PROJECT IDENTIFICATION FORM (PIF)
PROJECT TYPE: Full-sized Project
TYPE OF TRUST FUND: LDCF
For more information about GEF, visit www.TheGEF.org

PART I: PROJECT IDENTIFICATION

Project Title:	FishAdapt: Strengthening the adaptive capacity and resilience of fisheries and aquaculture-dependent livelihoods in Myanmar		
Country:	Myanmar	**GEF Project ID:**	5702
GEF Agency:	FAO	**GEF Agency Project ID:**	628454
Other Executing Partner(s):	Ministry of Livestock, Fisheries and Rural Development (MLFRD): Department of Fishery (DoF)	**Submission Date:**	April 15, 2014
GEF Focal Area (s):	Climate Change	**Project Duration:**	48 months
Name of parent program (if applicable): • For SFM/REDD+ ☐ • For SGP ☐ • For PPP ☐		**Agency Fee ($):**	570,000

A. FOCAL AREA STRATEGY FRAMEWORK[1]:

Focal Area Objectives	Trust Fund	Indicative Grant Amount ($)	Indicative Co-Financing ($)
CCA-1: Reducing Vulnerability: Reduce vulnerability to the adverse impacts of climate change, including variability, at local, national, regional and global level	LDCF	2,100,000	4,300,000
CCA-2: Increasing Adaptive Capacity: Increase adaptive capacity to respond to the impacts of climate change, including vulnerability, at local, national, regional and global level	LDCF	2,100,000	4,385,000
CCA-3: Adaptation Technology Transfer: Promote transfer and adoption of adaptation technology	LDCF	1,800,000	3,700,000
Total project costs		6,000,000	12,385,000

B. PROJECT FRAMEWORK

Project Objective: To enable inland and coastal fishery and aquaculture stakeholders to adapt to climate change by understanding and reducing vulnerabilities, piloting new practices and technologies, and sharing information.

Project Component	Grant Type	Expected Outcomes	Expected Outputs	Trust Fund	Indicative Grant Amount ($)	Indicative Co-financing ($)
1: Strengthen the National, Regional/ State and Township level regulatory and policy frameworks to facilitate the adaptive capacities of the fisheries and aquaculture sector	TA	1: Enhanced capacity of DoF, GoM and private sector stakeholders to address climate change issues through improved relevant national policies and strategies facilitating a climate resilient fisheries and aquaculture sector. **Indicators:** a) Number of adaptation actions implemented within the new fisheries strategy. b) Early warning system developed and providing information to users.	1.1: National level climate change vulnerability assessments for fisheries and aquaculture sector carried out. 1.2: Myanmar's National Policy on Fisheries Sector and supporting regulatory framework including national aquatic bio-security framework are strengthened. 1.3: Government Policies and Strategies on fisheries and aquaculture sector-specific implications for	LDCF	778,150	1,400,000

[1] Refer to the reference attached on the Focal Area Results Framework and LDCF/SCCF Framework when completing table A.

			key land-use planning and resource tenure policies and adaptation options are in place, with special attention to support integrated management of mangrove areas with fisheries, aquaculture and other stakeholders 1.4: Land and resource tenure policy, legal and regulatory framework strengthened to capacitate co-management in capture fisheries. 1.5: Institutional strengthening and capacity needs assessment for DoF, other relevant GoM agencies, and private sector & training program developed and applied. 1.6 A system to inform policy and planning through monitoring and assessment of the impacts of climate change on the fisheries and aquaculture sector at community, district and national level piloted and scaled up.			
2. Enhance critical adaptation practices demonstrated by fishers and fishing communities in vulnerable coastal and inland water regions of Myanmar	INV	2: Fishers in coastal and inland water regions of Myanmar increase their knowledge of and reduce their vulnerability to climate change, and disasters and develop/demonstrate critical adaptation practices and technologies. Indicators: a)Number of community-level vulnerability assessments, with a target of 20. b) Number of community-based CCA management plans created and piloted, with a target of 20.	2.1 Climate change vulnerability assessments undertaken in target fishing communities in coastal and inland regions are used to inform action plans and identify key adaptation actions. 2.2: Community based climate change adaptation and disaster risk management plans developed for target inland and coastal fisheries, including mangrove-fisheries interactions. 2.3: Critical adaptation technologies and practices piloted with targeted groups (e.g. resource monitoring; fishing gear; post-harvest processing; safety at sea; vessel design, etc.) 2.4: Community-based early warning system developed, including the use of ICT based information services to enable regular and early warning.	LDCF	2,050,000	4,470,000
3. Develop and	Inv	3: Small-scale fish farmers	3.1: Climate change	LDCF	2,195,000	4,530,000

apply/mainstream adaptation models to strengthen the resilience of Myanmar's aquaculture sector to the impacts of climate change.		in coastal and inland water regions of Myanmar increase their knowledge of and reduce their vulnerability to climate change, and develop and demonstrate critical adaptation practices and technologies. Indicators: a) Number of community-level vulnerability assessments, with a target of 20. b) Number of community-based CCA management plans created and piloted, with a target of 20.	vulnerability assessments carried out for aquaculture production systems in target coastal and inland regions in order to inform planning and develop adaptation actions. 3.2: Climate–related risk reduction strategies and plans developed for target inland and coastal, aquaculture production systems and fish farming communities. 3.3: Critical adaptation technologies and practices piloted with targeted production systems and fish farming communities (*e.g.* diversification of farmed species and production processes; stocks and strains with wider tolerance to environmental changes; storm resistant cage and pond construction). 3.4: Aquaculture-based early warning system developed, including the use of ICT based information services to enable regular and early warning. 3.5: Pilot integrated mangrove-aquaculture and rainfed rice paddy-fish systems assessed and implemented.			
4. Knowledge management, monitoring and evaluation, training and scaling up adaptation practices, lessons learned development and dissemination.	TA	4: Enhanced understanding and access to adaptation practices and technologies enable stakeholders to manage information and scale up adaptation in the fisheries and aquaculture sector. Indicators: a) Four training modules target four fisheries and aquaculture sectors/sub-sectors. b) Number of guidelines. c) Information sharing platform. d) Project implementation based on results based management and application of project findings and lessons learned in future operations facilitated	4.1: Cutting edge training modules and how -to" guidelines for fisheries and aquaculture stakeholders developed. 4.2: Peer-to-peer learning program targeting fishers and fish farmers implemented to provide access to improved knowledge on climate variability, climate impacts and adaptation options. 4.3: Information and knowledge sharing platform on aquatic animal disease and water quality concerning the fishery and aquaculture sector developed and in use 4.4: Project monitoring system operating implemented providing	LDCF	691,136	1,395,238

			systematic information on progress in meeting project outcome and output targets 4.5: Midterm and final evaluation conducted 4.6: Project-related "best-practices" and "lessons-learned" published			
				Sub-Total	5,714,286	11,795,238
				Project management Cost (PMC)[2] LDCF	285,714	589,762
				Total project costs[4]	6,000,000	12,385,000

C. INDICATIVE CO-FINANCING FOR THE PROJECT BY SOURCE AND BY NAME IF AVAILABLE, ($)

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Amount ($)
Ministry of Livestock, Fisheries and Rural Development	Government of Myanmar	In-kind	4,885,000
Myanmar Fisheries Federation (MFF)	MFF	In-kind	2,000,000
WorldFish Center (ACIAR-funded)	Australian Centre for International Agricultural Research (ACIAR)	Grant	200,000
Japan International Cooperation Agency (JICA)	JICA	In-kind	500,000
The Livelihoods and Food Security Trust Fund (LIFT)	LIFT (multi-donor trust fund)	Grant	4,500,000
FAO	FAO	Grant	300,000
Total Co-financing			12,385,000

D. INDICATIVE TRUST FUND RESOURCES REQUESTED BY AGENCY, FOCAL AREA(S) AND COUNTRY[1]

GEF Agency	Type of Trust Funds	Focal Area	Country Name/ Global	Grant Amount ($) (a)	Agency Fee ($) (b)[2]	Total ($) c=a+b
FAO	LDCF	CC	Myanmar	6,000,000	570,000	6,570,000
Total Grant Resources				**6,000,000**	**570,000**	**6,570,000**

[1] In case of a single focal area, single country, single GEF Agency project, and single trust fund project, no need to provide information for this table. PMC amount from Table B should be included proportionately to the focal area amount in this table

E. PROJECT PREPARATION GRANT (PPG)

Please check on the appropriate box for PPG as needed for the project according to the GEF Project Grant:

	Amount Requested ($)	Agency Fee for PPG ($)[3]
• (Up to) $50k for projects up to & including $ 1 million		
• (Up to) $100k for projects up to & including $ 3 million		
• (Up to) $150k for projects up to & including $ 6 million	150,000	14,250
• (Up to) $200k for projects up to & including $ 10 million		
• (Up to) $300k for projects above $ 10 million		

PPG AMOUNT REQUESTED BY AGENCY (IES), FOCAL AREA(S) AND COUNTRY(IES) FOR MFA AND/OR MTF PROJECT ONLY

Type of Trust Funds	GEF Agency	Focal Area	Country Name/ Global	PPG ($) (a)	Agency Fee ($) (b)	Total ($) c=a+b
LDCF	FAO	CC	Myanmar	150,000	14,250	164,250

[2] To be calculated as percent of subtotal

[3] PPG fee percentage follows the percentage of the GEF Project Grant amount requested.

