

## **Business Coaching Report - Roadmap to TRL 5 and MRL 5 for a Floating Vegetated Island and Biochar Filtration Solution**

### **1. Coaching context**

The coaching request focuses specifically on progressing toward Technology Readiness Level 5 (TRL 5) and Market Readiness Level 5 (MRL 5). For coaching purposes, TRL 5 is treated as validation of an integrated prototype in a relevant lake environment. MRL terminology is less standardised across organisations, so this report uses MRL 5 as a practical market-validation milestone: a clearly defined priority customer, a validated problem, a tested value proposition, evidence of willingness to pay or procure, a credible competitive position, and an initial repeatable business model.

### **2. The customer problem**

The concept should not initially be sold as 'floating islands with biochar'. That describes the mechanism, not the customer problem. The priority customer problem is better framed as the need for a low-impact, modular intervention that can reduce local nutrient or contaminant pressure, improve ecological conditions, and produce measurable evidence of restoration performance without requiring major civil works.

The first commercial use case should therefore focus on lake areas where conventional restoration is costly, disruptive, slow to procure, or difficult to apply at small scale. Examples include near-shore eutrophication zones, inflow areas, marinas, urban lake edges, restoration demonstration sites, or locations where localised treatment can complement catchment-level measures.

### **3. Recommended initial customer segments**

| <b>Customer segment</b>                       | <b>Main problem</b>                                                           | <b>Role</b>                           | <b>Priority</b> |
|-----------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------|-----------------|
| Municipalities / lake authorities             | Need visible, measurable restoration interventions with manageable deployment | Primary paying customer               | Very high       |
| Restoration projects / environmental agencies | Need pilotable solutions and performance evidence                             | Project customer / pilot host         | Very high       |
| Environmental engineering firms               | Need complementary nature-based treatment options                             | Channel / delivery partner            | High            |
| Protected-area managers                       | Need low-impact interventions compatible with ecological constraints          | Customer / co-design partner          | High            |
| Research organisations / NGOs                 | Need field experimentation and restoration evidence                           | Validation partner / project customer | Medium          |

#### 4. Technology roadmap to TRL 5

Reaching TRL 5 requires more than demonstrating that plants grow on a floating structure or that biochar adsorbs pollutants in laboratory conditions. The integrated system must function as a coherent prototype in a relevant environment, and the test must generate evidence on performance, reliability, maintenance and environmental compatibility.

| Technical workstream | Required action                                                                                 | Evidence to collect                                     | TRL 5 gate                                    |
|----------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------|-----------------------------------------------|
| System architecture  | Define island module, buoyancy, anchoring, root zone, biochar chamber and water-contact pathway | Engineering drawings, bill of materials, failure modes  | Integrated prototype specification            |
| Media selection      | Compare biochar types, particle size, containment and replacement method                        | Adsorption / nutrient-removal tests and leaching checks | Selected media configuration                  |
| Vegetation           | Select native or appropriate species for target conditions                                      | Survival, root development, seasonal performance        | Stable planted module                         |
| Hydraulic exposure   | Define how lake water interacts with biochar and roots                                          | Flow, contact time, clogging and bypass observations    | Functional treatment pathway                  |
| Field validation     | Deploy in one relevant lake zone with control/reference measurements                            | Before/after and treatment/control trends               | Evidence of effect under realistic conditions |
| Operations           | Test inspection, maintenance, media replacement and winter/seasonal resilience                  | Maintenance time, faults, replacement frequency         | Documented operating protocol                 |

#### 5. Design of the TRL 5 pilot

The pilot should be deliberately narrow. The entrepreneur should select one dominant problem and one principal outcome rather than trying to prove simultaneous removal of nutrients, metals, suspended solids and multiple ecological benefits. For example, an eutrophication-oriented pilot could focus on phosphorus-related pressure and local water-quality improvement, while a contaminant-oriented pilot would require a different biochar specification, analytical method and safety case.

A credible field protocol should include a baseline period, clearly defined treatment and comparison locations, repeated sampling, weather and hydrological context, documented maintenance events, and a transparent statement of what can and cannot be attributed to the prototype. Where laboratory analysis is required, an accredited or otherwise credible analytical partner should be involved.

