Darwin Initiative Main & Extra Annual Report

To be completed with reference to the "Project Reporting Information Note": (https://www.darwininitiative.org.uk/resources/information-notes/)

It is expected that this report will be a **maximum of 20 pages** in length, excluding annexes)

Submission Deadline: 30th April 2025

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Darwin Initiative Project Information

Scheme (Main or Extra)	Main
Project reference	30-025
Project title	Developing Sustainable Near-shore Sea Cucumber Aquaculture on Selayar Island, Indonesia
Country/ies	Indonesia
Lead Organisation	Centre for Sustainable Energy & Resources Management @ Universitas Nasional (CSERM-UNAS)
Project partner(s)	Heriot-Watt University
Darwin Initiative grant value	£556,778
Start/end dates of project	1 May 2023 – 1 April 2026
Reporting period (e.g. Apr 2024 – Mar 2025) and number (e.g. Annual Report 1, 2, 3)	April 2024 – March 2025, Annual Report 2
Project Leader name	Dr. Jito Sugardjito
Project website/blog/social media	http://cserm.unas.ac.id/, https://instagram.com/cserm_unas
Report author(s) and date	Dr. Jito Sugardjito, Qurratu Ainin, Christopher Kelly, Siti Holisoh, 30/04/2025

1. Project summary

The seagrass ecosystem on the tropical coast of Indonesia is a habitat with a high level of diversity and plays an important role in carbon sequestration. However, the condition of seagrass in Indonesia is under-protected at the national level. Threats that put pressure on this ecosystem include anthropogenic impacts, destructive fishing, and reclamation, which can negatively affect biodiversity, including important marine species, coastline integrity, and the biodiversity of adjacent mangrove forest and coral reef habitats. One of the living creatures that is highly associated with seagrass is sea cucumber, a high-demand commodity in the market, which is also under pressure due to high exploitation, non-selective harvesting and the use of dangerous tools in fishing activities.

In the Selayar Islands, sea cucumbers are commonly caught but in a non-sustainable way. On the other hand, one of the leading sectors in Selayar, the tourism sector, is still in the recovery phase after Covid 19 pandemic. In this sector, there is also the risk of boat engine prop scarring and poor waste management. In coastal communities, there is a division of labour between men and women in marine resource utilisation activities. This condition causes women to become dependent on male income.

This project will develop seagrass friendly, near-shore sea cucumber aquaculture to strengthen economic resilience and critical habitat conservation for coastal communities around Selayar Island in the Takabonerate-Selayar Biosphere Reserve, in collaboration with an established private sector partner and formal support from local government development agency.

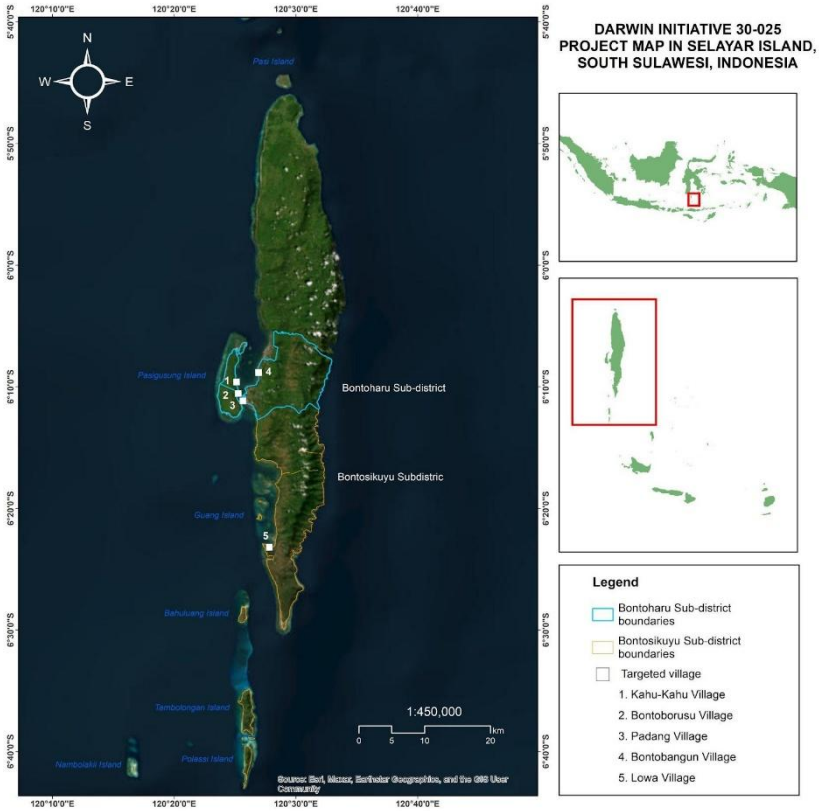

Figure 1 Project's site map

This project addresses multiple CBD targets: development of sustainable resource utilisation within a national biosphere reserve to raise awareness of biodiversity, and integrate key habitats into development. This project also provides supplementary income for local communities with an ecosystem-based approach, so that sea cucumber cultivation will reduce the impact of local global warming/climate change, reduce the impact of anthropogenic pressure, effectively regulate the near shore coastal environment while providing sustainable livelihood opportunities is critical to the preservation of this uniquely rich marine ecosystem.

This project focuses on developing sustainability in order to maximise benefits for women, capacity building to maximise economic returns based on product quality, with female community members from two family welfare empowerment associations (PKK). The project will empower local women with sustainable income opportunities in the near-shore environment, where they have traditionally harvested marine resources, and prevent the overexploitation of endangered sea cucumber species (*Holothuria scabra*) with effective management and regulation. By introducing blue carbon sea cucumber aquaculture as a vehicle for sustainable management of near-shore seagrass beds, the project will deliver tandem livelihood development and habitat conservation benefits for local communities and the wider Selayar Islands-Takabonerate Biosphere Reserve.

2. Project stakeholders/ partners

This project was initiated by CSERM-UNAS, the in-country lead partner, who invites all other partners to collaborate on implementation and leads coordination with other stakeholder groups including local communities, state agencies and private sector actors. Effective working relationships have developed between all project partners, with complementary skills sets helping

ensure all project outputs have been achieved according to schedule. The project's second year saw an approved-change to the project implementation partner structure, with a previous partnership between CSERM-UNAS and PT SPK being terminated due to logistical challenges resulting in suboptimal returns. This was replaced by a direct partnership with the Selayar Islands' Regency Fisheries Agency, which has agreed to participate in a breeding and restocking program in addition to their advisory and consultative role, providing juvenile sea cucumbers bred from cultured stock to support further site expansion and ensure sustainable production supply of *H. scabra* for the project. This agreement is anticipated to continue into the post-funding period, and will form the supply-side driver of the sea cucumber cultivation program. These will be purchased by participating communities via established village cooperatives, which have become primary stakeholders and project partners consisting of 44 members from a total of 104 female participants and 17 males taking work as site security. Their role is to provide a direct and participatory governance system for the management of sea cucumber cultivation pens, harvest, processing and sale of cultured stock, and the expansion of sites into the future. Village cooperatives were selected as the ideal structure to manage this project, having clear incentives for membership without being a requirement for participants, able to manage and allocate funds in a transparent way, sign commercial contracts and generally represent participating communities during interactions with other project stakeholders in the state and private sector. All purchases of harvested sea cucumber stock and juveniles from the established hatchery are now conducted through these cooperatives, ensuring community ownership and active participation in shaping the development of Selayar Islands' sea cucumber economy. The initial intention was to include all project participants as members of the cooperative, however not all participants expressed an interest in taking active roles in governance and decision-making, or are already members of other cooperative enterprises and did not want to increase their obligations. Communication between cooperative members spread across 4 villages is currently being conducted in a shared forum with CSERM-UNAS team members, who also act in an information sharing role via liaison with various experts and trainers. There is a need to establish an independent communication mechanism between individual villages to manage collective governance and decision-making during Y3 project implementation. Local communities have been engaged as active participants and consultants in all project activities, even prior to the cooperatives being established, contributing local knowledge and experience to the design modifications and operational innovations of the aquaculture program, with further pilot sites established in one additional village in the past 12 months. Lessons learned from each individual aquaculture site will be disseminated via the cooperative structure to encourage best practices and optimal production levels across the islands. Heriot-Watt University will be engaged directly in developing best practices for ownership and management of this critical marine resources industry, including plans for scaling and expansion, resource allocation, and sustainable growth during Y3. The intention is to provide a clear and coherent scaling roadmap for all project partners into the post-funding period, supported by clear government policy and structured investment programs. In addition, Heriot-Watt University has provided expert guidance on habitat monitoring and data collection, and will continue to assist in this process throughout Y3, contributing their analysis to a comprehensive environmental review in the project's final quarter. In order to support the establishment and technical operation of the hatchery facilities, new partnerships were established with the National Research Agency's Fisheries and Bioindustry Division, who provided expert insight on key environmental and technical parameters, and continue to review hatchery data and provide advice moving forward. Additional training on the post-harvest processing of *H. scabra* has been provided by PT Agang Nelayan, an experienced intermediary buyer of processed sea cucumbers from project cooperatives, ensuring that harvested stock is processed to a market-optimal level and therefore able to generate the highest possible returns.

