MID-TERM PERFORMANCE EVALUATION

USAID/SRI LANKA

INTEGRATED AQUACULTURE PROJECT (IAP)

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INTEGRATED AQUACULTURE PROJECT (IAP)

Cooperative Agreement No.383-A-00-10-00502-00

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EXECUTIVE SUMMARY

Background

Within its Public Private Alliance (PPA) program, USAID/Sri Lanka (USAID/SL) has collaborated with Aqua N Green (Pvt) Ltd, (ANG), a Sri Lankan firm, to establish the Integrated Aquaculture Project (IAP). IAP aims to boost incomes in the Northern and Eastern provinces, where long coastlines and brackish lagoons make aquaculture a promising opportunity. Like other PPAs, IAP aims toward achievement of USAID/SL Development Objective Two (DO 2: Increased and more equitable economic growth in conflict-affected areas) through Intermediate Results 2.1 (Increased private sector investment in conflict-affected areas) and 2.2 (increased enterprise development in conflict affected areas).

The three-year IAP initiative--with an anticipated one year, no cost extension--aims to help 1,300 households establish out-grower aquaculture enterprise, hiking beneficiary incomes as much as 300 percent. It concentrates on raising so-called 'seabass' (*Lates calcarifer*, also known as 'barramundi') in cages suspended from floating platforms in brackish lagoons.

As envisioned, IAP integrates multiple components in order to breed, raise, harvest and process seabass, mainly for export. Spawning takes place at ANG's hatchery in western Sri Lanka, where the resulting 'fingerlings' grow for several weeks, enough to withstand transfer. They then arrive by truck at IAP's Eastern Province nursery near Trincomalee, where they grow out for a few more weeks before sale to 'out-growers': local residents who then raise them for several months further in floating cages anchored within lagoons.

Additional IAP facilities near Trincomalee, as envisioned, include an office, a model cage farm ('model farm') for training and research, a mill and storage facility ('feed mill') for scientifically-formulated fish feed and a post-harvest processing and cold storage plant ('processing plant').

Out-growers feed their maturing broods on 'trash fish' left over from local catch. They execute other crucial tasks as well, such as cage-cleaning, disease prophylaxis, water quality monitoring, theft prevention and periodic sorting of different-size fish into separate cages to prevent cannibalization of the small by the large. At harvest, out-growers sell the mature fish back to ANG at a guaranteed price ('buy-back price'). ANG then either sells the fish for processing and export or, as envisioned, will process the fish in its own plant and export on its own account.

USAID grant funding pays for materials and construction of two cages per out-grower up to a ceiling of 500 out-growers. It also helps pay costs of out-grower technical training and for construction of the processing plant. USAID provides roughly $1.0 million towards the alliance while ANG has committed some $3.2 million. Out-growers secure micro-credit loans from the Bank of Ceylon (BOC) to cover costs of buying fingerlings from ANG and feed for their maturing broods.

Training for out-growers covers matters such as site selection; cage construction and maintenance; identifying and handling healthy fingerlings; harvest and post-harvest operations; stocking densities; and disease control. Training takes place at the IAP office and, as envisioned, at the model farm. Technical officers employed by ANG monitor and advise on out-grower operations as well those in the nursery and other facilities, including the envisioned model farm.

Upon completion, IAP will purportedly yield 2,000 metric tons (MT) of fish annually. Beyond its out-grower network, IAP aims to create an estimated 225 new jobs in its processing plant, feed mill, office, nursery and model farm. The processing plant has been planned for 4,000 MT in annual capacity, enough to handle total IAP output plus equivalent additional business. All operations will be certified under Global G.A.P. ('Good Agricultural Practices') standards.

As outlined in the Cooperative Agreement, IAP's target is 1,300 out-growers and 225 job-holders at the various facilities, including members of all major ethnic groups, with gender fairness. IAP also aims to boost out-grower participant incomes by up to 300 percent.

Evaluation Purpose and Audience

This is an external high-quality mid-term performance evaluation of IAP. Its purposes are to:

- Determine how well or poorly project components are working and why;
- Identify needed modifications.

Priorities identified in the evaluation Statement of Work (SOW) include investigating whether IAP's nucleus farm, out-grower and processing components are operating effectively and are meeting plans and targets. Primary audiences are USAID and ANG, with an eye toward sustainability of the former's investment and the latter's seabass aquaculture operations.

Methodology

Investigation utilized mixed methods, relying primarily on detailed questionnaires and in-depth interviews with out-growers, IAP management, BOC officials, government officials, the Central Bank of Sri Lanka, nongovernmental organization staff and private sector representatives. Findings are organized under headings of target monitoring; two analytic frameworks--a value-chain analysis and a comparison of IAP technical assumptions with actual IAP experience and successful reported international practice; and further findings.

Data Limitations

Due to implementation delays and the timing of our mid-term investigation, few (only 13) out-growers had completed a full harvest cycle. In view of IAP plans to deploy possibly hundreds of out-growers in the near future, we cannot draw meaningful quantitative conclusions on out-grower performance and experience. Moreover, because out-grower records are scant, data collection depended on recall, which for most quantifiable responses cannot be regarded as highly reliable.

Primary Conclusions

1) IAP has strong potential for positive impact on livelihoods, but confronts vulnerabilities that could limit that impact.

2) If 'crop' insurance can be secured, micro-credit remains available, feed costs stabilize, ANG attains adequate working capital and profitable export outlets can be sustained, IAP can provide several hundred full or supplemental livelihoods for well-trained, well-monitored out-growers or employee operators.

3) To date, technical training has given out-growers inadequate knowledge and experience for optimal aquaculture operations.

4) The current low buy-back price creates risk of credit breaches.

5) In hindsight, building the processing plant was a suboptimal resource use and building a feed mill would also be a suboptimal resource use.

6) Micro-credit arrangements have achieved mixed success and remain vulnerable in the absence of 'crop' insurance and alignment of buy-back and market prices.

7) IAP has not to date ensured adequate out-grower record-keeping.

Primary Recommendations

USAID/SL should encourage IAP management to do the following.

1) Restructure aquaculture operations toward maximum productivity and efficiency; toward full-time aquaculture operators over part-time; toward employee operators over out-growers without technical mastery; toward operator retention and development over expanded numbers

2) Develop improved out-grower monitoring, mentoring, follow-up and record-keeping on technical and credit matters

3) Explore raising pay to improve technical officer recruitment and retention

4) Raise buy-back price to align with market price

5) Re-evaluate advisability of planned processing plant and feed mill operations

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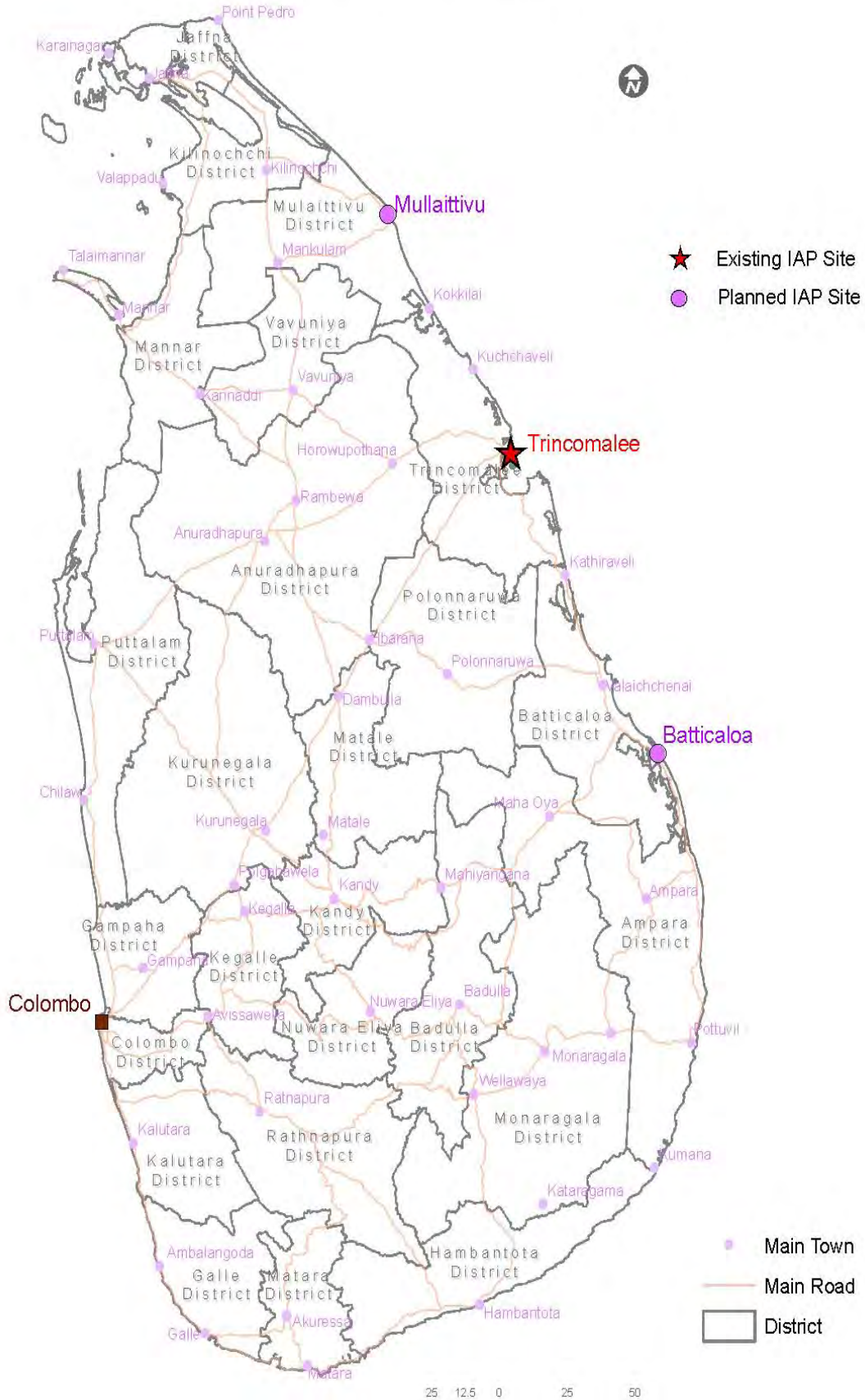
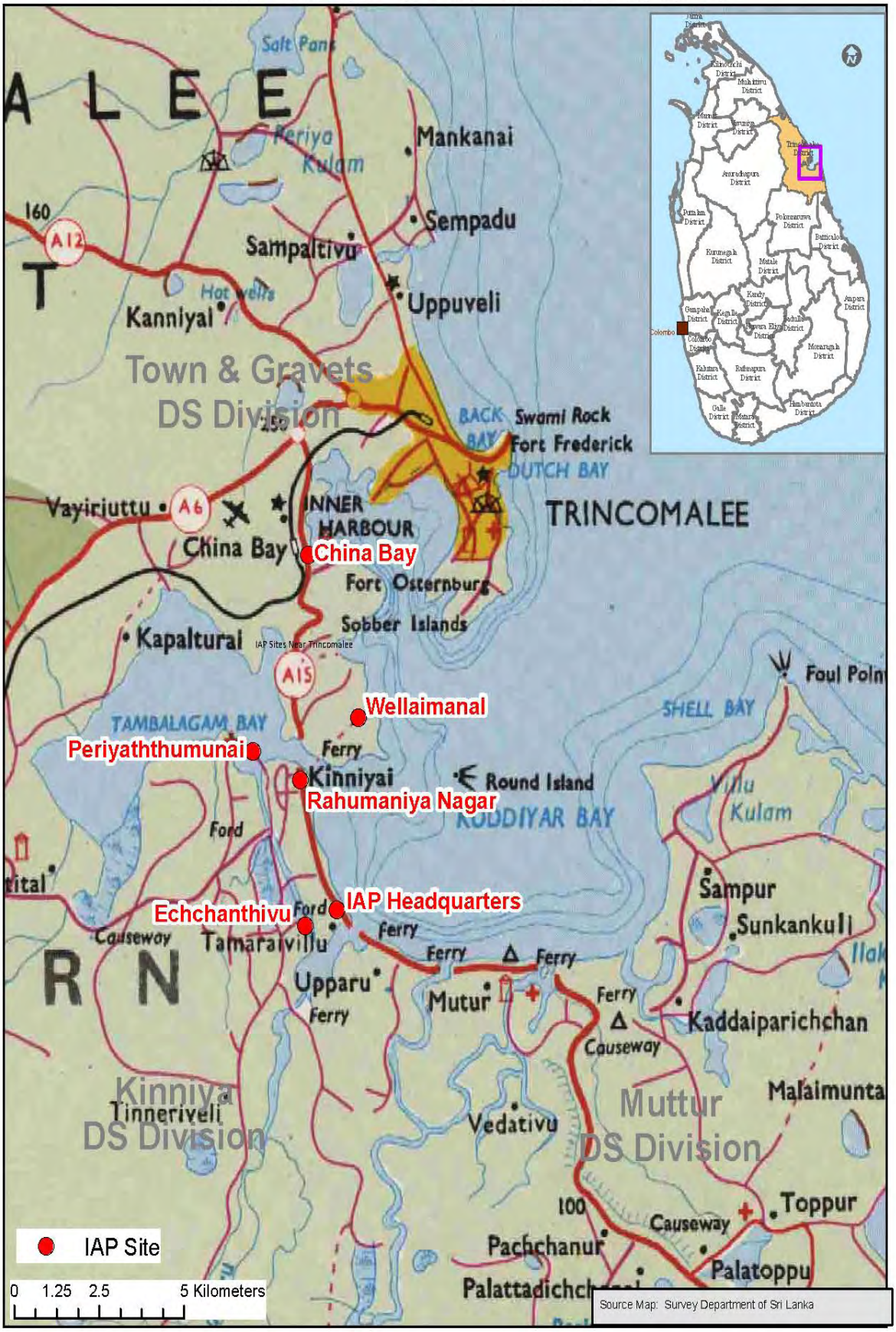
IAP Site Locations



IAP Sites Near Trincomalee



ACRONYMS/ABBREVIATIONS/DESIGNATIONS

ABC	Proposed NADeP Investment Company
ACIAR	Australian Council for International Agricultural Research
ADB	Asian Development Bank
ANG	Aqua N' Green (Pvt) Ltd
ARDQIP	Aquatic Resources Development and Quality Improvement Project
ADD	Agrarian Development Department
BOI	Board of Investment
BOC	Bank of Ceylon
CFC	Ceylon Fisheries Corporation
CIDA	Canadian International Development Agency
CrIB	Credit Information Bureau
DANIDA	Denmark Development Cooperation Agency
EEZ	Exclusive Economic Zone
EU	European Union
FAO	Food and Agricultural Organization of the United Nations
FCR	Food Conversion Ratio
FCS	Fisheries Cooperative Society
GDA	Global Development Alliance
Global G.A.P.	Global Good Agricultural Practices
GSP	General System of Preferences
GTZ	Germany Agency for Technical Cooperation
IAP	Integrated Aquaculture Project
IDRC	International Development Research Centre
IFAD	International Fund for Agricultural Development

ILO	International Labor Organization
ITI	Industrial Technology Institute
JICA	Japan International Cooperation Agency
KEQ	Key Evaluation Question
KOICA	Korean International Cooperation Agency
LKR	Sri Lankan Rupee
MASL	Mahaweli Authority of Sri Lanka
MFARD	Ministry of Fisheries and Aquatic Resources Development
MT	Metric ton
NADeP	National Agribusiness Development Programme
NARA	National Aquatic Resources Research and Development Agency
NAQDA	National Aquaculture Development Authority
NDB	National Development Bank
NDTF	National Development Trust Fund
NGO	Nongovernmental organization
NIFNE	National Institute of Fisheries and Nautical Engineering
NORAD	Norwegian Agency for International Development
ODA	British Overseas Development Administration
PPA	Public Private Alliance
SIDA	Swedish International Development Agency
SOW	Statement of Work
UNDP	United Nations Development Project
USAID/SL	United States Agency for International Development Sri Lanka mission
ZOA	Netherlands international relief and recovery agency

INTRODUCTION

This report represents a mid-term performance evaluation of the Integrated Aquaculture Project (IAP), an initiative of USAID's Sri Lanka mission (USAID/SL). IAP seeks to enhance livelihoods and foster economic growth in Sri Lanka's conflict-affected Eastern and Northern Provinces through lagoon aquaculture, with local 'out-growers' raising 'seabass' in floating cages for sale to a private Sri Lankan firm, Aqua N' Green (Pvt) Ltd (ANG), USAID's partner in the initiative.

COUNTRY CONTEXT

Since the prolonged Sri Lankan civil conflict ended in 2009, USAID/SL has focused its development objectives in severely affected northern and eastern regions.

With a population of 20.9 million, Sri Lanka has 72.2% rural residents, 21.5% urban, and 6.3% estate. Ethnically, the majority (74%) of the population are Sinhalese, 12.7% Sri Lankan Tamils, 7.1% Muslims, 5.5% Indian Tamils, and 0.8% other. In 2011, unemployment was officially reported at 4.2%, with female unemployment (6.8%), more than twice male unemployment (2.7%). [1] Unemployment in northern and eastern former conflict zones is likely higher than reported national rates. Sri Lanka faces key challenges in reconciling its diverse ethnic groups, in promoting equitable prosperity and in ensuring peaceful, democratic social conditions in former conflict zones. While the country has made rapid economic progress since the end of the conflict, it confronts multiple challenges including an unsustainable trade deficit and rapidly rising living costs.

