Darwin Initiative

Final Report

*To be completed with reference to the Reporting Guidance Notes for Project Leaders (http://darwin.defra.gov.uk/resources/) it is expected that this report will be a **maximum** of 20 pages in length, excluding annexes)*

Darwin project information

Project reference	23-024
Project title	Securing marine fisheries, livelihoods and biodiversity in Myanmar through co-management
Host country	Myanmar (Burma)
Contract holder institution	Wildlife Conservation Society – Myanmar Program
Partner institution(s)	Ministry of Agriculture, Livestock and Irrigation (Department of Fisheries/DoF), Pyoe Pin, Rakhine Coastal Conservation Association (RCA), Rakhine Fisheries Partnership (RFP), University of Exeter
Darwin grant value	£ 299,870
Start/end dates of project	May 1, 2016 - March 30, 2019
Project leader's name	Martin Callow (until 2017) Elizabeth Matthews, Thaung Htut (until 2019)
Project website/blog/Twitter	https://programs.wcs.org/myanmar/Wild-Places/Marine-Ecosystems.aspx
Report author(s) and date	Meira Mizrahi, Tony Bicknell, Kyaw Thinn Latt, Thaung Htut, Elizabeth Matthews.

1 Project Rationale

In Myanmar, marine resources act as a major contributor to food security, providing direct livelihoods to an estimated 1.4 million fishers, with per capita consumption remaining one of the highest in the world. As Myanmar emerges from decades of political isolation, the country faces a number of human-related challenges to its small-scale fisheries and associated marine environments, including the uncontrolled expansion of fishing effort, illegal and unreported fishing, in-migration to major fishing communities and conflicts over land use. The introduction of trawling during the 1980's has resulted in ongoing conflicts between small-scale and industrial trawling fleets. While current legislation prohibits trawlers from fishing inshore (11m[i] from the coastline), these laws are largely ignored, or not enforced by governing authorities. In 2014, a marine survey conducted by the EAF-Nansen project, supported by the Norwegian Agency for Development Cooperation (Norad), showed that pelagic and demersal fish stocks have subsequently decreased throughout Myanmar's exclusive economic zone to 10% of their 1979 biomass, with similar estimates for inshore coastal fisheries. Threatened species of sharks and rays are also increasingly being landed for a lucrative international market, despite an Order under CITES (the Convention on International Trade of Endangered Species and Wild Fauna and Flora) decreeing a nationwide moratorium on all targeted shark fishing.

Despite fisheries' importance, Myanmar has limited capacity for sustainable management. A recent University of Washington global analysis of fisheries governance systems labeled Myanmar the least effective. Overexploitation, encouraged by poor regulations, weak rule of law and enforcement and unsustainable fishing techniques, have resulted in drastic declines of stocks. Inshore fisheries are of particular concern, currently overcapacity and non-compliant with closed seasons.

In coastal Rakhine State, over 80% of the people are directly or indirectly involved in small-scale

fisheries for livelihoods and subsistence, but are rarely involved in decision-making or planning processes. Limited data indicate declines in catch over the past 5 years, particularly in sardine, anchovy and mackerel, and evidence of inshore fisheries bycatch, including a range of globally threatened species such as dugongs, turtles, sharks and rays, though information is guarded and poorly documented. Compounding these problems, Rakhine is ranked second in Myanmar's States and Regions in terms of poverty, with 78% of the population poor and concentrated along the coast.

These are great challenges. However, our work in Rakhine has shown how enthusiastic local communities are to do something about the state of their coastal fisheries. They have shown great interest in co-management approaches, and are working with our project team to collect data that can help inform the resource management process. The ideals of participatory co-management are a large change from previous top-down, strict governance models, especially for the new government with little experience of any other approaches. However, through our work with fisheries department representatives, we have seen great receptivity to these ideas. Through this project, with careful engagement and recognition of the needs of all local stakeholders and participants, we were able to develop a sustainable model of fisheries co-management that works for coastal communities in Rakhine state.

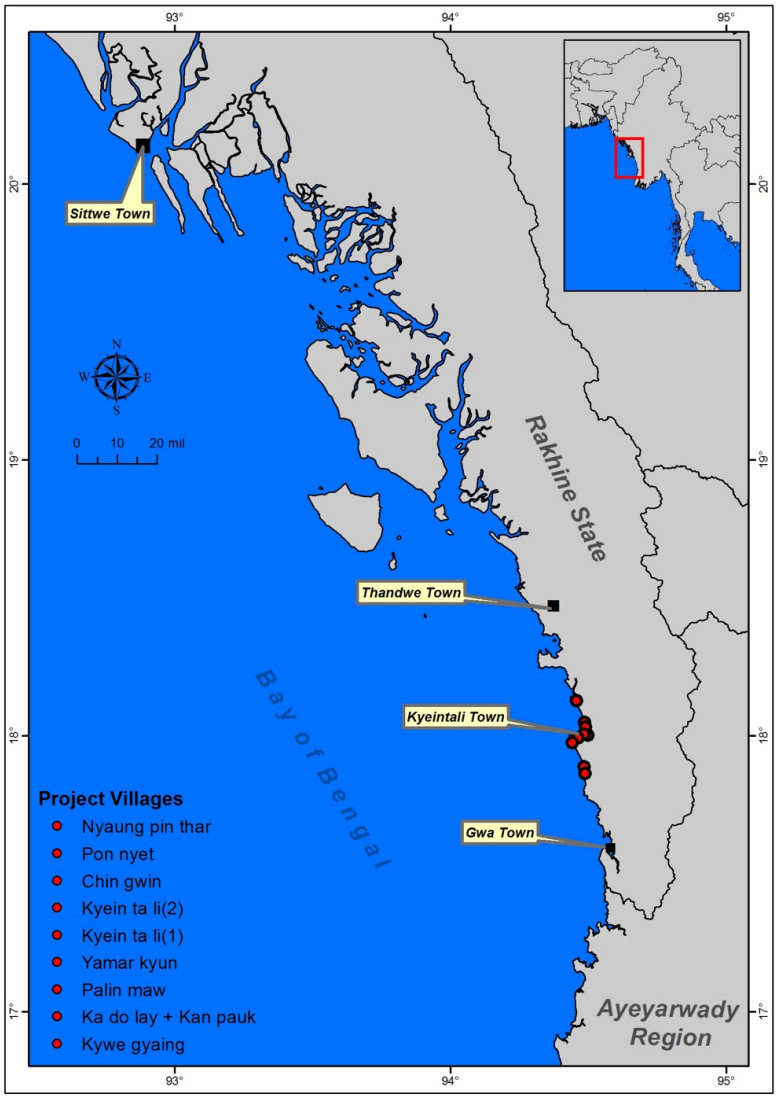

Figure 1. Map of project site: Rakhine state, Myanmar (Burma).

2 Project Partnerships

Partnerships: This project was led by the Wildlife Conservation Society (WCS), a US-based non-profit conservation organisation that has been working in Myanmar since 1993. WCS has been instrumental in the creation and expansion of several protected areas, including the country's first marine and aquatic protected areas. In Myanmar, WCS collaborates with the Ministry of Natural Resources and Environmental Conservation (MONREC), the Ministry of Agriculture, Livestock, Irrigation (MALI), Department of Fisheries (DoF) and local civil society organisations to assess the status of Myanmar's ecosystems, and to build capacity for wildlife conservation and natural resource management. WCS has been engaged with the DoF for over ten years on freshwater and marine projects, and has utilised its long-standing relationships to obtain inputs to - and support for - this project from local partners. These partnerships have been central to the successful implementation of this project in terms of bringing together government, civil societies and local communities to form a co-management approach to conservation and fisheries management.

Working through partnerships is core to the WCS 2020 Strategy, and has been essential to the design of this project. It is important to note that working with a government partner (in this case, the DoF) is necessary for any work like this in Myanmar. From the beginning of the proposal development process, we focused on ensuring this project was owned by the partners – particularly Pyoe Pin and the Rakhine Coastal Conservation Association (RCA). Furthermore, our partnership with and participation in the Rakhine Fisheries Partnership (RFP) has developed over the course of this project, which is a result of the outreach that the partners have been conducting to ensure the lessons being generated from this project are shared.

Department of Fisheries (DoF): The DoF is responsible for the development of the fishery sector in Myanmar. The DoF in Rakhine is the host of, and the main coordinating body of the RFP. Consultations with the RFP members, ensures that the DoF remains fully aware of stakeholder concerns and priorities in the fisheries sector. The DoF also uses the RFP to disseminate information related to the sector. The DoF has been involved with the design of this project from the outset. Staff from district and township offices accompanied WCS and Pyoe Pin staff on project scoping trips to Rakhine, and were instrumental in ensuring the project design reflects national and sub-national interests. Of particular importance to the project are the township offices in Thandwe, Gwa and Kyentali. DoF have also played a key role in project implementation, through providing support for data collection and sharing, co-management planning and communicating project progress to other States and Regions, and at the Union level. They also provided technical support to training courses and workshops.

***Pyoe Pin*:** The Pyoe Pin programme was formed in 2012 and supports local organizations, government departments, MPs, civil society groups, private sector and individuals to work cooperatively in meeting the needs and inspirations of Myanmar people. Through establishing coalitions of interest, Pyoe Pin undertakes a range of activities that contribute to furthering the basis for democratic and accountable governance within Myanmar. Through its work, the RFP has been established, with members including fishing communities, civil society organisations, NGOs, MPs, Government officials, the private sector and educational institutions. Pyoe Pin's work with the RFP focuses on reversing recent declines in the fisheries sector, and the RFP played an important role in the 2014 process that led to the drafting of the Rakhine State Freshwater Fisheries Law. The RFP is also engaged in promoting linkages between other states and regions in Myanmar including the Union level ministries and neighbouring countries.

This project generated significant partnership gains through our efforts to build trust with the Pyoe Pin team, which is politically connected in Rakhine State (through the RFP) and at the Union level.

***Rakhine Fisheries Partnership (RFP)*:** On June 1, 2013, a group of 30 stakeholders came together to discuss how Rakhine fisheries could be sustained and further developed. The participants included representatives from government, private sector, civil society, education institutions and local communities. The key organizations under RFP are Rakhine Thahaya Association (Northern Rakhine), Rakhine Coastal Association (Southern Rakhine (Thandwe, Kyentali and Gwa), Network Activities Group (Delta, Union Level), Ministry for Livestock, Fisheries and Rural Development (MLFRD), DoF, and Myanmar Fisheries Federation. It was agreed that the complexity of inter-related issues that have resulted in fisheries declines requires

a multi-stakeholder partnership committed to finding and implementing solutions for sustainable fisheries. RFP have been instrumental in securing strong relationships with Kyeintali fishers, which has been central to the success of our project.

***Rakhine Coastal Association (RCA)*:** Our partnership with the RCA was central to the success of this project. The RCA has strong local leadership (Dr Maung Maung Kyi), based in Kyeintali, the focal community for this project. RCA also is fortunate to have the support of a team of local volunteers who are committed to environmental conservation in Kyeintali, Gwa and Thandwe. This project has invested significant efforts to build awareness and capacity for fisheries research and fisheries co-management with this core group. Through this relationship, in particular, WCS is now a trusted member of the Kyeintali fisher community. Our efforts to elevate fisheries within the RCA is paying dividends, and the districts and township DoF officers are now also much more engaged on fisheries issues owing to the attention this project is bringing to the sub-township of Kyeintali.

