

Table S1. Summary of the first round of focus group interviews

Question	Findings
Environmental problems facing coastal aquafarmers	<ul style="list-style-type: none"> <li>• Water resources, subsidence, soil salinization, etc. are key environmental problems of aquaculture industries.</li> <li>• Is aquaculture the main cause of subsidence and problems related to water resource usage? The causal relationship must be established.</li> <li>• The types of aquaculture that are environmentally friendly is another major problem.</li> </ul>
Governmental measures that should be taken to improve aquaculture environments	<ul style="list-style-type: none"> <li>• Water resources should be used efficiently; for example, freshwater can be fed into fish farms and then redirected back into paddy fields, thereby increasing the efficiency of water resources.</li> <li>• Water can be supplied and extracted more efficiently from canals.</li> <li>• Aquaponic systems can be considered and provide other sources of income without compromising the original aquaculture practice.</li> <li>• Aquafarmers can be provided with options for switching to other environmentally friendly aquaculture techniques.</li> </ul>
Legal basis for applying PES in aquaculture?	<ul style="list-style-type: none"> <li>• The Wetland Conservation Act is effectuated and stipulates various compensation measures that provide a legal basis for the application of a PES.</li> </ul>
Aquafarmers' views on the protection of coastal environment	<ul style="list-style-type: none"> <li>• Failure of the governmental authority to effectively communicate with local aquafarmers after the enforcement of the Wetland Conservation Act resulted in a backlash of negative reactions among aquafarmers in Qigu District, who fear that the act will influence their livelihoods.</li> <li>• The entity managing the implementation of the PES must be established first, and then the governing body and departments with which the body communicates must be defined in order to resolve any problems derived thereafter.</li> </ul>
Economic methods with the potential to transform aquafarmers into ES providers	<ul style="list-style-type: none"> <li>• What measures should be taken to restrict aquaculture methods that are destroying the environment?</li> <li>• Funds for PES should be sourced from corporate organizations because the government might not have the budget for PES schemes given its current financial difficulties.</li> </ul>
International cases of PES application in aquaculture	<ul style="list-style-type: none"> <li>• Few international cases of PESs in aquaculture have been reported. The European Union provided PESs to two shrimp farms along the southern coast of Thailand between 2010 and 2011. Payment recipients must adopt environmentally friendly farming techniques. The amount of loss is estimated based on the opportunity cost.</li> <li>• Several aquafarmers in Australia adopted environmentally friendly approaches to practice aquaculture naturally without performing feeding themselves. The PES can be implemented in this direction.</li> </ul>
Feasible directions for implementation of PES in Taiwan	<ul style="list-style-type: none"> <li>• The Qigu lagoon wetlands could be a focus because the oyster racks in the area would be a suitable research target.</li> <li>• The value of environmental resources may not necessarily be used as a payment standard. The purpose of payment is to change the behaviours of aquafarmers.</li> </ul>

Table S2. Summary of the second round of focus group interviews

Question	Findings
Challenges faced by oyster farmers	<ul style="list-style-type: none"> <li>Oyster farming is affected by a number of natural factors, including typhoons, southwest monsoons, or drought, which generate dissimilar levels of influence on oysters and may even cause total loss.</li> <li>Government compensation is not enough to cover the losses.</li> <li>Problems facing oyster farmers stem from the risks and uncertainties of environmental disasters, which result in volatile costs and revenues that subsequently influence the economic conditions of aquafarmers.</li> </ul>
Environmental problems associated with oyster farming and potential solutions	<ul style="list-style-type: none"> <li>Oyster racks and polystyrenes discarded every season after harvesting of oysters severely pollute the coastal environment. Fishing gear waste (mostly polystyrene) generated from oyster farming activities is scattered in coastal waters or along the coast, thereby negatively affecting coastal landscapes and recreational quality.</li> <li>The Tainan city government is managing oyster farms in shallow seas by establishing the Self-Governance Rules for Management of Shallow Sea Oyster Farming in Tainan City, which requires oyster farmers to report and recycle aquaculture facilities, and the Regulations Governing the Management of Floating Raft Oyster Farming in Tainan City, which stipulates control over the total number of oyster racks allowed.</li> <li>A “compulsory user-pay” approach is recommended. Use of polystyrene floats should be coupled with incentive programmes, and principles of solid waste management should be applied.</li> <li>Other potential solutions: strengthen the enforcement of existing policies, laws, and regulations, establish complete management systems, and actively promote the use of subsidies for the development of alternative materials or environmentally friendly materials.</li> </ul>
Potential problems in the implementation of PES programmes in oyster farming	<ul style="list-style-type: none"> <li>The environmental effect of the presence and absence of oyster farming must be clarified first.</li> <li>The types of ESs that oysters can offer are then determined to further explore how to formulate a PES system that offers enough incentive to encourage business transformation.</li> <li>Oysters convert inorganic carbon into organic compounds (i.e., carbon fixation); therefore, oyster farming can benefit the environment and ecosystem. Very few people in Taiwan are aware of this benefit.</li> <li>From an ecological perspective, environmental resources should be paid by users.</li> </ul>
Effects and benefits of relevant legislation on the implementation of PES schemes in oyster farming	<ul style="list-style-type: none"> <li>Farmers are most concerned about their livelihoods. If a law influences the ability to make a living, farmers will not only feel concerned about it but also protest against it.</li> <li>The entity managing the implementation of PES must be established first, and the governing body and departments with which the body communicates must be defined thereafter to resolve any subsequent problems.</li> <li>An oyster farmer’s fishing right is granted by the demarcated fishing rights issued by the Council of Agriculture. However, Article 21 of the Coastal Zone Management Act can abolish the approval of fishery rights, cease the exercise of fishery rights, or restrict fishing activities.</li> <li>The government should contemplate whether the Coastal Zone Management Act and the Wetland Conservation Act are facilitating or impeding oyster farming.</li> <li>PES-based oyster environment improvement measures can be provided by tapping into Article 21 of the Coastal Zone Management Act: “Coordinate with the competent authority of fisheries to change or abolish the approval of fishery rights, cease the exercise of fishery rights, or restrict fishing in accordance with the Fisheries Act, to step up fishery resource conservation or coastal protection.”</li> </ul>