The United States Government Country Development Cooperation Strategy (CDCS) for Sri Lanka, FY 2011-2013, focuses on two Development Objectives (DOs). These are: (1) 'Strengthened Partnership between the State and its Citizens to Establish a Foundation for Reconciliation'; and (2) 'Increased and More Equitable Economic Growth in Former Conflict-Affected Areas.' Under DO 2, USAID sponsors Public Private Alliances (PPAs) to increase investments in conflict-affected areas and supports advocacy for regulatory reforms toward an improved business climate. Activities support enhanced workforce skills and enterprise productivity toward regional economic development and improved livelihoods for vulnerable populations.

Addressing regional imbalances in economic development, USAID has supported projects in the Northern and Eastern Provinces under DO 2. These projects pursue two intermediate results

[1] Economic and Social Statistics of Sri Lanka 2012, Central Bank of Sri Lanka, April 2012.

(IRs): IR 2.1, 'Increased private sector investment in conflict affected areas'; and IR 2.2 'Increased enterprise development in conflict affected areas.'

GLOBAL DEVELOPMENT ALLIANCE (GDA)

Through its Global Development Alliance (GDA), USAID has developed a worldwide public-private alliance (PPA) strategy that leverages private sector resources for development goals. GDA criteria for PPAs are as follows:

- At least 1:1 leverage of USAID resources
- Collaboratively-defined goals and development solutions
- Non-traditional partners (businesses, foundations, and others)
- Shared resources, risks and results
- Innovative, sustainable approaches

USAID/SRI LANKA (USAID/SL) PPA INITIATIVE

In consonance with GDA, USAID/SL's PPA initiative (2010-2014) has sought to expand economic activity in the conflict-affected Northern and Eastern Provinces. It has leveraged private sector funds to promote economic growth in those regions, thereby consolidating post-conflict stabilization.

Private firms--selected for organizational capacity and sound project conceptualization--provide capital, market access, sustainability and expertise, while USAID supplies funding, technical assistance and guidance on policy influence. The initiative has worked mainly with domestic firms, seeking partners committed to human rights, ethnic parity, gender sensitivity, integration of people with disabilities and other vulnerabilities, decent work conditions, environmental protection and community involvement in operations.

INTEGRATED AQUACULTURE PROJECT (IAP)

Within its ongoing Public Private Alliance (PPA) program, USAID/SL has collaborated with Aqua N' Green (Pvt) Ltd (ANG), a Sri Lankan firm, in establishing the Integrated Aquaculture Project (IAP). In March 2010, USAID/SL entered into a cooperative agreement with ANG to design and implement IAP in the Northern and Eastern Provinces. IAP aims to boost incomes in the Northern and Eastern provinces, where long coastlines and brackish lagoons make aquaculture a promising opportunity. Like other PPAs, IAP aims toward achievement of USAID/SL Development Objective Two (DO 2: Increased and more equitable economic growth

in conflict-affected areas) through Intermediate Results 2.1 (Increased private sector investment in conflict-affected areas) and 2.2 (Increased enterprise development in conflict-affected areas).

The three-year IAP initiative--with an anticipated one year, no cost extension--aims to help 1,300 households establish out-grower aquaculture enterprise, hiking beneficiary incomes as much as 300 percent. It concentrates on raising so-called 'seabass' (*Lates calcarifer*, also known as 'barramundi') in cages suspended from floating platforms in brackish lagoons. Though launched on schedule and operating at all times since launch, IAP has confronted delays from: 1) heavy flooding near its Eastern Province headquarters during 2010-11; and 2) problems with diets and spawning maturity estimates at its fish hatchery in western Sri Lanka.

IAP aims to integrate multiple components in order to breed, raise, harvest and process seabass, mainly for export. Spawning takes place at ANG's hatchery in western Sri Lanka, where the resulting 'hatchlings' grow for several weeks, enough to withstand transfer. As 'fingerlings,' they then arrive by truck at IAP's Eastern Province nursery near Trincomalee. They grow out there for a few more weeks before sale to 'out-growers': local residents who then raise them for several months further in floating cages anchored within lagoons.

Out-growers feed their maturing broods on 'trash fish' left over from local catch. They execute other crucial tasks as well, such as cage-cleaning, disease prophylaxis, water quality monitoring, theft prevention and periodic size-grading (sorting of different-size fish into separate cages to prevent cannibalization of the small by the large). At harvest, out-growers sell the mature fish back to ANG at a guaranteed 'buy-back' price. ANG then either sells the fish for processing and export or, as envisioned, processes the fish in its own plant and exports on its own account.

Out-growers secure micro-credit loans from the Bank of Ceylon (BOC) to cover costs of buying fingerlings from ANG and feed for their maturing broods. As envisioned, micro-lending could also support outlays to buy additional cages beyond the two that USAID provides each participant. BOC micro-loans, purportedly at concessionary rates, get repaid from proceeds when ANG buys harvested fish back from out-growers.

Additional IAP facilities near Trincomalee, as envisioned, include an office, a model cage farm ('model farm') for training and research, a mill and storage facility ('feed mill') for scientifically-formulated fish feed and a post-harvest processing and cold storage plant ('processing plant'). The feed mill, model farm and processing plant are not yet operational, but the office and nursery have begun operations.

Training for out-growers covers matters such as site selection; cage construction and maintenance; identifying and handling healthy fingerlings; harvest and post-harvest operations; stocking densities; and disease control. Training takes place at the IAP office and, as envisioned, at the model farm. Technical officers employed by ANG monitor and advise on out-grower operations as well those in the nursery and other facilities, including the envisioned model farm.

Upon completion, IAP will purportedly yield an envisioned 2,000 MT of fish annually and supervise 4800 floating fish-farm cage units. All operations will be certified under Global G.A.P. standards.

Beyond its out-grower network, IAP envisions creating an estimated 225 new jobs in its processing plant, feed mill, office, nursery and model farm. The processing plant has been planned for 4,000 metric tons in annual capacity, enough to handle total IAP output plus equivalent additional business.

IAP envisions enhancing women's livelihoods through engaging women as out-growers, through special micro-credit interest rates and through targeted hiring and training for technical officer jobs. Technical officer recruitment will also emphasize ethnic diversity.

Direct beneficiaries would purportedly be 1,300 out-growers in the Northern and Eastern Provinces and 225 job-holders at the various facilities. They will purportedly include members of all major ethnic groups, with gender fairness. IAP also aims to boost participant out-grower incomes by as much as 300 percent.

With start-up sites in Trincomalee district, IAP's out-grower network as envisioned will eventually reach Batticaloa and Mullaitivu districts as well. Plans for a Jaffna extension have been scrapped due to lagoon shallowness and suboptimal salinity there. To balance this, IAP now envisions proposes increasing out-grower numbers in Trincomalee, Batticaloa and Mullaittivu, beyond originally-planned levels.

USAID grant funding pays for materials and construction of two cages per out-grower, up to 500 out-growers. It also helps pay costs of out-grower technical training and supports construction of the processing plant. USAID provides roughly $1.0 million towards the alliance while ANG has committed some $3.2 million.

EVALUATION PURPOSE AND AUDIENCE

This is an external high-quality mid-term performance evaluation of IAP. Its purposes are to:

- Determine how well or poorly project components are working and why;
- Identify needed modifications.

Priorities identified in the evaluation Statement of Work (SOW) include investigating whether IAP's nucleus farm, out-grower, and processing components are operating effectively and are meeting plans and targets. Primary audiences are USAID and ANG, with an eye toward sustainability of the former's investment and the latter's seabass aquaculture operations.

TARGETS

The evaluation has sought to secure information, statistics, and assessments on performance. Based on the Cooperative Agreement, the evaluation has attempted to compile data on the following.

1) Number of full-time equivalent employees

2) Number of fish farming participants

3) Percentage increase of farming participants' incomes

4) Portion of operations or yield certified by Global G.A.P.

5) Number of fish cages constructed

6) Number of fish cages in the model farm

7) Number of fish cages placed

8) Number of fish cage harvests

9) Fish-farming yields, disaggregated by species

10) Number of training programs conducted

11) Number of trainees, disaggregated by ethnicity, gender, age, income

12) Proportion of trainees meaningfully engaged in fish farming, disaggregated as above

13) Participant earnings in ratio to financial costs and hours worked

KEY EVALUATION QUESTIONS

The evaluation addresses the following Key Evaluation Questions (KEQs), organized under themes of Performance, Problems and Parity.

<u>Performance</u>

1) To what extent have fish-farm participant incomes increased?

2) How sustainable is IAP's out-grower fish farming program from the standpoints of beneficiaries and ANG and what are the bases for this assessment?

3) How many sustainable jobs has IAP generated to date and how many more can be expected?

4) To what extent have micro-credit arrangements succeeded from the standpoints of fish farmers, ANG and the lending institution(s)?

Problems

5) What main obstacles has IAP faced, what solutions have been attempted and how successful have they been?

6) What modifications should IAP adopt or consider?

Parity

7) To what extent has IAP participation met ethnic equitability goals?

8) To what extent has IAP integrated gender considerations and fostered women's participation?

This report responds to these KEQs through Findings, Conclusions and Recommendations and also through a stand-alone section addressing the KEQs directly and sequentially. It may be noted that KEQ No. 5 overlaps with other KEQs and that KEQ No. 6 essentially calls for 'Recommendations.'

METHODOLOGY

The evaluation team utilized various respondents, methods and instruments for information-gathering, with substantial reliance on detailed questionnaires and structured in-depth interviews. We organized fact-finding under four frameworks: 1) IAP target-monitoring; 2) analysis of the IAP value chain (Analytic Framework I); 3) comparison of IAP planning assumptions with actual IAP experience and successful international practice (Analytic Framework II); and 4) further findings. Though the team encountered quantitative data limitations, it gathered ample information on critical qualitative issues.

Respondents, Methods and Instruments Overview

Respondents

The evaluation team interviewed out-growers (18), ANG management and staff personnel at central and regional levels (3), BOC management and staff personnel at central and regional levels (5), other donors (3), government agencies (7), the Central Bank of Ceylon, exporters (2), and a producer.

Methods

The evaluation team utilized structured in-depth interviews with out-growers and other key respondents; unstructured focus group discussions with some out-growers; detailed

questionnaires with ANG and BOC management; open-ended questioning with parties unconnected to IAP, as listed in Annexes 3.3 and 3.5; review of background materials (e.g., IAP business plans, documentation and quarterly reports; seabass aquaculture literature as listed in Annexes 4.1.1-7); and ad hoc means (e.g., email).

Instruments

IAP management

The evaluation team used multiple detailed questionnaires as listed in Annexes 3.2 and 5.2-5 and reviewed IAP documents as listed in Annexes 2.1-35.

BOC

The evaluation team used guided interviews, as listed in Annexes 3.4.1-2. (We also submitted a detailed questionnaire, to which we received no response.)

Out-growers

The evaluation team used a standard in-depth interview questionnaire for all eighteen respondents, as exhibited in Annexes 3.11. Eleven were interviewed alone, seven in two separate unstructured focus group discussions (one female and one male).

Other respondents

The evaluation team used open-ended questioning around the seabass industry and market, the status of aquaculture in Sri Lanka, IAP/ANG performance, and so on.

Fact-Finding Frameworks

The evaluation's fact finding frameworks are as follows.

Target Monitoring

Using IAP monitoring and other data, the evaluation team attempted to measure progress in relation to targets articulated in the Cooperative Agreement, plus one additional item: participant earnings in ratio to financial costs and hours worked. The team secured inadequate information on some items.

Analytic Framework I: Value chain analysis

Using a modified standard value chain model, the evaluation team studied IAP's performance, using data from external sources for context.

The evaluation team uses 'value chain' analysis as a descriptive and evaluative framework. A 'value chain' is a sequence of contributions in delivering a valuable good or service. Goods, for example, may pass through a sequence from research and design through inputs of materials, labor, management, land, physical capital and finance to transformative productive operations. Outputs are then inspected, packaged, transported, distributed, marketed and sold. Each 'step' of the sequence can be conceptualized as adding 'value.' Value chain descriptions, assessments and auditing have become standard devices in business quality certification.

For purposes here, the evaluation conceptualizes a simplified IAP out-grower production-cycle value chain with major headings of 'Inputs,' 'Production' and 'Post-Production,' and with pertinent divisions and sub-divisions. The evaluation reports Findings only as pertinent to Conclusions and Recommendations.

Analytic Framework II: Assumptions analysis

IAP targets a 300 percent increase in out-grower incomes by the end of the project (March 2014, as extended). It also targets engagement of 1,300 out-growers and creation of 225 jobs. These targets arise from technical assumptions detailed in IAP's micro-credit proposal (Annex 2.12) and in the cooperative agreement with USAID. (Annex 1.1) These assumptions stem in turn from IAP pilot studies, from aquaculture research literature, and from expert consultations. The evaluation compares these assumptions with actual IAP experience to date and with international practice embodied in FAO recommendations and exemplified by seabass cultivation in Thailand and elsewhere, documented by FAO and other sources.

The evaluation reports Findings only as pertinent to our Conclusions and Recommendations.

Further Findings

Further relevant findings emerged from sources other than target monitoring and analytic frameworks.

Data Limitations

Due to implementation delays and the timing of our mid-term investigation, carried out primarily in early October, 2012, few (only 13) out-growers had completed a full harvest cycle (Annex 2.8). In view of IAP plans to deploy possibly hundreds of out-growers in the near future, the evaluation team cannot draw meaningful quantitative conclusions on out-grower performance

and experience. Moreover, because out-grower records are scant, data collection depended on recall, which for most quantifiable responses cannot be regarded as highly reliable.

The evaluation team believes that serious qualitative issues--revealed by in-depth interviews with all 13 full-harvest out-growers, with several out-growers who have not completed harvests and with other sources--can usefully be addressed.

BOC interviews with various officials at central and local level (Annexes 3.4.1-2) resulted in somewhat inconsistent, unreliable and incomplete information (e.g., interest rate charged, number of loans approved and disbursed). The evaluation team's effort to rectify this gap with a detailed written questionnaire (Annex 5.6) received no response.

Because indings derive from a unique program under particular circumstances, the evaluation team does not view them as strongly generalizable.

FURTHER EVALUATION DETAILS

Evaluation Period

The evaluation took place between September 22 and December 15, 2012.

Evaluation Team

Timing and contracting complexities made enlistment of Sri Lankan parties for evaluation design and implementation impracticable. Research and analysis members of the team included team leader, Mr. Robin Rackowe, a fisheries sector expert (Annex 3.6.2), Ms. Mia Hyun, a development economist (Annex 3.6.3) and Mr. Mark Hager, a USAID/SL project officer (Annex 3.6.4). Mr. Mohammed Farhad, agribusiness advisor with Volunteers for Economic Growth Alliance, served as coordinator

Conflict of Interest Statement

None of the research and voting team members is aware of any interest conflict. (Annexes 3.6.5-7)

FINDINGS (as of October 2012)

Parenthetical citations refer to evidentiary support, filed as separate annexes.

Target Monitoring

1) Number of full-time equivalent employees:	**33** (Annex 2.11)
2) Number of out-grower participants:	**84** (Annex 2.7)
3) Percentage increase of farming participants' incomes:	**cannot calculate accurately based on available data** (Annexes 3.1.1 to 3.1.13)
4) Portion of operations or yield certified by Global G.A.P.:	**none as yet** (Annexes 3.2)
5) Number of fish cages constructed:	**nursery 110, out-growers 168, total 278** (Annex 2.11)
6) Number of fish cages in the model farm:	**no model farm as yet** (Annexes 3.2)
7) Number of fish cages placed:	**nursery 110, out-growers 168, total 278** (Annex 2.11)
8) Number of fish cage harvests:	**17** (Annex 2.8)
9) Fish-farming yields, disaggregated by species:	**2314.5 kg, all sea bass** (Annex 2.8)
10) Number of training programs conducted:	**46** (Annex 2.35)
11) Number of trainees, disaggregated by ethnicity, gender, age, income:	**total 149, see tables below on 1st and 2nd stage out-growers for disaggregation** (Annex 2.7)
12) Proportion of trainees meaningfully engaged in fish farming, disaggregated as above:	**total 84, see table below on 1st stage for disaggregation** (Annex 2.7)

13) Participant earnings in ratio to financial costs and hours worked: **cannot calculate accurately based on available data** (Annexes 3.1)

Analytic Framework I: Value Chain Analysis

Inputs

Out-growers

Background and Enrollment

The demographic profile of the out-growers interviewed is as follows. (Annexes 3.1 and evaluation team calculations)

A total of eighteen out-growers were interviewed, twelve men and six women. The age range was 22 to 60 with an average of 39 years. Seven were Singhalese, two Tamil, nine Muslim. The number of dependents ranged from zero to nine with an average of 3.6. Highest education level reached was primary school for three, grades 8-9 for two, O levels for eight, A levels for four, university attendance for one.

The demographic profile for the entire list of out-growers is as follows (Annex 2.7, evaluation team calculations).