Total Grant Resources	150,000	14,250	164,250

PART II: PROJECT JUSTIFICATION[4]

A. PROJECT OVERVIEW

A.1.1. Global Environmental Problems, Root Causes and Barriers that Need to be Addressed

1. Myanmar is one of the Least Developed Countries (LDC) where agriculture, including the fisheries and aquaculture sector, constitutes the largest contribution to the national economy. With 2,400km of coastline facing Bay of Bengal and Andaman Sea, and extensive river systems including Ayeyarwady River stretching over 2,000 km, Myanmar is endowed with abundant and diverse aquatic systems and the fisheries sector is a critical contributor to Myanmar's food security and to the livelihoods of rural people. In Myanmar, approximately 60 percent of the population resides in rural and coastal areas and an estimated one million people directly and three million people indirectly are involved in the marine/coastal and inland fisheries and aquaculture sector, including fish processing, trading, and fishing boat manufacturing. Fish, in particular, is a part of the staple diet of people in Myanmar and in most situations their only source of protein, which positions the fisheries and aquaculture sector as an important component in the country's food and nutrition security efforts.

2. The impacts of climate change, including variability, are already demonstrated[5] for Myanmar and include a general increase in temperatures across the whole country (~0.08°C per decade), most notably in the northern and central regions; a general increase in total rainfall over most regions, however, with notable decreases occurring in certain areas (e.g. Bago Region); a decrease in the duration of the south-west monsoon season as a result of a late onset and early departure times; and increases in the occurrence and severity of extreme weather events, including cyclones/strong winds, flood/storm surges, intense rains, extreme high temperatures and drought.

3. Climate change and variability will exacerbate the vulnerability of Myanmar's marine/coastal fisheries and aquaculture sector. Increase in sea water temperature is a major trigger of disturbance of the marine/coastal ecosystem including acceleration of potential occurrences of harmful algal blooms (HAB), less availability of dissolved oxygen, damages in coral reef systems and altered species composition of fish stock, decrease in production of pearl oyster and seaweed; all of which threaten the marine/coastal and near-coast inland fisheries and aquaculture sector. El Niño Southern Oscillation (ENSO) events cause changes in ocean currents, which alter distribution of pelagic fish species and juvenile fish resources recruitment; affecting productivity of coastal and inland aquaculture. Sea level rise also threatens coastal fish breeding and nursery habitats composed of mangroves and coral reefs, and increases vulnerability to waves and storm surges, posing risks of near-coast inland fisheries and aquaculture inundation. Climate variation and change also influence post-harvest/production of fish products through increased risks of fish disease and spoilage along the production chain. The profound damage on Myanmar's coastal zone by cyclones Nargis in 2003 and Giri in 2010 demonstrated the serious vulnerability of riparian and coastal fishing and aquaculture communities and the increasing risk facing these communities' production assets, infrastructure and health and safety.

4. Inland fisheries and aquaculture in Myanmar are impacted by a variety of factors such as air and water temperature, water levels, duration of floods, timing of the floods, regularity of flooding, fish migration and dry season refuges linked to climate variability and change impacts. In the inland areas, higher water temperature results in degradation of water quality, less availability of dissolved oxygen, changes in the range and abundance of pathogens, fish species composition, migration, spawning and peak abundance patterns. The inland aquaculture sector is also exposed to climate induced hazards such as salt-water intrusion, flooding of ponds, shortages in water supply and altered local ecosystems.

5. Projections of climate change for Myanmar indicate further increases in temperature, in the risk of flooding, in the occurrence and intensity of extreme weather events, including cyclones/strong winds, flood/storm surge, intense rains, extreme high temperatures and drought, and in rainfall variability during the

[4] Part II should not be longer than 5 pages

[5] Myanmar's National Adaptation Programme of Action (NAPA) to Climate Change (2012), the FAO-Regional Integrated Multi-Hazard Early Warning System "Managing Climate Change Risks for Food Security in Myanmar" (2011) and Personal Communications with Myanmar Department of Fisheries.

rainy season. These predicted changes will only add to the serious challenges faced by Myanmar's fisheries and aquaculture sectors in ensuring the sustainable use of vulnerable marine and inland aquatic resources. The higher degree of natural variability and the possibility of unprecedented large-scale environmental changes, such as coral bleaching, could affect the aquatic systems profoundly, compounding existing pressures on fisheries and those dependent on them.

6. The likely impacts of the changes mentioned above are still uncertain and little is known at present about the vulnerabilities of the fishery sectors and their dependent communities in terms of impacts on livelihoods, human health and land and water resources. However, there is growing evidence of changes directly impacting the fisheries and aquaculture sector in Myanmar as seen through salt-water intrusion impacting species mixes, flooding of fish ponds, shortages in water supply as a result of limited quality and quantity of water, excessive aquatic weeds and algae in fish ponds, which reduce fish growth and fish survival rates, more frequent harmful algal blooms, increased incidence of aquatic animal disease and parasites, and altered local ecosystems with changes in competitors, predators and invasive species (Tilapia, Giant Clarias catfish, etc.), changes in timing and success of fish migration, spawning and abundance, changes in fish recruitment success, loss of coastal fish breeding and nursery habitats (mangroves, corals, etc.) and reduced opportunities for fish farming where rainfall has decreased.

7. These indicators of change taking place and the results of the predictive models demonstrate the urgency of assessing the vulnerability of the different fisheries and fishing/aquaculture communities to ongoing climate change and variability and taking steps to increase the resilience of those considered most vulnerable. In a country already facing serious challenges in terms of poverty and food insecurity, with likely gender-specific differences, the country must be well-prepared to minimize the risks to fisheries and fish production and to take advantage of any positive impacts that may arise from climate change.

A.1.2 Baseline scenario

8. Myanmar's fisheries sector comprises capture fisheries and aquaculture in both marine/coastal and inland areas. Both aquaculture and capture fisheries make a significant contribution to GDP (approximately 9%) and food and nutrition security (e.g. 35% of animal proteins from fish). In the last ten years, fish production has seen steady growth across the fisheries subsectors, as in Table A below. However, this increasing production is putting more pressure on the natural aquatic systems, which are showing signs of stress. For example, the Government has had difficulties in finding leasers for recent fishery leases as the fisheries resources of the inland or coastal area for lease have degraded and, thus, are less attractive for leasing.

Table A: Fishery Production
(Source: DOF statistics)
(1,000 metric tons)

	Year	Total	Aqua-culture	Leasable Fisheries (inland)	Open Fisheries (inland)	Marine/ coastal Fisheries
1	2002-03	1595.87	252.01	109.53	180.61	1053.72
2	2003-04	1986.96	400.36	122.28	331.98	2232.34
3	2004-05	2217.47	485.22	136.79	366.75	1228.71
4	2005-06	2581.78	574.99	152.69	478.43	1375.67
5	2006-07	2859.86	616.35	170.10	548.09	1525.32
6	2007-08	3193.92	687.67	191.05	625.44	1689.76
7	2008-09	3542.19	775.25	209.72	689.71	1867.51
8	2009-10	3921.97	858.76	237.46	764.97	2060.78
9	2010-11	4163.46	830.48	250.04	913.12	2169.82
10	2011-12	4478.21	898.96	282.64	963.82	2332.79

9. Since March 2011, the Government of Myanmar has gone through policy reforms and political transition towards democracy, after which the country has attracted foreign and local private investments. Its attention to climate change issues stands at a nascent stage and the National Adaptation Programme of Action (NAPA) to Climate Change has only recently been submitted to the UNFCCC in May 2013. Myanmar is expecting rapid economic progress, including expansion of inland and coastal aquaculture, but has not fully integrated climate change risks into its development strategies. The following paragraphs present an overview of related management efforts within the aquaculture and fisheries subsectors and opportunities for climate-proofing the sector and increasing resilience of the socio-ecological systems.

10. **Inland Aquaculture:** Most of the aquaculture practices in Myanmar are land based and conducted in earthen ponds. As of 2010-11, the total pond area was ~180,000 hectare consisting of ~89,000 ha fish ponds and 91,000 ha of shrimp ponds. Freshwater aquaculture is the major source of country's aquaculture production with rohu (*Labeo rohita*) as the dominant culture species. Other commonly cultured species include Chinese carps, major carps, some catfishes, tilapia and freshwater prawns. Much of Myanmar's

aquaculture uses a mono-culture approach, which may be efficient from a production perspective but also renders the sector highly vulnerable to changes in environmental and market conditions. A diversified product portfolio, such as through polyculture and integrated aquaculture systems, would increase the resilience of aquaculture farms to such shocks and may contribute to increased ecosystem services from within the ponds. For aquaculture feed, both small scale and commercial private sector freshwater fish farms utilize farm-made feeds from locally available ingredients such as rice bran and groundnut cake. While there are 27 private feed mills producing feed pellets, feed formulae and feed conversion ratios are not yet optimized, leaving room for untapped potential for resource efficiency gains. Inland aquaculture has great potential to increase the adaptive capacities of rural communities through, for example, livelihood and food diversification and through the development of more resilience productions systems. However, strict controls on the conversion of rice lands into other uses (especially aquaculture) and a lack of integrated water management planning, may be the largest constraints to adaptation in the aquaculture sector. Therefore, a review of current land and water use policies to support adaptation actions, such as flexible land use planning to allow for optimal pond siting, conversions to aquaculture from other land uses and development of integrated rice-fish systems, as well as for holistic environmental and social impact assessments of water use options, is necessary.