3. Project progress

3.1 Progress in carrying out project Activities

Output 1: Sea cucumbers and seagrass habitat ecology education, awareness raising

Our project has successfully implemented activities for Output 1 in the first year. The activities included:

1.1 - Seagrass bed biosurvey to establish baseline ecological data (species composition, diversity, seagrass coverage & growth rates) for education and awareness raising program.

1.2 - Printed / digital materials created for dissemination among all local parties.

1.3 - 12 (4x3) women's only focus groups to identify gender-specific concerns, establish support for project development and participation, and receive feedback for modifying approach in line with local women's concerns.

1.4 - 12 (4x3) monthly community meetings introducing project approach and objectives, receiving feedback for modifying approach in line with local community concerns.

1.5 - 3 monthly FGDs with local government agencies introducing project approach and objectives, receiving feedback for modifying approach.

1.6 - Collaborative mapping of potential study sites in order to identify ideal locations for considering the interests of all parties.

We continue to raise education and awareness regarding seagrass ecosystem importance in line with the sea cucumber aquaculture to the new participants joining in Y2 through workshops and community discussions.

Output 2: Participating women trained to successfully manage and operate aquaculture pilot project sites

2.1 - Construct 9 (3x3) 16m2 pilot project sites at specified locations, stock with juvenile sea cucumbers (density: 3/m2). Construction of the pilot project sites from a total of 5 villages in Y1 is continued by narrowing down the sites to a total of 4 sites in Y2. The activity from Output 3 in Y2 is a continuous part of this activity.

2.2 - Weekly workshops were held continually over the course of the past 12 months to enhance basic training for monitoring, maintenance and harvesting practices, as well as to ensure continuous feedback from participants regarding project approaches and target outcomes as they evolved over the course of implementation. These workshops recorded an average attendance rate of 81%, with additional community members participating on their own volition to expand their knowledge, despite not formally being part of the sea cucumber livelihoods program.

2.3 - Pilot project operations have been modified in accordance with data from each site as well as overall best practices as identified across the project more broadly. These modifications continue in collaboration with local women, who provide direct input and suggestions for how to enhance operational SOP, as well as scientific input to optimise production and habitat maintenance. A key issue raised during this process is the higher than anticipated levels of predation by crabs, observed in the scarring of harvested sea cucumbers, and targeted responses to the issue are currently being trialled at different sites. Enhanced SOP has been distributed through the workshop program, promoting specific actions to be taken against crab predation, and identifying seasonal fluctuations during which maintenance activities should be halted.

2.4 - Initial harvesting schedules have been adjusted to account for seasonal weather variations and the impacts they have had on sea cucumber growth. Harvests were conducted in October, December, January and February.

2.5 - Focus groups with participating women to give feedback about project implementation, provide any additional information, and prepare for site expansion are conducted regularly, with clear feedback recorded and available to project partners.

Output 3: Expand aquaculture operations with profit from first harvest

3.1 - A local women's group coordinator for each village was elected to manage maintenance and monitoring responsibilities for expanded sites, holding a key position in the established village cooperative. This process was finalised in February 2025, later than originally planned, due to administrative delays in the establishment of cooperatives as legal entities which was completed in November 2024.

3.2 - Construction of expanded sites has been largely completed, with construction continuing into Q3Y2 in one location (Kahu-kahu) due to delays caused by seasonal weather patterns.

3.3 - Work rota and labour schedule has been established in all locations, with attendance and work contributions recorded by the administrative division of each women's cooperative.

3.4 - Seasonal fluctuations in weather conditions have been found to restrict sea cucumber growth during storm seasons, and in order to maximise productive efficiency target weights have been revised down to harvest size: 200-330 g. In Kahu Kahu sea cucumbers weighing > 80 gram were harvested. This allows cultured stock to reach harvesting size within the months of calm weather, reducing loss of sea cucumbers to predation and other hazards during periods of dormancy when growth is minimal. The lower weight of harvested sea cucumbers will be redressed with increased production volume via juveniles provided by the project hatchery facilities, and an in-situ breeding program to support increased wild sea cucumber populations in the area around the study site. Additionally, resources allocated to the further development of sea pens will focus on establishing storm-resistant constructions facilitating expanded ranching sites with minimal risk of lost investment due to damage or degradation during inactive cultivation periods associated with bad weather.

3.5 & 3.6 - Regular site visits continue to be held by field officers to assess progress for reporting, give feedback and technical support, and identify potential issues. These visits increase in frequency approaching significant events such as harvests, and otherwise consist of bi-weekly or monthly monitoring, with photos and monitoring data provided remotely by participating communities.

Output 4: Sea cucumber ranching integrated into district-level economic planning agenda

4.1 - Preliminary harvests of sea cucumbers at each project site have been carried out to provide stock for training workshops focusing on preparation and processing of sea cucumbers for sale. This was carried out primarily in October 2024, with additional sessions in December, January and February. Infrastructure including drying racks, cleaning stations & tools has been prepared at each location, with training provided to local women through a series of events. Preliminary harvest drying was found to deliver less than the ideal condition of finished product (approximately 80-90% moisture removed compared to the target 100%). A sub-program to develop enhanced specialised sea cucumber drying ovens has been initiated, and is expected to deliver improved results by the end of Q3Y3.

4.2 - Quarterly FGDs with local government and industry partners to identify and prepare necessary physical, institutional or regulatory infrastructure for developing sea cucumber industry have been ongoing, initiated ahead of schedule reflecting the project's close collaboration with the regency fisheries agency and regional planning and development agency. These agencies have pledged their support to developing a sustainable sea cucumber cultivation program for the Selayar Islands, including supporting communities in delivering the optimal product quality, maintaining control over prices and production standards, and managing critical coastal ecosystems. Specific policy and funding mechanisms to deliver these outcomes will be developed over Y3 and proposed to the local legislature at the end of the project.

4.3 - Initial harvesting was conducted in March 2024 (Q4Y1) at one project location (Lowa village), with subsequent cleaning, drying and processing activities integrated within an on-site training program attended by members of each participating community. The harvested stock was sold by June of 2024, with feedback regarding the finished product quality received and integrated into an enhanced SOP for future harvests. Additional training sessions were conducted at two locations (Lowa, Bontobangun) in October 2024 (Q3Y2), with all project participants in attendance, with new processing and preparation techniques disseminated.

Subsequent harvests were conducted at Bontoborusu in January 2025 and Kahu-kahu in February 2025 (Q4Y1). The stock is currently being processed and prepared for sale with this anticipated to be complete in March and April respectively, after which the product will be sold. The October and February harvests were shipped in March 2025. Before shipping, each location weighed and grouped the sea cucumber categories based on their size and weight (with guidance from project field officers) to establish an estimated sale price, and then they were packed and sent via shipping services.