## 6. Market roadmap to MRL 5

The market-readiness pathway should run alongside the pilot. The objective is to leave the TRL 5 demonstration not only with technical data, but also with evidence that a defined customer values the result enough to fund a larger deployment or a second pilot.

| <b>MRL<br/>workstream</b>  | <b>Coaching action</b>                                                                             | <b>Evidence required</b>                                                | <b>MRL 5<br/>outcome</b>    |
|----------------------------|----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-----------------------------|
| Problem validation         | Interview 10-15 lake managers, municipalities and restoration practitioners                        | Repeated evidence of costly or insufficient current options             | Priority problem confirmed  |
| Customer selection         | Compare urgency, budget ownership, procurement route and pilot openness                            | One primary segment selected                                            | Clear beachhead market      |
| Value proposition          | Test outcome-based messages rather than technology descriptions                                    | Customers rank benefits and objections                                  | Validated value proposition |
| Competition / alternatives | Map engineering, dredging, aeration, chemical treatment, wetlands and passive nature-based options | Customer view of strengths, weaknesses and switching barriers           | Defensible positioning      |
| Willingness to pay         | Present a defined pilot package with indicative price and scope                                    | Budget discussion, letter of interest, paid pilot or procurement signal | Commercial evidence         |
| Business model             | Test sale, lease, restoration-as-a-service and partner-delivered models                            | Preferred contracting mechanism                                         | Initial repeatable model    |

## 7. Recommended value proposition

The strongest initial value proposition is not that the solution is 'natural' or 'innovative', but that it provides a modular, visible and measurable restoration intervention that can be installed in targeted lake zones with lower physical disruption than major engineering works.

A possible value proposition is: For lake authorities and restoration programmes that need practical interventions in localised degraded zones, the solution provides modular floating vegetated treatment units enhanced with biochar filtration, allowing targeted water-quality improvement, ecological co-benefits and measurable pilot performance without committing immediately to large-scale infrastructure.

## 8. Willingness-to-pay test

A common mistake would be to ask potential customers, 'Would you buy this?' Instead, the entrepreneur should present a concrete pilot offer: site assessment, a defined number of modules, installation, monitoring, maintenance, final performance report and a fixed pilot duration. The customer should then be asked what budget line could fund it, who approves the purchase, what evidence is required, and what price range would be realistic compared with the alternatives.

## 9. Recommended initial business model

At TRL 5 / MRL 5, a project-based or service-based model is more realistic than pure hardware sales. Customers are unlikely to want responsibility for selecting biochar, maintaining vegetation, replacing media and interpreting performance data. The recommended market-entry offer is therefore a 'Lake Restoration Pilot as a Service'.

The package would include site diagnosis, system design, fabrication or sourcing of modules, installation, maintenance, monitoring, biochar replacement where required, and a final environmental performance report.

| Revenue model             | Best use                                        | Main advantage                              | Coaching assessment     |
|---------------------------|-------------------------------------------------|---------------------------------------------|-------------------------|
| Paid restoration pilot    | First customer deployments                      | Directly links payment to validation        | Primary route to MRL 5  |
| Restoration-as-a-Service  | Sites needing ongoing treatment and maintenance | Recurring revenue                           | Recommended after pilot |
| Direct system sale        | Experienced institutional buyers / partners     | Simpler transaction                         | Secondary option        |
| Engineering partner model | Scaling through established contractors         | Access to procurement and delivery capacity | Strong scale-up route   |

## 10. Integrated TRL 5-MRL 5 milestone plan

The most efficient development sequence is to use one field pilot to answer both technical and market questions. Before deployment, the entrepreneur should secure a pilot host that represents the intended customer segment and agree in advance on the performance indicators, operational responsibilities, reporting format and commercial decision that could follow a successful test.

- Month 1-2: customer interviews, use-case selection, site criteria and competitive mapping.
- Month 2-3: prototype specification, biochar and vegetation selection, partner identification and pilot economics.
- Month 3-6: field deployment, baseline and monitoring programme, maintenance testing and customer observation.
- Month 5-6: willingness-to-pay discussions using real pilot data and a defined follow-on offer.
- Month 6+: TRL 5 / MRL 5 review, documenting technical validation, customer evidence and the decision to refine, repeat or scale.

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Signature:



Date: 4th of September 2026