11. **Marine/coastal aquaculture**: Coastal aquaculture in Myanmar is mainly limited to shrimp farming, with smaller quantities of mud crabs and groupers produced. Marine shrimp farming, with particular reference to black tiger shrimp (*Penaeus monodon*) under extensive and traditional systems, is practiced mostly in Rakhine State. Soft shell mud crab farming has recently become popular as it commands high market price. Myanmar has no experiences or technologies of farming oyster mussels, cockles, or clams, while marine seaweed culture (e.g., *Eucheuma* for carrageenan production) is being tested in the southern part of coastal area. The coastal aquaculture sector contributes significantly to export earnings and shows potential for future development and diversification – but careful attention is needed to ensure its resilience to climate change. For example, disaster risk management planning is not currently integrated into aquaculture development planning and there is a lack of technical knowledge of potential hard (e.g. cage strengthening) and soft (e.g. fringe forestry) exposure reduction options and a need for better informed site planning to render coastal aquaculture systems more storm or cyclone proof. In addition, there is little documentation of potential impacts of the slow-onset changes, such as sea level rise and changes in water temperatures and alkalinity on aquaculture development, and how the different sub-sectors are more or less vulnerable to these risks and which sectors should be promoted in the face of new opportunities.

12. In summary, aquaculture in Myanmar has great potential to provide further contributions to economic growth and food and nutrition security as well as to provide adaptation options for other sectors. However, the sector is facing risks related to changes in water availability and quality, increases in fish diseases linked to higher temperatures, and direct exposure to floods, sea surges and cyclones. These risks are compounded by current institutional and management frameworks and by a lack of understanding of how the different aquaculture production systems, and the communities dependent on these, are vulnerable to climate-driven changes. Therefore, detailed adaptation planning and technical capacity building from within the sector has been greatly hampered.

13. **Inland capture fisheries:** Myanmar has extensive capture fisheries in its freshwaters. For management (licensing/regulation) purposes Myanmar divides its inland capture fisheries into two main categories: Leasable Fisheries and Open Fisheries.

14. Leasable "Inn" Fisheries refers to fishing activities for which fishing right is granted under a lease, via auction, by the DOF to individuals or groups who possess means to operate and sustain the designated fisheries resources. Leasable Fisheries are conducted almost exclusively in the key fishing grounds on floodplains. More than 50 percent of Leasable Fisheries licenses are located in Ayeyarwady Division, in the lower floodplains and delta of the river. The peak season involves capturing fishes migrating off the floodplain at the beginning of river draw-down. By regulation, the lessees must release some fish fry or fingerlings to their lot to sustain the stock once the flood waters have risen: but the numbers or species to be stocked is not defined. In an attempt to maintain and increase productivity of Leasable Fisheries, DOF and private hatcheries have provided quality freshwater finfish stock during the early period of a rainy season in the past two decades, to counter-balance the potential high mortality due to carnivorous nature of fishes. On the other hand, there are leasable fisheries that are dependent entirely on natural recruitment of indigenous species and in exceptional cases on exotics such as *Oreochromis niloticus*.

15. Leasable fisheries mainly contribute to the livelihoods of large commercial operators or institutions but depending on the management of the system can also support large numbers of sub-lessees and fish sellers. The nationwide number of Leasable Fisheries licenses dropped from 4,002 in 1970 to 3,458 today. The decrease is due to unsuccessful auction of the licenses due to decrease in fish productivity, which is potentially linked to adverse impacts of climate change and variability, including sedimentation from the change of river water current, flood and inundation, fish habit change, and extermination of some endemic fish species. In addition to providing quality finfish culture as above, DOF is also extending the lease period to up to 9 years to promote improved long-term management, though no clear improvement is yet to be reported.

16. Open Fisheries refers to fishing in all other inland areas including rivers, reservoirs and seasonal or perennial flooded areas. Fishing rights are granted by issue of fishing licenses, including a set fee for most licenses. Some of the larger gears, particularly "bagnets" set in rivers, are allocated by a tender system ("tender fisheries"). Fees are variable between regions according to production and capacity. In order to maintain the sustainable fishery resources in Open Fisheries, DOF conducts the stocking of quality fish seeds every year in all open fishery water bodies. However, little to no information is collected on the status of the target species and the fisheries activities nor is significant information collected on the consumption of fish and the nutritional benefits derived from these. In addition, the DOF has limited extension staff and has little opportunity to gather information on the dispersed fishing activities that are occasional, seasonal or rice paddy fishing.

17. The fishing techniques used in inland fisheries are drift net, gillnet, traps and pots, pole-and-line, stationary traps, and bamboo stake traps in the near shore of rivers, with an estimated landings of freshwater fish[6] and prawn in the order of 1 million tonnes in 2011, with reported increasing trends over the past decade. Officially, it is a requirement for all licenses that holders report their catches, although in practice, this is only likely for the larger leasable fisheries and larger fixed gear fisheries. This is one source of underestimation of the actual status of the production from inland fisheries. The entire fishery is closed during June to August (to allow spawning and recruitment). In practice this is probably enforced only for the Inn fishery, tender fisheries and larger gears. The small-scale fishery occurs year-round and is considered technically "illegal" during these months. Knowledge on the impact of changing water flows and temperatures on reproductive cycles is lacking and, therefore, fixed temporal and spatial management tools risk causing hardships for the dependent communities; while not producing desired biological improvements.

18. **Marine/coastal capture fisheries:** Myanmar's 2400 km long coastline can be divided into three regions: the Rakhine Coastal Region (from the mouth of the Naaf River to Mawtin Point, about 740km in length), the Ayeyarwady Delta and the Gulf of Moattama (Martaban) Coastal Region (from the Mawtin Point to the Gulf of Moattama, about 460km in length) and the Thainintharyi Coastal Region (from the Gulf of Moattama to the mouth of the Pakchan River, about 1,200 km in length) in the Bay of Bengal and in the Andaman Sea. With the long coastline, several large estuarine, delta systems and numerous offshore islands, Myanmar possesses a considerable diversity of coastal habitats, including coral reefs, mangroves, sandy beaches and mudflats. Ayeyarwady River, one of the largest rivers in Southeast Asia, feeds the vast Ayeyarwady delta area dominating the central part of the country.

19. Marine capture fisheries can be categorized into two main types as inshore fisheries and offshore fisheries. This project is concerned with inshore fisheries also known as coastal fisheries where the fishing vessels can operate within five nautical miles from the shoreline in the northern area and ten nautical miles in the southern area. Fishing vessels range from the traditional and/or small-scale type to commercial vessels of up to thirty feet using engines not more the twelve horsepower (HP). Under the Marine Fisheries Law, artisanal fishermen are given priority to fish in all zones. Marine fisheries management plans determine Maximum Sustainable Yield (MSY), season and area closures, and prohibited fishing gears.

20. The government has a limited number of programmes supporting the marine fisheries, DoF has established an appropriate legal framework and formulated and implemented various strategies for the sustainable development and management of marine fisheries. Fisheries management is pursued by licensing, prescribing exploitable species, designating environmental friendly fishing gears and methods, imposing closed areas and seasons, etc. Insufficient information on the impacts of climatic variables exists to support adaptive management within (e.g. flexible closed seasons and moving marine protected areas). The introduction of a Monitoring, Control and Surveillance (MCS) programme for fishery management is another

[6] Including carp, eel, catfish, rohu, shrimp, glass fish, wallago, rohtee, barbs, etc.

measure taken up recently by DoF. This programme should provide effective and efficient scientific data acquisition for resources evaluation and management of fisheries in Myanmar. It also provides the basis for effective monitoring and control of fisheries enforcement activities to ensure that only authorized or license-holding fishing vessels operate within the designated areas in the national EEZ.

21. Currently, no management plans exist for marine capture fisheries; however, the Bay of Bengal programme is working to support the development of one particularly important but at-risk species, Hilsa. In addition, the Norwegian Nansen research vessel is currently planning a large-scale marine ecosystem survey in Myanmar, which will include information on the fish resources, water quality information (temperature, Ph levels) and habitat mapping. Disaster risk management is not incorporated into marine capture fisheries management and issues specific to the sector have not been included in national disaster risk management planning; increasing the vulnerability of the coastal fishing communities as well as coastal fishing infrastructure. As most of the fisher communities are located along the coast, and include significant numbers of poor and generally vulnerable people and a high proportion of people dependent on fisheries activities and aquatic products for income and food security, there is a need to understand how food and livelihood security of these coastal communities will be impacted by changes in fish productivity due to multiple drivers of change, including pollution, overfishing, and climate related changes impacting the fish populations.

22. In summary, there are several **climate related risks** that further threaten the sustainability of the sector, both of aquaculture and of marine and inland capture fisheries developments. Impacts occur as a result of both gradual warming and associated physical changes as well as from frequency, intensity and location of extreme events. In terms of physical and biological impacts, climate change is modifying the distribution of fresh water species. In general warm and cold water species are being displaced and they are experiencing changes in size and productivity of their habitats. Temperature changes also affect fish physiological processes, resulting in both positive and negative effects on fisheries and aquaculture. Seasonality of particular biological processes such as reproduction, food webs, diseases and invasiveness of species are affected. Overexploited fisheries resources may not be able to cope with the additional impacts. What this means for the Myanmar fisheries and aquaculture sectors is currently not well known – and certainly not sufficiently integrated into national approaches in the fisheries sector.