Pre-shipping, harvested sea cucumbers were handled by the cooperative, which coordinated with PT Agang Nelayan for shipping (there is a scheduled pickup of goods in Makassar every week to minimise shipping costs). Having received the sea cucumbers they were checked for

quality, weight, and other factors, and feedback provided on the quality from each location. The results of the first sale have been relayed to the cooperative. The sale income will be transferred directly to the cooperative's bank account. The cooperative will play a key role in determining sale prices for future transactions conducted by participating groups, and will share data regarding the harvests, quality and prices of each location.

Subsequent harvests are anticipated in Q1Y3 (approximately May) in Bontoborusu, with restocking of juveniles to follow shortly after. Harvests on the island's West coast will be carried out between Q2-Q3Y3, with restocking running from approximately May-October. The earliest harvest in Kahu-kahu is expected no earlier than Q4Y3.

4.4. - Net ranching income surveys & sea cucumber price surveys conducted by field officers as preparatory information gathering for price-setting and negotiation with buyers.

4.5 - Regular site visits continue to be held by field officers to assess progress for reporting, give feedback and technical support, and identify potential issues. These visits increase in frequency approaching significant events such as harvests, and otherwise consist of bi-weekly or monthly monitoring, with photos and monitoring data provided remotely by participating communities. This information is currently being compiled and analysed to be presented to government partners.

Output 5: Sea cucumber aquaculture business transferred to local women's ownership

5.1 - Monthly monitoring of site operations by field officers, reporting of data collected by participating women is underway to ensure effective implementation of maintenance and monitoring protocols, anticipate, identify and prepare responses to specific operational issues.

5.2 - Women-led village-level cooperatives established in 4 villages ahead of proposed schedule to provide a legal and administrative framework for policy development and planning at scale, field-test coordination of financial and operational duties. These cooperatives have clear operational mandates, profit sharing mechanisms and governance mechanisms, and currently 44 participants are active members.

5.3 - Ceremony formally transferring management and operation of ranching sites, coordination of processing activities and sales to BUMDes will take place in Y3.

3.2 Progress towards project Outputs

OUTPUT 1 - Education and awareness raising provided to local communities as a precursor for pilot projects

Output complete as of EoY 1.

OUTPUT 2 - Local women trained in sea cucumber ranching at 3 project sites

From the pre-project baseline wherein local women had no specific technical knowledge or training regarding the cultivation of *H. scabra* and other sea cucumbers, as of EoY 2 this project output has been achieved. All 52 out of 60 groups of participating women successfully completed the training program delivered by CSERM-UNAS & the Selayar District Fisheries Agency between month 12-14 of project implementation (Output 2.1), and provided clear evidence of their understanding during a post-training feedback and focus group program (Output 2.5). This has provided participating women with the necessary skills and operational toolkits necessary to implement and manage *H. scabra* sea ranching in their local area to provide supplementary income.

OUTPUT 3 - Expand aquaculture operations with profit from first harvest

Compared to project stage one baseline at which point only limited trial sea ranching sites had been established at each location to establish ecological, operational and construction viability for the proposed technology, full-scale sea pen operations have now been established at 4 villages, under ownership and management of local women through the village-level cooperatives. A clear SOP has been established for these operations (Output 3.3), which has successfully delivered preliminary harvests and restocking of juveniles, all while maintaining sea pen facilities to a sufficient operational standard (Output 3.4).

OUTPUT 4 - <u>updated as per change request</u>:

Ranching sites developed into profitable aquaculture industry supported by local hatchery, to be operated by Selayar District Fisheries Agency in collaboration with CSERM-UNAS & HWU

Compared to project stage one baseline, at which wild sea cucumber populations had decreased as a result of overexploitation to the extent that they were no longer economically viable as a commodity, hatchery facilities to provide juveniles for sea pen restocking have been established during Y2 and are now operational. The intention is to provide sufficient aquaculture stock to reduce pressure on wild sea cucumber populations, while an in-situ breeding program will allow a certain proportion of cultured stock to reproduce in their natural habitat and help restore wild populations. The facilities are currently producing 20-25% of target cultivation stock, with production increasing to 2000 juveniles per month by Q2Y3. This is supported by local processing facilities at each participating village, with which participating women can clean, dry, prepare and store harvested cucumbers for resale (Output 4.1). Initial preliminary harvests have already been conducted, with restocking from hatchery juveniles planned for May 2025 (Output 4.2). Increased production is anticipated from improved understanding of specific spawning conditions, technical issues and the use of new technologies such as heaters to improve survival rate to maturity. Details are outlined in the table below:

3.3 Progress towards the project Outcome

Outcome: Adopting sustainable sea cucumber ranching delivers a profitable supplementary livelihood as economic empowerment for local women from 120 households across 3 coastal villages and effective seagrass habitat conservation.

Current progress towards project outcome remains slightly ahead of schedule, with enhanced production and processing facilities already in place, supported by ongoing expansion of hatchery facilities to provide ready stock of juvenile sea cucumbers. The delivery of profitable supplementary livelihoods depends on successful production of sufficient stock to support ongoing production cycles (expected to be achieved during Q2Y3), and improvements to drying technologies via the use of ovens and other techniques (currently in development). An alternate production schedule has been developed focusing on shorter harvest cycles to mitigate risk from storms and other factors, providing enhanced profitability to participants (more than 50% increase), and will be introduced to participating communities at the start of the next production cycle (May 2025). This will be paired with an ongoing breeding program to ensure genetic diversity in wild and cultivated populations, support juvenile stock availability, and further reduce pressure on wild sea cucumber populations. The total number of participating households is currently 104, with additional households expressing an interest in joining the program during Y3. Seagrass habitat in and around project sites is showing clear indications of improved health and increased growth vitality compared to control sites, to be confirmed by scientific data in Q3Y3.

3.4 Monitoring of assumptions

Outcome Assumptions:

1. **Participating women and households openly and accurately report relevant income data**
   Initial income reporting through survey data corroborated by discussions, interviews and monitoring of seagrass gleaning in each partner village location, with further data supplied via inferential monitoring of various economic activities at the community/household level. Evidence attached in survey results.
2. **Participating women opt to formalise their aquaculture enterprise in accordance with government initiatives**
   Aquaculture operations have been formalised through the establishment of village-level cooperatives with clear responsibilities and governance structures in place as of 8 November 2024.
3. **No external shocks, disasters (of human or natural origin) which negatively affect seagrass ecosystem health**
   Extreme weather events during storm season did not disrupt or negatively impact coastal seagrass ecosystems as a whole, but have been identified as causing cultivated sea cucumber stock to enter a state of dormancy, during which low or stagnant growth rates are recorded. This is believed to result from sea cucumbers burrowing into the sediment for shelter during bad weather, reducing their feeding time. To address this issue, Y3 will propose an adjustment to production targets focusing on larger numbers of smaller sea cucumbers, with a single cultivation cycle between storm seasons in each location.
4. **Economic benefits of project implementation encourage participation and support for associated initiatives by wider community**
   Strong support has been repeatedly reported from community partners for livelihood development, including in supporting industries and services, additional villages express an interest in blue carbon sea cucumber ranching. Enthusiasm for ongoing participation in this project is therefore heavily dependent on delivering an economically viable production model with guaranteed income. This further supports proposed adjustments in production targets in Y3 to ensure stable production and minimise losses during storm seasons.

3.5 Impact: achievement of positive impact on biodiversity and multidimensional poverty reduction

We originally proposed the impact of effective conservation and sustainable utilisation of Indonesian seagrass beds through demonstrating the potential of near-shore sea cucumber ranching practices as a vehicle for female economic empowerment and broader coastal resilience. At the higher-level impact on biodiversity conservation, significant stakeholders including state agencies and participating coastal communities have become aware of the potential for sustainable utilisation of seagrass beds, and closely coordinate with project management and field team to monitor ecosystem health and ensure potential expansion of profitable blue carbon sea cucumber ranching operations in the future across several suitable locations around Selayar Island. Potential locations identified through collaborative mapping with the field team and external consultants. Regarding our contribution to a higher-level impact on human development and wellbeing (poverty reduction), current sustainable livelihood operations remain supported by project field team and external budget inputs, and provide only minimal livelihood opportunities for local communities engaged in pilot project security, logistics, construction etc. Long-term higher-level poverty reduction impacts are anticipated in Y2-Y3 following profitable scaling of aquaculture operations.