So far ('1st stage'), out of a total of 84 out-growers, 63% are Muslim, 7% are Tamil, and 30% are Singhalese, 86% are men and 14% are women. There are only a few Tamils, as the Tamil villages are somewhat more remote from IAP sites, but there will be more Tamils as future groups of out-growers get started on production. Within a second group of 64 out-growers, ('2nd stage'), 23% are Muslim, 73% are Tamil and 3% are Singhalese, 88% are men and 12% are women. This means that by the time the '2nd stage' is implemented, 46% will be Muslim, 36% Tamil, and 18% Singhalese, and the gender ratio will be about 87% men and 13% women. (Evaluation team calculations)

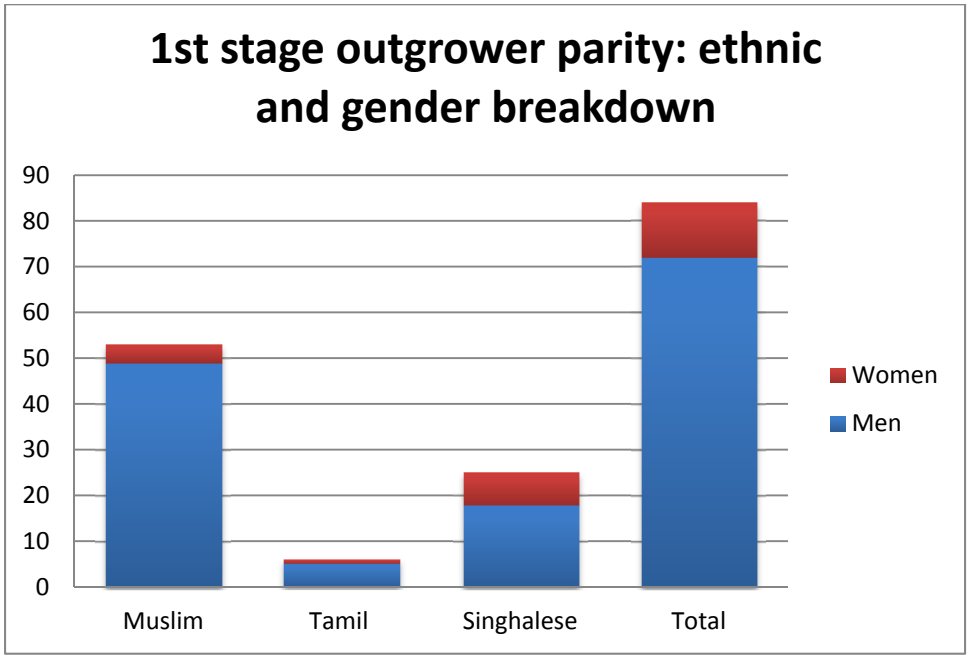
Existing (1st Stage) Out-growers

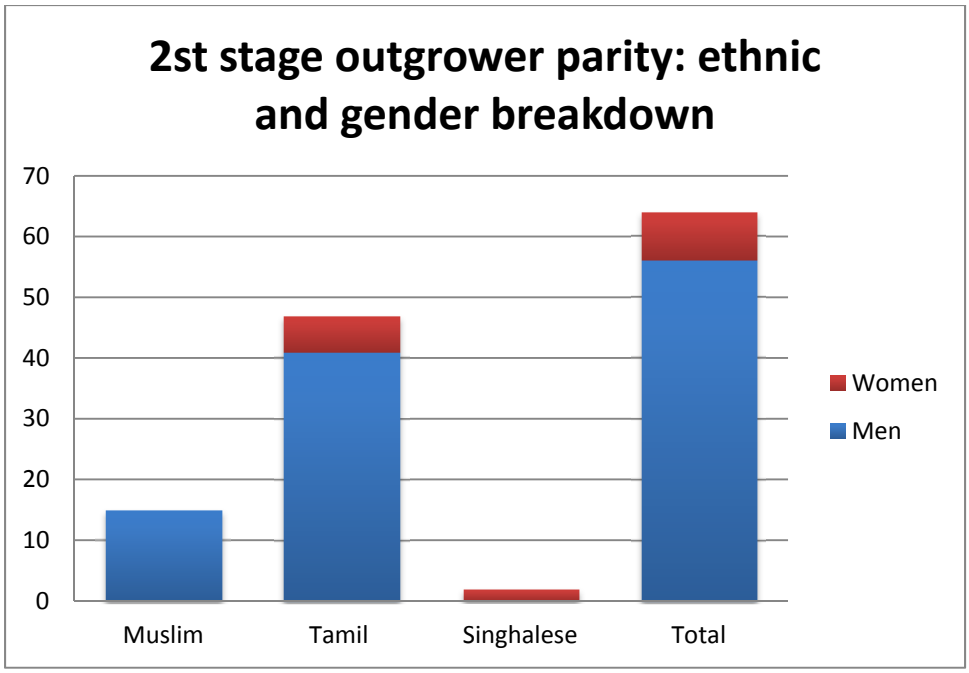
	Muslim	Tamil	Singhalese	Total
Men	49	5	18	72

Women	4	1	7	12
Total	53	6	25	84

Forthcoming (2nd Stage) Out-growers

	Muslim	Tamil	Singhalese	Total
Men	15	41	0	56
Women	0	6	2	8
Total	15	47	2	64





Among out-growers surveyed the range of monthly previous income is from 0 to LKR 30,000 as self-reported, and from 0 to LKR 10,000 according to ANG records. Weighing incomes as recorded in these two sources equally results in an average previous monthly income of roughly LKR 9,000. (Annexes 2.8, 3.1.1 and evaluation team calculations)

The principal criterion for out-grower selection is proximity to IAP headquarters in Kinniya, near Trincomalee. Since IAP does not finance purchase of fingerlings and feed, out-growers require BOC micro-credit approval before commencing operations. With varying levels of income from other sources, out-growers do not generally deem seabass culture their primary livelihood. (Annex 3.2.3)

Out-growers form groups (typically between three and eight persons, though one group has twenty-five) based on locality and acquaintance. With their cages connected, groups share tasks like buying trash fish for feed, feeding, cleaning nets, periodic size-grading to forestall cannibalism, and harvesting. For security, each group needs someone on watch every night. (Annexes 3.1, 3.2.3)

Active and potential out-growers currently sit at several different levels of preparation and operation. As of mid-October, 2012, 13 out-growers had completed fish harvests. A total of 84 had received two cages and 66 of these had received either 450 or 900 fingerlings, with the remaining 18 expecting 900 fingerlings by the end of October. Those who have received only 450 can receive 450 more by complying with terms under which a credit breach (discussed below) has been resolved. (Annexes 2.7, 2.8, 3.1, 3.2.2)

A further 33 out-growers have received micro-credit approval and should receive cages by the end of October and fingerlings by November. Another 15 can begin operations by mid-November by visiting BOC with their guarantors to sign micro-credit agreements waiting for them. Still another 17 can expect micro-credit approval by the end of November and could begin operations by year's end. IAP has approved a further 100 applicants, who can expect to start the micro-credit approval process in January, 2013. (Annexes 3.2.2, 3.2.4)

Part-time Out-growers

With rare possible exceptions, IAP out-growers will all operate part-time for the foreseeable future. High-quality aquaculture is a full-time livelihood. Unwilling to give up previous livelihoods which provide income, part-time out-growers face difficulties meeting the demands of successful aquaculture, which delivers no income until harvest. (Annexes 3.1, 4.1.4-7)

Women as Out-growers

A number of women out-growers have obtained BOC credit in their own names but then relinquished financial management and cage work to male family members or acquaintances. Aside from preparing trash fish, they took essentially no part in management or operations. Most felt it inappropriate to work on cages or even visit them. They played no role in nighttime security at cages. (Annexes 3.1.11-13)

Training and Assistance

IAP technical training takes place over 2-3 days, covering cage construction, cage and net maintenance, stocking, feeding, disease prophylaxis and size-grading. (Annexes 2.31, 3.1) Written training materials are not technically detailed. (Annex 2.31) Training on record-keeping and micro-credit is cursory. Initial training is supplemented with brief periodic cage visits by IAP technical officers. (Annexes 3.1) Technical officers purportedly visit out-growers every two weeks to help with size-grading and cage maintenance, to check water conditions, to provide advice and to prepare 'report cards' on out-grower performance. (Annex 3.2.2) In-depth mentoring is scant, however, due to thin and fluctuating technical staffing (Annex 3.2.2) Recruitment for such positions has suffered from scarcity of candidates with requisite skills and retention has been poor due to job market competition. (Annex 3.2.2)

Cages

Each out-grower initially receives two cages free of charge, with ANG retaining ownership. (Annex 3.2.3). Each cage is valued at LKR 40,000 (cost for materials is LKR 31,000, see Annex 2.6), measures roughly 18 cubic meters (3 x 3 x 2) and consists of a wooden frame floating on plastic drums and hung with netting. Plastic nets used early on are now being replaced by better quality nylon nets. IAP provides training on construction and maintenance. Out-growers build their own cages under IAP supervision. Though standard international practice is to use larger

cages, typically around 50 cubic meters, IAP fosters family farming by using small cages requiring fewer people to handle nets during cleaning and harvesting. (Annexes 3.2.4, 4.1.5-6)

ANG plans to build 100 cages a month (three per day) starting in October, 2012, supplying newcomers with two free cages apiece and furnishing established out-growers with extra cages, roughly at cost. (Annex 3.2.4.)

Cleaning requires several out-growers working together to handle heavy nets. IAP training recommends cleaning every two weeks. Out-growers confirm cleaning every one to two weeks. (Annexes 3.1)

Micro-Credit and Reimbursement

Under IAP arrangements, IAP provides BOC with names of those selected as potential out-growers. BOC checks applicant credit records and asks those without BOC accounts to open one, for which they receive passbooks and receive five to six percent annual interest on minimum deposits of SLR 500. (Annexes 3.4.1-2)

BOC carries out orientation with applicant out-growers on banking concepts, loan requirements, credit and savings management. It rejects applicants blacklisted with the Credit Information Bureau (CrIB). It requires each applicant to designate two creditworthy guarantors. (Guarantors are normally out-growers, who guarantee one another since no one else will. Non-out-grower guarantors would be acceptable, however.) Approval also requires proof that an applicant has entered a buy-back agreement with IAP and has received two cages. (Annexes 3.4.1-2)

BOC establishes a line of credit for each borrowing out-grower at LKR 100,000, with interest at a purportedly concessionary rate. Micro-loans are earmarked specifically for purchase of fingerlings and feed. (No requests for financing of repairs and maintenance have yet been received, but BOC would consider these). When ANG delivers fingerlings, out-growers sign receipts, which ANG takes to BOC. BOC then charges out-grower accounts and transfers corresponding sums to ANG. There is no cash transaction. (Annexes 3.4.1-2) For trash fish, out-growers pay cash and purportedly provide invoices to BOC. BOC transfers equivalent sums to ANG, which in turn transfers funds to out-grower accounts. (Annex 2.32) Some out-growers seem not to understand this trash fish credit/reimbursement system. Though we cannot estimate the consistency with which out-growers secure invoices for their waterside trash fish purchases, deliver them to BOC and receive reimbursement, some level of failure exists. (Annexes 3.1)

Though the BOC agreement requires that borrowers repay over two years in four equal parts, IAP encourages repayment in full with proceeds from each harvest. It does so to help out-growers save on interest, to establish a strong credit record and to simplify its own bookkeeping. (Annexes 3.2.2-4)

At harvest, ANG weighs and counts the fish, then issues out-grower receipts recording the quantity and number of fish sold, though not the total amount paid. This amount, LKR 250/kg, goes directly into the borrower's account, from which loan repayment is debited while the balance accrues to the borrower. (Annexes 3.2.2-4)

Loans have been given so far only by the Kinniya branch. A recorded 117 out-growers have been approved for credit as of the end of September, 2012, but only some 66 were operational with both cages and fingerlings. Beyond the 117, a further 31 awaited finalization of BOC paperwork. (Annexes 2.7, 3.2.4)

Interest rates are set by BOC's Development Banking Department. Though these rates have been described as concessional, they have nevertheless varied so far and will continue to vary with the general Sri Lankan interest rate regime. Over the past year, domestic interest rates have risen sharply and the rates charged to out-growers have risen accordingly from 8.0% to higher levels. According to disparate information, none of it adequately confirmed, current interest rates lie somewhere from 9.5 percent to 16.0 percent. (Annexes 3.2.2, 3.4.1-2)

Many out-growers do not understand the credit agreement and some sign it without reading it. This is especially the case with women out-growers, whose names appear on loans but who have almost all relinquished management to male members of their groups or families. This has left them vulnerable to mismanagement of funds, as has already occurred in one case described below (Annex 3.1.11). Out-growers do not always understand their BOC transactions and may not always receive complete information. (Annexes 3.1)

Out-growers have usually but not always received basic BOC orientation on credit management. They can miss this orientation by failure to attend a session for that purpose at IAP headquarters. There is little monitoring, mentoring or follow up. Some out-growers seem unclear on the credit process for buying trash fish. (Annexes 3.1)

BOC is a government-owned bank that makes loans without collateral to out-growers under a development promotion agenda and as a corporate social responsibility initiative. At present, it will not lend directly to ANG, due to ANG's inability to provide required collateral. BOC has lost confidence in its IAP credit program due to a recent incident described here. (Annex 3.4.2)

The incident grew out of a presumed 12-cage 'side-sale' to outside buyers offering a price better than what ANG provides as its 'buy-back' price. Self-designated inside 'managers' of a 25-member team commandeered harvestable fish for the side-sale from team members and then failed to distribute proceeds, leaving their team members in arrears on their loans. Faced with this substantial arrearage, BOC clamped a moratorium on further credit extensions to IAP generally, not just to the non-performing borrowers. (Annexes 2.35, 3.2.3-4)

A number of women team members had relegated management of their cages and loans to the inside managers. They subsequently discovered, when they applied to an unrelated women's micro-credit scheme, that their names had appeared on a blacklist. (Annex 3.1.11)

ANG has negotiated a resolution under which BOC will extend further credits, allowing out-growers to pay off loans with proceeds from the next harvest rather than the last one. (Annex 3.2.2-4) Negotiations among ANG, BOC and this out-grower group took place during October 2012 and apparently achieved a satisfactory resolution roughly as follows:

a) Out-growers deposit 25 percent of the amount owed.

b) BOC restores loans to 'performing' status and offers delinquent out-growers fresh credits equal to their 25 percent deposits, for one cage of fingerlings over the next harvest cycle, with further credit to be considered later.

c) Out-growers transfer remaining un-harvested fish without payment to ANG, which will deposit with BOC its sale proceeds from that fish against outstanding loans.

In addition, BOC has asked that all out-growers now post SLR 5,000 from each harvest into their savings accounts as partial assurance against defaults. (Annex 3.2.4)

Although micro-credit arrangements have worked satisfactorily in most cases, this incident represents an ominous failure despite its tentatively satisfactory resolution. Further such episodes could put IAP's sustainability at risk by provoking BOC to refuse further out-grower credits. Though BOC lends to IAP out-growers under corporate social responsibility and a governmental agenda to support development, it regards its commitment as provisional. It responded to the incident described here by freezing credit for the entire IAP program, pending resolution. (Annex 2.35)

Beyond this particular incident, BOC management now indicates discomfort with IAP risks generally. Natural hazards, such as floods and disease, can be expected from time to time, along with fluctuations in seabass market prices, which would adversely affect out-grower results. 'Crop' insurance for aquaculture is currently unavailable, partly because no pertinent actuarial data exists. (Annex 3.4.2) ANG has made clear that it will not assume risks of out-grower defaults. (Annex 3.4.2) It has approached the government-owned Regional Development Bank for additional micro-credit support. (Annex 2.35)

The Central Bank facilitates agricultural lending through a range of donor-supported loan guarantees, re-financing, and special interest rate schemes, implemented through various public and commercial banks. Unfortunately, however, cage culture is not currently included and the process of securing donor and Central Bank support would be lengthy and uncertain. (Annexes 3.4.1-2)

Fingerlings

ANG operates a hatchery near Negombo, housing tanks for both brood stock and hatched fingerlings. Low production (50,000/month) through IAP's first year stemmed from suboptimal diets and misestimated spawning maturities. These difficulties have recently been ameliorated with expert advice. Fingerlings now eat phytoplankton (algae) and zooplankton (rotifers) produced in the hatchery. Production has reached 200,000/month, with a target of 500,000/month. (Annex 3.2.3)

Fingerlings are transferred to the Kinniya nursery, with a capacity of 300,000, at between 22 and 45 days. There they mature for 30 to 45 days with a current survival rate of 30%. That rate should be 50% with sound practice. (Annex 3.2.3)

IAP charges out-growers LKR 25 per fingerling, LKR 11,250 per cage of 450 fingerlings. This amount is debited on an out-grower's line of credit and transferred to ANG in payment for fingerlings supplied to out-growers. In principle, ANG receives these funds only upon delivery of fingerlings (Annex 3.2.3) In several cases, however, out-growers have signed receipts for 900 fingerlings (two cages) but received only 450 or even less, with a promise that the rest would be delivered when available (Annex 3.1.3) This reflects shortfalls in fingerling production mentioned above. ANG contends that major problems have now been solved. (Annex 3.2.3)

Set by ANG with no alternative, fingerling prices have no market comparison. Prices could conceivably be hiked to cover expenses elsewhere in the value chain, namely ice and transport costs for harvested fish, as well as to provide 'working capital' for other operations. IAP currently covers harvest ice and transport costs partly by maintaining a spread between the price it pays out-growers for harvested fish ('buy-back price') and the price at which it sells harvested fish to buyers ('re-sale' or 'market' price). (Annex 3.2.4) That spread, however, threatens critical micro-credit, as explained above, by tempting out-growers toward side-sales.