23. **Mangroves:** Myanmar has the fourth largest expanse of mangrove areas in Southeast Asia. Myanmar mangrove forests are dominantly in the Ayeyarwady, Tanintharyi and Rakhine state/divisions. Mangroves in Myanmar are classified as "Primary" and "Secondary". Primary mangrove areas are protected under jurisdiction of the Ministry of Forestry and not available for aquaculture and are essentially forest reserves. Significant jurisdiction of secondary mangroves is devolved to the Department of Fisheries for availability to conversion for aquaculture. Mangrove forest cover in the Ayeyarwady Delta has declined for many decades due to the development of paddy cultivation and extraction of fuel wood, charcoal production and construction materials such as poles and thatches. There have been attempts to rehabilitate the mangrove forest, however, the complex natural and cultural ecology of mangroves makes mangrove rehabilitation difficult. Community-based mangrove forest management initiatives were also attempted in the past, yet they were thwarted by illegal encroachments from agricultural conversion, opening forests for aquaculture ponds and premature cutting of trees.

24. Mangroves can be effective pollutant sinks from land runoff as they are efficient nitrogen and phosphorus accumulators. These nutrients can be incorporated for biomass production or stored within the plant for later use. In addition, the complex root systems of mangroves can colonize sediments and stabilize them to modify the foreshore and reduce re-suspension thus ensuring some protection for near shore habitats. Mangroves can provide very effective protection against climate induced damage such as erosive wave-action and cyclones on the shoreline. Episodic heavy rainfall events can result in rapid land runoff where mangroves can also play an important role in trapping sediments before this runoff water reaches the open sea, protecting the coastal and marine ecosystems. As mentioned above, mangroves also play important nursery and feeding grounds for fish resources. The lack of effective conservation plans for mangrove ecosystems across the government's line agencies hinder the resilience of fisheries sector, coastal ecosystems and coastal communities to climate change impacts.

Baseline Programs/Projects:

25. Within the context described above of the current situation with respect to fisheries and aquaculture in Myanmar, the government of Myanmar and development partners are supporting specific baseline programs and projects that are relevant to this additional LDCF investment in climate change adaptation. This project

will be designed to be additional to these baseline projects and programs. A summary description and preliminary quantification is provided below:

National Fishery Sector Plan of Action: Myanmar's fishery sector action plan will focus funding on key issues such as: increasing production of value added fishery products from aquaculture through improved infrastructure and technology investments; conserving fisheries resources for capture fisheries by restricting fishing in critical habitats and developing a fishery vessel monitoring system; establishing modern laboratories to support improved fisheries and aquaculture management. These activities are estimated to contribute co-financing of approximately US$4.885 million. None of Myanmar's baseline funding for fisheries will be focused on understanding vulnerabilities to climate change and enabling the sector to respond in a proactive manner. This is the strategic niche that the LDCF funding will be designed to fill.

Myanmar Fisheries Federation (MFF). MFF is a non-profit organization that encourages and promotes the fisheries and aquaculture business of Myanmar. This includes helping member cooperatives access financing, new technology and tools, and improved practices and will provide an estimated US$2 million in co-financing to this project. Currently, their work does not include helping their members think about climate change adaptation. LDCF resources will complement this baseline association and networking work with inputs to enable an increased understanding of climate change adaptation challenges among fishers and aquaculture pond owners in Myanmar.

ACIAR and AusAID Asia Division are financing a four-year project through the Worldfish project "Myanmar's Inland & Coastal Fisheries - Improving Research and Development of Myanmar's Inland and Coastal Fisheries (MYFish)", running from September 2012 through August 2016. It establishes a partnership between WorldFish Center and four local Myanmar agencies and institutions: the Department of Fisheries (DoF) under the Ministry of Livestock and Fisheries, the Myanmar Fisheries Federation (MFF), Yangon University, and the Food Security Working Group (FSWG). This ACIAR project addresses the three constraints: (i) the lack of a comprehensive information base on fisheries; (ii) the lack of proven management approaches and technologies; (iii) and limited technical capacity to implement fisheries projects; by improving the management capacity for Myanmar's inland capture and culture fisheries, and by facilitating the emergence of co-management of fisheries and small-scale aquaculture. Research objectives are to characterize and improve the fisheries sector in the northern (upstream) and southern (downstream) Ayeyarwady Delta areas and to assess the scope for fisheries development in the Central Dry Zone. The first objective of the ACIAR project is to conduct a thorough review of current fisheries practices in the Ayeyarwady Delta and Central Dry Zone. The second objective is to identify and test viable options for improving the fisheries operations in Myanmar, through pilot interventions to test proposed fisheries improvements. The research and knowledge components of the MYFish project will contribute approximately $200,000 in co-financing to this project. Climate factors such as water availability were identified as one of priority research and capacity development areas to be targeted by the programme. The LDCF project will provide additional investments critical to linking this research to practical field level piloting and testing by fishers and fish farmers in order to inform and improve adaptation actions.

JICA aquaculture support through the three-year project, "Small-scale Aquaculture Extension for Promotion of Livelihood of Rural Communities in Myanmar" is part of Japan's overall poverty alleviation development assistance in Myanmar. The aquaculture project built skills and capacity of operating small-scale rice-field fish culture in the targeted five townships in the three designated regions in the southern delta: Ayeyarwady and Bago Regions and Kayin State and Phase II of the project is planned to be implemented in the central dry zone, focusing on aquaculture. JICA is also supporting restoration of mangrove forests in the coastal zone. This support project will provide approximately US$0.5 million in co-financing. This LDCF investment will be designed to complement baseline investments like JICA's in aquaculture to provide additional climate change adaptation capacity and capabilities that are not part of traditional aquaculture support programs including the diversification of aquaculture species, climate proofing farm and cage siting, and promoting integrated systems to reduce vulnerabilities.

The Livelihoods and Food Security Trust Fund (LIFT) is a multi-donor fund established in Myanmar in 2009, initially set up to address food insecurity and income poverty in cyclone Giri-affected areas of Rakhine State in Myanmar and has also supported formulation of National Action Plan of Agriculture and Rural Development. The donors to LIFT are Australia, Denmark, the European Union, France, the Netherlands, New Zealand, Sweden, Switzerland, the United Kingdom and the United States of America. The donors contracted

UNOPS as the Fund Manager to administer the funds and provide monitoring and oversight for LIFT. LIFT's vision is to be an effective mechanism for channelling aid to local implementing partners to achieve its goal of improving the food and livelihood security of the poor and vulnerable in Myanmar. Up to 2012 LIFT has received US$166 million in commitments and US$101 million in contributions. This fund and its projects will contribute considerable baseline activity and an approximate US$4.5 million in direct co-financing. FAO Investment Centre has provided technical assistant for part of the project. The PPG process will work closely with LIFT and it is likely that one of their rural development baseline investments will form a key part of this project's baseline program.

The FAO and the Government of Myanmar share a long history of cooperation in their respective pursuits to eradicate hunger, malnutrition and poverty through agricultural and rural development. The 2012-2016 FAO Myanmar program has identified seven priority outcomes covering a number of priority areas: food and agricultural production including fisheries and forestry sub-sectors, food security, food safety, human resource development, land use and land management, sustainable management of natural resources, preparedness for and mitigation of disasters and climate change. One such example is the Environmentally Sustainable Food Security Programme (ESFSP) "Support to the immediate rehabilitation of farming, coastal fisheries & aquaculture livelihoods in the cyclone Nargis-affected areas of Myanmar" (GCP/MYA/012/ITA), which was funded by the government of Italy and has been implemented since January 2010. The project aims at sustainable improvements in household food production, nutritional status and income-generating activities among households and communities that comprise landless, marginal and small-scale farmers and fishers in the cyclone-affected townships of Bogale, Labutta and Pyapon. Relevant activities under this program, including an FAO Technical Cooperation Programme project "Implementation of the National Adaptation Plan of Action (NAPA) in the Fisheries and Aquaculture Sector of Myanmar", will provide an estimated US$300 000 in co-financing to the proposed project.

26. **Barriers.** Despite the baseline programs and projects described above, there are still key barriers that prevent stakeholders from taking adequate action to reduce vulnerability to impacts of climate change and increase resilience in Myanmar's fisheries and aquaculture sector. The following table summarizes the logic underlying the design of this proposed LDCF investment, beginning with the key barriers preventing stakeholders from adapting to climate change in Myanmar's fishery and aquaculture sector. The main contributing issues and causes related to each barrier are then summarized along with the key measures to address these in order to enable stakeholders to overcome the barriers.