4. Project support to the Conventions, Treaties or Agreements

In addition to aligning with a wide range of international agreements, as translated into Indonesian law by decree of parliament, this project also supports several domestic policy making initiatives in the field of wildlife conservation, sustainable resource utilisation & habitat management. This includes the National Strategic Action Plan published by the General Directorate for Conservation of Natural Resources and Ecosystems to develop low carbon

solutions to coastal development for Indonesia's small islands in particular, and priorities outlined in the National Climate Adaptation Plan for the Marine & Coastal Sector, prioritising Combined Ecosystem-based adaptation (EbA) and community-based adaptation approaches including maintenance of a coastal greenbelt for which sea grass beds are a vital component.

The project has also been featured as part of the 15th Southeast Asia Biosphere Reserve Network, where it was identified as a collaborative action of CSERM UNAS with Selayar Islands local government in sustainable resource utilization, allowing development without harm to future generations.

5. Project support for multidimensional poverty reduction

This project is intended to deliver targeted poverty reduction for coastal communities on Selayar Island, South Sulawesi, targeted specifically to female community members participating in the project. The overall poverty reduction strategy is based on supplementary income generated by cultivating, processing and selling sea cucumbers (*H. scabra*), as well as from an overall increase in the ecological health and integrity of coastal ecosystems, which support a range of associated livelihoods in a number of ways.

To date, the project has delivered significant benefits for participating communities, with both direct and indirect impacts towards a reduction in multidimensional poverty. Primary poverty reduction impacts have been delivered via the project's training and capability enhancement programs, which have provided participating communities with the skills and facilities necessary to process sea cucumbers for resale at prices several times higher than they were previously able to. Additionally, the ability to dry and store harvested sea cucumbers to a market standard empowers these communities in any price negotiations, including the ability to accumulate larger volumes prior to sale.

The training and capability enhancement program is intended to prepare participating communities for active engagement with the project's primary livelihood delivery program, namely the sustainable cultivation of sea cucumbers via the sea pen 'ranching' method. Preliminary harvests have been successfully carried out at 3 locations, providing opportunities for hands-on training for participating communities in the cleaning, drying, and storing of harvested sea cucumber stock, which have since been sold to generate the project's first profits. Throughout Y3 the cultivation, harvest, preparation and sale operation will be expanded, both in existing locations and to new sites where appropriate, generating increased profits which can then be reinvested into the maintenance and management of sea ranching sites via the cooperative enterprise management framework.

Village-level cooperative enterprises established by the project provide an ideal vehicle for local ownership of livelihood models delivered by the project, given their democratic decision-making mechanisms, flexible membership, and clear legal status. These entities empower their members to take an active role in key decisions regarding the future development of Selayar's nascent sea cucumber industry, while increasing their collective bargaining power in relations with state and private sector actors. Cooperatives of this kind are additionally able to manage a wide range of village-level enterprises, supporting entrepreneurship and providing a critical safety net for members engaged in other enterprises.

Y2 project implementation saw a number of critical achievements, including the establishment of a sea cucumber hatchery facility to support the cultivation program by providing regular juvenile stock for the sea pen ranching operation, the successful completion of the processing and preparation training program, and the first harvests from each of the participating communities. These critical milestones provide both the technical skills and critical infrastructure to generate supplementary income from sea cucumber cultivation and reduce poverty among participating communities.

The project is anticipated to contribute to long term poverty reduction directly, by delivering a fully operational model of sea cucumber aquaculture to local communities with full policy and planning support from local government institutions. It is also anticipated to provide long-term indirect poverty reduction through enhanced knowledge and awareness of the importance of coastal

ecosystems, conservation of those ecosystems, and reduced exploitation pressure on seagrass beds in particular.

6. Gender Equality and Social Inclusion (GESI)

GESI Scale	Description	Put X where you think your project is on the scale
Not yet sensitive	The GESI context may have been considered but the project isn't quite meeting the requirements of a 'sensitive' approach	
Sensitive	The GESI context has been considered and project activities take this into account in their design and implementation. The project addresses basic needs and vulnerabilities of women and marginalised groups and the project will not contribute to or create further inequalities.	
Empowering	The project has all the characteristics of a 'sensitive' approach whilst also increasing equal access to assets, resources and capabilities for women and marginalised groups	
Transformative	The project has all the characteristics of an 'empowering' approach whilst also addressing unequal power relationships and seeking institutional and societal change	X

This project fulfills the criteria for a GESI transformative approach, given its focus on women-led livelihoods and systematic institutional change. The initial justification is based on a recognition of both women's needs for independent sources of income to provide for basic household needs, and their customary position as custodians of the coastal environment, and seagrass beds in particular (Outcome 0.2, Indicator DI-B10). By developing a women-led industry in a women-centred ecosystem into an established legally operating commercial entity, this program fundamentally alters the socially disenfranchised position of women in the Selayar islands. The sea cucumber cultivation program has been designed to minimise disruption to women's established roles as homemakers, with maintenance rotas allocating specific schedules according to consensus between participant working groups independent of project management (Output 2.2, 2.3, Indicator DI-A04, DI-B04). Establishing village-level cooperatives to manage the operational and financial duties associated with an expanding cultivation economy provides clear, democratic and participatory decision-making mechanisms for women participants in the project to engage meaningfully in choices about their economic future, and the management of a key ecosystem in their immediate environment (Output 0.4, Indicator DI-D01. This also strengthens their relative power when dealing with external actors such as state institutions, private companies, and male community members who may express alternative interests to utilising the near shore environment. This project was designed to deliver GESI-transformative change, and remains fully committed to that goal through achieving the stated outputs and project outcomes.

7. Monitoring and evaluation

Ongoing habitat and ecosystem monitoring of sea cucumber cultivation sites and surrounding ecosystem have been ongoing by CSERM-UNAS team and participating women, to provide up to date information regarding the wider ecological impact of the cultivation program. This data has been provided to project management and HWU for further analysis to ensure final SOP for sustainable sea cucumber cultivation fulfils important sustainability criteria prior to being integrated within district-level planning and policymaking in Y3.

Ongoing enthusiasm for project participation has been reflected in high attendance levels for workshops and other activities (attendance not being strictly mandatory), and participation by local women in the ongoing program of maintenance and monitoring. Post-harvest training for drying and processing was especially well attended, and provides insight into the value ascribed to this new knowledge by local communities. Successful transfer of a fully operational livelihood program will depend on integrating these village-level operations into a broader, district wide network of production, processing, sale, and restock supply, and progress towards this goal will be closely monitored by a combined group of CSERM-UNAS field team members and HWU aquaculture planning and policy experts.

The second year of project implementation has required a new monitoring framework be established for the hatchery program, to ensure sustainable and adequate provision of juvenile sea cucumbers as cultivation stock. The team has allocated a dedicated member for hatchery monitoring, working alongside staff from the local fisheries agency to provide comprehensive data on production targets, and additional data regarding the optimal conditions for production. This will then be used to modify and enhance production operations prior to the end of the project and transferral of ownership to local cooperative. Discussions with regional planning and development agency are ongoing to ensure optimum implementation of operational procedures and development of supporting infrastructure are planned and prepared into the foreseeable future. This has already been established as a key theme in the ‘sea cucumber policy direction meeting’ focusing on upstream development of human resource capacity, strengthening and integrating key groups and institutions.

Current progress towards overall project outcome is focused on two key parameters, namely: increasing the volume and consistency of juvenile stock production from the project hatchery, and improving the post-harvest drying and processing operation. These two parameters comprise critical elements of the overall profitability calculation, increasing both the quantity and quality of finished product and providing funds for reinvestment and potentially expansion. Careful monitoring across a wide range of environmental, chronological and biochemical factors at the hatchery facilities is currently underway to provide detailed productivity protocols moving forward, while a dedicated oven/drying development program is set to be launched in Q1Y3.