Myanmar Fisheries Partnership (MFP): MFP have opened opportunities for the project and its learning to access new audiences. In particular, we are proud to be founding members of the Myanmar Fisheries Partnership (MFP), a national consortium of NGOs, institutions of higher education, community based organizations, the Myanmar Fisheries Federation and the DoF.

***University of Exeter (UoE)*:** WCS was also very fortunate to be working with the UoE on this project and on broader scientific activities in Myanmar. The team members from UoE have been instrumental in helping our project develop a robust research methodology and have provided training to the WCS team and RCA staff/volunteers. This academic partnership has provided this project with a scientifically credible construct, which, when considering all the partners involved, ensures we have a project design that is rich in technical, social and political capital.

Achievements: Until WCS brought these partners together, government bodies, researchers and civil society organisations had rarely worked together in Rakhine. As a result, there was little habit of collaborating or communicating, and numerous misunderstandings of each other's work. Since this project, these habits have shifted towards a strong collaborative relationship demonstrated through the achievements outlined in this report, such as the formal promulgation of Myanmar's first Marine Fisheries Co-Management Area. Partners have worked together to form the Kyeintali Inshore Fisheries Co-Management Area Association (KIFCA) which evolves the careful co-ordination of activities between DoF, RCA, and local communities. The KIFCA have worked together to develop the Management Plan for the co-management area, and have been patrolling the area for illegal activity. Together they have caught five illegal fishing boats, a monumental achievement considering that prior to this project, zero patrols for illegal fishing had occurred in Rakhine by DoF. In addition, the KIFCA has worked to increase community participation in wildlife and ecosystem conservation and successfully inspired and empowered local people to manage their own resources through co-management areas.

WCS has also formed a stronger relationship with local communities and other stakeholders as a result of these partnerships and the work over the course of this project. For example, WCS was invited to (and attended) various state level events in Sittwe (the capital of Rakhine state) and Kyaukpyu through invitations from Pyoe Pin and the RFP. In addition, WCS also secured invites for Pyoe Pin (and the Director General and Research Director of the Department of Fisheries) to attend The Economist's South-East Asia and Pacific Regional Fisheries Summit (Jakarta, October, 2016) and (for Pyoe Pin and the Deputy Minister and Director of the Department of Fisheries) to attend The Economist's World Ocean Summit (Bali, February, 2017).

Finally, our partnership with the UoE has ensured a strong scientific foundation to monitor impact of the co-management area on local fisheries livelihoods, by designing a monitoring and evaluation method that will continue be used beyond the scope of this project. Together, all of the project partners collectively ensure that we have an implementation team that is diverse and capable in technical, social and political capital.

Future for partnerships: WCS is pleased that Pyoe Pin has secured a new phase of funding, which will enable the team to continue to work with partners to advance important reforms of the fisheries sector in Myanmar. Furthermore, WCS has secured funding from SwedBio and the MPA Fund (WCS internal funding) through which we will continue to support RCA and KIFCA by providing technical and financial assistance to ensure the activities begun under this project are successfully implemented over the longer term. This additional funding is also enabling us and

our partners to share lessons and expand this model of fisheries co-management to other communities in Myanmar.

3 Project Achievements

Overall progress in carrying out project activities has gone largely to plan. Some elements of this project have taken longer than originally anticipated because the "bottom-up" approach of managing marine areas through co-management is a relatively new concept in Myanmar. It has therefore taken some time for people to understand their roles in the process, including the project team. Simply the fact that local people have a role in a resource management process is a new concept. As a result, we have moved carefully and steadily with activities to ensure that people are active and engaged in the processes we have been promoting. We have been pleased to see how supportive and enthusiastic people have been to this project and its ideals of co-management.

3.1 Outputs

3.1.1 Output 1. A gender-sensitive participatory planning process has led to the development and adoption of a co-management plan for coastal fisheries in Thandwe District in Rakhine State.

Baseline condition: When this project began, the inshore area of Thandwe district, Rakhine State, was operationally an open-access fishery, with some of the highest levels of poverty in Myanmar, and anecdotal evidence of declining fish stocks. Along the Thandwe coastline, over 80% of people were directly or indirectly involved in small-scale fisheries for livelihoods and subsistence. Furthermore, while women participated in fisheries activities such as processing and managing fisheries-related finances, there was very little (if any) inclusion in decision-making process related to managing local marine resources.

Change over the course of the project: During the first stage of this project, WCS worked closely with RCA and the DoF to develop a detailed proposal for the co-management area in Kyeintali Township, which was submitted to the DoF office in Naypyidaw in May 2018. The planning process for developing this proposal incorporated detailed consultations with 10 fishing dependent communities is Thandwe, and focused on identifying spatial and temporal measures and management zones to support the local management of marine recourses. Communities proposed their own no take zones, seasonally closed areas, gear restricted zones, and protected turtle nesting beaches. In addition, participating communities also proposed a potential marine protected area (18 mi^2) outside of the co-management area due to its perceived biodiversity values. Once zones were proposed, and management plan drafted, awareness-raising meetings were held in each of the 10 communities to discuss and revise the proposed Kyeintali Inshore Fisheries Co-Management Area, draft Management Plan, and vote on committee members. A total of 533 community members participated in these initial discussions (356 male and 178 female), and by December 2017, a total of 1,435 community members (899 male and 536 female) formally acknowledged their support for the co-management initiative by signing a joint letter of support.

Following a three-month period of review and internal government consultations at the national, subnational, and local levels, the Kyeintali Inshore Fisheries Co-Management Area was formally declared by the Director General of the Department of Fisheries on August 8, 2018**.** The designated area now covers 280 mi^2 of coastal waters in the vicinity of the ten participating communities and incorporates a number of management zones (Figure 1). These zones include: no-take zones (8 mi^2), seasonally closed areas (9 mi^2), gear-restricted areas (57 mi^2), and sea turtle nesting beaches (1 mi^2) (see Figure 1) and are intended to protect important habitats and reduce potential interactions of threatened species with fishing activity (See Measureable Indicator 1.2). A public ceremony was held on October 12 in Thandwe and Kyeintali, with participation from the Director General of the Department of Fisheries to officially declare the Co-Management Area.

A gender-inclusive Management Plan has been developed (currently in Burmese language only) to guide the management and implementation of the co-management area. The overall development process was highly participatory, with strong involvement from fishing communities as well as government partners. During this process, the management committee was selected,

and includes members of RCA, DoF, GAD, and two democratically elected representatives from each Kyeintali village (totally 20 community representatives), with 50% representation by women (10/20). The management plan indicates that the Kyeintali Inshore Fisheries Co-Management Association (known locally as KIFCA) should remain a democratically elected association with equal parts male and females (1 male and 1 female from each community). RCA were the main facilitators of this process, and by the end of this project, 50% of their core full-time staff are women (3 out of 6) (See Measurable Indicator 1.1).

In order to develop this Management Plan, WCS and RCA facilitated sessions to enable the community members to improve their co-management vision and objectives. The vision of the co-management area developed by community members is: *To improve living standard by sustainable utilization of fishery resources*.

Their objectives of this management plan are to:

1. *Address the decline of illegal fishing activities collaboratively with involvement of the local community and government;*
2. *Protect the habitat and spawning grounds;*
3. *Obey the current rules and regulations and take responsibility for fishery improvement;*
4. *Improve law enforcement; and*
5. *Foster development options for the fisher communities in each village.*

When the management plan was submitted, more than 1300 fishers and traders (30% of whom were female) from the Kyeintali area signed their support, accounting for 35% of the Kyeintali population (n=4121) and 72% of fishers and traders in Kyeintali (measurable indicator for Output 1.3)

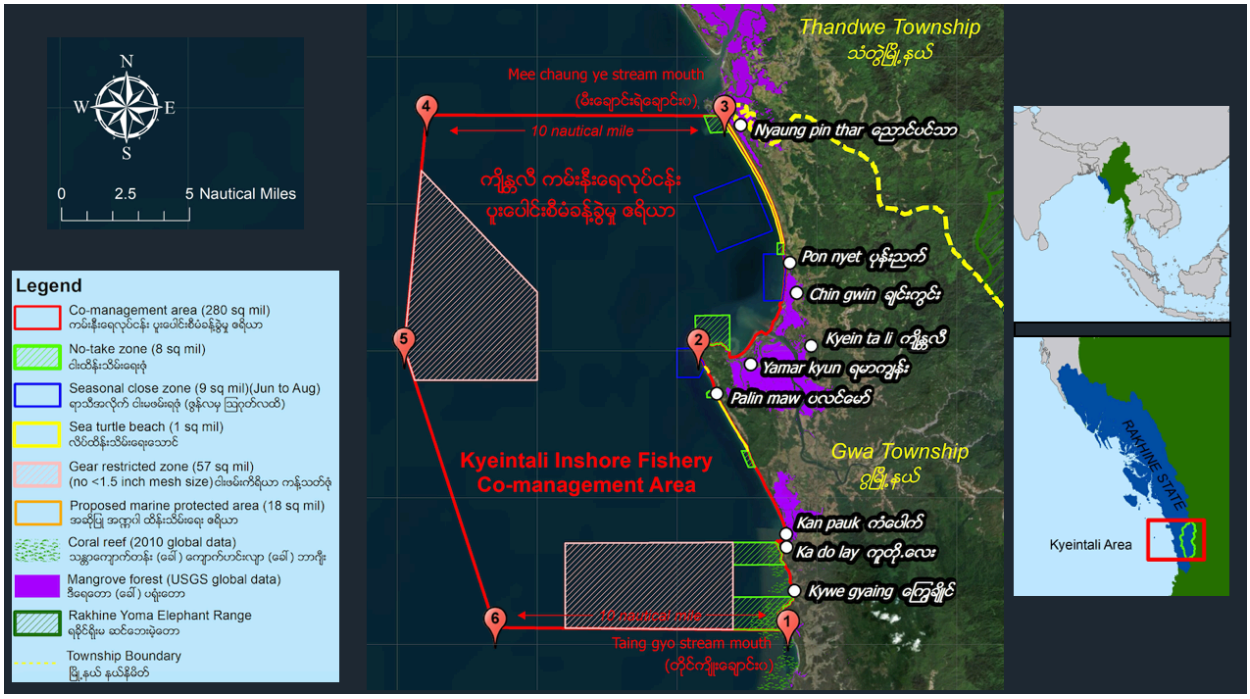

Figure 1. The designated Kyeintali Inshore Fisheries Co-Management Area and its management zones.

3.1.2 Output 2. Baseline data is available and routine participatory collection of additional data is integrated into the governance mechanisms for co-management.

Baseline condition: When this project began, there was limited independently collected data on catch, landings or socio-economic trends. Anecdotal fisher interviews conducted by WCS in May 2015 suggested a >50% drop in catch over the past 5 years, particularly in sardine, anchovy and mackerel. There was also observed evidence of inshore fisheries bycatch, including a range of globally threatened species like dugongs, turtles, sharks and rays, however information was

guarded and poorly documented.