Table 2: Barriers, causes and measures to address barriers

Barriers	Causes	Key measures to address barriers	Project component
Lack of climate resilient sector policies, and limited integration of fisheries specific climate responses in national policies	Limited systematic analysis of the climate change related vulnerabilities in the fisheries and aquaculture sector in Myanmar. Lack of coordination among relevant government agencies. Lack of monitoring and feedback systems on climate change impacts on fisheries and aquaculture system within the DoF, from national to local levels.	Enabling national fisheries (including aquaculture and shrimps) and related policies and strategies and enhanced capacity that foster transformative fisheries adaptation and development not only within the MLFRD/DoF but also among other relevant government and private agencies.	Component 1: Strengthen the National, Regional/ State and Township level regulatory and policy frameworks to facilitate the adaptation of the fisheries and aquaculture sector
DoF is not prepared to support communities in responding to climate related stressors and fisheries and aquaculture adaptation to climate change impacts.	Under-developed management capacity including on policy, technical as well as local management levels. Limited knowledge and capacity to respond to climate change impacts.	Strengthening the capacity of local communities including field level agents that DoF and other relevant agency staff to the extent they can assess, plan and identify adaptive measures to reduce climate change risks.	Component 1: Strengthen the National, Regional/ State and Township level regulatory and policy frameworks to facilitate the adaptation of the fisheries and aquaculture sector

Barriers	Causes	Key measures to address barriers	Project component
	Lack of information and analytical capacity. Lack of information services to communities. Lack of monitoring and feedback systems on climate change impacts on fisheries and aquaculture system within the DoF, from national to local levels.	Promotion of appropriate technologies and approaches including information based on specific different sensitive ecological settings of the country that enhance fisheries and aquaculture productions and community livelihoods in the face of climate change impacts.	
The relevant fisheries and aquaculture dependent communities lack understanding on the issues of climate change and their impacts on fisheries and aquaculture and its consequent effects on their livelihoods.	Limited knowledge and capacity to respond to climate change impacts. Lack of information and analytical capacity. Lack of information services to communities. Limited understanding of possible adaptive responses in the fisheries sector, specific to Myanmar. Lack of climate change resilient fisheries and aquaculture technologies and options. DRM largely focuses on maritime aspects and sea safety, only during climate extreme events (cyclonic, flooding).	Strengthening the capacity of local communities including field level agents that DoF and other relevant agency staff to the extent they can assess, plan and identify adaptive measures to reduce climate change risks Promotion of appropriate technologies and approaches including information based on specific different sensitive ecological settings of the country that enhance fisheries and aquaculture productions and community livelihoods in the face of climate change impacts. – Promotion of appropriate technologies and approaches including information based on specific different sensitive ecological settings of the country that enhance fisheries and aquaculture productions and community livelihoods in the face of climate change impacts.	Component 2. Enhancing critical adaptation practices demonstrated by fishers in vulnerable coastal and inland water regions of Myanmar Component 3. Develop and apply/mainstream adaptation models to strengthen the resilience of Myanmar's aquaculture sector to the impacts of climate change.

A.1.3 Proposed alternative scenario [with a brief description of expected outcomes and components of the project]:

27. The proposed alternative will address climate change adaptation in the fisheries and aquaculture sector in Myanmar systematically for the first time. As noted above, Myanmar is a country dependent on fish and aquatic products for its food and nutrition security and economy but the sector is highly vulnerable to the impacts of climate change. The project will strengthen coordination in the sector and bring together key stakeholders to address the priorities identified in the NAPA priority areas 1-Agriculture, early warning, forestry, 2-Water resources, 3-Coastal Zone and 4-Biodiversity. The project will address the limited capacity in Myanmar to analyse vulnerability, to plan and implement interventions and to develop policy and governance at national, sub-national and community levels in the fisheries and aquaculture sector. Participatory planning with the Government of Myanmar and stakeholders has led to the development of these fisheries and aquaculture sector adaptation interventions, which will contribute to the implementation of the national climate change strategy. The project implementation will be designed adopting a collaborative "One-UN" and multi-donor delivery mechanism in support of the national frameworks for development, and will clearly strengthen national adaptation capacity within Myanmar.

Component 1: Strengthen the national, regional, state and township level regulatory and policy frameworks to facilitate the adaptive capacities of the fisheries and aquaculture sector.

Outcome 1. Enhanced capacity of DoF, GoM and private sector stakeholders to address climate change issues through improved relevant national policies and strategies facilitating a climate resilient fisheries and aquaculture sector.

Specific issues: The fisheries and aquaculture sector in Myanmar has a limited capacity to inform policy development and decision making due to a lack of understanding of the sector's vulnerability to climate change and disaster impacts, potential adaptation options and cost/benefit analysis capacities of potential interventions. Myanmar's fishery sector has developed an action plan that focuses on development issues, such as increasing production of value added fishery products from aquaculture through improved infrastructure and technology investments; conserving fisheries resources for capture fisheries by restricting fishing in critical habitats and developing a fishery vessel monitoring system; establishing modern laboratories to support improved fisheries and aquaculture management. None of Myanmar's baseline funding for fisheries is focused on understanding vulnerabilities to climate change and enabling the sector to respond in a proactive manner. In addition, projects and programmes funded by LIFT to address a wide range of post disaster and development issues do not address issues specific to the sector. Likewise, the UN-HABITAT and UNEP programme to implement the "Myanmar Climate Change Alliance Project (GCCA)", funded by EU, from September 2013 through 2016, will support high-level policy development but not for the agriculture or fisheries sectors.

Climate change adaptation is not currently included as a priority in Myanmar's Fisheries Policy, although effective adaptation will be critical to enabling the achievement of the Policy's main objectives. In addition, understanding vulnerabilities within the fisheries and aquaculture sector in Myanmar is in its nascent stages and is primarily limited to anecdotal information: people are perceiving climate change at work in ponds that are too hot for currently farmed fish species or a through changes in fish stock distributions. Myanmar's first NAPA process shed some light on these changes; however, stakeholders have not yet assessed systematically how these changes may impact sector and why the sector may be vulnerable to these changes.

Adaptation alternative: This project and the co-financing FAO TCP project "Implementation of the National Adaptation Plan of Action (NAPA) in the Fisheries and Aquaculture Sector" will provide additional support to climate change policy development and capacity building under this component. A national level vulnerability assessment of climate change risks facing the fisheries sector shall be undertaken and updated regularly. The assessment will be used to inform the Department of Fisheries as well as the national climate change coordination mechanism of Myanmar of the potential severity of sector impacts on key geographic areas, production systems and vulnerable fishing and fish farming communities. The assessments will be carried out at national and sub-national levels and be informed by and communicate findings through participatory consultation with stakeholders, with particular attention to gender-specific differences in vulnerabilities for better targeted adaptation planning. Capacity development of those undertaking the assessments, analyses and reporting will be carried out through on-the-job training. The assessments will build on the extensive existing livelihoods knowledge base developed by projects already under implementation, such as the LIFT programme and the Japanese funded small-scale aquaculture programme undertaken in collaboration with the World Bank, the EU, the World Fish Centre and local universities. Relevant programmes and projects facilitated by FAO include the Italian project, Sustainable Small-Scale Fisheries and Aquaculture Livelihoods in Coastal Mangrove Ecosystems, and the FAO Technical Cooperation Programme project, Implementation of the National Adaptation Plan of Action (NAPA) in the Fisheries and Aquaculture Sector of Myanmar.

This LDCF project will be well positioned within the Government of Myanmar to leverage the relevant capacities at the Government level to absorb and integrate the improved understanding and knowledge into climate resilient policy development and implementation strategies. The assessments will be used to inform future sector climate proofed development in line with the climate smart agriculture principles as well as climate proofing of current programmes under implementation in Myanmar. This assessment will also inform the other Components of this project.

Specific issues: As mentioned above, national policies for fisheries and aquaculture need strengthening in relation to climate change adaptation to enable sector-specific actions as well as to ensure coordination with other sectors. Furthermore, the current reform process within Myanmar has led to decentralization of policy making to sub-national and township level where current capacity is weak. These issues are recognized by the

government and, whilst initiatives to review and develop high level policy are underway, they do not focus on specific sectors such as fisheries and aquaculture.

Adaptation alternative: To achieve synergy, the proposed FAO/GEF-LDCF project will focus on the development of fisheries sector-specific adaptation policies and strategies which fall outside the scope of other initiatives and will pay particular attention to the climate proofing of aquatic animal health biosecurity frameworks. Fishers and fish farmers resource tenure and access rights will also form a key theme within the project policy development activities.

The project will strengthen coordination through existing and new networks and structures and work closely with other policy development initiatives. The project will adopt best practices in the development of fisheries and aquaculture sector policies and strategies including broad stakeholder consultations and the support of legal expertise. There will be a focus on engagement of women and marginalized groups. Policy and strategy development will be informed through linkages to research and technical advisory networks at regional and national levels, including the WorldFish Centre, NACA, SEAFDEC, AIT and national fisheries and aquaculture universities and government agencies.

Appropriate priority government policies and strategies will be supported at relevant, national, state, and regional administrative levels across the country. Policy/strategy support will also be provided in the districts, townships and villages involved in Component 2 of the project. Policy and strategy development initiatives may also include piloting of activities such as the development and mainstreaming of local/community CCA/DRM contingency planning and early warning systems for fishing and fish farming communities. Networks and systems to monitor and assess the impacts of climate change, as identified by target communities, will be piloted and scaled up (under component 4). Findings from these networks will be consolidated at relevant state, region, local levels and used to inform policy and planning and the design of specific project adaptation actions. The project's fisheries and aquaculture policy development work will build on the previous good practice and lessons learned under the Government of Myanmar – FAO Sustainable Small-Scale Fisheries and Aquaculture Livelihoods in Coastal Mangrove Ecosystems project and the Japanese funded small-scale aquaculture programme, which support government policy and focus on the development of fisheries co-management, mangrove restoration and community management and the development of small scale aquaculture.