If the side-sale temptation could be removed by aligning buy-back price with market price, transport and ice costs along with working capital could be covered by hiking fingerling prices. Though hiking fingerling prices would tend to undermine out-grower profits, higher buy-back prices would compensate for this. Because higher fingerling prices would not suffer from market comparison, they would offer a better means for covering costs and working capital than do below-market buy-back prices. (Evaluation team analysis)

Production

Feeding

Out-growers currently use only trash fish for feed (Annexes 3.1). This will continue for at least another year, until the planned feed mill may become operational (Annex 3.2.4) Typically, they

purchase trash fish daily at waterside sites, paying anywhere between LKR 10-50/kg, with a predominant reported price around LKR 30-40/kg. (Annexes 3.1) Those who are fishermen sometimes use trash fish from their own catches. Out-growers would prefer to buy large quantities when heavy catches cause prices to drop, but generally lack storage capacity (containers and ice). Some strongly express a need for storage close to their cages (Annexes 3.1) ANG indicates that providing storage at its own expense would be cost-prohibitive. (Annex 3.2.4)

Out-growers chop trash fish according to the size of their stock, finely chopped for small fish, coarser for large. Wives and other family women often do the chopping. (Annexes 3.1)

IAP's current trash fish supply is poor-quality and insufficient to meet rising demand without substantial cost pressure. Trash fish costs have increased over recent months. Meanwhile, the cost of imported formula remains high (SLR 200/kg). Sri Lanka's Industrial Technology Institute (ITI) has developed formulas, but domestic production will commence only when adequate demand arises.

Feed is the main out-grower expense and the least understood. ANG provides a feeding schedule based on its pilot studies. (Annex 2.28). It sets out recommended feed amounts and frequencies with associated costs in 15-day increments. Some out-growers report feeding at higher than recommended amounts and frequencies, based on perceptions that they should feed until their fish stop eating. (Annexes 3.1) This may be wasteful since seabass will not eat feed sunk to cage bottoms. Moreover, increased consumption may not yield proportional growth. (Annex 4.1.4) Several out-growers complain that fish grow slowly despite generous feeding. (Annexes 3.1) Yield per monetary input falls with overfeeding, of course.

Feed Mill

At present, IAP out-grower seabass consume trash fish only. Nursery fish eat about half trash fish and half imported formula. ANG plans construction of a mill producing formula for out-growers to buy. (Annex 3.2.3)

Construction has confronted delays. At its originally-planned site near Negombo, where it could have utilized waste from tuna processing plants, the mill stumbled over unresolved issues involving a previous tenant. Repositioned near Trincomalee, the plant could draw inputs from ANG's processing plant waste and from local sardines at low prices during high catches. Leased government land has only recently been allocated, however, and permits are yet to issue. (Annexes 3.2.3-4)

Existing Sri Lankan feed mills have not yet started to produce seabass formula. One can infer that volume is insufficient to justify it. In feed production, economies of scale and product diversification are needed to ensure competitive pricing. ANG's proposed feed mill may lack the requisite scale economies and diversification. The viability and cost-justification of ANG's

proposed mill therefore seem questionable. One prospective Sri Lankan seabass producer plans to import formula from Australia and the United States rather than produce it domestically at higher cost. (Annex 3.5.5)

Out-Grower Record-Keeping

Out-growers have not by and large adopted habits of regular detailed record-keeping. Events requiring record-keeping take place largely at cages, where records cannot conveniently be kept. Most critically, records on feed costs and feeding amounts are systematically deficient. This makes it difficult to determine optimal feeding practices and levels of expenditure on feed. (Annex 3.2.2)

Post-Production

Harvest

To date ANG has had 17 harvests (from thirteen out-growers, four with two harvests apiece). Average fish weight reached one kilogram in four of the seventeen harvests. The majority had an average weight of 700-800 gm. The average grow-out time was seven to nine months. (Annex 2.8)

Harvest time is agreed mutually between ANG and out-growers, based on fish size. IAP technical officers oversee harvest processes. ANG counts and weighs the fish that it will buy, returning under-size fish to cages. Harvested fish are killed in ice water ('chill kill') on-site and then trucked out in containers with ice provided by ANG. (Annex 4.1.4)

At harvest, ANG provides out-growers with receipts stating the number and weight of fish purchased, but with no specific indication of the value or overall purchase price. According to the buy-back agreement, ANG must buy all harvest-size fish, and out-growers must sell their harvest to ANG. ANG sets the buy-back price at LKR 250/kg. ANG prepares an invoice on behalf of the seller, which it then presents to BOC. BOC then debits ANG's account and credits the out-grower's account after subtracting loan repayment amounts. (Annex 3.2.3)

On two occasions so far, entire cages of fish have disappeared at the brink of harvest. Implications of these incidents are explored below. (Annexes 3.1.3, 3.1.11)

Buy-back price

At LKR 250/kg, the buy-back price is lower than market prices, currently LKR 350-400/ kg. (Annexes 3.1) This limits out-grower returns. Moreover, out-growers face temptation to circumvent the IAP contract by 'side-sales' to outsiders. Whenever they do so, they may fail in micro-credit repayments. If harvest sales go properly to ANG, repayment comes 'automatically' from deducted proceeds. In the absence of that procedure, repayment requires a

special visit to the lender. Moreover, some out-growers fail to grasp the implications of credit breach. (Annex 3.2.2) Several have already found themselves blacklisted, as described above. (Annexes 3.1)

One possible side-sale incident involved the slashed nets and 'lost' fish of two out-growers on the same team. ANG management believes this incident represents theft by lagoon fishermen who slashed the nets and promptly netted the released fish. This version presupposes a nighttime security lapse, which the out-growers in question explain as misplaced reliance on a nearby police post. The other possibility is that the out-growers slashed their own nets to conceal side-sales. (Annexes 3.1.3, 3.2.2)

In another incident, roughly 12 cages of fish raised by an unusually large team of 25 out-growers 'disappeared,' loaded onto a truck by night. (Annexes 3.1.11, 3.2.3) The clear likelihood is that this involved side-sale. Subsequent failure to repay BOC loans yielded the serious credit incident described above.

ANG deems the current spread between its buy-back and re-sale prices necessary to cover the costs of fingerling transport and ice and to provide 'working capital' for out-grower training and staff salaries. When it reaches 30,000 kg/month harvest (approximately 100 harvested cages/month: 700 total cages on a seven-month harvest cycle), it could purportedly align buy-back and re-sale prices by spreading its overhead over more harvest. (Annex 3.2.4) Various constraints detailed in this report make 700 cages seem a distant target at present. With all due appreciation of ANG's cash flow challenges, waiting until then to align buy-back and re-sale prices poses grave micro-credit risk. This risk will continue until ANG either aligns its buy-back price with the market price or secures alternative financing that reduces reliance on micro-credit.

Processing Plant

ANG's planned processing plant structure is nearly complete and machinery is on-site, though not in place. The facility could be physically complete and certified to operate by early 2013. Unfortunately, ANG currently lacks financial resources needed to operate the plant without sacrifice of vital functions elsewhere. Even more unfortunately, prospects for profitable plant operations in the near future appear dim. (Annex 3.2.2)

Current Sri Lankan processing plant capacity exceeds available inputs by a factor of three. A number of plants are consequently inactive at present. (Annexes 3.3.2, 3.5.6) Inputs have recently been imported from as far away as New Zealand to make up for local input shortages. ANG management believes the surplus in capacity may be only short-term, attributable to declining tuna exports as the European Union suspends Sri Lanka's 'GSP Plus' trading privileges over political issues. (Annex 3.2.2) Even if GSP Plus suspension is a factor, however, overcapacity appears structural for the foreseeable future.

Markets

Domestic seabass prices are not attractive for producers. Though domestic demand does exist under the label 'rockfish,' it is limited for the foreseeable future by tastes and attitudes. (Annex 3.3.5)

IAP expectations of profitable seabass export sales may be faulty. Under current arrangements, ANG sells to exporters (chiefly TESS and Ceylon Fresh Foods) at LKR 350/kg (roughly US$2.69) for small fish (800-1000 grams) and SLR 390/kg (roughly US$3.10) for large fish (over 1000 grams). Export prospects can be divided into high-price and low-price markets. (Annex 3.2.3)

In limited high-price markets, TESS sells large seabass fillets (1.5 to 2.5 kg) at US$12-14/kg. It mixes seabass with market-fungible grouper, red snapper and parrot fish fillets for sale at a common price. Raw seabass yields 38% in fillets. At a raw fish cost of US$3.10/kg (LKR 390/kg) and 38% yield, the cost for producing large IAP fillets comes to US$8.16/kg (US$3.10/0.38). (Annex 3.5.6) This is too high to allow much profit even at US$12-14 selling prices, once labor, packaging, freezing, storage, freight and other costs are added. Moreover, ANG can supply few fish of the requisite size (Annex 2.8) In short, IAP cannot expect substantial sales at LKR 390/kg.

The low-price small-fillet market is dominated by Nile perch from Africa and catfish from Vietnam, which are market-fungible with seabass. At US $2.69 for raw fish and 38% yield, the cost for producing TESS/IAP small fillets is US$7.05/kg. With competitor Nile perch and Vietnamese catfish selling at US$6/kg, the prospect for profitable export of small TESS/IAP seabass fillets looks unpromising. Indeed, to compete in this segment of the market, TESS has imported cheaper fish from as far as New Zealand. Competition in seabass exports comes from high-volume, low-cost producers in Indonesia, Thailand and (especially) Vietnam. As of earlier this year, the highest recorded price for Vietnamese catfish was US$1.18/kg, far below the IAP/TESS price.[2] (Annex 3.5.6)

Though the analysis here is not the last word on IAP export prospects, it raises doubts, especially at increased volume levels.

Analytic Framework II: Assumptions Analysis

Micro-credit Interest Rate

IAP planning assumed an annual micro-credit interest rate of 8.0 percent. (Annex 2.14) Disparate information from BOC, from ANG and from various out-growers makes it impossible

[2] http://www.globefish.org/pangasius-february-2012.html

to specify actual current interest rates. Indications vary from 9.5 to 16.0 percent. (Annexes 3.2.2, 3.4.1-2) Micro-credit rates vary with Sri Lanka's general interest rate climate. Central Bank policy during 2012 has deliberately pushed rates upward to achieve macroeconomic objectives. Higher rates, which can be anticipated throughout IAP's remaining term, affect the profitability of out-grower operations. (Annex 2.14)

Cage Size

IAP planned for and implemented cage sizes of roughly 18 cubic meters (3 x 3 x 2 meters = 18 m3) (Annex 2.6). This lies at the lowest end of reported successful international practice, where cage sizes range as high as 300 cubic meters, with a typical size around 50 cubic meters. (Annexes 4.1.5-6) IAP chose its cage size based on convenience for family operations, not production efficiency, which is presumptively found with the larger cages used in successful international practice.

Stocking Density

IAP planned for and implemented stocking densities of 25 fingerlings per cubic meter. (Evaluation team calculations) This is lower than initial stocking densities in reported successful international practice, which ranges from 40 to 300 fingerlings per cubic meter (Annexes 4.1.4-7), but higher than stocking densities sometimes practiced internationally later in the grow-out cycle. (Annex 4.1.7) In its IAP pilot studies, ANG stocked at only 22 fingerlings per cubic meter. (Annex 2.29) This lower density could partially explain the substantially higher survival rate in pilot studies than in actual IAP experience. (See 'Survival Rates' below)

Size-grading Frequency

Cannibalism can be addressed by frequent grading to separate fish by size. This is impracticable when the number of cages per out-grower is low because each cage must then harbor a larger range of sizes than would be the case with more cages. Moreover, grading in the early weeks requires equipment currently available only during bi-monthly IAP technical officer visits (Annex 3.2.2) Out-growers confirm grading only every fifteen days (Annexes 3.1), while successful international experience suggests it should take place every week. (Annex 3.5.2)

Feed Cost

IAP plans estimate a trash fish cost of LKR 20-25/kg. (Annexes 2.12, 2.28) Out-growers report prices fluctuating between LKR 10/kg and 60/kg, with most indicating a range of LKR 30-50/kg. (Annexes 3.1)

Feed Quantities

IAP assumes and recommends an average of roughly 14kg/day in trash fish feed for two cages. (Annex 2.28). In practice, out-growers show poor fidelity to IAP recommendations and hazy

tracking of feed amounts. There is evidence of substantial overfeeding in fruitless effort to achieve accelerated growth. (Annexes 3.1) Successful international practice indicates that feed amounts should be decreased as fish grow in size. (Annexes 4.1.4, 4.1.6-7)

Grow out period (from out-grower reception of fingerlings to harvest)

IAP planning documents assumed a grow-out period of six or seven months. (Annexes 2.12, 2.14, 2.28) Actual experience to date has varied widely, with a typical range from seven months to nine or more. (Annexes 3.1) In successful reported international practice, the grow-out period to harvest size of one kilogram is twelve months. (Annex 4.1.5)

Survival Rates

ANG's expected survival rate is 80 percent (see page 16, Annex 2.12) Thai experience suggests survival rates of 80–95 percent in normal conditions. (Annex 4.1.5) Limited IAP experience reveals 79 percent survival in pilot studies and 40 percent with actual out-growers. (Annex 2.29) It is, however, premature to draw realistic IAP survival rate findings for actual out-growers.

One out-grower reports problems with disease and another expresses anxiety about it. (Annexes 3.1) Literature suggests its likelihood over time. (Annex 4.1.4) Out-growers report substantial losses in early grow-out stages, with some citing cannibalism of smaller fish by larger. (Annexes 3.1)

Average Fish Weight at Harvest

IAP planning assumed an average fish harvest weight of one kilogram. (Annex 2.12, 2.14) IAP experience reveals 700-800 grams as the most common average harvest weight, with one kilogram reached only in a minority of harvests. (Annex 2.8) Successful reported international practice indicates that a one kilogram harvest size requires twelve months of grow-out. (Annex 4.1.5)

Feed Conversion Ratio (FCR) and Cost Effectiveness

FCR is the ratio of total feed weight to total harvest weight for a harvest cycle. High FCRs indicate low efficiency in converting feed to harvest, while low FCRs indicate high efficiency. IAP planning assumed a trash fish FCR of 5.9:1. (Annex 2.30) Actual IAP experience to date cannot be determined due to lack of accurate records. (Annexes 3.1, 3.2.2) NAQDA reports a domestic trash fish FCR of 8-9:1 (Annex 3.3.5). In successful international practice, FCRs for trash fish range between 3:1 and 10:1. (Annexes 4.1. 4-5)

IAP's assumed FCR lies in the mid-low range of successful international practice and well below NAQDA's estimate (Annex 3.3.5) It may therefore be unrealistically low. This is made more likely by the fact that some out-growers feed more than IAP-recommended amounts and harvest

sizes are lower than predicted. A higher-than-expected FCR would imply higher-than-expected feed costs to produce a given yield and therefore lower-than-projected incomes.

Furthermore, IAP's feeding schedule assumes a trash fish cost of LKR 20-25/kg and a six-month grow-out cycle, resulting in a total harvest expenditure of LKR 32,038/cage (Annexes 2.12 2.28) Since the cost of trash fish is as high as LKR 60/kg and the actual grow-out period exceeds six months, out-growers spend more on feed than IAP estimates (Annexes 3.1) Several have borrowed between LKR 40,000-45,000 for feed over one harvest cycle (Annex 2.7) Though others borrowed LKR 10,000 or less, they almost certainly have been buying feed with their own money. (Annex 2.7)

Further Findings

Out-grower Income

Limited experience to date suggests that proficient out-growing under favorable conditions can boost incomes appreciably. (Annexes 2.8, 2.29, 2.34, 3.1)

Ethnic Parity

We found no evidence that out-grower participation will be ethnically skewed and conclude that it will be balanced to a satisfactory degree. (Annex 2.7)

The principal criterion for selecting out-growers is proximity to the production site, currently Kinniya, Trincomalee. Priority goes to local people. (Annex 3.2.3) So far, out of 84 active out-growers, 63% are Muslim, 7% are Tamil, and 30% are Singhalese. Tamils are underrepresented only because their villages are somewhat more remote from IAP sites.