Change over the course of this project: We have worked with the University of Exeter to design appropriate survey tools to be used to monitor fisheries and associated communities throughout and beyond the course of this project. This has included socio-economic survey questions/forms (fishers and traders), fisheries participatory mapping protocol, fish landing site surveying (for Catch Per Unit Effort (CPUE), and length-weight frequency data) and acquired novel "Pelagic Data Systems" GPS tracking devices to attach to a selection of purse seine vessels (supported by vessel owners and DoF). Two training workshops were delivered to WCS and RCA staff in the use of the survey tools, with a specific focus on training a core team of project enumerators. The first training session targeted 13 trainees (5 women): WCS = 1, DoF = 2, RCA = 6, fishers = 4. The second training event targeted 23 additional trainees (5 women).

Following training, baseline data collection took place during October 2016, with final surveys conducted in December 2018/January 2019. These included participatory socio-economic, key informant, mapping and catch surveys. Furthermore, ten pelagic data loggers have been deployed by WCS and RCA and continue to transmit data. Members of the RCA and individuals trained (as above) have collected this data, and WCS worked with them to enter and analyse the socioeconomic and catch data. Baseline fisheries and socioeconomic data is now available and managed by the DoF and WCS (See Outcome 2.2).

This considerable amount of baseline data is available to use for Outcome 2 indicators (and others) and as reference points within the adaptive co-management framework. This includes three years (seasons) of fisheries landings and catch length-weight survey data, plus three years of socioeconomic data characterising all fishing communities (10 villages). These data will enable KIFCA and communities, with support from WCS technical staff, to assess the effects of any management measures going forward, and feedback into their planning and management efforts.

Challenges: The process for the co-management area development was slower than anticipated. This is because this decentralized form of management strategy is very new to Myanmar and it has taken a while for people to understand how it works and to recognize its many benefits. As the co-management site was only declared towards the end of this project, it is likely that it will likely take at least a year from implementation for management measures to show significant effect on fisheries, which will fall outside the three-year time frame of the project. Now that RCA are trained to conduct socioeconomic and fisheries surveys, we plan to continue monitoring fisheries data annually to document fisheries benefits of the co-management area.

3.1.3 Output 3. A strategy to reduce unintended bycatch of marine vertebrates has been developed and implemented by local fishing communities.

Baseline condition: At the beginning of this project evidence of inshore fisheries bycatch existed within DoF, including a range of globally threatened species such as dugongs, turtles, sharks and rays, however this information was guarded and poorly documented. Furthermore, no strategy to reduce bycatch had been implemented.

Change over the course of this project: Due to difficulties in collecting quantitative bycatch data within the communities, details of Output 3 were modified during year two of the project to enable a more achievable objective focusing on raising awareness of bycatch mitigation practices within the fishing community and their potential inclusion in future co-management strategies. A workshop was held in July 2016 to share knowledge of the threats to Rakhine's marine wildlife and to share knowledge of the tools and practices that fishers might deploy to minimise unintended bycatch. This training in Kyeintali was attended by 38 persons (9 women): Government = 2, DoF = 2, Fishers = 24, RCA = 8, WCS = 2. Bycatch reduction was also included in the training session on sustainable marine management that was held in Kyeintali from August 18-19, 2016 and at the Annual Forum (April 24-26, 2017). Finally, sea turtle conservation training was made twice in 2019 (Palinmaw and Ponenyet villages; to a a total of 55 persons (40 fishers). Participants were from DoF, RCA, KIFCA, and WCS (Male: 49, Female:6). Awareness raising and by-catch reduction training was delivered to each of 10 villages (>500 individual), and a total of 110 posters were disseminated within the area (See Measureable Indicator 3.2). Training highlighted the importance of reducing bycatch, through simple, traditional means during daily fishing routines and how it can effectively be incorporated into the design of community management plans. The trainees who have successfully completed the training are now training other community members on by-catch reducing techniques.

One positive result of wildlife and bycatch reduction training to Rakhine's marine wildlife, is that communities have shown initiative to incorporate species-specific zoning into the co-management area. Communities proposed their own protected turtle nesting beaches (1 mi^2) (see Figure 1) to reduce potential interactions of threatened species with fishing and poaching activity. These are being monitored and guarded by community members, and over the course of this project, five Olive Ridley turtle nests were identified and protected by elected community members, and over 500 hatchlings released into the ocean under the guidance of the Turtle Survival Alliance (TSA). In addition, participating communities also proposed a potential marine protected area (18 mi^2) outside of the co-management area where they have observed high occurrences of sharks and rays.

Challenges: While this project intended to directly show reduction of bycatch, quantifying Bycatch Per Unit Effort (BPUE) was challenging due to its (often) unreported nature, and therefore estimates gained through interviews may be misleading. Therefore, we have had to consider what other strategies might be deployed for reducing bycatch – such as circle hooks (to reduce turtle bycatch), acoustic deterrent devices (for cetaceans), and lights on nets (for turtles). Minimising dugong interaction with fisheries via these kinds of technical approaches are challenging to implement (as they are non-specific to dugong) and success may only be achieved through time-area management of fisheries. As such, we considered it most beneficial to use the results of participatory mapping of dugong bycatch areas to design seasonal or area closures to reduce the interactions. This resulted in several no-take zones and seasonal closures have been placed in potential conflict zones between fishers and dugongs (See Measurable Indicator 3.1) particularly in Maw Yone where bycatch was most highly documented.

3.1.4 Output 4. Lessons learned from fisheries co-management planning and practices are shared to boost national fisheries resource governance capacity.

Baseline condition: At the beginning of this project, there was limited sharing of information between marine stakeholders in Rakhine, particularly between and within government bodies, civil society organisations, local communities and the general public.

Change over the course of this project: During the course of this project, a number of activities have taken place to promote sharing of co-management planning and practices between local partners, as well as at a national and international scale. Through match funding, WCS and Pyoe Pin were able to host the DoF Director General and Director of Research at the South-East Asia and Pacific Regional Fisheries Summit in Jakarta (July 2016). Similarly, our "Thriving Fisheries" project (funded by the blue moon fund) has enabled us to visit Aweyarwady, Thanintharyi and Mon States/Regions to share learning about co-management and the activities under this Darwin-funded project to DoF staff and members of the regional fisheries partnerships.

Our project team has also been actively attending regional events across Myanmar (see Measureable Indicator 4.2). We have attended meetings of the RFP in Kyaukpyu to share lessons with parliamentarians and other regional fisheries partnership attendees. Phoe Cho, who led WCS's fisheries work until early 2019, has presented to (and is now a member of) the Mon state fisheries partnership, plus WCS has conducted (under separate funding) site assessments across each of Myanmar's main coastal states and regions, which have included workshops to share our learning and collect participatory inputs for our learning process (See Measurable Indicator 4.1). WCS is also a founding member of the MFP, and we have attended MFP events in Naypyidaw and Yangon (June 2016, December 2016, March 2017).

At a local scale, the WCS project team have brought Kyeintali communities together through three annual forums (two in Thandwe and one in Kyeintali) (See Measurable Indicator 4.2). Specifically, these forums brought together members from Rakhine Tharaya Association, Network Activity Group, Sustainable Coastal Fisheries, Tanintharyi Coastal Association, Dawei Research Association, Marine Fisheries Federation and RCA, Ayaywaddy Fisheries Partnership, Fisheries Development Association, DoF (all levels), General Administration Department, National Coastguard, Ministry of Social Welfare, Myanmar Navy, KIFCA, and other fishers or fish workers from adjacent area in Rakhine and Dawei, Gwa. As one of the first inshore fisheries co-management demonstration projects in Myanmar, many useful lessons are being learned in Kyeintali that can inform further replication and policy reform. At Annual Forums in 2017 and 2018, community representatives and other stakeholders from Ayeyarwady and Tanintharyi Regions, Mon State, and other areas of Rakhine State participated and learned directly from the

Kyeintali co-management committee and their experiences. This has helped build closer partnerships with other organizations supporting similar efforts, and plans are underway now to facilitate a number of exchange and cross-visits. Furthermore, as a result of these forums, two alternative districts in Gwa and Dawei, have pledge to support the implementation of fisheries co-management, and consultations to kick-off this process are now underway (See Measurable Indicator 4.3).

WCS has also shared experiences through a number of other meetings and fora, including at a coastal fisheries workshop hosted by Rare and the Smithsonian Institution. We have been sharing project learnings through social media and other communications outreach. We have broadcast messages about conservation and WCS Myanmar projects to an extensive audience, with over 5.4 million impressions during the period from 1/05/2016 to 31/03/2019. Over the duration of this project, we have an audience reach of 3.281 million people and have achieved 221.5 thousand engagements on Facebook, while on Twitter we have recorded 21.4 thousand followers during that same period. A blog story about the project was published on National Geographic at:

https://blog.nationalgeographic.org/2018/09/27/ensuring-a-blue-future-for-myanmars-coastal-communities/

Finally, in September 2017, WCS senior marine manager Kyaw Thinn Latt travelled to Chile to present on our work on the co-management area at the International Marine Protected Areas Congress 4 (IMPAC4). In addition, WCS staff shared an update on our coastal fisheries work at a US-ASEAN regional fisheries meeting in Bangkok in September 2017.

3.2 Outcome

An inshore fishery co-management plan is implemented in Rakhine State, Myanmar, ensuring sustainable livelihoods and improved income for local fishing communities, reducing bycatch and providing a scalable resource governance model.

3.2.1 By 2019, 15% of fishers from our focus area (assuming Kyentali is chosen = 420 participating people) document a 5% increase in CPUE compared to 2016 baselines.

In order to discern if the implemented co-management areas were having their intended impact on fishers' livelihoods, Dr. Anthony Bicknell and colleagues from the UoE designed survey methods, trained partners and have been providing support to WCS staff to help deliver parts of Outputs 2 and 3. To enable collection of baseline data for Myanmar's inshore fisheries, UoE developed and trained staff of project partners (WCS, RCA and DOF) in the use of socio-economic, participatory mapping, and landings surveys. These data are used to characterise the local fishing community and fleet, understand fishing activity and effort, and provide evidence needed to implement an effective co-management plan. In addition, UoE advised on the installation of GPS tracking devices on 10 purse seine fishing vessels (the largest fleet), to provide further information on space use and fishing activity

For the purposes of this project outcome, CPUE has been calculated for the main species according to catch frequency, overall weight and/or value based on current data for purse seine fishing, due to its dominance within the fisheries sector. CPUE for purse seine fishing has been calculated using the following equations:

$CPUE_1$ - Catch in weight / hours fished

$CPUE_2$ - (Catch in weight / hours fished) / 100 m^2 of nets

(* e.g. m^2 for nets, number of hooks for line fishing)

Average seasonal values for species have been produced to allow comparison between seasons and start to build a database that could be used to detect changes or trends in the future (multiple years would be required to provide power and confidence in analyses).

Purse Seine fishing

Our surveys showed that purse seining (one and two boat) is the largest fishery in the Kyeintali sub-township area, with approximately 40 units (100 boats) making up approximately 40% of the fleet, and approximately 50% of fishers working on the boats (RCA figures from 2016). On average, there are 10 crew in a unit (unit = 2 or 3 boats) but this can be as large as 40 people.