Capacity of stakeholders at all levels and across the sector will be supported through a wide range of capacity building activities including on-the-job training, training of trainers, training visits and the strengthening of existing information sharing networks such as the existing WorldFish Centre-DoF research network. A full capacity needs assessment will be conducted and a training program developed during the project preparation phase for implementation under the full project.

Component 2: Enhance critical adaptation practices demonstrated by fishers and fishing communities in vulnerable coastal and inland water regions of Myanmar.

Outcome 2.1 Fishers and fish farmers in coastal and inland water regions of Myanmar increase their knowledge of and reduce their vulnerability to climate change, and develop demonstrate critical adaptation practices and technologies.

Specific issues: The government of Myanmar currently has no programmes or activities related to strengthening climate change adaptation planning and capacity in the fisheries and aquaculture sector. Some limited advice regarding early warning is provided to the sector by the national disaster management agency. The current DRM frameworks and plans in Myanmar do not provide specific messages for the farmers (aquaculture and agriculture) as to what preparedness measures should they take to protect their fish/shrimp farms or croplands from CC induced disasters nor they disseminate specific messages on slow onset events such as drought, sea level rise, salinity, erratic rainfall, temperature rise, cold spells, etc. DoF does not collect, maintain database on various climate factors that affect/ influence the fisheries and aquaculture production systems viz. salinity, drought, rainfall, water flow, temperature and analyse their trends and impacts on fisheries rendering the DoF unable to understand and support communities to respond to climate related stressors and fisheries adaptation to CC impacts.

Adaptation alternative: Adaptation alternative: Under the adaptation alternative scenario this component will work with target fishing communities, using good practices in participatory appraisal and risk analysis, to identify their vulnerability to climate change impacts, develop adaptation action plans and identify and agree

on appropriate priority adaptation actions. The community level climate change vulnerability assessments for the fisheries sector in targeted coastal and inland regions will inform adaptation planning and identify adaptation actions in pilot regions. The project will build on the successful fisheries co-management experiences of the Government of Myanmar-FAO ITA project and of the GoM-FAO Mangrove to further develop community-based climate change adaptation and disaster risk planning. The main activities will be undertaken in Ayeyarwady Region, Yangon Region and Rakhine State. The component will support the co-management groups under ITA that already have now access fishing leases, to develop and implement fisheries climate change adaptation and disaster management plans and further build their resilience. These plans will be developed using best practice in community and stakeholder consultation, the ecosystem approach to fisheries and aquaculture, and support the participation of women and other vulnerable groups in the processes. FAO has identified a range of good practices related to climate change adaptation in the fisheries sector. Actions to specifically address adaptation that have been identified in the region and may be applicable could include for example, ensuring that fish refugia, breeding areas or protected areas in rivers and lakes are managed and designed to be resilient also to the impacts of climate change (such as drought, flooding, salt water intrusion). New fisheries management measure to address climate change impacts could include preventing fishing during climate induced droughts and managing water levels through increasing river bank height or installing sluice gates to manage changes in water flow. For coastal communities, changes to the management of fisheries need to be agreed with communities and could include protecting vulnerable ecosystems and habitats that provide protection to extreme events. Changes in the type of fishing gears used by fishers may be required as the species composition change as well as spatial zoning of fishing activities, including those of migratory fishers. Protecting fisheries infrastructure (such as landing areas, ice making facilities or markets) in vulnerable coastal areas may be needed. Projected increases in the number and strength of tropical storms due to climate change mean that Innovative approaches to safer fishing are required. In addition to the early warning systems being developed, community based actions could include development of safer vessels and climate proofed infrastructure (harbours, landing areas and anchorages). As climate change impacts the type, quantity and quality of fish harvested additional actions to reduce postharvest losses will be essential to maintain food availability and decrease the risk of food-borne diseases. Adoption of value chain analyses and improvements will further support adaptation planning and the development and diversification of at risk livelihoods and households. The Policy and Strategies developed and strengthened under Component 1 will further support rights and access to leasable fishing. The project will facilitate the up-scaling of climate smart fisheries management approaches and technologies to additional pilot communities in the Delta. At least two communities relying on inshore capture fisheries will be supported with government to develop and implement climate smart fisheries co-management. The GoM-FAO TCP mangrove project in Rakhine province has built significant capacity in community based management of sustainable mangrove-fisheries-aquaculture systems. Mangrove forests significantly reduce vulnerability for coastlines and communities to climate change and sea level rise through reducing and buffering impact from waves and tides. This LDCF-GEF project will work with the forestry and fisheries departments in further climate proofing existing communities. Approaches used here will address coastal flooding from an ecosystem approach-coastal erosion may be addressed via active mangrove management and restoration, sand dune rehabilitation using native species, wetland restoration, agricultural land reclamation, and construction and rehabilitation of fringing coral reefs. These habitats will provide important coastal habitats, reduce erosion and maintain other ecosystem services. This will be done through the development and implementation of climate change adaptation and disaster risk management plans for the fisher and fish farming communities that rely on the ecosystem services provided by mangrove-fishery-aquaculture systems. The project will work with fishers, communities, local NGO, local universities and government agencies to develop community-based early warning systems to jointly monitor and communicate changes in the environment. The project will work with the WorldFish Centre and local Universities. Relevant programmes and projects facilitated by FAO include the FAO-GEF/IW BOBLME programme which will build capacity in fisheries management. The FAO Technical Cooperation Programme project, Implementation of the National Adaptation Plan of Action (NAPA) in the Fisheries and Aquaculture Sector will further support this component. The component will benefit from and coordinate with the activities under components 1, 3 and 4.

Component 3: Develop and apply/mainstream adaptation models to strengthen the resilience of Myanmar's aquaculture sector to the impacts of climate change.

Outcome 3.1 Small-scale fish farmers in coastal and inland water regions of Myanmar increase their knowledge of and reduce their vulnerability to climate change, and develop and demonstrate critical adaptation practices and technologies.

Specific issues: The aquaculture sector in Myanmar is significant in terms of production and its contribution to the economy. The aquaculture sector in Myanmar is particularly vulnerable to the impacts of climate change and disasters as a result of a lack of capacity in climate change adaptation planning and policy, limited focus on few species, few alternative production systems. Weak national biosecurity frameworks further increase risk through climate related disease outbreaks. Development of small scale aquaculture is a priority for the government and is currently being supported by the Japanese government. Small scale aquaculture provide climate resilient livelihood diversification to poor and food insecure households. Significant investment is made in the larger private sector owned farms but that for small scale producers is limited.

Adaptation alternative: Adaptation alternative: Under the adaptation alternative scenario this component will work with target aquaculture farmers and communities to identify their vulnerability to climate change, develop adaptation action plans and identify and agree on appropriate priority adaptation actions. These community level climate change vulnerability assessments for the aquaculture sector in targeted coastal and inland regions will be used to inform adaptation planning actions. Building on and supporting the policy and strategy development in Component 1, this component will further develop specific community level climate risk reduction strategies and plans with a focus on small scale aquaculture producers and communities. These are built on the good practices developed by the Japan-funded project in diversifying livelihoods at household level through the integration of low input low-risk polyculture approaches. The LDCF project will build on these successful pilots with the integration of community level farmer groups and household climate adaptation planning and implementation. Aquaculture adaptation actions identified and developed will be community and area specific. A wide range of such climate change adaptation practices for small scale aquaculture exist. If appropriate for the local setting, these may be adapted or adopted by farmers. These practices and technologies include, for example, adoption of locally available saline tolerant species for culture in areas affected by salt intrusion. Improved aquaculture systems will enable farmers to adapt to climate related environmental change such as increased drought, floods, or sea level rise. For example, construction of aquaculture ponds with higher bunds will enable them to continue culture during periods of drought. Improvement of hatcheries to withstand additional climate change related drought and flood for example can be carried out through securing larger water reservoirs or wells and increasing pond dykes thus allowing operators to continue functioning during periods of climate related stress. Brood banks and improved management of broodstock will allow medium to long term planning and development of climate resilient aquaculture. The community managed mangrove systems developed in Component 2 will be further strengthened through the integration of low risk low impact extensive aquaculture and ranching/penning technologies using for example mud crabs. At a national level, this component will contribute to and build on climate adaptation policy and planning to reduce risk to the aquaculture sector. This work will involve support to the identification of diversified and locally appropriate integrated production systems and culture of species already present in Myanmar. The project will work closely with Universities and Research institutions both at National level and regional level to improve the production models and systems in Myanmar. Risk to aquaculture from disease may increase due to climate change and the national biosecurity framework for aquatic animal health will be strengthened through capacity development and appropriate investments to ensure these are minimized. The project will work with fish farmers, communities, local NGO, local universities and government agencies to develop and implement aquaculture-based monitoring and early warning systems to jointly monitor and communicate changes in the environment and farming systems. This component will work with NACA, the WorldFish Centre and local Universities. Relevant programmes and projects include the Japan-funded programme and the FAO Technical Cooperation Programme project.

Component 4: Knowledge management, monitoring and evaluation, training and scaling up adaptation practices, lessons learnt development and dissemination.

Outcome 4.1 Enhanced understanding and access to adaptation practices and technologies enable stakeholders to manage information and scale up adaptation in the fisheries and aquaculture sector.

Specific issues: The fisheries and aquaculture sector of Myanmar currently has no documented experience in understanding climate change vulnerabilities and adaptation options specific to its situation. In addition, no mechanisms exist for the various stakeholders to share their information of change and technologies, practices and knowledge to promote resilience within the sector across the country.