8. Lessons learnt

Lessons applied to the sea cucumber cultivation project have come from a range of sources. Preliminary understanding of how to develop a viable aquaculture industry have been learned from observing established local industries such as seaweed cultivation, where shorter production cycles allow participating communities to generate profits more quickly, helping ensure their long-term enthusiasm. This is part of the reason for the project’s adjusted harvest cycles, shortening production times to deliver more regular income. Several potentia/former participants have indicated their willingness to join/rejoin the program based on the results of harvesting.

Given the inability of PT SPK to provide a viable supply of juvenile sea cucumbers, the project rapidly adjusted its production method to include an in-situ hatchery, developed in collaboration with the district-level fisheries agency. This was based on the understanding that local interests on the part of state and community partners towards the successful implementation of the sea cucumber project were more likely to deliver strong and effective partnerships, and this proved to be true. The hatchery facility is currently operational, with a combined CSERM-UNAS/fisheries agency staff, and is anticipated to begin delivering target production quotas by Q3Y3.

The most important lessons learned this year relate directly to the biology and ecology of sea cucumbers themselves. Primarily, the impact of seasonal weather fluctuations on sea cucumber growth rates in open-air sea pen culture has been identified as disrupting their growth patterns, informing the decision to shorten harvest cycles and maximise returns on outgrowing sea cucumbers between seasonal storms. In order to account for the smaller size and younger age of harvested sea cucumbers, a partial harvesting regimen will be implemented to ensure mature individuals remain to breed and support wild populations. The new harvesting and restocking system has been adapted to account for these seasonal changes and prevent individual sea cucumbers being damaged/disturbed. Furthermore, observations regarding the impact of

seasonal storms on the open-air seapens have provided the foundation for a seapen innovation program to be launched in Y3, where specific design parameters will be trialed to develop storm-resistant sea pens, facilitating expansion of sea cucumber cultivation across wider coastal areas will increased exposure to incoming weather events.

The importance of delivering marketable products was highlighted by one of the potential buyers interested in developing a long-term relationship with the project, and because of this the decision was taken to integrate training and product development into the purchase system. At the present time, training for sea cucumber processing and preparation is being provided by PT Agang Nelayan, who has also agreed to purchase the processed sea cucumbers based on prices according to agreed-upon parameters.

9. Actions taken in response to previous reviews (if applicable)

The current AR includes multiple tables, notes, minutes and photographs to support the claims made in regard to specific outputs. This is in response to the reviewer comment on our previous AR.

10. Risk Management

Over the past 12 months, the project has encountered and overcome numerous risks related to delivering its key outcomes. Primarily, it was quickly identified that suboptimal survival rates among juvenile sea cucumbers delivered by PT. SPK, the project's initial partner, would be insufficient to supply participating communities with the stock they need to maintain viable enterprises. In response to this, the project terminated its agreement with PT. SPK on good terms, and reorientated its focus towards developing an in-situ breeding and hatchery program for Selayar Islands. This facility is now running, and is anticipated to reach production targets by Q2Y2. Secondary risks associated with failure to reach the projection targets are being addressed via a dedicated monitoring program and careful modification of production SOP to ensure optimal yields.

Risks associated with Selayar Islands' seasonal weather changes have also presented a delivery risk to the project, by undermining cultivation growth rates and reducing the overall profitability of the livelihoods. In response, the project has pivoted towards a shorter production cycle of larger harvests, avoiding extreme weather events and focusing on enhanced processing and preparation techniques to deliver the highest quality product. This will be supported by an additional breed-out program to ensure mature individuals are available to support genetic diversity in wild populations.

Additional risk information can be found in the attached risk register.

11. Scalability and durability

As of Y2 end, this project possesses significant scaling potential, due to enhanced partnerships with a wide range of external stakeholders and the development of dedicated scaling processes internally. Primarily, developing deep collaboration with district-level government partners in the Regional Planning and Development Agency, Fisheries Agency, and District Administration, the project has successfully delivered a co-managed hatchery facility dedicated to providing sea cucumber juveniles for restocking of village-level production. This facility continues to be developed in terms of production capacity and efficiency, building upon scientific and economic data to improve operational protocol and policy integration. Special dispensation for this facility has been secured, with profits from sea cucumber production to be reinvested into the facility through the purchase of juveniles for growing out in open-air sea pens. This facility serves the dual function of providing a stable supply of juvenile sea cucumbers while reducing pressure on wild populations, supporting both the economic and ecological parameters of sustainable production. Given the strong support from participating communities, and critical alignment between the project's stated goals and key policy objectives at the district level, this facility is anticipated to generate independent momentum during the post-funding period, and will be formally integrated within planning and policy frameworks during Y3 implementation.

Evidence of the project's attractiveness to additional stakeholders has been identified through the mapping of additional communities seeking to participate in the sea cucumber cultivation program, independent of the Darwin Initiative-supported funding period. Given the variable ecological conditions of these additional communities' locations across Selayar Island, there is a need to develop an innovative design for sea pen construction, and refined SOP for operational protocol in new locations. This has been initiated in Q4Y2, with a dedicated team of design experts allocated to develop new designs according to strict ecological, economic and design parameters identified through collaborative discussions with potential community partners. The intention is to deliver a 'ready-made' operational system for these additional locations, both via the established cooperative (which can accommodate additional memberships from new partners), and state agencies (who will play a critical role in permissions and support mechanisms for these new sites), supported by the project's economic and ecological data as a foundation.

The allocation of special land-use dispensation for sea cucumber cultivation at coastal locations across Selayar has been established as a paradigm by the District Government, which has provided 2.55 hectares of dedicated space (outside existing boat traffic routes) for existing operations at 4 participating villages. This dispensation has been granted in perpetuity for the cultivation of sea cucumbers using the CSERM-UNAS sea pen grow-out method, and will be abrogated only in the event of it being unused for cultivation for a period of more than 6 consecutive months. Establishing this innovative land-use regime is a critical step towards long-term project sustainability, providing a clear framework for recognition and state support based on fulfilling the environmental criteria and operational protocol designed by the project to deliver sustainable sea cucumber livelihoods, and is intended to function as a pathway for new project partners to establish additional operations without compromising the wider environmental benefits which it is intended to generate.

Sustainable sea cucumber cultivation as a supplementary livelihood for coastal communities has clearly begun to be established as a planning and policy priority for the various state agencies of the Selayar Islands District, and this is a critical goal for long-term project sustainability. In Y3 implementation there will be a strong focus on transitioning from three-way relationships with CSERM-UNAS serving as interlocutor between community actors and state agencies, towards operationalised and clearly defined two-way relationships designed to continue into the post-funding period. Having established the cooperative enterprise to represent the interests of local communities and the hatchery facilities which are co-operated by state agencies and project partners, it will be important to focus on identifying clear communication channels, policy analysis and strengthening institutional procedures to ensure that these critical project components continue to function as intended. The fact that the District Fisheries Agency has been willing to participate directly in the management and operation of the hatchery is a promising sign that this collaboration can be implemented smoothly, with additional support from the Regional Planning and Development Agency to deliver higher-level policy and infrastructure alignment as part of the overall exit strategy.

The medium-term development plans for Selayar District are also aligned with key elements of project implementation, as identified in key policy documents including the 6 development missions of Selayar District, targeting enhanced livelihoods and development at the village level, improved quality of life for coastal communities, improved management and delivery of outcomes in the maritime economy, and improved management of the natural environment. Each of these policy priorities can be addressed by successful implementation of this project, and efforts will be made to harmonise all project activities with this policy framework as far as possible to secure ongoing support from current and future administrations.