The fishing is mainly conducted at night using lighting boats as attractants and a 'mother' boat to net the fish, but some more traditional day fishing still takes place. The fishing season runs from September/October until April/May, during the dry periods, and stops during the wet season. Data from the fisher household interviews indicate the top five target species groups are anchovy, sardine, mackerel, tuna and ribbonfish, but squid is also an important species caught in this fishery.

Landings data has been obtained from 65 purse seine unit logbooks from 7 landing sites, which were collected by RCA during the course of three fishing seasons (2016/17; 2017/18; and 2018/19). This equates to approximately 50% of the fleet each season and large coverage of fishing days and trips for analysis (Table 1). Details of the number of boats fishing (1 or 2) and the size of the nets were also collected from each owner to link to the landings data. The average number of hours fished by each boat per trip was calculated based on the lunar cycle, a method known to be used by the purse seine fleet.

Table 1 Summary of the purse seine logbooks sampling coverage

Season	Landing sites	Units	Days	Trips
All	7	65	692	6195
1	6	19	205	1494
2	6	20	253	2067
3	7	26	234	2634

The logbook data showed 89 species were landed by the purse seine units during the three seasons. The top 10 species based on total weight or monetary values were similar, and produced a combined list of 11 species, plus 'Trashfish' (a term used to describe fish of little individual value but sold together for animal feed or fertiliser).

$CPUE_1$ and $CPUE_3$ values were calculated for the 11 species and 'trashfish' landings for each season (Table 2). Purse seine units have varying net sizes, so to standardise this effort variable $CPUE_3$ was calculated using the method below:

$CPUE_3$ = (Catch in weight / hours fishing) / net size (m^2)

(Values have been adjusted to represent per 100m^2 to help interpretation)

While the co-management plan was finalized and implementation started within the duration of this project, it had taken longer than anticipated to implement at the beginning of this project. As co-management is a new governing process for Myanmar we have found that we needed to spend more time with the communities, government and our own staff to build acceptance and understanding of the approach and its methods. Increases in CPUE (O.1) and income (O.3) will not be reflected in our data yet, primarily because these are indicators measuring processes that take time to meaningfully change. We therefore plan to continue to monitor this closely over the coming years to monitor anticipated improvements in CPUE, and to evaluate if adjustments need to be made.

Table 2. CPUE for top 11 species and 'trashfish' landings for each of three fishing seasons (2016/17; 2017/18; and 2018/19).

Top 11 fisheries species	Scientific name	S	N	$CPUE_1$ kg/hr (mean)	$CPUE_1$ kg/hr (SD)	$CPUE_3$ kg/hr/100m^2 (mean)	$CPUE_3$ kg/hr/100m^2 (SD)	Total landings (kg)	Total landings ($)
Indian anchovy	*Stolephorus indicus*	1	666	10.09	14.19	0.0414	0.0750	135,331	107,892
		2	858	15.82	35.21	0.0620	0.1435	267,241	254,341
		3	781	6.94	13.08	0.0191	0.0479	103,680	104,861
Goldstripe sardinella	*Sardinella gibbosa*	1	475	15.97	23.27	0.0547	0.0991	148,217	43,817
		2	647	24.98	38.95	0.0945	0.1535	301,921	110,087
		3	588	13.76	23.57	0.0401	0.0691	157,860	62,049
Indian mackerel	*Rastrelliger kanagurta*	1	232	3.98	6.93	0.0113	0.0224	18,269	19,863

		2	300	7.56	13.18	0.0234	0.0435	45,405	55,548
		3	802	4.71	12.685	0.0098	0.0290	68,227	60,715
Narrow-barred Spanish mackerel	*Scomberomorus commerson*	1	394	0.87	7.05	0.0024	0.0193	7,334	35,849
		2	483	1.35	8.81	0.0039	0.0246	13,981	88,264
		3	1,093	0.78	4.67	0.0015	0.0080	17,914	92,622
Island mackerel	*Rastrelliger faughni*	1	121	4.52	6.03	0.0134	0.0163	11,960	5,645
		2	149	7.98	18.55	0.0245	0.0506	26,034	25,023
		3	494	3.47	6.73	0.0075	0.0132	36,055	24,719
Scaly mackerel	*(unconfirmed)*	1	74	0.40	1.07	0.0010	0.0024	485	4,546
		2	223	0.55	1.56	0.0016	0.0044	2,598	25,534
		3	NA	NA	NA	NA	NA	NA	NA
Indian squid	*Loligo duvaucelii*	1	497	1.48	4.82	0.0045	0.0159	16,314	43,241
		2	774	1.51	4.03	0.0049	0.0122	23,280	92,846
		3	1761	1.98	3.33	0.0040	0.0072	69,033	154,364
Pink shrimp	*Parapenaeopsis stylifera*	1	35	18.49	27.31	0.2465	0.4351	12,847	28,697
		2	38	14.86	24.26	0.0504	0.0700	9,433	13,606
		3	NA	NA	NA	NA	NA	NA	NA
Black pomfret	*Parastromateus niger*	1	177	0.94	3.72	0.0026	0.0107	3,590	22,352
		2	293	1.73	5.45	0.0056	0.0185	10,530	71,523
		3	671	1.63	8.11	0.0027	0.0112	24,198	88,286
White-spotted spinefoot	*Siganus canaliculatus*	1	56	16.41	26.09	0.0466	0.0717	19,809	5,407
		2	58	16.09	26.89	0.0777	0.1319	19,824	6,665
		3	300	13.12	25.94	0.0319	0.0587	84,293	18,553
Common ponyfish	*Leiognathus equualus*	1	123	5.53	5.98	0.0212	0.0447	13,789	3,517
		2	77	8.14	11.75	0.0291	0.0399	12,904	4,770
		3	182	5.91	30.21	0.0125	0.0486	23,586	10,411
[Trashfish]	na	1	407	8.51	12.95	0.0278	0.0473	72,018	17,577
		2	520	8.85	12.30	0.0397	0.0698	93,330	33,919
		3	547	8.25	18.01	0.0188	0.0386	90,136	18,790

3.2.2 By 2019, more than 25% (420 people) of the small-scale fishing fleet of Kyentali Township, including a proportionally representative number of women, are actively engaged with resource governance decision-making processes. (2016 Baseline = 0).

Within the three years of this project, important components related to the above outcome have been met. Specifically, an inshore fishery co-management area for Rakhine State has been established with specific spatial and temporal zoning to help transition to more sustainable fisheries and lessen incidences of unintended bycatch. Details of the co-management area have been outlined in a co-management area management plan which was formally recognised by the DoF in 2018. The rights to manage this area have been given to the KIFCA, who were formally registered with GAD during 2019. Implementation of this work has involved broad community participation and engagement, with women representing 50% of the association's executive committee members, i.e. 10 out of 20 democratically voted community members. Furthermore, based on 2018 data, there are currently a total of 319 people (19% of Kyeintali Township) who are currently actively engaged within KIFCA, 58 of whom are women (18% of total associated). RCA continue to seek to increase the number of people engaged with KIFCA including their female members.

3.2.3 By 2019, annual socio-economic surveys demonstrate a 5% increase in participating fisher (N=420) and associated fish-worker (N=unknown, TBD) incomes against 2016 baselines.

Based on surveys developed with UoE (See Outcome 0.1 above), fisher household socio-economic interview surveys were completed by RCA and WCS staff during September 2016, in

December 2018/January 2019. During 2016, A total of 379 fishers in 2016 and 389 in 2018/2019 were interviewed at the household level within (10 village/landing sites).

One component of the household questionnaire supplies details of income and expenses relating to fishing activities, which enables the calculation of a net annual 'fishing related income' for households surveyed in the beginning and the end of this project. These data have been used to determine an overall average, an average by fisher type (i.e. owner and crew) and an average for each village (Tables 3 & 4). The questionnaire data also enabled the average percentage of total household income the 'fisher related income' represents to be calculated (Tables 3 & 4).

These data were intended to demonstrate increase in fishers' and fish workers' incomes following one year of active co-management implementation. Due to reasons outlined in Outcome 1, the co-managed area was not in effect until towards the end of the project. While our data shows that average annual income for households between 2016 and 2019 has increased by 30%, greater overall pressure has been placed on fisheries (82% in 2016 compared to 90% in 2018/19) and household incomes have remained relatively similar (2% decrease). The absence of any meaningful change was anticipated by both Darwin and WCS within the October 2018 report review. It will likely take at least a year from implementation (one year from August 2018) for measures to have an impact on fisheries, which will fall outside the three-year project. Therefore, at this point, any significant change seen in income data should not be attributed to co-management measures.

Table 3. Annual household income between 2016 and 2018 (median averages).

Fisher type	Year	n	Average annual fisher earnings	Min. annual fisher earnings	Max. annual fisher earnings	Average % household income	Average annual household income	Min. Annual household income	Max. annual household income
All	2016	379	$593	$222	$38,973	82%	$926	$339	$48,717
	2019	389	$775	$97	$31,633	90%	$904	$121	$36,314
Crew	2016	236	$593	$222	$5,926	81%	$667	$356	$5,926
	2019	277	$697	$97	$18,980	90%	$872	$121	$18,980
Owners	2016	143	$2,444	$237	$38,973	82%	$3,007	$339	$48,717
	2019	112	$1,743	$194	$31,633	100%	$2,179	$194	$36,314

(Exchange rate from Oct 2016: US$1 = MMK1350, December 2018: US$1 = MMK1549)

Table 4. Annual household income for each village/landing site in 2016 and 2019 (median averages). (Exchange rate from Oct 2016: US$1 = MMK1350, December 2018: US$1 = MMK1549)

Village /landing site	Year	n	Average annual fisher earnings	Min. annual fisher earnings	Max. annual fisher earnings	Average % household income	Average annual household income	Min. annual household income	Max. annual household income
Chinkwin	2016	20	$1,185	$259	$5,926	65%	$1,778	$432	$11,852
	2019	15	$710	$97	$7,747	80%	$1,001	$121	$7,747
Kanpauk	2016	11	$1,815	$444	$2,963	75%	$2,469	$635	$6,049
	2019	7	$3,615	$194	$19,367	100%	$5,165	$194	$19,367
Katolay	2016	30	$733	$474	$18,148	82%	$988	$474	$18,148
	2019	30	$904	$387	$30,988	80%	$1,130	$387	$30,988
Kyeintali 1	2016	88	$563	$233	$25,926	82%	$684	$363	$25,926
	2019	12	$1,549	$232	$9,038	80%	$1,549	$258	$9,684
Kyeintali 2	2016	86	$593	$296	$31,104	87%	$741	$356	$31,104
	2019	165	$775	$291	$30,988	100%	$872	$349	$30,988
Kywegyaing	2016	27	$741	$222	$16,326	77%	$1,037	$339	$17,284
	2019	28	$633	$194	$29,051	90%	$764	$277	$36,314
Nyaungbintha	2016	17	$593	$474	$20,000	83%	$677	$474	$20,000

	2019	17	$587	$484	$6,779	80%	$1,356	$484	$16,946
Palinmaw	2016	24	$2,244	$356	$15,901	85%	$2,624	$356	$17,668
	2019	15	$452	$226	$5,810	80%	$646	$323	$15,494
Ponnyet	2016	45	$593	$311	$9,096	77%	$778	$519	$10,107
	2019	45	$775	$194	$18,980	90%	$904	$258	$18,980
Yamarkyun	2016	31	$2,296	$259	$38,973	83%	$2,540	$432	$48,717
	2019	34	$968	$155	$31,633	100%	$1,065	$310	$31,633

3.2.4 By 2019, bycatch of marine vertebrates (dugong and sea turtles) decreased by between 10% and 30% compared to 2016 baselines

In 2016, 33 turtles were reported to be caught, by fishers during household surveys. This decreased to 15 turtles in 2018, showing a 55% reduction in turtle by-catch over two years. Zero dugongs were captured in 2018/2019 surveys compared to one dugong in 2016 showing a 100% reduction. While these results are promising, collecting accurate data on by-catch is difficult because people are reluctant to admit to committing illegal activities. Due to these challenges Outcome 0.4 was modified during the course of this project to comprise a more achievable objective of awareness raising of bycatch mitigation practices within the fishing communities, and their potential inclusion in future co-management strategies. See Output 3 for details of how awareness raising activities and spatial representations of dugong and sea turtles were incorporated into the co-management area.