As IAP expands around Trincomalee over coming months, more Tamil villages will be reached. Out-growers for the next expansion 'stage' will include 23% Muslims, 73% Tamils and 3% Singhalese, bringing overall participation to 46% Muslim, 36% Tamil, and 18% Singhalese. Planned expansion of the out-grower program to Mullaitivu will increase the proportional involvement of Tamils, while expansion to Batticloa will do likewise for Singhalese. (Annex 2.7)

Out of 33 full-time IAP jobs at present, 16 are held by Tamils, 14 by Singhalese and three by Muslims. (Annex 2.21)

Job Creation

IAP has not met targets for job creation and, as stated in planning documents, cannot do so without external financing. (Annexes 2.11, 3.2.2)

Delays, Cash Flow and Financing

IAP has not met certain other targets within planned time frames. Delays have reduced the cash flow ANG requires to finance IAP as initially planned. ANG may lack sufficient funds at present to maintain and expand its out-grower program, to construct its feed mill and to complete its processing plant. (Annexes 2.17-20, 3.2.2-3)

IAP implementation has been delayed about one year, chiefly due to flooding at Trincomalee and hatchery production issues. Flooding created problems of access, suboptimal salinity, cage breakaway, damaged gear and others. Flooding lies beyond IAP's managerial scope, of course. But it may have caused less actual delay than it seems, considering simultaneous delay in fingerling production. (Annex 3.2.3).

Insufficient fingerling supply has held back out-grower training and cage construction. Meanwhile, poor cash flow due to low fingerling sales has delayed construction of ANG's processing plant. ANG has requested a one-year, no-cost extension on IAP, originally scheduled to close on March 31, 2013. Fingerling production issues have reportedly now been solved (Annex 3.2.3).

Seeking fresh capital, ANG has been approved in principle for a financing scheme under National Agribusiness Development Programme (NADeP), a Central Bank initiative co-funded by the government and the International Fund for Agricultural Development (IFAD). (Annex 3.3.4) The scheme would assign completed and planned cages to a separate company ('ABC'), which would secure financing from NADeP. Financing would support ongoing cage construction, fingerling production and feed purchases, along with construction and operation of five 'semi-processing' sites where fish would be headed, finned and gutted before sale to ANG for final processing at its Trincomalee plant. ABC financing would reduce or eliminate reliance on micro-credit. (Annexes 2.13, 2.27, 3.2.1, 3.2.4, 3.3.4).

With ANG expertise, ABC would manage ongoing out-grower operations and buy harvested fish for input to its semi-processing sites. ANG would pay ABC costs plus 15 percent for semi-processing services and fish inputs. Out-growers would become ABC shareholders, using profits distributed to them over time to redeem NADeP's financing, gaining equity holdings in ABC as they do so. (Annexes 2.13, 2.27, 3.2.1, 3.3.4).

It is hard to assess the prospects for this complex financing solution. Implementation is currently on hold for several months, pending probable transfer of NADeP from the Central Bank to the Ministry of Economic Development. (Annex 3.3.4) An alternative financing scenario may arise via a potential offshore equity investor (Dec. 11, 2012 conversation with ANG chief executive officer)**.**

It is technically inadvisable to separate semi-processing units from the central processing plant. (Annex 3.6.8) ANG management contends that the semi-processing units could save costs by using out-growers rather than paid labor and by simplifying central plant operations, thereby making them more cost-effective or even profitable (Annex 3.2.2). It also contends, however,

that the units will create ten jobs apiece. (Annex 3.6.8) In any case, international practice favors placing all processing under one roof. It is easier to manage one unit under quality and hygiene standards than to manage several in different locations. (Annex 3.6.8) Moreover, extra handling and transfers between trucks and facilities create extra contamination risks. (Annex 3.6.8)

ANG requires substantial financing in order to maintain seabass aquaculture, especially if it puts the processing plant and feed mill into operation. As explained above, neither plant nor mill provides a substantial revenue source in the near future. Nor does the processing plant promise major cost savings, with processing costs already low due to overcapacity. The ABC plan provides ANG's main foreseeable short-term source of alternative financing. As explained here, however, that plan poses risks.

CONCLUSIONS

Conclusions center on sustainability prospects for ANG-led seabass aquaculture over a five-year period and on sustaining USAID's investment in IAP. 'Primary' and 'Secondary' Conclusions reflect levels of relevance with respect to IAP sustainability. 'Secondary' Conclusions are clustered under three headings, referring respectively to issues 'External' to IAP, those concerning its 'Business Model,' and those concerning 'Technical Implementation.' The evaluation team assumes that IAP's core objective is sustainable aquaculture livelihoods and that particular approaches and methods hold secondary importance.

Primary

1) IAP has strong potential for positive impact on livelihoods, but confronts vulnerabilities that could limit that impact.

2) If 'crop' insurance can be secured, micro-credit remains available, feed costs stabilize, ANG attains adequate working capital and profitable export outlets can be sustained, IAP can provide several hundred full or supplemental livelihoods for well-trained, well-monitored out-growers or employee operators.

3) To date, technical training has given out-growers inadequate knowledge and experience for optimal aquaculture operations.

4) The current low buy-back price creates risk of credit breaches.

5) In hindsight, building the processing plant was a suboptimal resource use and building a feed mill would also be a suboptimal resource use.

6) Micro-credit arrangements have achieved mixed success and remain vulnerable in the absence of 'crop' insurance and alignment of buy-back and market prices.

7) IAP has not to date ensured adequate out-grower record-keeping.

Secondary

External

8) To remain sustainable in seabass aquaculture, ANG requires prompt additional financing, especially if it persists with processing plant and feed mill plans.

9) Participation of women as out-growers has been unsuccessful.

Business Model

10) IAP ethnic parity goals are on target to be achieved.

11) Though IAP stocks cages at initial density lower than in general international practice, it retards growth by failing to reduce density as fish get bigger.

12) Trash fish prices in IAP's operating zone exceed IAP projections and are rising quickly, undermining out-grower profit potential.

13) Seabass export prospects may be limited at IAP's comparatively high current production costs.

14) Even if IAP can secure external financing, job creation efforts should focus on aquaculture operatives and technical officers, not processing plant and feed mill operations.

15) Proposed ABC semi-processing units may reduce costs but pose quality and hygiene risks.

16) IAP assumptions are overoptimistic on harvest grow-out time, on harvest fish weight, on micro-credit interest rates, and on FCR and costs per unit of yield.

17) IAP cage sizes are at the low end of international practice where typical size is nearly three times larger and, by inference, more efficient.

18) The micro-credit system for trash fish purchases, relying on issuance of invoices at waterside points of sale and requiring bank visits for redemption, is prone to misunderstanding and failure.

Technical Implementation

19) IAP has not so far established adequately frequent size-grading.

20) Ad hoc increased feeding to achieve better growth contravenes both IAP recommendations and successful international practice, which recommends reduced feed per biomass as fish grow.

21) The talent pool for technical officers is shallow and IAP compensation is inadequate to secure retention.

RECOMMENDATIONS

Recommendations center on promoting sustainability for ANG-led seabass aquaculture over a five-year period and on sustaining USAID's investment in IAP. 'Primary' and 'Secondary' Recommendations reflect levels of urgency in ensuring sustainability. We assume that IAP's core objective is sustainable aquaculture livelihoods and that particular approaches and methods are secondary in importance. Recommendations should be read as IAP modifications that USAID should encourage.

Primary

1) Restructure aquaculture operations toward maximum productivity and efficiency; toward full-time aquaculture operators over part-time; toward employee operators over out-growers without technical mastery; toward operator retention and development over expanded numbers

2) Develop improved out-grower monitoring, mentoring, follow-up and record-keeping on technical and credit matters

3) Explore raising pay to improve technical officer recruitment and retention

4) Raise buy-back price to align with market price

5) Re-evaluate advisability of planned processing plant and feed mill operations

Secondary

6) Expand outreach to technical advisors, including the National Aquatic Resources Research and Development Agency (NARA)

7) Implement more frequent size-grading during grow-out to reduce cannibalism

8) Alter harvest invoices to itemize income per cage

9) Explore using larger cages and reducing stocking density over the grow-out period, as international practice indicates

10) Assume a 12-month grow-out to reach one kilogram, realistically higher interest rates and realistically higher FCR and costs per unit of yield; adjust expectations and operations accordingly

11) Pursue job creation through employment of aquaculture operatives and technical officers, not

through processing plant and feed mill operations

12) Explore improvements to micro-credit/reimbursement system for trash fish purchases

RESPONSES TO KEY EVALUATION QUESTIONS WITH EXPLANATORY DISCUSSIONS

1) To what extent have fish-farm participant incomes increased?

For some out-growers with harvests in, average monthly incomes have increased substantially, but for others they have scarcely improved at all.

The number of harvests so far is less than twenty. Experiences have varied so widely that none can be viewed as 'typical.' While some have roughly doubled their previous incomes, others have seen little or no increase (Annexes 2.8, 2.34, 3.1)

Constraints on fingerling supply due to uncertainties over diet and brood stock spawning maturities, have apparently been overcome. Critical current constraints include costly and poorly-standardized feed, subpar technical implementation and micro-credit bottlenecks.

Because most out-growers interviewed have retained previous livelihoods, income from seabass culture has not by and large come at the price of sacrificing other income sources. (Annexes 3.1, 3.2.3)

Few out-growers keep specifically aware of income and expenditures, as they maintain neither their own records nor ANG paperwork. Input receipts and sales invoices, which ANG should provide, are incomplete. (Annexes 3.1, 2.4)

Out-growers lack convenient means of verifying harvest incomes because ANG prepares both its own receipt for fish received (which does not itemize value and prices) and the out-grower invoice to ANG (of which out-growers receive no copy). (Annexes 3.1, 2.4)

Harvests have not yet confronted natural threats that will certainly arise from time to time. (Annex 3.4.2) Out-growers indicate willingness to pay for insurance against harvest failure, natural disaster, disease, and so on, were such insurance available. (Annexes 3.1)

2) How sustainable is IAP's out-grower fish farming program from the standpoints of beneficiaries and ANG and what are the bases for this assessment?

In its present form, IAP's out-grower program presents a mixed sustainability outlook from the beneficiary standpoint.

Participation will be lower than projected, attrition will be serious and income growth will be lower than expected. At least one of thirteen out-growers with a completed harvest intends to

abandon participation. (Annexes 3.1) BOC officials indicate that some 10 of 25 out-growers who have paid off their first rounds of loans have not come back for more. (Annex 3.4.2)

Constraints include:

1) Training inadequate to produce technically proficient out-growers (Annexes 3.1)
2) Retention of previous livelihoods, leaving insufficient time for essential outgrowing tasks (Annexes 3.1)
3) Implementation as a part-time livelihood rather than full-time with each out-grower operating many cages as recommended by FAO (Annexes 4.1.4-7)
4) Departures from international practice in stocking densities, frequency of size-grading and feeding regimens (Annexes 3.1)
5) Failures to communicate, comprehend and execute protocols on feeding, grading, cleaning, and disease (Annexes 3.1)
6) Out-grower incapacity in financial management and record-keeping (Annexes 3.1)
7) A buy-back price too low for adequate out-grower return (Annexes 3.1).
8) Inherent risks like flooding, problems with water quality and salinity, theft, storm damage, disease, cannibalism, and inadequate trash fish supply for feed, (with crop insurance unavailable to date) (Annexes 3.1)
9) Overoptimistic projections on grow-out periods; feed amounts, cost and availability; survival rates; FCRs; average harvest weights; needed frequency of size-grading; and micro-credit interest rates (Annex 2.12, 2.14).
10) Bottlenecks in cage construction; in fingerling supply; and in trash fish supply and prices (up sharply due to out-grower demand) (Annexes 3.1)
11) Poor retention of technical officers (Annex 3.2.2)

At present, IAP's out-grower program presents a mixed sustainability outlook from ANG's standpoint.

IAP has failed to meet certain targets within planned time frames. Delays have reduced the cash flow ANG requires to finance IAP as initially planned. ANG may lack sufficient funds at present to maintain and expand its out-grower program, to construct its feed mill and to complete its processing plant. Excess domestic processing capacity will hamper economic returns from ANG processing activities. (Annex 3.2.3)

IAP has been delayed about one year, chiefly due to flooding at Trincomalee and fingerling production issues. Insufficient fingerling supply has held back out-grower training and cage construction. Poor cash flow has retarded construction of ANG's processing plant. ANG has requested a one-year, no-cost extension on IAP, originally scheduled to close on March 31, 2013. (Annex 3.2.3)

Seeking fresh capital, ANG has been approved in principle for a financing scheme under NADeP (National Agribusiness Development Programme), a Central Bank initiative co-funded by the government and IFAD. The scheme would assign completed and planned cages to a separate company ('ABC'), which would secure financing from NADeP. Financing would support ongoing cage construction, fingerling production and feed purchases, along with construction and operation of five 'semi-processing' sites where fish would be headed, finned and gutted before sale to ANG for final processing at its Trincomalee plant. (Annexes 2.13, 2.27, 3.2.4)

With ANG expertise, ABC would manage ongoing out-grower operations and buy harvested fish for input to its semi-processing sites. ANG would pay ABC costs plus 15% for semi-processing services and purchased fish. Out-growers would become ABC shareholders, using profits distributed to them to redeem NADeP's financing, gaining larger equity stakes in ABC as they do so. (Annexes 2.13, 2.27, 3.2.4).

It is hard to assess the prospects for this complex financing solution. Implementation is currently on hold for a period of several months, pending probable transfer of NADeP from the Central Bank to the Ministry of Economic Development. ANG has no alternative financing at definitely at hand, though it has attracted attention from one potential offshore equity investor. (Annex 3.2.2; Dec. 11, 2012 conversation with ANG chief executive officer)

Prospects for profitable exports may be limited by high current production costs. (Annexes 2.8, 3.2.3, 3.5.6)

3) How many sustainable jobs has IAP generated to date and how many more can be expected?

ANG projections of 225 sustainable jobs appear unrealistic, especially within the remaining 18 months (with extension) of IAP itself.

Projections of roughly 90 jobs in the processing plant appear especially unrealistic in that half its capacity is earmarked for non-ANG inputs, for which it will need to compete in a soft market. Job projections for both processing plant and feed mill would of course change substantially if ANG accepts Recommendations proposed below to postpone those components.

Partial compensation for 'lost' processing plant and feed mill jobs might be secured by expanded employment of aquaculture operatives and technical officers.

4) To what extent have micro-credit arrangements succeeded from the standpoints of fish farmers, ANG and the lending institution(s)?

From the standpoint of out-growers, micro-credit arrangements have registered mixed success.

Many out-growers do not understand the credit agreement. This seems especially so for women, whose names appear on loans but who seem to hand management over to others in their groups or families. This leaves them vulnerable to fund mismanagement, as has already occurred in one case. (Annexes 3.1)

Out-growers do not always understand transactions with BOC and may not receive complete information. They usually but not always receive basic orientation on credit management from BOC. (Annexes 3.1) Orientation should be supplemented by monitoring, mentoring and follow up. Some out-growers feel that available credit for feed is insufficient and some are unclear on the credit/reimbursement process for buying trash fish. (Annexes 3.1)

From the standpoint of ANG, micro-credit arrangements have registered mixed success.

Though micro-credit arrangements have worked favorably for ANG in most cases, a serious credit incident, described above, highlights vulnerabilities in financing arrangments. BOC responded to the incident by freezing credit for the entire IAP program, pending resolution. Further episodes could threaten IAP by undermining BOC's willingness to extend credit. (Annexes 3.2.3-4)

Though BOC makes non-collateralized out-grower loans under its development promotion mandate, lending directly to ANG would, under prevailing rules and practice, be precluded by ANG's inability to post collateral. (Annex 3.2.3)

From the standpoint of BOC, micro-credit arrangements have registered mixed success.

The incident described above has shaken BOC's confidence in IAP micro-credit arrangements. BOC temporarily froze IAP credits in response to the incident. (Annex 2.35)

BOC lends to IAP as a matter of corporate social responsibility and under a governmental mandate to support development. It regards its commitment as provisional, however. (Annexes 3.4.1-2).

Negotiations among ANG, BOC and the credit-breaching out-grower group took place during October and apparently achieved a satisfactory though complicated resolution roughly as follows:

a) Out-growers deposit 25 percent of the amount owed.

b) BOC restores loans to 'performing' status and offers delinquent out-growers fresh credits equal to their 25 percent deposits, for one cage of fingerlings over the next harvest cycle, with further credit to be considered later.

c) Out-growers transfer remaining un-harvested fish without payment to ANG, which will deposit with BOC its sale proceeds from that fish, up to LKR 100,000, against outstanding loans.

Beyond this particular incident and its implications, BOC officials indicate discomfort with risks under IAP generally. Natural hazards like floods and disease can be expected from time to time, along with fluctuations in seabass market prices, which would adversely affect out-grower results. Insurance is currently unavailable, partly because no pertinent actuarial data exists. ANG reports itself in no position to assume risks of out-grower defaults going forward. (Annex 3.4.2)

The Central Bank supports agricultural lending through a range of donor-supported loan guarantee, re-financing, and special interest rate schemes, implemented through various public and commercial banks. Unfortunately, however, cage culture is not currently covered and the process of securing coverage would be lengthy and uncertain. (Annex 3.4.2)

In one conceivable solution, ANG would borrow on its own account from BOC and manage the entire out-grower micro-credit program through on-lending to out-growers. This would encourage close ANG oversight on out-grower activities. This solution appears unlikely for the foreseeable future because under current protocols BOC would require collateral for loans to ANG and ANG has none to offer. (Annex 3.2.4)

Problems

5) What main obstacles has IAP faced, what solutions have been attempted and how successful have they been?

IAP has confronted serious problems in the forms of delays, planning issues, implementation issues, harvest losses and a credit incident.