At the current implementation phase the project's exit strategy is both on track and ahead of schedule, with the modified implementation of hatchery facilities acting as a critical incubator for the relationships necessary to translate the project's funding-supported benefits into long term change at the systematic level. It is clear that a larger scale of sea cucumber cultivation on Selayar Island will deliver exponential benefits for all parties, by empowering participating communities to negotiate improved prices, generate economies of scale in production, processing and restocking operations, further raise the profile of sea cucumber cultivation as a key economic policy platform, and further develop a comprehensive sustainable program covering a wider area of variable coastal ecosystems, including those outside the production system itself. Additional material support in the post-funding period to expedite and enhance the

implementation of both production, processing, restocking and site expansion will be invaluable, and CSERM-UNAS will endeavour to secure this from external partners at the same time as continuing to nurture existing relationships in pursuit of further policy and planning objectives.

12. Darwin Initiative identity

This project has taken deliberate steps to highlight the central role of the Darwin Initiative, and the UK government more generally, as a partner in the delivery of this project. The logo, profile, and description of the Darwin Initiative has been featured in all project materials, including those delivered via workshops to local communities, meetings with state and community partners. The Darwin Initiative logo appears on all associated promotional and dissemination materials including: uniforms for field officers (t-shirts, hats); promotional banners and signage of field office and all field locations; informational posters and public announcements in the village hall of each participating village. It has also been clearly displayed at all conferences and seminars at which the project has been represented, including the SeaBRNet 15th, ICFA Bangkok, BCE Yogyakarta which were attended in Y2 implementation of the project. In the field, the newly-established hatchery facilities are clearly identified as having been developed as part of a Darwin Initiative funding program by a sign displayed at the entrance to the facilities. The Darwin Initiative also appeared in a local article by Quarta.id on the internet which discussed our sustainable sea cucumber aquaculture program in Selayar. At the Dies Natalis of Universitas Nasional, CSERM UNAS presented a video on sea cucumber aquaculture by including the BCF logo in the video. The CSERM-UNAS website and instagram account also makes clear mention of the Darwin Initiative as a project partner, featuring the name, logo and profile on all relevant posts and reposting articles from the Darwin Initiative newsletter for domestic and international audiences to review as part of CSERM-UNAS' online profile. These materials include scientific findings, observational data, workshops and events conducted in Selayar, and are linked to the BCF account for easy access by visitors.

13. Safeguarding

14. Project expenditure

Table 1: Project expenditure during the reporting period (1 April 2024 – 31 March 2025)

Project spend (indicative) since last Annual Report	2024/25 Grant (£)	2024/25 Total Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)				
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items (see below)				
Others (see below)				
TOTAL	**189,433.00**	**189,876.57**		

Table 2: Project mobilised or matched funding during the reporting period (1 April 2024 – 31 March 2025)

	Secured to date	Expected by end of project	Sources
Matched funding leveraged by the partners to deliver the project (£)	[redacted]	[redacted]	Universitas Nasional, Heriot-Watt University
Total additional finance mobilised for new activities occurring outside of the project, building on evidence, best practices and the project (£)			

15. Other comments on progress not covered elsewhere

The project exit strategy has been enhanced by establishing a local hatchery facility on Selayar Island, to be co-managed by the community cooperative and fisheries agency in the post-project period. An additional program to develop new sea pen designs supporting an island-wide rollout of cultivation livelihoods in the post-project period is also being prepared for rollout in Y3 as part of comprehensive exit strategy preparation.

16. OPTIONAL: Outstanding achievements or progress of your project so far (300-400 words maximum). This section may be used for publicity purposes.

I agree for the Biodiversity Challenge Funds to edit and use the following for various promotional purposes (please leave this line in to indicate your agreement to use any material you provide here).

The second year of project implementation has witnessed several significant achievements which each contribute systematic and transformational change for the twin biodiversity and poverty reduction outcomes of Selayar Island, South Sulawesi, Indonesia.

Most notably, Y2 implementation includes the establishment of a sea cucumber hatchery on Selayar island to provide juvenile stock for the grow out program. This is the first example of collaborative facility operations of this kind being launched in Selayar, and represents a paradigm shift in the relationship between coastal communities, district government agencies, academic researchers, and international donors. In operating this facility, all project partners generate incentives for sustainable operation of sea cucumber aquaculture, establishing a new economic driver through the purchase of juveniles and resale of harvested stock. In addition, these facilities help reduce exploitation pressure on wild sea cucumber populations, by providing an alternative supply of juveniles for stocking cultivation sea pens. These facilities are a critical component of the project exit strategy, and are anticipated to be operating at full capacity by Q2Y3, with provisions made for their long-term funding and operational procedures to be developed thereafter.

Secondly, the establishment of sustainable sea cucumber cultivation on Selayar Island has been successfully enshrined in formal land use and planning dispensation policy. Existing project areas have been formally recognised and granted utilisation status in perpetuity (provided they remain in continual use), with a framework established for recognising further sites following ongoing expansion, provided they implement the sustainable production techniques trialled and introduced through this project. By introducing an entirely new category of land-use status this project has therefore established enduring and systematic change in the relationship between

the Selayar District, its coastal habitats, particularly seagrass beds, and the communities who depend upon them.

The research conducted as part of this project and their findings have been recognised as making a meaningful contribution to the study and understanding of sea cucumbers, seagrass beds, and tropical coastlines more generally, as evidenced by their acceptance and publishing by Springer Press. Successfully securing publication in this world-renowned academic journal indicates the highest standards of academic rigor have been applied during the data collection and research operationalisation process, and supports ongoing conclusions regarding key conservation and poverty reduction outcomes.

File Type (Image / Video / Graphic)	**File Name or File Location**	**Caption including description, country and credit**	**Social media accounts and websites to be tagged (leave blank if none)**	**Consent of subjects received (delete as necessary)**
Video	Male sea cucumbers spawning.MP4	Male sea cucumbers spawning in Selayar hatchery	Instagram: cserm_unas, disper.selayar Website: https://cserm.unas.ac.id	Yes
Photo	Sea cucumber pens in Lowa, Selayar Islands.jpg	Sea cucumber pens in Lowa, Selayar Islands	Instagram: cserm_unas Website: https://cserm.unas.ac.id	Yes

Annex 1: Report of progress and achievements against logframe for Financial Year 2024-2025

Project summary	Progress and Achievements April 2024 - March 2025	Actions required/planned for next period
Impact Effective conservation and sustainable utilisation of Indonesian seagrass beds through demonstrating the potential of near-shore sea cucumber ranching practices as a vehicle for female economic empowerment and broader coastal resilience	New land use categories for sustainable sea cucumber cultivation established, ongoing cultivation operations have begun harvesting and delivering supplementary income, seagrass growth and integrity around project sites has increased, 104 female participants receive increased income.	[redacted]
Outcome **Adopting sustainable sea cucumber ranching delivers a profitable supplementary livelihood as economic empowerment for local women from 120 households across 3 coastal villages and effective seagrass habitat conservation**		
Outcome indicator 0.1 Increase in 120 participating women's monthly income from seagrass associated activities of at least 100% in year 3 compared with year 1 baseline, overall monthly income of at least 50% in year 3 compared with year 1 baseline, overall income of participating households by at least 10% in year 3 compared with year 1 baseline	Income increase on track for Y3 achievement, current progress still partial based on preliminary harvests. Cooperative commercial system already established to manage and distribute profits among participants.	Enhance processing and preparation methodology to increase profitability, increase hatchery production, accept 16 new members into cooperative/cultivation program
Outcome indicator 0.2 120 women report improved economic resilience to external shocks, increased household decision-making power and more financial independence as a result of project implementation in year 3 compared to year 1 baseline	Income increase on track for Y3 achievement, current progress still partial based on preliminary harvests. Cooperative commercial system already established to manage and distribute profits among participants. New harvest cycle proposed to stabilise income generation capacity.	Enhance processing and preparation methodology to increase profitability, increase hatchery production, accept 16 new members into cooperative/cultivation program, implement refined harvest cycle
Outcome indicator 0.3 At least 50% of participating women elect to continue with or expand existing 'ranching' operations as an alternative livelihood beyond the project life span	Current surveys report 91/104 participants intend to continue operating the sea cucumber cultivation system in the post-funding period, dependant on profitability as delivered in output 0.1, 0.2.	Enhance training and education program, empower participants to take independent decisions, identify potential shortcoming and address them

