Water
- Access to turnover rate fish
- Adjustable height

Concept Generation

Decision Characteristics & Weights

<table>
<thead>
<tr>
<th>Decision Characteristics</th>
<th>Weight (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size &amp; dimensions</td>
<td>4</td>
</tr>
<tr>
<td>Filtration material</td>
<td>7.6</td>
</tr>
<tr>
<td>Inflow &amp; outflow</td>
<td>26.3</td>
</tr>
<tr>
<td>Height adjustability</td>
<td>49.9</td>
</tr>
<tr>
<td>Cost</td>
<td>12.2</td>
</tr>
</tbody>
</table>

Design

Operation
- Circulates water between aquarium and tray that holds plants
- Slant tray
- 6 lbs of rock per hole

Prototype and Testing

Description of Prototype
- Clear basin with slanted bottom and outflow holes
- Filled with rocks
- Exo Terra Repti Flow 200 circulation pump feeding distribution manifold
- Legs built from PVC pipes

Testing Setup
- Goals: to confirm functionality of the product and to determine a feasible fish to plant ratio
- Four configurations in 8 gallon tanks were tested: 5 goldfish and 2 plants, 5 goldfish and 4 plants, no goldfish and 2 plants, and 5 goldfish with no AquaGarden.
- Levels of ammonia, nitrites, nitrates, pH, and other potentially harmful chemicals were measured daily using test strips.

Test Results and Future Work

Sample Data
- Fig. 8 Plot of test results

Results
- Results inconclusive
- Test strips consistently show water is non-toxic
- Deaths of 6 fish unrelated to water quality; possibly due to disease contracted before purchase
- Plants successfully maintained

Recommendations
- Incorporate overflow wall to keep gravel away from exit holes and prevent blockage
- Add filter wool over exit holes to prevent clogging and to assist in filtration

Summary & Reflections
- Identified features that would make design unique
- Selected one concept from feasible concepts using AHP
- Constructed and tested prototype
- More time needed for testing
- More consultation with experts and research necessary for improvement

ENME472 - Integrated Product and Process Design and Development