Delays

IAP implementation has been delayed by about one year, chiefly as a result of flooding at Trincomalee (compromising access; reducing salinity levels and thereby constraining fish growth) and issues with fingerling production (improper diet and faulty identification of spawning maturities), which has led to an insufficient supply. ANG indicates that fingerling production bottlenecks have now been resolved.

As a consequence of inadequate fingerling supplies for existing cages, IAP slowed down on developing out-growers and constructing cages. The impact of flood-related delays may perhaps be discounted due to the impact of simultaneous delays in fingerling production. (Annex 3.2.3)

Construction of the processing plant and other aspects of the project have been compromised by unanticipated poor cash flow. Processing plant delay has in turn contributed to poor cash flow. (Annex 3.2.3)

The feed mill has also been delayed. The original plan had been to locate the plant at a site in Negombo (because of access to waste from tuna processing plants), but this plan did not move forward due to unresolved issues with a previous owner. The plant site was shifted to Kinniya, where waste from ANG's processing plant and sardines available at low prices during high catches could be used as inputs. Government land to be leased has recently been allocated but permits are still pending. (Annex 3.2.3)

Planning Issues

The evaluation has identified a number of important planning issues, as follows.

The current low buy-back price limits out-grower profits and creates risk of credit breaches.

The proposed processing plant and feed mill may entail suboptimal use of resources.

Expecting that thinly-trained residents could quickly and in substantial numbers become successful part-time out-growers was unrealistic.

IAP practice inhibits growth by failing to reduce stocking density as fish get bigger.

IAP relied on overoptimistic expectations as to trash fish prices; harvest grow-out times and fish weights; micro-credit interest rates; food conversion ratios and costs per unit of yield; and the ease of recruiting and retaining competent technical officers. (Annexes 2.12, 2.14)

ANG management has indicated willingness to alter planning on some or all of these items.

Implementation Issues

The evaluation has identified a number of important implementation issues, as follows.

Technical training and follow-up has given out-growers inadequate knowledge and experience for optimal aquaculture operations.

Micro-credit arrangements have achieved mixed success and remain vulnerable in the absence of 'crop' insurance, alignment between buy-back and market prices and adequate financial management training for out-growers.

Adequate out-grower financial management and record-keeping has not been achieved.

Increased feeding to achieve better growth has contravened both IAP recommendations and successful international practice, which indicates reduced feed per biomass as fish grow.

ANG management has shown strong interest in ameliorating these problems.

Harvest Losses

On two occasions, entire cages of fish have disappeared at the brink of harvest.

One incident involved slashed nets of two out-growers on the same team. (Annexes 3.1.1 and 3.1.5) ANG management believes it represents theft by lagoon fishermen who slashed the nets and promptly caught the released fish. This version presupposes a nighttime security failure, which the out-growers in question explain as misplaced reliance on a nearby police post. The other possibility is that the out-growers slashed their own nets to conceal side-sales.

In another incident, roughly 12 cages of fish raised by an unusually large team of 25 out-growers disappeared, loaded onto a truck by night. (Annex 3.1.11) The likelihood is that this involved side-sale at prices above what ANG offers on buy-back.

In any case, theft and side-sales represent ongoing threats. ANG indicates that it cannot feasibly provide cage security, which out-growers now provide themselves by rotating nights spent at cage sites. (Annex 3.2.4) Risk of side-sales cannot be avoided so long as ANG's buy-back price is substantially below market.

Credit Incident

The presumed 12-cage side-sale just mentioned gave rise to a serious credit incident. Inside 'managers' of the 25-member team commandeered harvestable fish from team members for side-sale and failed to distribute proceeds, leaving their team members in arrears on their loans. (Annex 3.1.11) Faced with this substantial arrearage, BOC clamped a moratorium on further credit extensions to IAP generally, not just to the non-performing borrowers.

A number of women team members had relegated management of their cages and loans to inside managers of an association to which all members subscribed. They subsequently discovered, when they applied to an unrelated women's micro-credit scheme, that their names had turned up on a blacklist. (Annex 3.1.11)

ANG will not pay off loans directly but has negotiated a resolution described above under which BOC will extend further credits so that out-growers can then pay off loans with proceeds from the next harvest. BOC has asked that all out-growers now post SLR 5,000 from each harvest into their savings account as partial assurance against defaults. (Annexes 3.2.4, 3.4.2)

ANG is considering preventive measures against further incidents.

6) What modifications should IAP adopt or consider?

Recommendations center on promoting sustainability for ANG-led seabass aquaculture over a five-year period and on sustaining USAID's investment in IAP. 'Primary' and 'secondary'

Recommendations reflect levels of urgency in ensuring sustainability.

Primary

1) Restructure aquaculture operations toward maximum productivity and efficiency; toward full-time operatives over part-time; toward employee operators over out-growers without technical mastery; toward operator retention and development over expanded numbers

2) Develop improved out-grower monitoring, mentoring, follow-up and record-keeping on technical and credit matters

3) Explore raising pay to improve technical officer recruitment and retention

4) Raise buy-back price to align with market price

5) Re-evaluate advisability of planned processing plant and feed mill operations

Secondary

6) Expand outreach to technical advisors, including the National Aquatic Resources Research and Development Agency (NARA)

7) Implement more frequent size-sorting during grow-out to reduce cannibalism

8) Alter harvest invoices to itemize income per cage

9) Explore using larger cages and reducing stocking density over the grow-out period, as international practice indicates

10) Assume a 12-month grow-out to reach one kilogram, realistically higher interest rates and realistically higher FCR and costs per unit of yield; adjust expectations and operations accordingly

11) Pursue job creation through employment of aquaculture operatives and technical officers, not through processing plant and feed mill operations

12) Explore improvements to micro-credit/reimbursement system for trash fish purchases

<u>Parity</u>

7) To what extent has IAP participation met ethnic equitability goals?

IAP will maintain reasonable ethnic parity, especially if it expands as planned into strongly-Tamil Mullaitivu and into Batticloa, with its substantial Singhalese population.

We found no evidence that out-grower participation will be ethnically skewed and conclude that it will be balanced to a satisfactory degree. (Annex 2.7)

The principal criterion for selecting out-growers is proximity to the production site, currently Kinniya, Trincomalee. Priority goes to local people. (Annex 3.2.3) So far, out of 84 active out-growers, 63% are Muslim, 7% are Tamil, and 30% are Singhalese. Tamils are underrepresented only because their villages are somewhat more remote from IAP sites. (Evaluation team observations and calculations.)

As IAP expands around Trincomalee over coming months, however, more Tamil villages will be reached. Out-growers for the next expansion 'stage' will include 23% Muslims, 73% Tamils and 3% Singhalese, bringing overall participation to 46% Muslim, 36% Tamil, and 18% Singhalese. Envisioned expansion of the out-grower program to Mullaitivu will increase the proportional involvement of Tamils, while expansion to Batticloa will do likewise for Singhalese. (Annex 2.7)

Out of 33 full-time IAP jobs at present, 16 are held by Tamils, 14 by Singhalese and three by Muslims. (Annex 2.21)

8) To what extent has IAP integrated gender considerations and fostered women's participation?

IAP has proved disappointing on integrating gender considerations and fostering women's participation.

IAP explicit policy encourages women's participation. (Annex 1.1) No evidence indicates that ANG has failed to make creditable efforts on this policy. (Annex 3.2.2) A goal of strong female participation may never have been realistic, however.

ANG records show that 14% of registered out-growers are women. This will drop slightly to 13% when a currently waiting group attains registration. (Evaluation team calculations) Non-equal participation does not by itself represent failure of IAP policy, given prevailing gender norms. Participation at 13% could even be counted a success in the face of such norms.

More telling perhaps is the actual involvement of enrolled women. Both male and female out-growers indicate that enrolled women normally stay uninvolved in routine tasks except chopping and preparing trash fish at home. Nor are women heavily involved in financial management, which is handled by husbands or sons, leaving women only nominally affiliated. (Annexes 3.1)

Because the out-grower program essentially establishes family micro-businesses, a pattern of gender bifurcation is hardly surprising, given prevailing norms. Indeed the program establishes new situations of gender bifurcation. It is hard to see how the program could require women enrollees to handle their own financial management tasks rather than relinquishing them to men.

Gender bifurcation flows further from the need to spend nights at cage sites for security purposes. It is unrealistic to expect that women would do so. This means that teams could achieve gender parity in involvement, even if so motivated, only by assigning women with heavy daytime responsibilities to compensate for their unavailability on nighttime security. Given prevailing gender norms on child care and other matters, such daytime responsibilities would also be unrealistic.

BOC's micro-credit extends no special interest rates to women. (Annex 3.2.2) This was probably never a realistic scenario. Even were BOC inclined to offer women special treatment, it would have no assurance that women would be actual rather than pretextual beneficiaries under preferential rates. Meanwhile, IAP plans to deploy women as technical officers have not, as yet, borne fruit. (Annex 3.2.2) Of 33 total IAP jobs at present, four are held by women. (Annex 2.21)

Fundamental change in these realities cannot reasonably be expected. Concentrating out-grower recruitment on unmarried women might conceivably make a difference, but would create culturally problematic situations of interaction with male team members in isolated settings. All-female teams are probably unrealistic due to both heavy-labor requirements and cultural constraints.

Direct employment in place of out-growing might conceivably give ANG more leverage in boosting female participation. It would also eliminate aquaculture financial management as a site for gender bifurcation within families and remove gender bifurcation on security duties within work teams, though ANG-employed guards would almost certainly be men.

In addition to these generic gender issues, the 12-cage fish disappearance and credit incident raises gender ramifications. In light of this negative experience, even if its effects can be ameliorated, the women involved voice plans to relinquish the out-grower program entirely. (Annexes 3.1.11)

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3. Evaluation team documentation

3.1 Out-grower interviews

3.1.1 Ansar, harvested, MM

3.1.2 Bandara, defaulted, MS

3.1.3 (Male focus group) Farook, Seilabdeen, Sathakuula, harvested, MM

3.1.4 Mathanarasa, non-harvested, MT

3.1.5 Mazaker, harvested, MM

3.1.6 Naufer, non-harvest, MM

3.1.7 Premadasa, non-harvested, MS

3.1.8 Ranees, harvested, MM

3.1.9 Riyath, not active, MM

3.1.10 Ruhulla, harvested, MM

3.1.11 (Female focus group)Dayawathi, Lnaka, Kumudu, Gunawathi, default non-harvested, FS

3.1.12 Kanthilatha, harvested, (default group) FS

3.1.13 Kumanaverny, non-harvested, FT

3.2 ANG interviews

3.2.1 ABC plan summary

3.2.2 ANG interview 13 Nov

3.2.3 ANG interview 25 September

3.2.4 ANG interview Trinco

3.3 Government of Sri Lanka Interviews

3.3.1 Dept of Fisheries Trinco

3.3.2 Dept of Fisheries Colombo

3.3.3 Export Development Board Colombo

3.3.4 NADeP Colombo

3.3.5 NAQDA Colombo

3.3.6 NAQDA Trinco

3.3.7 NARA Colombo

3.4 BOC interviews

3.4.1 BOC Colombo

3.4.2 BOC Regional Trinco

3.5 Other agency interviews

3.5.1 AJ Fishing Industries

3.5.2 FAO 11 Oct

3.5.3 FAP 26 September

3.5.4 Fresh Catch

3.5.5 Oceanpick

3.5.6 TESS Group

3.5.7 ZOA

3.6 Miscellaneous documents

3.6.1 Sri Lanka fisheries background

3.6.2 Robin Rackowe c.v.

3.6.3 Mia Hyun c.v.

3.6.4 Mark Hager c.v.

3.6.5 Robin Rackowe conflict of interest statement

3.6.6 Mia Hyun conflict of interest statement

3.6.7 Mark Hager conflict of interest statement

3.6.8 Robin Rackowe expert opinion re ‘semi-processing’ units

4. Other agencies documentation

4.1 FAO and other reports

4.1.1 Aquaculture Development and Investment Strategy for Sri Lanka 7/2012

4.1.2 Fisheries Action Plan Northern Province

4.1.3 Aquaculture in Southern Province 2012

4.1.4. FAO Fisheries and Aquaculture, *Lates calcarifer*
http://www.fao.org/fishery/culturedspecies/Lates_calcarifer/en

4.1.5. CAGE CULTURE OF SEA BASS
http://www.fao.org/docrep/field/003/AB707E/AB707E08.htm#ch8

4.1.6 Training Manual: Biology and Culture of Sea Bass (lates calcarifer)
http://www.fao.org/docrep/field/003/AC230E/AC230E00.htm

4.1.7 L. Cheong, Status of Knowledge of Farming of Seabass (lates calcarifer) in South East Asia, 1989

5. Research instruments

5.1 Methods, summary table

5.2 Checklist for ANG management

5.3 Questions for ANG (Trinco)

5.4 Questions for ANG final

5.5 Follow up questions for ANG

5.6 Follow up questions for BOC

5.7 Out-growers survey instrument

SELECTED ANNEXES

1.2

STATEMENT OF WORK

Mid-Term Performance Evaluation of the Integrated Aquaculture Project (IAP) Under

USAID's Public Private Alliances (PPA) Program in the Northern and Eastern Provinces of Sri Lanka

July 23, 2012

I. Background

A. Project Identification Data

Program:	Public-Private Alliances in Northern and Eastern Sri Lanka
Project:	Integrated Aquaculture Project (IAP)
Award No:	Cooperative Agreement No.383-A-00-l 0-00502-00
Award Dates:	April 1, 2010 to March 31, 2013 (one-year extension pending)
Funding:	SLR 120,000,000 (equivalent to $1,045,114)
Implementer:	Aqua N' Green Limited
AOTR:	Salma Peiris

B. Objective

USAID/Sri Lanka (USAID/SL) proposes to carry out a high-quality mid-term performance evaluation of its Integrated Aquaculture Project (IAP) assessing progress toward project goals. It seeks an organization with previous monitoring and evaluation experience to execute this evaluation.

C. Development Context

Through its Global Development Alliance (GDA), USAID has developed a public-private alliance strategy that leverages private sector resources for development goals. GDA criteria for public-private alliances (PPAs) are as follows:

- At least 1:1 leverage (in cash and in-kind) of USAID resources
- Commonly-defined goals and development solutions
- Non-traditional partners (companies, foundations, and others)
- Shared resources, risks and results
- Innovative, sustainable approaches

USAID/SL assessments have in the past concluded that inequitable regional distribution of economic development helped fuel Sri Lanka's prolonged conflict. To address disparities, its PPA program seeks to expand economic activity in the conflict-affected Northern and Eastern Provinces. USAID/SL has acquired substantial experience in leveraging private sector funds to promote economic growth in lagging regions, thereby consolidating post-conflict stabilization. Private firms provide capital, market access, sustainability and expertise, while USAID supplies funding, technical assistance and guidance on policy influence.

Building on USAID/SL's established economic growth portfolios, PPAs create jobs and generate income, primarily in conflict-affected northern and eastern regions. USAID/SL particularly seeks domestic firms as partners. Partners must demonstrate respect for human rights, ethnic balance, gender sensitivity, integration of people with disabilities and other vulnerabilities, decent work conditions, environmental protection and community involvement in their operational practices.

Within USAID's PPA program, USAID has collaborated with Aqua N Green, a Sri Lankan firm, in establishing the Integrated Aquaculture Project (IAP). IAP aims to boost incomes in the Northern and Eastern provinces, where long coastlines and brackish lagoons make aquaculture a promising opportunity.

A three-year alliance will help 1,300 households establish aquaculture practice in cage fish farming, hiking beneficiary incomes as much as 300 percent. IAP will train participants on best practices; oversee certification under Global G.A.P standards; and enter into buyback agreements securing producer returns. Within three years, IAP will yield an estimated 2,000 metric tons of fish annually. It will produce 4800 floating fish-farm cage units.

Training for fish farmers will cover the following topics, among others: site selection; cage construction and maintenance; identifying and handling healthy fingerlings; harvest and post-harvest operations; stocking densities; and disease control. By termination, all relevant IAP operations will be certified under Global G.A.P. standards.

Fish farmers will on their own accounts buy fingerlings, fish food and cages other than the two that IAP provides to each participant. Micro-credit lending to participating fish farmers will be arranged through IAP collaboration with one or more domestic banks.

Beyond its out-grower network of fish farmers, IAP will create an estimated 225 new jobs, in two facilities near Trincomalee: one an ice-making and fish-processing plant; the other a 'nucleus farm,' including office, fish nursery, model cage farm, feed storage facility, and training/research units aimed at boosting supply of value-added fish products to local and export markets. The fish-processing plant will reach 4,000 metric tons in annual capacity, enough to handle total IAP output plus additional business. IAP will pursue improved women's livelihoods through special interest rate arrangements on bank lending to female fish farmers and through targeted hiring and training of extension officers to help farmers with technical problems like disease control. Extension officer recruitment will also emphasize ethnic diversity.

USAID provided roughly $1.0 million towards the alliance while ANG has committed some $3.2 million.