Outcome indicator 0.4 Improved seagrass ecosystem health in and around 50m radius of sustainable 'ranching' sites ([a] seagrass growth rate increase of at least 10% compared with control sites in year 2, 20% in year 3, [b] seagrass coverage increase of at least 10% compared with year 1 baseline, [c] benthic macroinvertebrate abundance increase by at least 5% compared with year 1 baseline, species diversity 10% higher in year 3)	Seagrass growth at 3 locations (one further site with limited seagrass presence) displays higher growth rates and increased coverage in and around the cultivation pens (⅔ sites). Invertebrate abundance was reduced within cultivation pens because of regular predator cleaning operations.	Y3 surveys will expand to a 100m radius around cultivation sites to gather enhanced understanding of ecological impact
Outcome indicator 0.5 No-take zone/no prop scarring zone established around aquaculture 'ranching' sites to protect commercial operations and associated seagrass habitat	Achieved Y1. Community partners and state agencies have agreed to establish priority for sea cucumber aquaculture in pilot project locations. To be confirmed at the end of funding period following successful scaling.	-
Output 1. Education and awareness raising of the importance, ecology and economic potential of seagrass beds provided to local communities as a precursor for pilot projects		
Output indicator 1.1 Formal permission to conduct habitat survey with clear intention to develop aquaculture pilot sites by local communities and government representatives following public meeting and FGD with government at the start of project	Achieved Y1.	-
Output indicator 1.2 Formal permission for at least 3 aquaculture pilot sites development by local government and community members given within 1 month of habitat assessment survey, following public meeting and FGD with government	Achieved Y1. Pilot project sites permitted and currently active following habitat assessment survey and a range of targeted public discussions with state and community partners	-
Output 2. Participating women trained to successfully manage and operate aquaculture pilot project sites		
Output indicator 2.1 60 groups of women agree to join 12 month training program (month 12-24 of project implementation) conducted by CSERM team & PT Sejahtera Putra Kusuma	Current active participants: 104 women from 52 groups. 14 participants expected to join following the successful harvest.	Invite participants to join/rejoin the cultivation program following sea cucumber harvest
Output indicator 2.2	Post workshop assessment with participants displayed technical understanding and capacity of between 72-99%.	Continue to expand and review training program, focus on

Participating women display key technical capabilities and knowledge within month 1 of training program in preliminary review session		productivity, efficiency and product quality
Output indicator 2.3 Methodology, technical designs, management practices refined and modified specifically for conditions at each site formalised (5)	Modified SOP developed, introduced and refined based on feedback from buyer, participating communities, and scientific data from monitoring. To be further developed in Y3 to focus on enhanced processing techniques and shorter harvest cycles.	Further develop processing SOP and shorter harvest cycle methodology, formalise SOP into clear policy document
Output indicator 2.4 Pilot stock sea cucumbers harvested & sold successfully to private sector partner	Partial harvests sold successfully, purchase agreement and cooperative enterprise established to oversee sales.	Expand scale of new harvests, monitor and set price targets
Output 3. Pilot sites expanded into full-scale sea cucumber ranches managed by participating women at Stage 2		
Output indicator 3.1 At least 75% of workshop/pilot site participants elect to participate in site expansion	Achieved, only 1 participant elected not to participate	-
Output indicator 3.2 Responsibility for management and monitoring of expanded sites in accordance with sustainability SOP assumed by participating women	Achieved. Women deal with maintenance and monitoring, work rota established	-
Output 4. Ranching sites developed into profitable aquaculture industry supported by local hatchery, to be operated by Selayar District Fisheries Agency in collaboration with CSERM-UNAS & HWU		
Output indicator 4.1 Expanded 'ranching' sites generate ROI of at least 120% in year 3 (including initial construction costs), with sustainable harvesting regimen in place	Y3	End of project activity
Output indicator 4.2 Capacity to prepare and process sea cucumbers increased across 120 households, able to sell finished products for at least 200% year 1 baseline price per kg by year 3	A sea cucumber processing training program conducted in Y2, drying processing and sale preparation achieved 80% quality target, new parameters and methods provided by the sales partner.	increase processing quality following sale partner parameters
Output indicator 4.3 Sea cucumber aquaculture established as economic development priority for Selayar District	Y3	End of project activity

Output 5. Sustainable aquaculture industry transferred to local ownership and management		
Output indicator 5.1 At least 50% of participants (female) in the expanded ‘ranching’ phase elect to take over management of the sites and associated processing activities following the end of project activities in year 3	Y3	End of project activity
Output indicator 5.2 At least 10% profits from sea cucumber aquaculture reinvested in juvenile stock and/or site expansion at 3 sites	Y3	End of project activity

Annex 2: Project's full current logframe as presented in the application form (unless changes have been agreed)

Project summary	SMART Indicators	Means of verification	Important Assumptions
Impact: **Effective conservation and sustainable utilisation of Indonesian seagrass beds through demonstrating the potential of near-shore sea cucumber ranching practices as a vehicle for female economic empowerment and broader coastal resilience**			
Outcome: **Adopting sustainable sea cucumber ranching delivers a profitable supplementary livelihood as economic empowerment for local women from 120 households across 3 coastal villages and effective seagrass habitat conservation**	0.1 - Increase in 120 participating women's monthly income from seagrass associated activities of at least 100% in year 3 compared with year 1 baseline, overall monthly income of at least 50% in year 3 compared with year 1 baseline, overall income of participating households by at least 10% in year 3 compared with year 1 baseline 0.2 -100 women report improved economic resilience to external shocks, increased household decision-making power and more financial independence as a result of project implementation in year 3 compared to year 1 baseline 0.3 - At least 50% of participating women elect to continue with or expand existing 'ranching' operations as an alternative livelihood beyond the project life span 0.4 - improved seagrass ecosystem health in and around 50m radius of sustainable 'ranching' sites ([a] seagrass growth rate increase of at least 10% compared with control sites in year 2, 20% in year 3, [b] seagrass coverage increase of at least 10% compared with year 1 baseline, [c] benthic macroinvertebrate abundance increase by at least 5% compared with	0.1a - Participating women's monthly coastal 'foraging' income survey, annual 0.1b - Participant interviews, annual 0.1b - Participating women's monthly income survey, annual 0.1c - Participating household monthly income survey, annual 0.2 - Female economic empowerment survey 2023, 2026 0.3a - Participant feedback surveys & interviews regarding successes, shortcomings, intent to continue, 2026 0.3b - Sea cucumber ranching community-owned enterprise (koperasi/BUMDes) membership records, 2026 0.4a - vertical growth analysis 2023, 2026 (hole-punch method, Arnull et al. (2021)) 0.4b - annual quadrat sampling extrapolation method 0.4c - annual biosurvey of benthic fauna 0.5 - Public awareness raising materials (signage) set up by local communities around participating villages photographed	Participating women and households openly and accurately report relevant income data Participating women opt to formalise their aquaculture enterprise in accordance with government initiatives No external shocks, disasters (of human or natural origin) which negatively affect seagrass ecosystem health Economic benefits of project implementation encourage participation and support for associated initiatives by wider community

