Evaluation of an Integrated Biological-Stakeholder Decision Framework for Salinity Management in the Wetlands of Aunu'u, American Samoa

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Natural resources worldwide, especially in coastal areas such as the Aunu'u wetlands of American Samoa, are threatened by salinity. Adaptive management strategies primarily require consideration of biological effectiveness (BE) and stakeholder preferences (SP). BE was assessed through the average % shoot weight reduction of Colocasia esculenta, while SP was measured through composite Likert-scale scores from surveys. A hierarchical ranking of alternative strategies was created for each criterion, then integrated through a Multi-Criteria Decision Analysis (MCDA) model. A pairwise Kendall's tau-b correlation analysis was then conducted to assess concordance, divergence, and sensitivity across varying weighting scenarios. The study's results showed a weak divergence between BE and SP ($t = -0.05$, $p = 1.00$) while MCDA rankings had a moderate positive association with SP ($t = 0.62$, $p = 0.07$) and a weaker association with BE ($t = 0.33$, $p = 0.37$). Strategies such as the use of salt-tolerant cultivars remained robust, ranking highest across weighting scenarios, while strategies such as improving water retention showed high sensitivity. Sensitivity analysis revealed concordance under similar weightings, but divergence under extreme differences. The key factors influencing SP include feasibility, perceived risk, socio-cultural context, and familiarity with methodology. These findings cement the importance of participatory involvement, as adoption willingness and perceived practical feasibility lead to significant differences in the prioritization and selection of management strategies compared to biological effectiveness alone, thereby further improving sustainability and environmental governance under a Pacific Island socio-cultural and economic context.

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