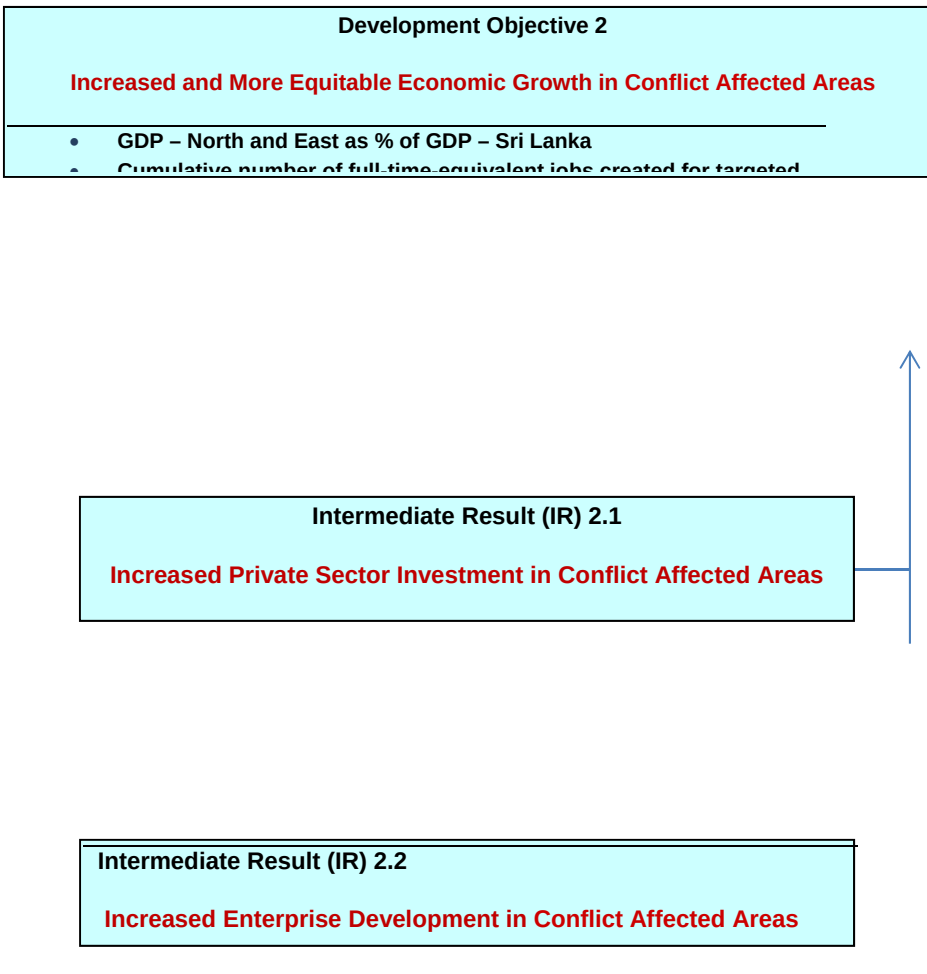
Beneficiaries will equitably include members of all major ethnic groups in the Northern and Eastern Provinces, with gender fairness. Direct participants will be 1,300 out-grower farmers in those provinces and 225 workers at the Trincomalee facility and in other operations.

IAP has established the prototype nucleus farm, so far offering technical and advisory support for cage fish farming. Fingerlings hatched in Negombo are delivered to the developing out-grower network through the farm's nursery. Network expansion and a successful first harvest in November 2011 have yielded increased demand and a need to expand production. The Ministry of Industry and Commerce has meanwhile approved a site for the ice and processing plant at the Trincomalee Industrial Park, where construction recently commenced.

With start-up sites in Trincomalee district, IAP's out-grower network will eventually reach Batticaloa, Jaffna and Mullaitivu districts as well.

D. Intended Results

The pertinent results framework for USAID/SL's development objective number two (DO2) is as follows:



Like other PPAs, IAP aims toward achievement of IR 2.1 (increased private sector investment in conflict affected areas) and IR 2.2 (increased enterprise development in conflict affected areas).

E. Materials

USAID and IAP will provide the evaluation team with materials, including:

- Project description
- Project quarterly reports
- Annual work plans

II. Rationale

A. Purposes

This is an external high-quality mid-term performance evaluation of IAP. Its purposes are to: 1) determine how well or poorly project components are working and why; and 2) identify needed modifications. Priorities include investigating whether IAP's nucleus farm, out-grower, and ice/processing components are operating effectively and are meeting plans and targets.

B. Use

The chief users of the evaluation report will be USAID/SL and its implementing partner, Aqua N' Green. USAID/SL will use the report to modify its IAP description as needed. Aqua N' Green will learn strengths and weaknesses and adjust accordingly.

III. Information and Questions

The evaluation should provide information, statistics, and assessments on performance. Using project monitoring information where possible, the evaluation will compile data on at least the following:

1) Number of full-time equivalent employees
2) Number of fish farming participants
3) Percentage increase of farming participants' incomes
4) Portion of operations or yield certified by Global G.A.P.
5) Number of fish cages constructed
6) Number of fish cages in the model farm
7) Number of fish cages placed
8) Number of fish cage harvests
9) Fish-farming yields, disaggregated by species
10) Number of training programs conducted
11) Number of trainees, disaggregated by ethnicity, gender, age, income
12) Proportion of trainees meaningfully engaged in fish farming, disaggregated as above
13) Participant earnings in ratio to financial costs and hours worked

It should chart performance against target indicators set out in project planning documents and should also recommend realistic updated targets.

The evaluation should address the following questions, using sources as suggested in parentheses or others:

Performance

1) **To what extent have fish-farm participant incomes increased?** (Bank and ANG records; Interviews with fish farmers)

2) **How sustainable is IAP's out-grower fish farming program from the standpoints of beneficiaries and ANG and what are the bases for this assessment?** (Interviews with ANG management and fish farmers)

3) **How many sustainable jobs has IAP generated to date and how many more can be expected?** (ANG records; Interviews with ANG management)

4) **To what extent have micro-credit arrangements succeeded from the standpoints of fish farmers, ANG and the lending institution(s)?** (ANG records; Bank records; interviews with bank staff, ANG management, fish farmers)

Problems

5) **What main obstacles has IAP faced, what solutions have been attempted and how successful have they been?** (ANG records; Interviews with ANG management, IAP project employees, fish farmers)

6) **What modifications should IAP adopt or consider?** (ANG records; Interviews with ANG management, IAP project employees, fish farmers)

Parity

7) **To what extent has IAP participation met ethnic equitability goals?** (ANG records; Interviews with ANG management, IAP project employees, fish farmers)

8) **To what extent has IAP integrated gender considerations and fostered women's participation?** (ANG records; Interviews with ANG management, IAP project employees, fish farmers)

IV. Implementation

The evaluation team should design and propose appropriate methods; review provided documents; review available records; gather information from and about stakeholders and beneficiaries through interviews, focus group discussions or other techniques; devise and implement appropriate quantitative analyses; and take other steps needed to address the evaluation questions.

V. Tasks, Deliverables and Format

The evaluation team will be responsible for executing the following tasks, along with others as needed:

- Gain familiarity with objectives and indicators
- Compile verify, validate and analyze data as itemized above
- Assess performance on objectives and indicators
- Respond to all evaluation questions
- Present report, including findings, conclusions and recommendations

The estimated performance period is six to eight weeks, commencing with task order signature by the contracting officer. This includes preparation for and travel to the region, implementation of research, and preparation of the report. The evaluation will include the following phases.

Phase I

The evaluation team will complete preparation and planning. A written methodology (evaluation design/operational work plan) will be prepared and discussed with USAID before the evaluation proceeds.

Phase II

The evaluation team will complete a desk review and consult project documents and additional background information, not limited to matters supplied by USAID/Sri Lanka. It is strongly encouraged to meet with USAID/EGAT and the USAID/Asia Bureau before travelling to Sri Lanka.

Phase III

The evaluation team will travel to Sri Lanka. hire local partners and have discussions with U.S. Government staff to refine approaches and develop schedules. It will meet with donors, ministries and other organizations concerned with economic development in Sri Lanka. It will gather data in accord with Section IV above. It will provide entry and exit briefings to USAID staff upon arrival and departure from Sri Lanka.

Phase IV

A draft shall be submitted and an oral briefing provided at least one week prior to the due date for the final report. Feedback on the draft and briefing shall be considered in preparation of the final report. All instruments used and data gathered shall be submitted with the final report, in formats suitable for reanalysis, by flash drive or other suitable medium agreed upon with the USAID/Sri Lanka. The quantitative data must be organized and fully documented for use by those not fully familiar with the project or the evaluation, must be owned by USAID and must be made available to the public barring rare exceptions.

All modifications to the statement of work, whether in technical requirements, evaluation questions, evaluation team composition, methodology or timeline shall require written approval from USAID.

The main deliverable shall be the final evaluation report. Other deliverables include the draft report and briefings as described above.

The evaluation report should:

Comply with USAID branding requirements.

Represent a thoughtful, well-researched and well organized effort to evaluate objectively what worked in the project, what did not and why.

Address all evaluation questions in the statement of work.

Explain in detail the evaluation methodology and all evaluation tools.

Disclose limitations to the evaluation, especially with methodology (selection bias, recall bias, unobservable differences between comparator groups, and so on).

Present findings as analyzed facts, evidence and data, not anecdotes, hearsay or opinion compilation.

Present findings specifically and concisely, with strong quantitative or qualitative evidence.

Present a “statement of differences” if needed, regarding significant unresolved divergences of view among funders, implementers, and members of the evaluation team.

Assess outcomes and impact on males and females.

Support recommendations with specific findings.

Offer action-oriented, practical and specific recommendations, with defined responsibilities for actions.

Include an annex containing all tools used such as questionnaires, checklists and discussion guides.

Include the statement of work as an annex.

List all sources of information in an annex.

The format for the evaluation report shall be as follows, modified as necessary:

1. Executive Summary: 3-5 pages in length that summarizes salient findings, conclusions and recommendations
2. Table of Contents
3. List of Acronyms/Abbreviations
4. Introduction: purpose, audience, and task synopsis
5. Background: overview of project strategy and components and of evaluation purpose
6. Methodology: description of methods and limitations
7. Findings/Conclusions/Recommendations
8. Issues: technical, administrative, and other
9. Future Directions
10. References (including bibliographical documentation, meetings, interviews and focus group discussions);

11. Annexes: the evaluation statement of work; a "statement of differences" if needed, regarding significant unresolved divergences of view among funders, implementers, and members of the evaluation team, evaluation methods such as tools used, schedules, interview lists, sources of information, and tables in succinct, pertinent and readable formats; others as needed.

VI. Specific Skills and Experience

The evaluation team should possess adequate experience in program assessments, surveys or polling; understanding of economically-challenged communities; and experience in qualitative and quantitative evaluation methodologies. It should include as members or hire persons proficient in written and spoken Tamil and Sinhala. It should provide written disclosure of possible conflicts of interest.

It shall consist of two key positions, an external team leader/evaluation specialist and an economic analyst, as well as one or more local members assisting with data collection and logistics. It will also include a USAID/Sri Lanka staff member trained on evaluations if USAID/Sri Lanka can provide one. The team leader/evaluation specialist shall be responsible for evaluation design, technical management, and development of tools and instruments such as interview sheets or questionnaires and data processing sheets. The team leader/evaluation specialist and the economic analyst will be jointly responsible for data collection and analysis, along with production of spreadsheets and the report. They should hire local partners for assistance and implementation.

VII. Management

The evaluation team will report to and work closely with Mr. Mark Hager, USAID/Sri Lanka Program Office. The period of performance will be roughly six to eight weeks, beginning around early October 2012.

5.1

Survey and data collection instruments

Research Summary			
Respondents	**Methods**	**Instruments**	**Notes**
ANG management Colombo	In depth interview Questionnaire Request for documentation: - business plans for processing plant and fish feed plant, hatchery - costing for cage construction - costing for licensing - micro-finance proposal - NADeP proposal - IAP Annual reports	ANG management checklist ANG questionnaire	
ANG Staff Trincomalee	Request for documentation: - training materials - complete harvest report - out-grower file sample - complete up to date progress on targets - sample out-grower agreement with ANG. - sample out-grower agreement with BoC. (not public document)	- Harvest report spreadsheet - Annual Work Plan (April 2012-March 2013) Annex 2 - Performance Management Plan, Table 1: Performance Indicator Table	

BOC headquarters in Colombo	- guided interview	- BOC questionnaire	
BOC regional office in Trincomalee	- guided interview - request for additional information	- BOC questionnaire, as above - written questionnaire emailed to BOC	
Out-growers - 18	Survey using in-depth interview technique Focus group discussion using same in-depth interview technique	- out-growers' interview questionnaire	
Government agencies: - NAQDA in Colombo - NAQDA in Trincomalee - NARA - Dept of Fisheries in Trincomalee - Ministry of Fisheries in Colombo (statistics and quality management offices) - NADeP (CBSL) - Sri Lanka Export Development Board	Open guided Interview technique		
Exporters: -TESS/Tropic Fish - Fresh Catch	Open guided Interview technique		

Producers: -Oceanpick	Open guided Interview technique		
Manufacturer of fishing gear, boats and tanks - A.J. Fishing Industry	Open guided Interview technique		
NGOs: - FAO - ZOA	Open guided Interview technique		
Literature review			
Robin Rackowe	Core report		
FAO	2 aquaculture		

Checklist for ANG Management – Interview on 25 September 2012

Person/s responding	**Job title**		
Data compilation			
Questions	***End of project target indicators set in project planning documents***	***Current status***	***Recommended updated targets***
SOW II A – purposes			
<u>Nucleus farm</u> Model farm Fingerlings			

Nurseries Mussel & oyster spat Feed storage & mixing plant Office Staff quarters Aquaculture field laboratory Aquaculture training facility			
<u>Fish-farming out-grower components</u> *Selection criteria:* ethnicity gender disabled female headed household widowed ex-combatant age number of dependents education level capital technical experience other *secondary employment:* are out-growers hiring workers?			
<u>Ice and processing</u>			

Plant Interim arrangements			
Other			
Feed Mill			
Hatchery Negombo Production Expansion Employment *Hatchery Kinniya* - Production - Expansion - Employment			
General SoW questions			
Number of full-time equivalent employees hired by ANG: - IAP office - Extension agents - Processing plant - Feed mill - Hatchery Negombo - Hatchery Kinniya			
Number of fish farming out-growers			
Percentage increase of farming out-growers incomes			
Portion of operations or yield certified by Global			

GAP			
Number of fish cages constructed			
Number of fish cages in the model farm			
Number of fish cages placed with out-growers			
Number of fish cage harvests excluding model farm			
Fish farming yields, (metric tonnes / year) - yr 1 - yr 2 - yr 3			
Number of training programs conducted Content of training programs Who were the trainers Plans for follow-up training			
Total number of trainees, disaggregated by - ethnicity - gender - age - income			
Proportion of trainees meaningfully engaged in fish farming, disaggregated by - ethnicity - gender			

- age - income			
Participant earnings in ratio to financial costs and hours worked: Investment per farmer per harvest cycle (feed, seed, maintenance, depreciation, insurance) Production per farmer per cycle (MT) Farm gate price (MT) Number of hours worked per farmer per harvest cycle Financing arrangements: Equity/loan ratio			
Buy back arrangement: modality Marketing arrangements, buyers, etc Side-sales			
Performance, Problems and Parity			
Questions	***Answers to questions***	***Basis for assessment***	
To what extent have fish-farm participant incomes increased			
How sustainable is IAP's out-grower fish farming program from the standpoints of beneficiaries and ANG and what are the bases for this assessment			
How many sustainable jobs			

(non farming) has IAP generated to date and how many more can be expected			
To what extent have micro-credit arrangements succeeded from the standpoints of fish farmers, ANG and the lending institutions			
What main obstacles has IAP faced, what solutions have been attempted and how successful have they been			
What modifications should IAP adopt or consider			
To what extent has IAP participation met ethnic equitability goals			
To what extent has IAP integrated gender considerations and fostered women's participation			
Recruitment and/or retention: Staff (elaborate) Out-growers			
Working Capital constraints: Purpose Amount Possible sources (cost, terms) Status			
Expansion arrangements: Scaling up existing Trincomali site Regional – new sites			

For individual out-growers			
Any other business			

5.2

Interview Checklist

ANG Management

Person/s responding	**Job title**		
Data compilation			
Questions	***End of project target indicators set in project planning documents***	***Current status***	***Recommended updated targets***
SOW II A – purposes			
<u>Nucleus farm</u> Model farm Fingerlings Nurseries Mussel & oyster spat Feed storage & mixing plant Office Staff quarters Aquaculture field laboratory			

Aquaculture training facility			
<u>Fish-farming out-grower components</u> *Selection criteria:* ethnicity gender disabled female headed household widowed ex-combatant age number of dependents education level capital technical experience other *secondary employment:* are out-growers hiring workers?			
<u>Ice and processing</u> Plant Interim arrangements			
Other			
Feed Mill			

Hatchery Negombo Production Expansion Employment *Hatchery Kinniya* - Production - Expansion - Employment			
General SoW questions			
Number of full-time equivalent employees hired by ANG: - IAP office - Extension agents - Processing plant - Feed mill - Hatchery Negombo - Hatchery Kinniya			
Number of fish farming out-growers			
Percentage increase of farming out-growers incomes			
Portion of operations or yield certified by Global GAP			