	year 1 baseline, species diversity 10% higher than control sites) 0.5 - No-take zone/no prop scarring zone established around aquaculture 'ranching' sites to protect commercial operations and associated seagrass habitat (month 6)		
Output 1 **Education and awareness raising of the importance, ecology and economic potential of seagrass beds provided to local communities as a precursor for pilot projects**	1.1 - Formal permission to conduct habitat survey with clear intention to develop aquaculture pilot sites by local communities and government representatives following public meeting and FGD with government at the start of project 1.2 - Formal permission for at least 3 aquaculture pilot sites development by local government and community members given within 1 month of habitat assessment survey, following public meeting and FGD with government	1.1 - Formal permission for seagrass habitat assessment at 9 villages with clear intention to identify ideal aquaculture pilot sites, approved by local Planning and Development Agency and co-signed by village heads in each location following public meeting with citizens 1.2 - Formal letter of support for pilot project development with clear intention to expand successful sites at 3 village locations, approved by local Planning and Development Agency and co-signed by village heads in each location following public meeting with citizens	Existing interest by local community partners remains until project start date in 2023 Seagrass habitat health remains in good enough condition to facilitate aquaculture pilot project No conflict of interest between identified pilot sites and changes to local government development or planning agenda
Output 2 **Participating women trained to successfully manage and operate aquaculture pilot project sites**	2.1 - 60 groups of women agree to join 12 month training program (month 12-24 of project implementation) conducted by CSERM team & PT Sejahtera Putra Kusuma. 2.2 - Participating women display key technical capabilities and knowledge within month 1 of training program in preliminary review session 2.3 - Methodology, technical designs, management practices refined and modified specifically for conditions at each site formalised (5)	2.1a - Letter of commitment signed by women from participating households 2.1b - Rota for shared monitoring and maintenance duties agreed by each group 2.1c - Surveys demonstrating a change in understanding 2.2 - Preliminary skill review test score for women from group at least 75% 2.3 - Waterproof SOP manual created for each site for reference and instructions, distributed all local participants	Participating women are able to attend repeated training sessions and happy to collaborate on monitoring/maintenance activities Comparative data between different locations, stocking densities and other factors produce clear, actionable findings No external shocks, disasters (of human or natural origin), theft or

	2.4 - Pilot stock sea cucumbers harvested & sold successfully to private sector partner	2.4 - At least 500x400g sea cucumbers (*Holothuria scabra*) harvested per chamber after 12 months' operation	destruction which disrupts pilot operations
Output 3 **Pilot sites expanded into full-scale sea cucumber ranches managed by participating women at Stage 2.**	3.1 - At least 75% of workshop/pilot site participants elect to participate in site expansion 3.2 - Responsibility for management and monitoring of expanded sites in accordance with sustainability SOP assumed by participating women	3.1a - Management/monitoring agreement signed by all participants, responsibility rota established 3.2 - Attendance, rota and site monitoring report by project field officers to confirm duties carried out	Participating women are able to allocate sufficient time, and are happy to collaborate on monitoring/maintenance activities
Output 4 **Ranching sites developed into profitable aquaculture industry in collaboration**	4.1 Expanded 'ranching' sites generate ROI of at least 120% in year 3 (including initial construction costs), with sustainable harvesting regimen in place 4.2 Capacity to prepare and process sea cucumbers increased across 120 households, able to sell finished products for at least 200% year 1 baseline price per kg by year 3 4.3 Sea cucumber aquaculture established as economic development priority for Selayar District	4.1 - Survey of net ranching income per village 2023-2026 4.2a - Sea cucumber sale price survey, 2023, 2026 4.2b - Training course attendance certificates 4.2c - Participant survey indicating shift in perception of value and skill capacity 4.3a - Letters of support from district head, planning and development agency, local industry partners, commitment to collaborate towards developing the industry 4.3b - Supporting policy framework adopted by district government	No external shocks, disasters (of human or natural origin), theft or destruction which disrupts expanded site operations or secondary processing activities Market price fluctuations limited to within 50% of year 1 baseline
Output 5: **Sustainable aquaculture industry transferred to local ownership and management**	5.1 - At least 50% of participants (female) in the expanded 'ranching' phase elect to take over management of the sites and associated processing activities following the end of project activities in year 3 5.2 - At least 10% profits from sea cucumber aquaculture reinvested in	5.1 - Act of registration for 3 village-owned enterprise to take over site management and sea cucumber processing with at least 50% of project participants (female) registering as members at the end of year 3. 5.2 - Enterprise financial reporting end of year 3	Improved livelihoods encourage women to seek higher ROI from sea cucumber ranching

	juvenile stock and/or site expansion at 3 sites		

Annex 3: Standard Indicators

Table 1 Project Standard Indicators

Please see the Standard Indicator guidance for more information on how to report in this section, including appropriate disaggregation.

DI Indicator number	Name of indicator	If this links directly to a project indicator(s), please note the indicator number here	Units	Disaggregation	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
DI-D02	Number of people whose disaster/climate resilience has been improved (income).	0.1, 0.2	People	Women	0	104	120	104	120
DI-B10	Number of individuals/households reporting an adoption of livelihood improvement practices as a result of project activities	0.1, 0.2	People	Women	0	104	120	104	120
DI-B10	Number of individuals/households reporting an adoption of livelihood improvement practices as a result of project activities	0.3	Households	None	8	104	120	104	60
DI-D01	Stabilised/improved species population (relative abundance/distribution) within the project area	0.4	Increased Abundance/ Distribution	Seagrass	-	-	-	-	-
DI-B01	Number of new/improved habitat management plans available and endorsed	0.5	Number	Management Plans	3	4	5	4	5
DI-A07	Number of government institutions/departments with enhanced awareness and understanding of biodiversity and associated poverty issues	1.2	Number	Government Agencies in Selayar	2	3	3	3	3
DI-A07	Number of government institutions/departments with enhanced awareness and understanding of biodiversity and associated poverty issues	1.2	Number	Government Agencies in Selayar	2	2	2	2	2
DI-A01	Number of people from key national and local stakeholders completing structured and relevant training.	2.1	People	Women	8	104	120	104	120

DI Indicator number	Name of indicator	If this links directly to a project indicator(s), please note the indicator number here	Units	Disaggregation	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
DI-A04	Number of people reporting that they are applying new capabilities (skills and knowledge) 6 (or more) months after training.	2.2	People	Women	8	104	120	104	120
DI-B04	Number of new/improved sustainable livelihood/poverty reduction management plans available and endorsed*	2.3	Number	None	3	4		4	4
DI-B08	Taxa (Flora/Fauna/Fungi); Standard used; Product Type.		Number	Stock	0	n/a	n/a	0	n/a
DI-B07	Number of people participating in community-based management groups and/or Payment for Ecosystem Service schemes	0.1	People	Women	8	104	120	104	120
DI-B04	Number of new/improved sustainable livelihoods/poverty reduction management plans available and endorsed*.	4.3	Number	Management Plans	3	4		4	4
DI-A11	Number of individuals / households reporting an adoption of livelihood improvement practices as a result of project activities.	4.1	Percentage	Profit ROI	0	0	120	0	120
DI-A04	Number of people reporting that they are applying new capabilities (skills and knowledge) 6 (or more) months after training.	2.2	People	None	22	104	120	104	120
DI-B12	Number of policies developed or formally contributed to by projects and being implemented by appropriate authorities.	4.3	Number	Policies	0	2	3	2	3
DI-B10	Number of individuals / households reporting an adoption of livelihood improvement practices as a result of project activities.	0.1, 0.2	People	Women	0	0	60+	0	60+
DI-A11	Number of sustainable livelihood enterprises that are profitable	4.1	Number	Enterprises	0	0	3	0	3

Table 2 Publications

Title	Type (e.g. journals, best practice manual, blog post, online videos, podcasts, CDs)	Detail (authors, year)	Gender of Lead Author	Nationality of Lead Author	Publishers (name, city)	Available from (e.g. weblink or publisher if not available online)
Determining Suitability of Sea Cucumber Ranching Sites through Community Participation and Habitat Assessment, Case Study: Selayar Islands, Indonesia	Abstract book	Ainin Q, Indriana LF, Sainal S, et al. 2024	Female	Indonesian	TIIKM Edu - ICFA	Link
Cultivating Sea Cucumbers in Seagrass Beds: A Path to Biodiversity Conservation and Sustainable Livelihoods	Abstract book	Indriana LF, Kelly C, Ainin Q, Holisoh S, Tadjuddin N, Sugardjito J. 2025	Female	Indonesian	BCE Symposium	Link
Community participation and habitat assessment determine sea cucumber grow-out site suitability in Selayar Islands, Indonesia	Journal	Ainin Q, Indriana LF, Sainal S, et al. 2025	Female	Indonesian	Springer	Accepted, currently waiting for publication

Checklist for submission

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