3.3 Impact: achievement of positive impact on biodiversity and poverty alleviation

Impact statement from log frame: *Myanmar's inshore fisheries are sustainably co-managed to recover depleted stocks, boost value capture, and minimise unintended catch of threatened species, while supporting food security, diverse and resilient livelihoods.*

Our project was designed to improve human well-being and foster sustainable development through successful fisheries co-management, where people are directly involved in managing the natural resources upon which they depend. The goal is to have a positive impact on marine biodiversity by decreasing the negative impacts of fisheries on coastal species, while sustaining a long-term, positive impact on human well-being through improved fishery benefits. These benefits include reliable income and nutrition, as well as the benefits associated with biodiversity conservation. The new community proposed co-management area includes no-take zones, seasonally closed areas, and gear restricted areas that will help protect key marine habitats such as coral reefs and improve the sustainability of fisheries resources. In addition, sea turtle nesting beach zones aim to help protect key nesting habitats of these important threatened species. As these areas were proposed by the communities themselves, it is expected that levels of compliance will also be quite high. This is a key step, as one of the greatest hindrances to sustainable fishing in Myanmar is a lack of enforcement of marine-related regulations. In areas where enforcement is low, compliance must be won through local support, therefore co-management area can be considered one of the most appropriate strategies to recover local fish stocks, and thereby increase food security and resilient livelihoods.

These kinds of "bottom-up" co-management approaches to conservation and fisheries management are new in Myanmar, however over the past three years this approach has been well received by fishing communities and project partners. While it is too early for our results to show meaningful recovery of depleted stocks or value of capture, we have a significant amount of baseline data for socioeconomic status and fisheries to monitor any socioeconomic and fisheries benefits. Through support from UoE, we now have a refined survey methodology, and trained survey team to continue to monitor and evaluate the impacts of co-management areas on fisheries stocks and associated livelihoods beyond the end of this project. As the co-management area is expected to enhance local control over their own coastal resources, this is anticipated to have important medium to long-term benefits for coastal livelihoods and poverty alleviation.

4 Contribution to Darwin Initiative Programme Objectives

4.1 Contribution to Global Goals for Sustainable Development (SDGs)

This project contributes towards SDG 14 *Conserve and sustainably use the oceans, seas and marine resources for sustainable development.* The project specifically focused on improving sustainability of coastal fisheries and improving fisheries management systems in Myanmar. The co-management area offered a new model of decentralized natural resources management in the country and integrated important sustainability and conservation measures. As such, this demonstration project has inspired other coastal areas (such as Gwa and Dawei) to follow suit and focus on marine resource management by showcasing how an innovative co-management approach can work in the local context and helping to inform broader policy reforms that can be replicated across the country.

4.2 Project support to the Conventions or Treaties (CBD, CMS, CITES, Nagoya Protocol, ITPGRFA))

This program of work supports the goals of protecting marine biodiversity in Myanmar as described in the Myanmar National Biodiversity Strategy and Action Plan, as well as Aichi targets 1,11,14 and 18, and SDG 14 (see 4.1).

Aichi Biodiversity Target 1 We have supported awareness raising activities in Kyeintali and further afield to promote the values of marine ecosystems, and have engaged communities to develop co-management strategies. Awareness raising activities have included three co-management forums, social media campaigns, meetings in villages, training on mitigating by-catch threats and partaking in several national and international level workshops and conferences. See Output 4 for details, and log frame 4.2 and 4.3 for indicators.

Aichi Biodiversity Target 11 The Kyeintali Co-Management Area falls within the “other effective area-based conservation measures”, and have contributed to 0.15% percent of marine management areas in Myanmar’s EEZ, 1.5% of Myanmar’s inshore fisheries area.

Aichi Biodiversity Target 14 The Kyeintali Co-Management Area has focused efforts on safeguarding locally important fisheries species which will in-turn support local communities in meeting their livelihood needs. The co-management area was designed through inputs from male and female fishers and fisher workers to promote equity among anticipated benefits, and management by local communities has met a pre-requisite of 50% females in leadership roles in RCA and KIFCA.

Aichi Biodiversity Target 18 The entire co-management area resulted through inputs from local communities and fishers.

CITES Our project team is coordinating with the WCS Myanmar Wildlife Trade Team that has a grant from DEFRA on wildlife trade/CITES implementation.

4.3 Project support to poverty alleviation

The baseline socioeconomic data collected in this project was aimed to support greater understanding of how co-management areas can contribute to poverty alleviation. A baseline level for income has been calculated from these initial survey questionnaires. This has been calculated separately for crew and owners, in order to pull out differences between these two classes within targeted coastal communities. Initial surveys have also identified negative trends in fish catch volumes and sizes, with corresponding increases in effort, as well as community perceptions of the causes of these trends. Efforts to improve the sustainability of fisheries is anticipated to result in increased incomes over time, an indicator that we will continue to assess beyond the scope of this project in order to quantify these impacts. Ultimately, the fisheries co-management planning process and associated plan will help limit the impacts of unsustainable and destructive fishing, towards recovery of depleted stocks, and therefore enhanced economic returns.

For many small-scale fishers in Myanmar, marine resources also hold bequest values, offering meaningful significance to their lives through social and non-extractive cultural means. Preliminary research coming out of southern Myanmar suggests that for most small-scale fisheries in coastal Myanmar, fishing is potentially a more important factor in influencing life satisfaction compared to wealth. This suggests that small-scale fishers in Rakhine may derive a

special proportion of their wellbeing from fishing. This is congruent with wider studies that show that job satisfaction is a significant aspect of individual and community wellbeing in general. This provides insight that co-management areas that seek to improve fish catch for small-scale fishers in Rakhine should provide benefits not only financially, but also to the wellbeing of fishers if fish catch increases as a result of the co-managed area. We will therefore continue to monitor changes in fish catch and wealth to assess how the Kyeintali Co-Management Area is contributing to poverty alleviation.

4.3 Gender equality

While fishers in the target communities are predominately men, females play significant roles in fish processing and often manage household finances. Securing the participation of females in fisheries management and community development-related meetings has been challenging due to long-established cultural norms and expectations. Females are not frequently involved in leadership or management decisions outside of the household. WCS and RCA staff have interviewed female fish traders and sellers in order to understand their roles in the fishery and to speak with them about fisheries management options. Through concerted efforts of the project team, the 20 community representatives in the inshore fisheries co-management association (two for each of the 10 targeted communities) are made up of 50% females, thereby ensuring a seat at the table for female voices. In electing the four Executive Committee members, one woman and three men were selected by the association members for these leadership positions. At the Annual Forum held in year two, the female committee member had a speaking role to share with participants about the progress of the association. These efforts are therefore helping to empower women's active participation in project activities, strengthen their voices and representation, and build their confidence and leadership skills. More efforts will certainly be needed to continue to build this momentum in the future, such as through more focused meetings targeting female participants exclusively, but this initiative to date is helping to demonstrate how gender equality issues can begin to be proactively addressed in fisheries management activities.

4.4 Programme indicators

- **Did the project lead to greater representation of local poor people in management structures of biodiversity?**

The KIFCA management structure is mostly represented by local fishers, and 50% of KIFCA community representatives are female.

- **Were any management plans for biodiversity developed?**

Yes. See Supplementary Materials for the Kyeintali Inshore Fishery Co-Management Plan (currently in Burmese only)

- **Were these formally accepted?**

Yes. The DoF officially designated the Co-Management Plan in August 8th 2018. Ceremony with DoF and each community when official letter was handed over.

- **Were they participatory in nature or were they 'top-down'? How well represented are the local poor including women, in any proposed management structures?**

By nature, the co-management approach to management areas is participatory, with strong representation from local communities. Over 1300 community members signed their support of the co-management plan, and the management committee (KIFCA) is represented by two democratically elected community members from each Kyeintali community, with 50% female representation.

- **Were there any positive gains in household (HH) income as a result of this project?**

As the co-management area took longer than anticipated to formally promulgate, it is too early to measure gains in household income. As a result of this project, we have strong baseline date that we will continue to monitor in the coming years to gauge any changes in household income increase.

- **How many HHs saw an increase in their HH income?**

NA (See Outcome 0.3)

- **How much did their HH income increase (e.g. x% above baseline, x% above national average)? How was this measured?**

NA (See Outcome 0.3)

4.5 Transfer of knowledge

Transfer of knowledge and lessons learnt was a large component of this project, and this is outlined in detail in Output 4.

Did the project result in any formal qualifications?

This project resulted in one formal qualification of a MSC student. (See Annex 4 for details).

4.6 Capacity building

Training workshops to date have enabled us to develop capacity of local fishers, RCA and KIFCA regarding data collection (See Output 2 for further details). This will enable them to continue to monitor changes in fisheries and income that are anticipated to result as a product of the co-management areas. We also trained local community members in socioeconomic surveys, participatory mapping, data, entry level GIS, and vertebrate monitoring training (See Annex 3).

5 Sustainability and Legacy

The project has earned a reputation as one of the leading fisheries co-management demonstration projects in Myanmar, due to its strong local partners and robust data collection efforts. There are strong indications that it has the potential to serve as a model for replication to other areas across the country as the Government of Myanmar moves ahead with its reform and decentralization agenda. A field visit connected with the 2018 Annual Forum gave participants from across the country a chance to see the co-management area first-hand and to hear the fishers' experiences directly. Additional presentations at important meetings, such as the Myanmar Fisheries Partnership, have also helped enhance the project's visibility. The main legacy of the project will be the establishment of the co-management area. This has helped to ensure the sustainability of the project's investments through securing community rights over their local marine resources. The fact that our local partner RCA is embedded in the communities will contribute to ensuring that investments to date are sustained and that ongoing capacity development for the nascent co-management association is able to continue. Connections built between local communities and DoF officials will continue to be strengthened and institutionalized beyond the life of the project due to the mutual benefits derived from these improved collaborations.

