

A Study on Sri Lanka's readiness to attract investors in aquaculture with a focus on marine aquaculture sector

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Commissioned by Norad for the Royal Norwegian Embassy, Colombo, Sri Lanka

TABLE OF CONTENTS

Table of contents	2
Abbreviations and Acronyms	6
Background and scope of study	8
Action plan - main findings and recommendations	8
Ref. Annex 1: Regulatory, legal and institutional framework conditions related aquaculture	9
Ref. Chapter I: Aquaculture related acts and regulations	9
Ref. Chapter II: Aquaculture policies and strategies	10
Ref. Chapter III: Aquaculture application procedures	10
Ref. Chapter IV: Discussion on institutional framework related to aquaculture	11
Ref. Chapter V: Environmental legislation	11
Ref. Chapter VI: Investing procedures in Sri Lanka, including incentives in custom, taxes and financing	12
Ref. Annex 2: Strategies for building human resources, research and technology with a focus on marine aquaculture	12
Ref. Annex 3: Models for encouraging commercial development in marine aquaculture	12
Ref. Chapter 1: Private companies, joint venture with foreigner	12
Ref. Chapter II: Buy Back arrangements	13
Ref. Chapter III: Public-Private-Partnership arrangements	13
Ref. Chapter IV: Aquaculture parks	13
Ref. Chapter VI: Other models to encourage commercial development	13
Ref. Annex 4: Why should foreign investor look into Sri Lanka?	15
Ref. Chapter III: How to mobilize foreign aquaculture investors - by Sri Lanka	15
Annex 1: Regulatory, legal and institutional framework conditions related aquaculture	15
I. Aquaculture related acts and regulations	16
a) Department of Fisheries & Aquatic Resources	17
b) National Aquaculture Development Authority of Sri Lanka	18
c) Department of Animal Production and Health	25
d) Recommendations	25
II. Aquaculture policies and strategies	26
III. Aquaculture application procedures and licensing	29
IV. Discussion on institutional framework related to aquaculture	32
a) Department of Fisheries & Aquatic Resources	32

b)	National Aquaculture Development Authority of Sri Lanka	33
c)	National Aquatic Resources Research and Development Agency	34
d)	Research.....	34
V.	Environmental legislation	36
a)	In the coastal zone	36
b)	Outside the coastal zone.....	37
c)	Marine Environment Protection Authority (MEPA).....	39
VI.	Investing procedures in Sri Lanka, including incentives in custom, taxes and financing	41
a)	Board of Investment (BOI)	41
b)	One stop shop	44
a)	Labour law.....	45
b)	Incentives	46
c)	Financing/funding	47
Annex 2: Strategies for building human resources, research and technology with a focus on marine aquaculture		47
I.	Universities	47
a)	University of Peradeniya	48
b)	University of Kelaniya	48
c)	University of Ruhuna.....	48
d)	University of Sri Jayewardenepura	49
e)	Wayamba University	49
f)	University of Jaffna	49
g)	Ocean University	49
h)	Conclusions	50
II.	Foreign multi- or bilateral cooperation in aquaculture	51
a)	FAO.....	53
III.	Strategies for research and development projects to support sector development	54
Annex 3: Models for encouraging commercial development in marine aquaculture		56
I.	Private companies, joint venture with foreigner	56
a)	OceanPick.....	56
b)	Ceylon Seafood Limited	59
II.	Buy Back arrangements	60
a)	Hailey's.....	60

b) Aqua N'Green Ltd.....	63
III. Public-Private-Partnership arrangements	64
a) Shrimp hatchery at Batticaloa.....	65
b) Divron.....	65
c) Marine fish hatchery Batticaloa	66
d) Recommendations	66
IV. Aquaculture parks.....	67
a) Batticaloa	67
b) Mannar.....	67
c) Recommendation.....	67
V. Aquaculture in ports	68
a) Galle Harbour	68
b) Oluvil Harbour.....	69
c) Trincomalee Harbour	69
d) Conclusion.....	70
VI. Other models to encourage commercial development.....	70
a) Demonstration, training and trial farms	70
b) Cluster/cooperative	71
c) Zoning – recommendations	72
d) Fisheries Mega Zones.....	74
Annex 4: Why should foreign investor look into Sri Lanka?	75
I. General observations.....	75
II. Why is foreign investment beneficial to development of aquaculture	78
III. How to mobilize foreign aquaculture investors - by Sri Lanka	79
Annex 5: Appraisal of aquaculture status and potential with a focus on marine aquaculture	82
I. Area availability and physical conditions	82
II. Species	83
a) Seaweed.....	83
b) Sea cucumber.....	84
c) Bivalves	85
d) Crustaceans.....	86
e) Freshwater fish	89
f) Marine fish	90

III. Some Input factors.....	91
a) Feed.....	91
b) Labour	92
IV. Production volume.....	92
V. Market and value chain issues observations	93
VI. Organisations related to aquaculture products.....	94
Annex 6: People met and consultant team	95
Annex 7: Reference list	102
Annex 8: Terms of Reference.....	105
Report from 1 st workshop delivered as separate file/report.....	109
Report from 2 nd workshop delivered as separate file/report.....	110