Adaptation alternative: Under this component the project will develop and record lessons learned, elaborate cutting-edge training modules to train Government staff and other stakeholders in climate change adaptation and develop "how-to" guidelines. It will enhance understanding and access to improved knowledge on adaptation practices in fisheries and aquaculture sector at various levels and encourage peer-to-peer learning among fishers and fish farmers. The component will develop capacity and information systems within existing fisheries and aquaculture sector support facilities and institutions to address the emerging impacts of climate change on the sector. A lasting integrated system directly relevant to the country M&E will be developed and implemented, including a knowledge sharing platform on aquatic animal disease and water quality monitoring. This project will support the established framework through furthering the communication and outreach activities through. Lessons learnt will be made widely available and shared through relevant technical and policy-level decision making debates and fora as well as newsletters, a website and other for a appropriate to the context.

A.1.4 Global environmental benefits (GEFTF, NPIF) and/or adaptation benefits (LDCF/SSCF):

Myanmar is one of the Least Developed Countries (LDC) and is vulnerable to climate change and variability. It currently has very low capacity to adapt at local and national levels. There is growing recognition that climate change poses a significant threat to the fisheries and aquaculture sector, in particular in the coastal areas as identified in the recently submitted NAPA and that, without financial and technical support, urgent adaptation actions will remain unaddressed.

A.1.5 Innovativeness, sustainability and potential for scaling up

Linking climate change adaptation to food security. The project is innovative in that it addresses Climate Change adaptation issues for fishing and fish farming communities in Myanmar. By taking a food security focus, integration of climate smart fisheries and aquaculture investments in the future will broaden food security opportunities in Myanmar. The project will incorporate uncertainty and variability explicitly into fisheries and aquaculture development and management, including the development of flexible spatial and temporal closures, and will develop participatory monitoring systems in the inland fisheries and aquaculture as an early warning mechanism. These activities will better prepare the sector to participate in national climate change and DRM discussions, including cross-sectoral water management in adaptation and GHG mitigation planning for sustainability and scaling up.

Engaging the private, non-profit sector in Myanmar. Myanmar has surprisingly robust and active federations and associations. The involvement of the MFF in this project and its local level affiliates, has the promise of being an innovative way to really engage civil society in Myanmar, when civil society organizations in many areas of Myanmar are still in their nascent stages. Private sector involvement in the project formulation and implementation will be a critical ingredient to reaching sustainability goals. The project will engage with private sector fisheries enterprises through the project.

Sustainability will be ensured through working with and building the capacity of stakeholders and institutions at local, provincial and national level. Project activities will be up-scaled through integration with the national development programmes run by NGO's, government and partner agencies. A focus on technical capacity support at this stage is a critical foundation for future up-scaling of the work.

A.2. Stakeholders. Identify key stakeholders (including civil society organizations, indigenous people, gender groups, and others as relevant) and describe how they will be engaged in project preparation.

Key stakeholders and their respective roles will be further reviewed and defined during full project preparation.

Key stakeholders	*Mandate and Relevant Roles in the Project*
Ministry of Livestock, Fisheries and Rural Development	DoF is responsible for fisheries management and development. It is organized with four divisions: Aquaculture, Fisheries Revenue and Supervision, Fish Inspection and

(MLFRD): Department of Fishery (DoF)	Quality Control Inspection and Administration and Finance.
Ministry of Environmental Conservation and Forestry	GEF operational focal point (OFP). The Department of Forests is also a key stakeholder for fisheries sector as it needs to collaborate and cooperate with fisheries sector in mangrove integrated aquaculture and mangrove conservation, which serves as spawning and feeding ground of aquatic organisms.
Ministry of Agriculture and Irrigation (MoAI)	There are some collaborative activities in terms of integrated paddy cum fish farming and solution of conflicts with inland fisheries and freshwater aquaculture. Land and water use problems are usually solved in collaboration with Water Utilization Department and Land Record Department, which are under MoA.
Department of Meteorology and Hydrology (DoMH), Ministry of Transport	The DoMH is the NAPA focal point for Myanmar and as such will be an important advisor to the project's adaptation work.
Myanmar Fisheries Federation (MFF)	Founded in 1989, MFF represents the interests of member enterprises and associations of the fishery industry of Myanmar. MFF works closely with MLF, and is one of the highest national level NGO/NPO in Myanmar and the only one concerned with fisheries. MFF has sub-federations at all township, districts, state/region levels. It also includes sub-associations specialized in: (1) freshwater aquaculture; (2) offshore capture fisheries; (3) inland fisheries; (4) fish and fishery product export; (5) fish feed; (6) shrimp culture; (7) eel culture and export; and (8) crab culture and export.
Local universities	National Universities such as the Marine Science University and Yangon University play important roles in the fisheries sector with particular reference to aquaculture, fish seed production and sea-farming through research and education.
Local and indigenous communities	Fishers and fish farmers will be involved in the project mainly through participation in climate change adaptation planning and co-management of the resource but also in other project activities. Their interest in the success of the project is that their income/livelihood will be made more resilient to the impacts of climate change through sustainable management of the resource. They will influence the outputs of the project through their level of commitment and change in behaviour (i.e. participation in planning and management and compliance with strategies and plans developed regulations).
WorldFish Centre	A member of the CGIAR Consortium, is an international, nonprofit research organization that aims to improve the livelihoods of the poor and vulnerable through generation of knowledge and capacity building.
Network of Aquaculture Centres in Asia-Pacific (NACA)	NACA is an intergovernmental organisation that promotes rural development through sustainable aquaculture in the region through capacity development, collaborative research and network building to share aquaculture related knowledge. Myanmar is one of its 18 member governments. FAO is a non-voting member of its Governing Council.
Southeast Asian Fisheries Development Center (SEAFDEC)	SEAFDEC is an autonomous inter-governmental body, which mandate is "to develop and manage the fisheries potential of the region by rational utilization of the resources for providing food security and safety to the people and alleviating poverty through transfer of new technologies, research and information dissemination activities". Myanmar is one of the 11 member countries.
Food Security Working group (FSWG)	An umbrella group of national and international NGOs, relevant to the proposed project. The FSWG will be an ideal group for CSO consultations during project preparation and may have a role in project implementation. Though their activities do not focus on fisheries, the issue of climate change adaptation, fisheries and food security will be important going forward.

A.3. Risk (table format acceptable)

The following risks have been identified. The risks table will be reviewed and updated during full project preparation.

Risk	*Level*	*Mitigation Measures*
1. Communal violence often occurs in the Rakhine State where there are 64,805 hectares of extensive and traditional marine shrimp farming. Law and order restoration in these areas is still major challenge to the government.	Medium	Establishment of pilot project demonstration sites to be considered in full consultation with government, local authorities and communities.
2. Extreme climatic events such as hazardous cyclones in the coastal areas, including the Rakhine State.	Medium	Mitigating climate risk is central to the project. The project will build the capacity of farmers, communities and government to

		better deal with the ongoing climate variability including extremes and future climate change through adaptation practices.
3. Higher surface water temperature due to climate variability may cause greater evaporation rate in aquaculture ponds, increasing mortality of fish culture, and low market price due to muddy smell. (Soft-shell mud crab farming in pond water surface areas will be particularly vulnerable.)	Medium	The project aims to build the capacity of farmers, communities and government to better deal with the ongoing climate variability including extremes and future climate change through adaptation practices.
4. Farmers' lack of willingness to adopt appropriate climate change adaptation approaches and maintenance of pond aquaculture water quality. There is a tendency for farmers to continue existing aquaculture practices.	Low	The project will provide capacity building opportunities (and create incentive mechanisms) to adopt appropriate adaptation approaches.

A.4. Coordination

The proposed project will support government of Myanmar coordination and policies. In addition it will coordinate closely with the following ongoing projects concerning the fisheries and aquaculture sector.