6 Lessons learned

After initial delays in the administrative start of this grant which affected the staff recruitment process, we were able to make up the lost time during the final years. More importantly, we have learned not to underestimate the time and effort required to ensure enough capacity exists in communities related to the techniques and application of monitoring and fisheries management approaches. The appropriate use of these techniques is crucial to the project's long term success, and training must match the needs of local communities and other participants. We have been fortunate to work with the RCA, and they have actively and enthusiastically been using the new methods and knowledge.

Working with the DoF has also presented a set of challenges including limited capacity; a very production-oriented approach to fisheries where sustainability is in the narrative but knowledge of practices is limited; and a historical and entrenched command-and-control philosophy to resource management. To mitigate these challenges, we carefully tried to ensure that the views of DoF were represented at meetings and workshops, while also trying to emphasize the importance of the new co-management model of co-management where responsibility is shared with fishing communities. WCS's local team has very strong ties with DoF. Our consistent messaging and persistent attention to these issues has paid off, and the DoF is now a strong advocate for this approach, hosting their own Marine Fisheries Co-Management Forum earlier this month.

In hindsight, there are some things we would do differently. We anticipated some reluctance of community members to have data loggers used on vessels, and so we decided not to deploy fisheries-monitoring apps and a fishers registration system. However, the pelagic data systems

trackers have been well received, and, if we had more funds, we could deploy this system more widely. It appears that we could have implemented other technologies as well to improve the efficiency of fisheries data collection. The current paper-based system we are using is time intensive for the RCA and WCS team, and there were delays associated with data entry and management. In the future, we plan to explore means of improving the efficiency of data collection through use of technology, such as the Kobo toolbox, which is being rolled out more widely across WCS programs collecting and managing social data. Since there is a lack of available data in Myanmar, we could have spent more time earlier in the project to map coastal habitats to get a better idea of marine wildlife presence and seasonality. We also could have allocated more time to capacity building. For instance, if a partner does not have much capacity for scientific data management, more time is needed to build that capacity. If they lack sufficient human resources, the project results could be affected along its limited timeframe.

For others doing similar projects, we would recommend an early assessment of participatory methods to ascertain if particular methods are preferred or best avoided. In addition, it is important to challenge your own and your team's perceptions and assumptions. Invest in building skills in the core team from the very start, if not before. Skills in project management are just as important as scientific methods, since participatory projects require a significant amount of planning and forecasting, as well as organising and reporting. Understanding and investing in your team's development of these skills will have a long-standing impact. For multi-level partnerships, it is important to identify a local leader or steward, to have clear messages and good communicators within the team, to have strong connections with politicians for broader impact, and to build advocates within the fishing community to help proliferate project learning.

In order to build these lessons into the project and into future plans, we will hold more frequent project team meetings, focus attention on research planning, all with the intention of further developing further the co-management and co-management committee plan. Now that the co-management planning process is well underway, there is the option for continued and regular dialogue with fishers. This communication is essential, and may become the key mechanism for open and transparent communication between project team and the local communities. Until now many project plans have been developed among WCS-DoF-Pyoe Pin, somewhat in isolation. So the formation of the co-management committee presents the best possible project communication and learning platform.

6.1 Monitoring and evaluation

Project activities were monitored both through regular work planning and the semi-annual and annual analyses linked to progress reporting. Data collection efforts throughout the duration of the project have enabled us to establish quantitative baselines for key indicators such as income and CPUE and provide a sound methodology to replicate and demonstrate any benefits that the co-management area will have on fisheries catch and related income. Unfortunately, while data was collected from 2016 to 2019, due to the longer than anticipated time it took to implement the co-management area, we were not able to provide any data on the impact that the new area had on CPUE or income. However, as we have a strong baseline and RCA staff who are trained and now experienced in survey methodology, we will continue to monitor change in catch and income beyond the life of the Darwin project.

One of the major challenges had to do with the initial approach proposed to produce quantifiable data on by-catch of key species. This proved particularly problematic as few fishers are willing to report on incidences of threatened or restricted marine species, which subsequently limited our ability to estimate Bycatch Per Unit Effort (BPUE) as initially envisioned. This issue was also highlighted in the first Annual Report Review which recommended to "Revise log-frame, with particular emphasis to Outcome level indicators and the indicators for Output 3." This was discussed with Darwin in August 2017 and resulted in proposed changes to the project logframe, which were subsequently approved in October 2017.

6.2 Actions taken in response to annual report reviews

We have proactively responded to the issues raised in the review of past annual reports. To address these, meetings were held with project partners to discuss these issues and determine appropriate responses. Project partners understood the review comments and were in agreement with key findings and suggestions. Monitoring and evaluation, revisions to the project logframe and indicators were subsequently proposed approved by Darwin, with the revised

logframe presented in Annex 1.

7 Darwin identity

WCS has been proactive in recognizing support of the Darwin Initiative for this project. The Darwin Initiative logo has been included on all banners and presentations used at workshops and meetings, in products produced related to this Darwin Award (such as the Marine Biodiversity Atlas), and on the Biodiversity Atlas web portal (marine.myanmarbiodiversity.org, currently being updated). Major events included the Second Annual Forum and highlighting progress of the project at the fourth Myanmar Fisheries Partnership meeting, and a presentation at the IMPAC4 in Chile. In addition, the project has been actively communicating locally through Twitter and Facebook posts, which are linked to the Darwin Initiative's social media channels. Project partners, such as the University of Exeter, have also linked back to the Darwin Initiative and its social media channels. WCS also produced an article on the project that was published in the Darwin Initiative Newsletter February 2018 issue on *Life Below Water*.

7 Finance and administration

7.1 Project expenditure

Project spend (indicative) since last annual report	2018/19 Grant (£)	2018/19 Total actual Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)			99%	
Consultancy costs			0%	
Overhead Costs			95%	
Travel and subsistence			97%	
Operating Costs			107%	
Capital items (see below)				
Monitoring and Evaluation (M&E)			100%	
Others (see below)			122%	This category was overspent by £234, due to unexpected additional costs for equipment and supplies.
TOTAL			100%	

Staff employed (Name and position)	Cost (£)
Mya Than Tun (Marine Conservation Coordinator)	
Nwe Ni Win (Finance Manager)	
San San Htay (Office Manager)	
Thaung Htut (Fishery Monitoring Officer)	
Barry Flamming (Marine Technical Advisor)	
Min Khant San (Marine Research Assistant, WCS Myanmar)	

Internship	
U Myint Aung, Manager	
U Aung Myo Naing, Field coordinator	
Daw Khin Saw Tint, Admin&Finance officer	
U Min Min Tun, Field Facilitator	
Daw Tin Thida, Field Facilitator	
U Myint Oo, Field Facilitator	
U Nain Htoo, Field Assistant (Helper)	
U Myint Maung, General Worker (Boatman)	

Capital items – description	**Capital items – cost (£)**
TOTAL	

Other items – description	**Other items – cost (£)**
Consumables Other necessary equipment Stationery/Booklets	
TOTAL	

8.2 Additional funds or in-kind contributions secured

Source of funding for project lifetime	**Total (£)**
MPA Fund	
Helmsley	
MacArthur	
SwedBio	
TOTAL	

Source of funding for additional work after project lifetime	**Total (£)**
The Agence Française de Développement (AFD)	
Helmsley	
MacArthur	
SwedBio	
MPA Fund	

TOTAL	

8.3 Value for Money

For any purchases made throughout this project, we followed WCS's procurement guidelines to ensure best value for money. WCS Myanmar Procurement Manual applies to all operations whether implemented by WCS Myanmar office or implemented by partners. The award of contracts and purchases were always applied to principles of economy and efficiency. The works, services or goods supplied always complied with requirements of: 1) satisfactory quality; 2) timely delivery or completion; & 3) price corresponding to market prices. This manual will be made available upon request.

Annex 1 Project's original (or most recently approved) logframe, including indicators, means of verification and assumptions.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Impact: Myanmar's inshore fisheries are sustainably co-managed to recover depleted stocks, boost value capture, and minimise unintended catch of threatened species, while supporting food security, diverse and resilient livelihoods.			
Outcome: (Max 30 words) An inshore fishery co-management plan is implemented in Rakhine State, Myanmar, ensuring sustainable livelihoods and improved income for local fishing communities, reducing bycatch and providing a scalable resource governance model.	0.1 By 2019, 15% of fishers from our focus area (assuming Kyentali is chosen = 420 participating people) document a 5% increase in CPUE compared to 2016 baselines. 0.2 By 2019, more than 25% (420 people) of the small-scale fishing fleet of Kyentali Township, including a proportionally representative number of women, are actively engaged with resource governance decision-making processes. (2016 Baseline = 0). 0.3 By 2019, socio-economic surveys demonstrate a 3% increase in participating fisher (N=420) average fishing-related incomes against 2016 baselines. 0.4 By 2019, increased awareness of bycatch reduction practices (including spatial and temporal closures and modified fishing methods) by 40% of participating fishers.	0.1 Fisher catch/log forms completed and submitted to WCS/RFP for CPUE analysis. Data will be disaggregated by gender. 0.2 RFP/RCA meeting attendance records (including gender records) and documented support for decisions. 0.3 Socio-economic surveys and reports demonstrate trends towards improvements in value capture and fishers and fish-workers livelihoods. Data will be disaggregated by gender. 0.4 Fish landings survey data and fisher interviews/surveys of awareness of co-management plan provisions related to bycatch.	0.1. That communities and the newly emerging government (under the leadership of the National League for Democracy) are willing and able to actively participate in co-management. 0.2 That fisheries are capable of recovering within project timeframe to secure improvements in CPUE and social-economic returns. 0.3. That no natural disasters impact the coastal communities and no socio-political unrest emerges. 0.4. Increased awareness translates into behavior change; adoption of bycatch reduction practices by the local community are closely monitored.
Outputs: 1. A gender-sensitive participatory planning process has led to the development and adoption of a co-management plan for coastal fisheries in	1.1 By 2017, more than 50% of the RCA members (current RCA members in Kyentali = 40, but this is expected to rise by 2017), which includes a proportionally representative number of female fish-	1.1 RFP meeting notes demonstrate consensus, gender balance and commitments to co-management.	1.1 That communities and fishers feel empowered by this governance framework and want to participate (and do not feel disenfranchised by historical government policies).