Number of fish cages constructed			
Number of fish cages in the model farm			
Number of fish cages placed with out-growers			
Number of fish cage harvests excluding model farm			
Fish farming yields, (metric tonnes / year) - yr 1 - yr 2 - yr 3			
Number of training programs conducted Content of training programs Who were the trainers Plans for follow-up training			
Total number of trainees, disaggregated by - ethnicity - gender - age - income			
Proportion of trainees meaningfully engaged in fish farming,			

disaggregated by - ethnicity - gender - age - income			
Participant earnings in ratio to financial costs and hours worked: Investment per farmer per harvest cycle (feed, seed, maintenance, depreciation, insurance) Production per farmer per cycle (MT) Farm gate price (MT) Number of hours worked per farmer per harvest cycle Financing arrangements: Equity/loan ratio			
Buy back arrangement: modality Marketing arrangements, buyers, etc Side-sales			
Performance, Problems and Parity			
Questions	***Answers to questions***	***Basis for assessment***	

To what extent have fish-farm participant incomes increased			
How sustainable is IAP's out-grower fish farming program from the standpoints of beneficiaries and ANG and what are the bases for this assessment			
How many sustainable jobs (non farming) has IAP generated to date and how many more can be expected			
To what extent have micro-credit arrangements succeeded from the standpoints of fish farmers, ANG and the lending institutions			
What main obstacles has IAP faced, what solutions have been attempted and how successful have they been			
What modifications should IAP adopt or consider			
To what extent has IAP participation met ethnic equitability goals			
To what extent has IAP integrated gender considerations and fostered women's participation			
Recruitment and/or retention: Staff (elaborate) Out-growers			

Working Capital constraints: Purpose Amount Possible sources (cost, terms) Status			
Expansion arrangements: Scaling up existing Trincomali site Regional – new sites For individual out-growers			
Any other business			

5.3

Questions for ANG

Second Questionnaire

October 3, 2012

1. **Right now there is a margin between ANG fish purchase price and re-sale price. This creates a risk of side-sale by out-growers and consequent loan default. How important is ANG's buy/resale margin, given the risk it poses to the credit structure?**

2. **What is the current status of the meal/feed plant? Where will it be located? When will it begin operating?**

3. **How does the Central Bank loan re-finance system work? How could it help ANG and B of C solve the problem of default risk?**

4. **How did ANG create its recommended trash fish feeding schedule? Industry standards? Pilot project? Trial in local lagoons? Other?**

5. **If an operational processing plant would allow ANG to pay higher prices to out-growers, why is that the case?**

6. **What efforts has ANG made toward securing 'micro-insurance' against harvest losses caused by uncontrollable factors? Is collaboration with B of C warranted on such efforts? What further efforts could be emphasized over the next six months?**

7. **Could ANG provide advances or credit on fingerlings if it took credit from B of C?**

8. **Since B of C is currently extending non-collateralized loans to out-growers, what would prevent it from extending non-collateralized credit to ANG? Is ANG aware that B of C would need to follow different rules for loans to ANG than for loans to out-growers?**

9. **Does ANG see any possibilities for securing credit to itself through collateral or mortgages for purposes of supporting out-grower operation? If so, what are those possibilities and what disadvantages does each pose for ANG?**

10. **Is it realistic to suppose that ANG could redeem out-grower invoices for cash from banks, which could then be used to support out-grower operations? Why or why not?**

11. **B of C has apparently proposed that out-growers sequester LKR 5000 from each harvest with B of C as security against future default. Is this a viable proposal? Why or why not?**

12. **What effective and affordable additional security, if any, could ANG provide to out-growers against theft and vanadalism risks? What costs or other burdens would be involved?**

13. **If current high interest rates continue for the next 18 months, how seriously would the ANG/out-grower business plan be threatened? Why?**

14. **Could ANG assist out-growers with expanded trash fish storage and security against trash fish theft? If so, how, and how burdensome or expensive would this be? Would this be a significant benefit to out-growers? Why or why not?**

15. **With fish feed available from the ANG mill, would out-grower outlays rise or fall? How much and why? Would out-growers yields rise or fall? How much and why?**

16. **Are sea-fishermen who do not own their own boats advised that sea bass outgrowing could damage sea-fishing income because outgrowing tasks cannot be performed by someone who is out fishing?**

17. Is ANG aware of Oceanpick's impending operation of industrial offshore sea bass cage farming at Trincomalee? What threats, if any, does this pose to the sustainability of the ANG/out-grower business model?

18. One group of current out-growers has 25 members to be called 'Team 25' for purposes of questions here. Is it true that Team 25 experienced serious delays in receiving fingerlings promised to them due to hatchery and nursery problems? Please explain.

19. Is it true that some or all Team 25 members received no training on credit? Please explain.

20. Is it true that ANG invoiced B of C on 900 fingerlings for Team 25 members, but that some members received their second 450-fingerling installment several months later? Please explain.

21. Is it true that ANG decided it would be better to get other out-grower teams started with fingerlings before supplying Team 25 members with their second fingerling installments? Please explain.

22. Is it true that ANG promised roughly seventeen Team 25 members that they would receive 450 fingerlings around December 2011 and were invoiced accordingly but that those fingerlings have not yet been provided? Please explain.

23. Is it true that the nursery was moved to a different location for some period of time after operations commenced? If so, when and why did this happen? What was the duration of the re-positioning? What were the consequences for ANG/out-grower operations, if any?

24. What major problems are posed by plastic fish cage net used in the ANG/out-grower program? Weight? Mesh size? Algae? Water flow? Growth rates? More frequent cleaning? Other?

25. Has ANG estimated or recorded the number of fish per cage too small for paid harvest by the end of a normal cycle? If so, what is that estimate/record?

26. Is it true that under normal conditions with standard practices, cage sea bass in any given batch may grow at substantially different rates? If so, what feasible solutions, if any, could be found?

27. Should ANG consider recommending larger out-grower groups, along the size of Team 25, to allow economies on labor, feed storage, lower trash fish purchase prices and others? Why or why not?

28. Do registered societies like Team 25 enjoy any advantages in securing government services? If so, what are those advantages?

29. Is it true that cage sea bass eat less when salinity is too high or low?

30. Is it true that the level of sea bass eagerness to eat can be reliably determined through direct observation?

31. Can trash fish be purchased in bulk at discount prices?

32. Is a target of 800 grams/fish in order to receive 250 LKR/kg. overly high?

33. Has ANG encountered substantial situations of prolonged harvest periods due to unexpectedly slow growth?

34. Is it true that harvests occur only when fingerlings are brought from the hatchery? If so, why, and could this be altered?

35. Would ANG seriously consider a proposal to purchase super-size cage sea bass from Team 25 for a locally-adapted parent stock? Why or why not?

36. Could the Wellaimanal site handle 175 cages? Why or why not?

37. How does NAQDA licensing work?

38. What are the conditions for a good sea bass cage culture site?

39. How are sea bass cage platforms held in place?

40. What, if anything, has Team 25 told ANG about the damage to nets and loss of fish in a particular severe storm? Has ANG reached a conclusion as to the reliability of any account it heard from Team 25? If so, what is that conclusion?

41. What are the details, including dates and other data, of an occasion when Team 25 fish apparently vanished between a time when the harvest was estimated and the time of actual harvest? What is ANG's best explanation for any discrepancy and what is the basis for it?

42. What is the purpose of ANG's NaDep proposal, what are the capitalization details, and how is the proposed scheme fair and advantageous to current and future out-growers? Would the scheme convert current or future out-growers from single entrepreneurs to shareholders or wage-workers, wholly or partly? What is the purpose of the semi-processing centers and how does this relate, if at all, to the out-grower program?

5.4

Follow-up Questions ANG: Third Questionnaire and Document Request

1.How many full-time jobs does IAP provide? How do these break down by gender, ethnicity and job category?

2.What special efforts, if any, has IAP made to recruit women employees and out-growers?

3.How many out-growers should be served by each IAP extension officer in a well-run program?

4.How many retention officers have quit after beginning work?

5.What are the leading causes of retention officer attrition?

6.What solutions does IAP envision for improving retention of extension officers?

7.Does IAP have retention issues in other job categories? If so, what categories are involved and what solutions are envisioned?

8.What are your projections on processing plant income? On what are these projections based?

9.How do you respond to concerns that your processing plant will deliver insufficient revenue because Sri Lanka already has an overcapacity in fish processing?

10.How would the proposed ABC semi-processing sites affect your processing revenue plant projections?

11.Does ANG envision any alternatives to the NADeP/ABC scenario for financing, going forward? If so, please describe.

12.What are the prospects for securing crop insurance and what is the current status of your efforts?

13.Is it feasible for you to begin paying market price for harvested fish? If not, why not?

14.Is it feasible for you to raise fingerling prices to defray shipping/ice costs? If not, why not? If so, what should the new price be?

15.Should your targets on number of out-growers be shifted downward? If not, why not? If so, why and what should the new targets be?

16.How feasible would it be to shift emphasis from part-time out-growers to full-time employees for aquaculture operations? Please explain.

17.Can IAP survive another credit breach like the recent one? Please explain.

18.How feasible would it be to recruit and use unemployed youth with some schooling for aquaculture operations? Please explain.

19.Could you consider restricting your processing plant operations in order to concentrate resources on fish production? Please explain.

20.Could you hire aquaculture experts to support your operations? Please explain.

21.Could you step up your training, monitoring, mentoring and follow-up on aquaculture operations? Please explain.

22.What explanations would you offer for your departures from international practices (e.g., Thailand) on feeding amounts, grading frequency and stocking density?

23.Could you alter your receipt/invoice practices so that out-growers receive an immediate record of gross sale revenues?

24.What delays did 2010-11 flooding cause?

25.Could ANG collaborate with out-growers to monitor their different feeding regimens and results? Please explain.

26.What is ANG's current estimate of annual income over the next two years from out-grower operations? What assumptions does this estimate rest on?

27.What is ANG's current estimate of annual income over the next two years from the model farm and nursery? What assumptions does this estimate rest on?

28.What is ANG's current estimate of annual income over the next two years from the processing plant? What assumptions does this estimate rest on?

29.How much will current high interest rates reduce projected out-grower incomes? Please explain.

30.How much will current high trash fish prices reduce projected out-grower income? Please explain.

31.How much would raising fingerling prices to cover production and delivery costs reduce projected out-grower incomes? Please explain.

32.How feasible would it be to concentrate more heavily on retaining current out-growers and expanding their operations rather than on launching new out-growers? Please explain.

33.Since IAP's beginning, how much has ANG spent on:

Processing plant?

Feed mill?

Hatchery?

Nursery?

Model farm?

Payroll?

Other?

34.What would ANG's main revenue sources be after ABC begins operations? What annual revenues

does ANG project from each source?

35. What unanticipated delays, if any, has IAP faced in getting its feed mill and processing plant online? Why were these delays not anticipated?

36.Did your experimental pilot studies use out-growers?

37.Has ANG ever been audited?

38.How frequently are out-grower cages visited over recent weeks? How frequently should they be visited?

39.If an operational processing plant would allow ANG to pay higher prices to out-growers, why is that the case?

40.From whom have you borrowed for IAP working capital needs, how much have you borrowed and with what collateral?

41.What interest rate is BOC currently charging out-growers?

42.How will ABC semi-processing plants afford cost savings to you on grading, gutting, gilling, cleaning, etc.?

Document Requests

1.ANG out-grower agreement in English
2.Financial assumptions/projections/data for processing plant
3.Records on numbers of fish in each harvested cage
4.Tabulations of cage grow-out survival rates in pilot studies and actual experience
5.ANG capital and revenue records over life of IAP

5.5

Follow-up Questions ANG

1. How many full-time jobs does IAP provide? How do these break down by gender, ethnicity and job category?
2. What special efforts, if any, has IAP made to recruit women employees and out-growers?
3. How many out-growers should be served by each IAP extension officer in a well-run program?
4. How many retention officers have quit after beginning work?
5. What are the leading causes of retention officer attrition?
6. What solutions does IAP envision for improving retention of extension officers?
7. Does IAP have retention issues in other job categories? If so, what categories are involved and what solutions are envisioned?
8. What are your projections on processing plant income? On what are these projections based?
9. How do you respond to concerns that your processing plant will deliver insufficient revenue because Sri Lanka already has an overcapacity in fish processing?
10. How would the proposed ABC semi-processing sites affect your processing revenue plant projections?
11. Does ANG envision any alternatives to the NADeP/ABC scenario for financing, going forward? If so, please describe.
12. What are the prospects for securing crop insurance and what is the current status of your efforts?
13. Is it feasible for you to begin paying market price for harvested fish? If not, why not?
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16. How feasible would it be to shift emphasis from part-time out-growers to full-time employees for aquaculture operations? Please explain.
17. Can IAP survive another credit breach like the recent one? Please explain.
18. How feasible would it be to recruit and use unemployed youth with some schooling for aquaculture operations? Please explain.
19. Could you consider restricting your processing plant operations in order to concentrate resources on fish production? Please explain.
20. Could you hire aquaculture experts to support your operations? Please explain.
21. Could you step up your training, monitoring, mentoring and follow-up on aquaculture operations? Please explain.
22. What explanations would you offer for your departures from international practices (e.g., Thailand) on feeding amounts, grading frequency and stocking density?
23. Could you alter your receipt/invoice practices so that out-growers receive an immediate record of gross sale revenues?
24. What delays did 2010-11 flooding cause?
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26. What is ANG's current estimate of annual income over the next two years from out-grower operations? What assumptions does this estimate rest on?
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plant? What assumptions does this estimate rest on?

29. How much will current high interest rates reduce projected out-grower incomes? Please explain.
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31. How much would raising fingerling prices to cover production and delivery costs reduce projected out-grower incomes? Please explain.
32. How feasible would it be feasible to concentrate more heavily on retaining current out-growers and expanding their operations rather than on launching new out-growers? Please explain.
33. Since IAP's beginning, how much has ANG spent on:
    Processing plant?

    Feed mill?

    Hatchery?

    Nursery?

    Model farm?

    Payroll?

    Other?

34. What would ANG's main revenue sources be after ABC begins operations? What annual revenues does ANG project from each source?

35. What unanticipated delays, if any, has IAP faced in getting its feed mill and processing plant online? Why were these delays not anticipated?

5.6

Follow-up Questions – BOC

1. What interest rates were charged at the onset of the out-grower program and what are being charged now?
2. Are these rates concessional? Please explain.
3. How are the interest rates determined?
4. Are different rates charged to different borrowers?
5. Are special rates extended to women?
6. Do special rules apply to allow noncollateralized loans to out-growers? Please explain.
7. Is BOC lending to the out-grower program a matter of corporate social responsibility? Mandate from some authority? Encouragement from some authority? Please explain.
8. If BOC encounter further credit incidents in the out-grower program, how likely is it that BOC would terminate issuance of credit to all out-growers?
9. What assistance can BOC provide in helping the out-grower program secure 'crop insurance'?
10. Has BOC now imposed a requirement that out-growers taking credit must deposit LKR 5000 from each harvest into their savings accounts?
11. If such a requirement has been imposed, does it apply to all out-growers or only to those implicated in the recent 'default'?
12. How does such a requirement provide assurance to BOC against default scenarios? Please explain?
13. How feasible is it that BOC could step up its monitoring, mentoring and follow up for out-grower borrowers?
14. Could ANG itself become the borrower under some feasible interpretation or modification of BOC rules on making noncollateralized loans for development purposes?

5.7

Interview Checklist

Out-growers –based on most recent cycle

1. Name
2. Sex
3. Ethnicity
4. Age
5. Marital status
6. Education level
7. Are you head of household
8. Number of dependents
9. Are/could women be involved in this activity? In what way? Why?
10. Employment and income before undertaking this activity: for each income earner, clarify timeframe (monthly, 6 months?)
11. How has this (time/income) changed since undertaking FF?
12. Training received; when and by whom, areas covered (ANG, BOC)
13. How long actively involved in this fish farming?
14. Number of cages, when each installed?
15. Capital expenditure: purchase of additional cages; by source(s) of funds, when.
16. Fingerlings; source, quantity used/cycle, cost/fingerling, survival rate (how many fingerlings did not survive and why)
17. Production; yield (in kgs)/cycle, how long each cycle, how many cycles, cause of variance, average and range fish weight at harvest
18. Feed; source, type of feed, quantity used per cycle (feed conversion ratio), cost/kg, requires preparation (chopping)?How does this change (actual feed, quantity, quality and frequency)
19. How much time (hrs/day or week or month spent by FF and/or family members for various activities: feeding, security, harvesting, maintenance, other?
20. Number of paid persons employed (from outside the family) on each cage; by gender, ethnicity, activity, time spent per day/week/month and cost.
21. Harvesting: who does it, how often, how long does it take, what is the cost?
22. Marketing/sales: at farm gate, delivered to buyer? types of buyers, prices by sizes of fish, other services

23. Transport to market: who does it, cost?I
24. Income from sales of fish; by harvest, 17) x 22)
25. Operating expenses, by harvest; 16), 18) and 20)
26. Cash flow by harvest; 24) minus 25)
27. Use of credit; source(s), application, payment terms (principle/harvest, cost (interest)
28. Net cash flow per harvest: 26) minus 27)
29. Obstacles, risks or problems encountered or potential/expected; solutions attempted and degree of success
30. Modifications suggested
31. Future prospects; likely sustainability or not, anticipated growth: would you expand to more cages? How many and when? Why or why not? What additional resources would be required?
32. Do you have crop insurance? Would you buy aquaculture insurance if becomes available? Why or why not?