- UN-HABITAT, in close coordination with UNEP, is going to implement "Myanmar Climate Change Alliance Project (GCCA)", funded by EU, from September 2013 through 2016. To achieve synergy, the proposed FAO/GEF LDCF project will focus on fisheries sector specific adaptation policy and strategies and pilot activities including fisheries focused Early Warning System, which falls outside the scope of UN-HABITAT project.
- Winrock International has signed a MOU with the Ministry of Livestock and Fisheries to provide technical assistance under "Farmer to Farmer" program to support aquaculture development, including tilapia culture, in twelve locations through early 2014. This project is funded by USAID.
- This LDCF effort will benefit from coordination with the GEF-funded Bay of Bengal Large Marine Ecosystem Project (BOBLME) running through May 2014. Myanmar is one of the eight countries involved. BOBLME seeks greater resilience of coastal communities through the following components: (i) establishing Strategic Action Programme (SAP) including trans-boundary diagnostic analysis, institutional arrangements and sustainable financing strategy; (ii) community-based integrated Coastal and Marine Natural Resource Management and Sustainable Use (targeted species are shark, Hilsa [*Tenualosa ilisha*] and Indian mackerel); (iii) improving understanding and predictability of the BOBLME environment through addressing critical data gaps, including establishing MPAs; and (iv) maintaining ecosystem health and management of pollution. BOBLME's work with countries in the Bay of Bengal region has focused on the management of hilsa, a key fisheries species in Myanmar and neighbouring countries. BOBLME has also been working to develop better regional understanding of climate driven processes in oceanography through partnership with the Indian Ocean Global Ocean Observing System and the UNESCO project entitled "Monsoon Onset Monitoring and its Social and Ecosystem Impacts." It contributed to generation of information on biogeochemical processes, as well as ocean acidification, through the procurement and deployment of sensors for the data buoy in the Bay operated by the NOAA funded program "Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction" or RAMA. This work is accompanied by some capacity development and networking at national and regional level. BOBLME has been promoting ICM capacity development and supported the training of relevant staff in ICM training courses. A major capacity development activity has been the design of an Ecosystem Approach to Fisheries management training course which is due for upscaling amongst member countries and in the wider Asia-Pacific region. This course focuses on fisheries but also allows other environmental and human dimensions such as vulnerability and climate driven effects to be built into management plans.
- A scientific survey is now underway on the fish resources, marine biodiversity and oceanography in Myanmar waters by the Norwegian Research Vessel (RV) Dr Fridtjof Nansen, operating within the framework of the FAO EAF-Nansen Project "Strengthening the Knowledge Base for and Implementing an Ecosystem Approach to Marine Fisheries in Developing Countries" (GCP/INT/003/NOR) and the BOBLME. This is a significant addition to the range of national activities in Myanmar and regional activities involving Myanmar scientists and government officials in a wider Bay of Bengal context. FAO has been collaborating with Norad and the Institute of Marine Research of Bergen, Norway, to carry out fisheries resources and environment surveys in developing countries in Africa, Asia and Latin America using the vessel RV Dr Fridtjof Nansen since 1975. The on-going survey is the second such survey programme by the EAF Nansen Programme in Myanmar waters. The old research vessel Dr. Fridtjof Nansen had carried out similar surveys in the period 1979-1980, establishing important benchmark

information on the state of the Myanmar marine resources. The current survey will massively improve the understanding of the status of the marine resources, and provide the information essential for informed management and sustainability of Myanmar's marine resources for years to come.

- The project will seek close synergies with other prospective GEF-funded projects in Myanmar. In particular, in the mangrove area under the UNEP-implemented LDCF project "Adapting Community Forestry landscapes and associated community livelihoods to a changing climate, in particular an increase in the frequency and intensity of extreme weather events" (approved in November 2013). In addition, the project also seeks synergies with the UNDP-UNEP implemented global/regional LDCF project "Building capacity for LDCs from Asia and the Pacific to participate effectively in intergovernmental climate change processes" (submitted in October 2013).
- The national programmatic and international aid and investment landscape in Myanmar is evolving rapidly. Project preparation efforts will keep apace of this change, engaging development partners to ensure that the LDCF grant is additional to the most up to date baseline and that it coordinates with appropriate relevant measures.

B. DESCRIPTION OF THE CONSISTENCY OF THE PROJECT WITH:

B.1. National strategies and plans or reports and assessments under relevant conventions, if applicable, i.e., NAPs, NAPs, NBSAPs, national communications, TNAs, NCSAs, NIPs, PRSPs, NPFE, Biennial Update Reports, etc.:

B.1 National strategies

The LDCF project clearly supports the Government of Myanmar national development frameworks and national policies on Agriculture and Fisheries and Aquaculture. The National Commission for Environmental Affairs (NCEA) has directed the work for conservation and protection of the environment. Also Myanmar has signed and ratified biodiversity conservation on climate change. There is still no manifest source of national policy and strategies with regard to CCA on fisheries sector. However Myanmar DOF is actively participating in the regional workshops on CCA inaugurated by FAO-RAP.

Myanmar ratified the UNFCCC and submitted its NAPA in 2013. Specifically the project addresses NAPA priorities of Coastal Zone and Biodiversity which directly concern the fisheries and aquaculture sector. Of Coastal Zone sector, the proposed GEF project is consistent with all four priorities: (i) adaptation to climate change through Integrated Coastal Zone Management (ICZM), (ii) community-based mangrove reforestation for building climate-resilient ecosystems and rural livelihoods in degraded coastal areas in the Rakhine State, (iii) community based eco-friendly aquaculture systems (e.g. mudcrab, clam, shrimp and tilapia) for enhancing the climate change resilience of rural livelihoods and supporting the recovery of mangrove forest ecosystems and (iv) small-scale aquaculture and mangrove buffers demonstration sites for transferring adaptation technologies to Mon and Tanintharyi coastal communities.

With respect to the commitments of the government of Myanmar to the CBD, the proposed GEF project is in line with the four priority areas which include (i) Buffering marine habitats and sustaining fish populations under climate change conditions through community-based MPA management and ecosystem sensitive fishery practices at the Sister Group Islands of the Myeik Archipelago, (ii) mainstreaming ecosystem-based climate change adaptation for buffering rural communities against climate change impacts into policy, planning and relevant projects in Ayeyarwady, Sagaing and Mandalay (iii) buffering marine habitats and sustaining fish populations under climate change conditions through community-based management and ecosystem sensitive fishery practices at Wetthay Chaing (bay) coastal area, and (iv) buffering marine habitats and sustaining fish populations under climate change conditions through community-based management and ecosystem sensitive fishery practices at the Thameehla Island, Ayeyarwady Region. The United Nations Development Assistance Framework (UNDAF) in Myanmar clearly sets out climate change as a key delivery area, and specific activities are mainstreamed through the framework. The FAO Country Programme framework support the UNDAF in food security and agriculture (including fisheries and forestry).

B.2. GEF focal area and/or fund(s) strategies, eligibility criteria and priorities:

Myanmar is a LDC party to the UNFCCC and has just submitted its National Adaptation Program of Action to Climate Change (NAPA) in May 2013. Myanmar is eligible for LDCF funding, and the project is consistent

with the NAPA priorities related to coastal zone and biodiversity sectors. The project will contribute to the achievement of the three adaptation objectives CCA-1 "Reducing vulnerability", CCA-2 "Increasing adaptive capacity", and CCA-3 "Adaptation technology transfer". The contribution will be primarily through the promotion of climate resilient fisheries and aquaculture technologies/practices and strengthening regulatory and policy frameworks at national, regional and community levels.

B.3. The GEF Agency's comparative advantage for implementing this project:

FAO has long and deep experience in working in the fisheries and aquaculture sector development in the Asia Pacific Region and its strong leadership and scientific capacity in the thematic area are exemplified in Expert Workshop on Climate Change Implications for Fisheries and Aquaculture held in 2008. In recent years FAO's Fisheries Department and the Regional Office for Asia and the Pacific have been instrumental in providing guidance for member countries in the areas of climate change adaptation and mitigation in the fisheries and aquaculture sector. FAO/Asia-Pacific Fishery Commission (APFIC) regional workshop: Implications of Climate Change on Fisheries and Aquaculture: Challenges for Adaptation and Mitigation in the Asia Pacific Region held in 2011 and a review work: the Fisheries and Aquaculture Sector in National Adaptation Programmes of Action: Importance, Vulnerabilities and Priorities published in 2011 exemplify FAO's focus and commitment in assisting the countries achieving NAPA priorities in the fisheries and aquaculture sector in the region.

FAO has a long history of partnership with the Government of Myanmar in its quest to eradicate hunger, malnutrition and poverty through the development of the agriculture sector including the fisheries and aquaculture sector. FAO's Regional Office for Asia and the Pacific, together with ACIAR and Network of Aquaculture Centres in Asia-Pacific (NACA), fielded an aquaculture and inland fisheries mission to Myanmar in 2002. FAO has supported the Government of Myanmar with immediate rehabilitation of farming, coastal fisheries and aquaculture livelihoods in the cyclone Nargis-affected areas of Bogale, Labutta and Pyapon townships from 2009 to 2013, which activities are integrated with Italy-funded Sustainable Small-Scale Fisheries and Aquaculture Livelihoods in Coastal Mangrove Ecosystems project. FAO also took lead in developing and is implementing GEF-funded Bay of Bengal Large Marine Ecosystem Project (BOBLME) from 2009 through 2014, covering trans-boundary marine/coastal areas of eight countries including Myanmar.

PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S): (Please attach the Operational Focal Points endorsement letter(s) with this template. For SGP, use this OFP endorsement letter).

NAME	POSITION	MINISTRY	DATE
Hla Maung Thein	Deputy Director General, Environmental Conservation Department	Ministry of Environmental Conservation and Forestry	JANUARY 8, 2014

B. GEF AGENCY(IES) CERTIFICATION

This request has been prepared in accordance with GEF/LDCF/SCCF/NPIF policies and procedures and meets the GEF/LDCF/SCCF/NPIF criteria for project identification and preparation.

Agency Coordinator, Agency name	Signature	Date	Project Contact Person	Telephone	Email Address
Gustavo Merino Director, Investment Centre Division Technical Cooperation Department FAO Viale delle Terme di Caracalla (00153) Rome, Italy TCI-Director@fao.org		April 15, 2014	David Brown Fisheries officer FIRF FAO Rome And/or Cassandra De Young Fisheries analyst FIRF FAO Rome	+3906570 55041 +3906570 54335	David.Brown@fao.org Cassandra.DeYoung@fao.org
Jeffrey Griffin Environment Officer and Officer-in-Charge, Day-to-day Matters, GEF Unit, FAO Rome GEF-Coordination-Unit@fao.org Tel: +3906 5705 5680					