Thandwe District in Rakhine State.	workers, have pledged support for a participative co-management plan. 1.2 By 2018, a suite of sustainable fisheries input and output controls are designed by the RFP/RCA. 1.3 By 2019, between 50-75% of participating fishers within the target geography are compliant with the co-management plan.	 1.2 Co-management plan and input/output controls and documented endorsement from RFP/RCA. 1.3 Record of RFP/RCA meeting attendance and reported management infractions. Data will be disaggregated by gender.	 1.2 That government remains stable over the lifecycle of the project and does not enact conflicting policies. 1.3 DOF maintains support for co-management.
2. Baseline data is available and routine participatory collection of additional data is integrated into the governance mechanisms for co-management.	2.1 By 2017, baseline fisheries, socio-economic and value-chain monitoring data is available for >30% of the participating small-scale fleet and associated fish-workers/households. 2.2 By the end of Year 1, fisheries and socioeconomic data has been circulated via the first RFP/RCA stakeholder workshop. 2.3 Co-management planning process receives annual inputs from collaborative monitoring data.	2.1 Baseline fisheries, socio-economic and value-chain data records available. Data will be disaggregated by gender. 2.2 Stakeholder workshop proceedings. 2.3 Co-management planning process adaptive management updates.	2.1 That communities and government are willing to participate in collaborative monitoring. 2.2 That the value chain is traceable / transparent 2.3 That training workshops are sufficient to generate a consistent quality of participative data / inputs.
3. A strategy to reduce unintended bycatch of marine vertebrates has been developed and implemented by local fishing communities.	3.1 By 2017, areas and seasons to protect from fishing have been identified and incorporated into the co-management plan. 3.2 By 2018, increased awareness of bycatch reduction practices (including spatial and temporal closures and modified fishing methods) by 20% of participating fishers.	3.1 Participative temporal-spatial mapping (and GPS spot tracker) records demonstrate potential areas for protection. 3.2 Surveys documenting increased understanding of co-management plan provisions regarding bycatch reduction. Data will be disaggregated by gender.	3.1 That fisher interviews provide accurate information. 3.2 That appropriate bycatch reduction practices will be adopted in the co-management plan and that support can be generated for marine vertebrate protection.
4. Lessons learned from fisheries co-management planning and practices are	4.1 By 2018, RFP/RCA members document key lessons learned to date.	4.1 Lessons learned documented. 4.2 Meeting membership lists	4.1 That Union Government support for co-management continues to persist.

shared to boost national fisheries resource governance capacity.	4.2 By 2018, the annual forum hosts community and government officials from at least two other districts, states or regions. 4.3 By 2019, 2 alternative districts, states or regions pledge to support the implementation of fisheries co-management.	demonstrate interest for co-management of small-scale fisheries in other areas. 4.3 Minutes of meetings held in other districts, states or regions.	4.2 That Union Government policies continue to permit the devolution of management responsibility to states and regions.

Annex 2 Report of progress and achievements against final project logframe for the life of the project

Project summary	Measurable Indicators	Progress and Achievements
Impact: Myanmar's inshore fisheries are sustainably co-managed to recover depleted stocks, boost value capture, and minimise unintended catch of threatened species, while supporting food security, diverse and resilient livelihoods.		Myanmar's first inshore-fisheries co-management area has been formally declared and management plan ratified, which includes measures to protect important habitats and species (e.g. no take zones, sea turtle nesting beaches, etc.), as part of collaborative and participatory co-management of local fisheries in southern Rakhine State. Monitoring of baseline household income (2016 & 2019) and fisheries catch (2016-2019) data has been complete, allowing assessment of tangible improvements in coastal livelihoods in the years following this project. Unintended catch of dugongs and sea turtles have reduced as a result of awareness raising activities and new zoning to support turtle nesting beaches and known dugong areas.
Outcome An inshore fishery co-management plan is implemented in Rakhine State, Myanmar, ensuring sustainable livelihoods and improved income for local fishing communities, reducing bycatch and providing a scalable resource governance model.	**0.1** By 2019, 15% of fishers from our focus area (assuming Kyentali is chosen = 420 participating people) document a 5% increase in CPUE compared to 2016 baselines. **0.2** By 2019, more than 25% (420 people) of the small-scale fishing fleet of Kyentali Township, including a proportionally representative number of women, are actively engaged with resource governance decision-making processes. (2016 Baseline = 0). **0.3** By 2019, socio-economic surveys demonstrate a 3% increase in participating fisher (N=420) average fishing-related incomes against 2016 baselines. **0.4** By 2019, increased awareness of bycatch reduction practices (including spatial and temporal closures and modified fishing methods) by 40% of participating fishers.	**0.1** We have a strong baseline database for fishers CPUE between 2016-2019. Due to the slower than anticipated development of the Kyeintali Co-Management Area, we were not able to show a change over time related to the new management regime. Through this project we have developed a robust survey methodology and significant baseline database, and will therefore continue to monitor changes in CPUE over the coming years. **0.2** The KIFCA currently has a total of 319 members, which equates to 19% of Kyeintali Township. Fifty-eight are female (18% of KIFCA). Currently KIFCA committee is seeking to increase their members. Two members from each of the 10 communities involved in the co-management area represent their village in KIFCA, within which 50% are women. Finally, a total of 1300 fishers from the 10 communities in Kyentali Townsip have signed their support for the Co-Management Area. **0.3** We have a strong baseline database for socioeconomic data pertaining to household income and fishing related activities. A mentioned in 0.1, due to the slower than anticipated development of the Kyeintali Co-Management Area, we were not able to show a change over time related to the new management regime. Through this project we have developed a robust survey methodology and significant baseline database, and will therefore continue to monitor changes in household income over the coming years. **0.4** We conducted two turtle bycatch trainings during 2018 and 2019. This resulted in twelve sea turtles that were released when accidentally caught as bycatch. We also conducted one dugong and marine mammal training course focusing on general handling process and methods for safe release. Through the community's suggestions, we have incorporated three turtle-related zones for sea turtle nesting beaches in the co-management area (total of 16 miles of

		beach area). Patrolling of nesting beaches is conducted from December to April by a sea turtle patrolling group (subsidiary of KIFCA). A total of five nests have resulted in 500 hatchlings of Olive Ridley turtles, who have been safely released under the guidance of Turtle Survival Alliance.
Output 1. A gender-sensitive participatory planning process has led to the development and adoption of a co-management plan for coastal fisheries in Thandwe District in Rakhine State.	**1.1** By 2017, more than 50% of the RCA members which includes a proportionally representative number of female fish-workers, have pledged support for a participative co-management plan. **1.2** By 2018, a suite of sustainable fisheries input and output controls are designed by the RFP/RCA. **1.3** By 2019, between 50-75% of participating fishers within the target geography are compliant with the co-management plan.	**1.1** The overall co-management planning process has been highly participatory, with strong commitment from fishing communities as well as government partners. Women represent 50% of the inshore fisheries co-management association (KIFCA), with 1 in 4 in a leadership position on the Executive Committee. Furthermore, within RCA, 50% core full time staff are women (3 out of 6). When management plan submitted, more than 1300 signatures (30% of whom were from women working in the fisheries sector) from fishers and traders. This equates to around 72% of all fishers and fish works in Kyeintali (1300/1801). **1.2** A Co-Management Plan has been designed and formally signed off by the DoF at a national level. Zoning of the co-management area includes no-take zones, seasonal closures, sea turtle beaches, and gear restricted zones. **1.3** As zonation of the co-management area has been determined by communities themselves, high levels of compliance are expected. Currently the patrolling is completed by KIFCA with the specific aim to stop illegal offshore fishers fishing inshore. Awareness raising was conducted within each Kyeintali village, and a set of rules and regulations are now also available in every village. As a result of patrolling activities, 5 illegal fishing boats have been infiltrated and wither given a warning (three boats) or fined and had their fishing licence suspended.
Activity 1.1. Meetings to discuss challenges and propose and design the fisheries co-management planning process. [Led by PP, supported by WCS].		This activity was completed in year one. During July 2016, stakeholder meetings were held in Thandwe District (Thandwe, Kyeintali and Gwa) to officially launch the project with the DoF, local partners and community members. One hundred fourteen people attended these events: 39 fishers/fish-workers, 32 DoF staff (including the Rakhine State Fisheries Director), and 43 RCA members (including a Rakhine parliamentarian). Sixteen women attended these stakeholder meetings; a concerted effort will be required from all project partners to ensure female representation is expanded (a common challenge for development projects in Myanmar). Our strategy will focus on identifying barriers to women's participation, identifying and targeting women who should attend the meetings, and possibly running a series of parallel side meetings (focus groups) for women. The aforementioned stakeholder meetings not only launched the project but also solicited feedback from community members on the challenges faced by the fisheries sector in the region. The events secured strong buy-in for the project from stakeholders, particularly the DoF (State and District officials) and RCA members. In addition, through these meetings, agreement was reached for the project to target the township of Kyeintali (the base for the RCA).

Activity 1.2. Site-based / fisher village meetings to ensure awareness and uptake of the emergent input/output controls and adaptive management processes (legal framework, monitoring, compliance, reporting). [Led by PP, supported by WCS].		To support the project's uptake, a sustainable fisheries management training workshop was conducted in July 2016 and another in February 2017 to transfer knowledge on sustainable fisheries management practices, generally used input and output controls, and to identify participatory project team members. This training in Kyeintali was attended by 38 persons (9 women): Government = 2, DoF = 2, Fishers = 24, RCA = 8, WCS = 2. On February 15-16, 2017 the training session in Kyeintali was attended by 27 persons (5 women): Government (GAD) = 1, Police=1, DoF = 1, Fishers = 15, RCA = 5, WCS = 3, Exeter=1. The total for both training sessions was 59 people, plus the WCS and Exeter staff.
Activity 1.3 Co-management plan developed and ratified by members of the RFP/RCA/fishing communities. [Led by PP, supported by WCS].		DoF officially designated the co-management plan in August 8th 2018. Ceremony with DoF and each community when official letter was handed over. Our communications team developed a video communicating the ceremony of KIFCA in Thandwe which was disseminated on June 2019 at the Co-Management Forum.
Output 2. Baseline data is available and routine participatory collection of additional data is integrated into the governance mechanisms for co-management.	**2.1** By 2017, baseline fisheries, socio-economic and value-chain monitoring data is available for >30% of the participating small-scale fleet and associated fish-workers/households. **2.2** By the end of Year 1, fisheries and socioeconomic data has been circulated via the first RFP/RCA stakeholder workshop. **2.3** Co-management planning process receives annual inputs from collaborative monitoring data.	**2.1** Considerable amount of baseline data available to use for these indicators (and others) and reference points within the adaptive co-management framework. This includes three years (three seasons) of fisheries landings and catch length-weight survey data, plus socioeconomic data characterising all fishing communities (10 villages). These data will enable KIFCA and communities, with support from WCS technical staff, to assess the effects of any management measures going forward and feedback into their planning and management efforts. A total of 390 people interviewed for socioeconomic data, representing a total of 1368 households. This represents approximately 22% of the Kyeintali fishers and fish trader population of (390/1801). **2.2** Following initial delays, fisheries and socioeconomic data is now available from 2016-2019, and has been circulated throughout RFP and RCA, and at annual co-management forums. **2.3** Information from indicators 2.1 and 2.2 has been shared at each annual forum.
Activity 2.1. Training in fisheries (catch, compliance, etc.), socio-economic and value-chain data collection provided to members of the RFP/RCA/fishing communities. [Led by WCS, supported by PP].		Training on socioeconomic surveys, fish catch data collection, and value chain data was implemented in year one to members of RFP, RCA and fishing communities
Activity 2.2. Participative measurements of ecological and socioeconomic criteria through fish landing monitoring, semi-structured/key informant interviews, household and market/value-chain surveys. [Led by WCS, supported by PP].		Participatory baseline socioeconomic surveys were completed in year one, and subsequently in year three. Fish landing monitoring was completed for three seasons (2016/2017, 2017/2018, 2018/2019).
Activity 2.3. Consultative meetings with RFP/RCA members/fishing communities to present survey results and discuss the design of adaptive management actions. [Led by WCS, supported by PP].		Regular consultations were held throughout year two and three with RCA and communities to inform the development of the co-management area and plan, including presentations at the second Annual Forum.

Output 3. A strategy to reduce unintended bycatch of marine vertebrates has been developed and implemented by local fishing communities.	**3.1** By 2017, areas and seasons to protect from fishing have been identified and incorporated into the co-management plan. **3.2** By 2018, increased awareness of bycatch reduction practices (including spatial and temporal closures and modified fishing methods) by 20% of participating fishers.	**3.1** The co-management zoning has three turtle nesting beach zones which are managed by the sea turtle patrolling group subsidiary of KIFCA. **3.2** We have provided awareness raising training on how to carefully handle bycatch over 500 people in 10 villages.
Activity 3.1 Rapid assessment boat based field survey to determine the presence and conservation status of dugong and other marine invertebrates known to be caught as by-catch in coastal fisheries in Rakhine. [Led by WCS].		Boat-based surveys were conducted during years one and two, but did not identify significant occurrence of species of interest. With a revised approach to addressing bycatch, this activity was not continued in year three.
Activity 3.2 Community workshops held to discuss and agree spatial and gear modifications / practices to minimise impacts on dugong and marine turtles. [Led by WCS, supported by PP].		Discussions with communities in year two resulted in identification of no take zones, seasonally closed areas, gear restricted areas, and turtle nesting beaches, which were incorporated into the co-management area zoning.
Activity 3.3 Participative reports of by-catch reductions presented at consultative meetings with RFP/RCA members/fishing communities. [Led by WCS, supported by PP].		As noted in Activity 3.1, it was not possible to acquire quantitative data on bycatch. With our revised approach, we have instead focused on awareness of and compliance with co-management area zones and regulations, as described in Activity 3.2.
Output 4. Lessons learned from fisheries co-management planning and practices are shared to boost national fisheries resource governance capacity.	**4.1** By 2018, RFP/RCA members document key lessons learned to date. **4.2** By 2018, the annual forum hosts community and government officials from at least two other districts, states or regions. **4.3** By 2019, 2 alternative districts, states or regions pledge to support the implementation of fisheries co-management.	**4.1** RCA documented key lessons learnt from the co-management process in May 2019 to deliver to fisheries in Kyeintali. **4.2.** Three annual forums (two in Thandwe,one in Kyendeli) were held over the course of this project. Participanting groups included: RTA (Rakhine Tharaya Association) NAG (Network activity group), sustainable coastal fisheries (SCF), TCA (Thanintharyi Coastal Association), DRA (dawei research association), Myanmar Fisheries Federation. Rakhine fisheries partnerships (RFP), AFP (Ayaywady fisheries partnership). FDA (fisheries development association). DoF (all level), GAD general administration department, coastguard, ministry of social wealfare, Navy, Army, KIFCA, other fishers from adjacent area in Rakhine and Dawei, Gwa **4.3** Dawei and Gwa have been identified as future co-management sites, and initial consultations have begun in both areas.
Activity 4.1 Communicate project results, impacts and lessons learned at state, region and union levels through the annual forum. [Led by PP, supported by WCS].		WCS has presented on project status and results were presented at each Annual Forum in 2017/2018/2019 as well as at meetings with union level DoF.
Activity 4.2 Conduct site visits to other states and regions to share lessons directly with other fisheries partnerships (e.g. in Ayeyarwady region). [Led by PP, supported by WCS].		WCS attended meetings of the RFP in Kyaukpyu to share lessons with parliamentarians and other regional fisheries partnership attendees. Phoe Cho has presented to (and is now a member of) the Mon state fisheries partnership, plus WCS

	has conducted (under alternative funding) site assessments across each of Myanmar main coastal states and regions, which have included workshops to share our learning and collect participatory inputs for our learning process. WCS has also attended MFP events in Naypyidaw and Yangon where we shared lessons learned from co-management development (June 2016, December 2016, March 2017).
Activity 4.3 Promulgate project learning to an international audience through attendance at IMPAC4 (Chile) and social media channels. [Shared by WCS and PP].	WCS's senior manager Kyaw Thinn Latt attended IMPAC4 in Chile in 2017, in which he presented the co-management approach delivered through this project

Annex 3 Standard Measures

Code	Description	Total	Nationality	Gender	Title or Focus	Language	Comments
Training Measures							
1a	Number of people to submit PhD thesis	0					
1b	Number of PhD qualifications obtained	0					
2	Number of Masters qualifications obtained	1	Myanmar	1 Male	Assessments of anchovy and sardine fish catches by purse sein net in Kyeintali coastal area, Rakhine state	English	
3	Number of other qualifications obtained	0					
4a	Number of undergraduate students receiving training	8	Myanmar	4 Females 4 Males	Socioeconomic surveys, Participatory mapping, data collection/entry GIS training, and vertebrate monitoring training		
4b	Number of training weeks provided to undergraduate students	19	Myanmar	4 Females 4 Males	2 weeks socioeconomic survey training 3 weeks fisheries survey training 1 week vertebrate monitoring training		

					1 week GIS training 3 months on job training for MSP		
4c	Number of postgraduate students receiving training (not 1-3 above)	9	Myanmar	2 Females 7 males	Socioeconomic surveys, Participatory mapping, data collection/entry GIS training, and vertebrate monitoring training		
4d	Number of training weeks for postgraduate students	19			2 socioeconomic 3 weeks fisheries survey training 1 week vertebrate monitoring 1 week GIS training 3 months on job training for MSP		
5	Number of people receiving other forms of long-term (>1yr) training not leading to formal qualification (e.g., not categories 1-4 above)	0					
6a	Number of people receiving other forms of short-term education/training (e.g., not categories 1-5 above)	20	Myanmar	10 Males 10 Females	Fisheries management/co-management, leadership, institutional and financial training, and SMART patrolling		

6b	Number of training weeks not leading to formal qualification	6 weeks	Myanmar	10 male 10 female	2 weeks Fisheries management 2 weeks Institution & financial training 1 week SMART patrolling, 1 week leadership		
7	Number of types of training materials produced for use by host country(s) (describe training materials)	2		NA	1x field guide manual for fisheries and socioeconomic surveys 1x MSP training manual	Myanmar and English	

Research Measures		**Total**	**Nationality**	**Gender**	**Title**	**Language**	**Comments/ Weblink if available**
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (ies)	1	NA	NA	Co-Management Area Management Plan	Myanmar	
10	Number of formal documents produced to assist work related to species identification, classification and recording.	0					
11a	Number of papers published or accepted for publication in peer reviewed journals	0					

11b	Number of papers published or accepted for publication elsewhere	0					
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country	1	NA	NA	Marine Biodiversity Atlas	English	
12b	Number of computer-based databases enhanced (containing species/genetic information) and handed over to host country	0					
13a	Number of species reference collections established and handed over to host country(s)	0					
13b	Number of species reference collections enhanced and handed over to host country(s)	0					

Dissemination Measures		**Total**	**Nationality**	**Gender**	**Theme**	**Language**	**Comments**
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	3	Myanmar	60% Male 40% Female attendees	Forums on lessons learned in Rakhine	Myanmar	
14b	Number of conferences/seminars/ workshops attended at which findings from Darwin project work will be presented/ disseminated.	4	Myanmar Myanmar	3 Males 2 Males	Chang Mai 3rd World Small Scale Fisheries Congress 2018 sept Our Ocean 2017, Malta		Presentation on co-management Area development Commitment to MSP "Myanmar will implement MSP in entire EEZ by 2021"

Dissemination Measures		Total	Nationality	Gender	Theme	Language	Comments
				2 Males 2 Males	Blue Solutions Fair US-ASEAN Conference on Sustainable Fisheries management and food security, Bangkok		Poster presentation 1 presentation

Physical Measures		Total	Comments
20	Estimated value (£s) of physical assets handed over to host country(s)	£s5000	1 computer to RCA 2 GPS to RCA 3 survey material set 3 cameras 1 printer 1 motorcycle Promotional t-shirts and patrolling uniform Patrolling equipment
21	Number of permanent educational, training, research facilities or organisation established	0	

Physical Measures		Total	Comments
22	Number of permanent field plots established	1	280 square miles of Co-management area. Within the area, there are 4 main zones encompassing 10 communities

Financial Measures		Total	Nationality	Gender	Theme	Language	Comments
23	Value of additional resources raised from other sources (e.g., in addition to Darwin funding) for project work	£39450.84					£39450.84 50,000 from AFD to RCA

Annex 4 Aichi Targets

	Aichi Target	Tick if applicable to your project
1	People are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.	✓
2	Biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.	
3	Incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.	
4	Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.	
5	The rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.	
6	All fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.	
7	Areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.	
8	Pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.	
9	Invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.	
10	The multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.	
11	At least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.	✓
12	The extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.	
13	The genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.	
14	Ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded,	✓

	taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.	
15	Ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.	
16	The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.	
17	Each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.	
18	The traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.	✓
19	Knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.	
20	The mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.	

Annex 5 Publications

Type * (e.g. journals, manual, CDs)	Detail (title, author, year)	Nationality of lead author	Nationality of institution of lead author	Gender of lead author	Publishers (name, city)	Available from (e.g. web link, contact address etc)
Manual	Field Manual for Socioeconomic Fisheries and Marine Vertebrate Surveys in Myanmar, Dr Tony Bicknell, 2017	British	British, University of Exeter	Male	WCS (Yangon) and University of Exeter (Exeter)	https://www.dropbox.com/sh/auznn8ra5wl3eap/AACiNRggo6Hmhd9aCAJc9JXKa?dl=0
Report	Darwin Initiative Project: Income and Landings Data, Dr Tony Bicknell, 2019	British	British, University of Exeter	Male	WCS (Yangon) and University of Exeter (Exeter)	https://www.dropbox.com/sh/auznn8ra5wl3eap/AACiNRggo6Hmhd9aCAJc9JXKa?dl=0
Report	WCS Myanmar Darwin Initiative Project: Securing marine fisheries, livelihoods and biodiversity in Myanmar	British	British, University of Exeter	Male	WCS (Yangon) and University of Exeter (Exeter)	https://www.dropbox.com/sh/auznn8ra5wl3eap/AACiNRggo6Hmhd9aCAJc9JXKa?dl=0

	through co-management					

Annex 6 Darwin Contacts

Ref No	23-024
Project Title	Securing marine fisheries, livelihoods and biodiversity in Myanmar through co-management
Project Leader Details	
Name	Elizabeth Mathews
Role within Darwin Project	*Associate Director, WCS Marine Program* (global). PhD in Marine Affairs (University of Rhode Island). Providing oversight and technical support on small- scale fisheries, gender and conservation, international marine/coastal policies and programs.
Address	
Phone	
Fax/Skype	
Email	
Partner 1	
Name	Daw Thida Moe
Organisation	Department of Fisheries
Role within Darwin Project	Strategic Advisor
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Partner 2	
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Partner 3	
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Partner 4	

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Partner 4	
Name	Dr Anthony Bicknell
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Role within Darwin Project	Fisheries Specialist, Survey Advisor
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