ABBREVIATIONS AND ACRONYMS

Acre	1 Acre = 0.4047 ha
ADB	Asian Development Bank
ANG	Aqua N'Green (a company)
BB	Buy Back (arrangement) i.e. fixed and guaranteed price purchase arrangement
BMP	Best Management Practises
BOI	Board of Investment
CCC	Ceylon Chamber of Commerce
CEO	Chief Executive Officer
Cess	Levy on imports
CFC	Ceylon Fisheries Corporation
D	Director
DAPH	Department of Animal Production and Health
DFAR	Department of Fisheries and Aquatic Resources Development
DFI	Direct Foreign Investments
DG	Director General
EDB	Sri Lanka Export Development Board
EIA	Environmental Impact Assessment
EIM	Environmental Impact Monitoring
Eoi	Expression of Interest
EPL	Environmental Protection License
EU	European Union
FAO	United Nations Food and Agriculture Organisation
FAOLEX	Comprehensive legislative and policy database
FCR	Feed Conversion Rate i.e. ratio of kg feed to produce 1kg fish
FDI	Foreign Direct Investment
GoSL	Government of Sri Lanka
ha	1 hectare = 2.47 acres
HDPE	High Density Poly Ethylene (plastic tubes for cages)
HRD	Human Resource Development

IAP	Integrated Aquaculture Project (a USAID supported project)
IEE	Initial Environmental Examination
IFAD	International Fund for Agricultural Development
IQF	Individual Quick Frozen
IT	Information Technology
JV	Joint Venture
Knot	1 knot = 0.5 m/s
LKR ¹	Sri Lankan Rupee (01.07.16: LKR 140 = USD 1)
LTTE	Liberation Tigers of Tamil Eelam (Tamil Tigers rebel group)
Mill.	Million
Mariculture	Aquaculture in the sea
MEPA	Marine Environmental Protection Authority
MFARD	Ministry of Fisheries and Aquatic Resources Development
ML	Ministry of Lands
MPI	Ministry of Primary Industries
NARA	National Aquatic Resources Research and Development Agency
NAQDA	National Aquaculture Development Authority
NBT	National Building Tax
NIFATI	National Inland Fisheries and Aquaculture Training Institute (under NAQDA)
NGO	Non-Governmental-Organisation
NOK ¹	Norwegian Kroner (01.07.16: NOK 8.072 = USD 1)
Norad	Norwegian Agency for Development Cooperation
ODA	Overseas Development Assistance
PAL	Port and Airport Development Levy
PCR	Polymerase Chain Reaction
PL	Post Larvae (of shrimp or freshwater prawn)
PPP	Public Private Partnership
R&D	Research and Development
SPF	Specific Pathogen Free (broodstock)

¹ Currency exchange rates from OANDA.com

SLA	Sri Lanka
SRC	Semi Refined Carrageenan, a colloid produced from seaweed
ToR	Terms of Reference
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
USD	US Dollar
VAT	Value Added Tax
VND	Vietnamese Dong (currency) about 23,000 to 1 USD

BACKGROUND AND SCOPE OF STUDY

Sri Lanka's bilateral relationships have moved away from donor driven cooperation into more commercial and technical cooperation. During a visit by the Norwegian Minister for Foreign Affairs, business development in the fisheries sector was one of the key cooperation areas identified to explore and to build on during 2016-17.

Following a meeting between the Norwegian Ambassador and the Minister for Fisheries & Aquatic Resources Development (MFARD) of Sri Lanka, a request was sent to Norway, to support a consultant to work with MFARD to prepare better for the above mentioned transition, by identifying the requirements and changes needed for commercialisation of especially the marine aquaculture sector, and for attracting commercial investors both local and foreign. Especially the large underutilized marine and coastal area resources have been considered a unique competitive edge of Sri Lanka (SLA).

The main scope of the consultancy is to make a comprehensive appraisal of SLA's readiness to attract local and foreign investors in aquaculture with a focus on marine aquaculture, and develop an action plan with recommendations to MFARD, for how to commercialize especially the marine aquaculture sector, by developing a better investor friendly environment able to attract investors.

The consultant wants to thank NAQDA for providing work space and assistance during the consultancy.

ACTION PLAN - MAIN FINDINGS AND RECOMMENDATIONS

The below action plan presents the main findings and recommendations, which could improve SLA's readiness to develop a commercial aquaculture sector. The recommended actions are not all related to MFARD and its line agencies. Therefore there is a need for MFARD to follow up towards other ministries or agencies. The recommended actions are presented with reference to the Annex headings and chapters to make it easier to find more detailed information and justifications.

REF. ANNEX 1: REGULATORY, LEGAL AND INSTITUTIONAL FRAMEWORK CONDITIONS RELATED AQUACULTURE

Ref. Chapter I: Aquaculture related acts and regulations

- Amend and update acts and regulations to reflect that in reality DG NAQDA has been authorised to issue the inland fisheries license; the inland culture based fisheries license and the aquaculture management license. Reference to the DG DFAR having some pro forma power in aquaculture and inland fisheries should be omitted in both 2006-amendments to the principal Fisheries Act and the principal NAQDA Act as well as Inland Fishing Operations Regulations, 2011. Thus a new amendment to the NAQDA Act should give NAQDA the clear full direct power for the aquaculture management licensing and the fee collection, as it has been given by the mandate for aquaculture management.
- In the 2006-amendment to the NAQDA Act regarding its functions, there is a conflicting use of words in:
Section 12, bullet b: Initiate and **conduct** researches and resource surveys and **assist in conduct** of research to ascertain the development potential in water and land resources, for aquaculture.
At one hand it says conduct research, but in same sentence it also says only to assist in conduct of research. As there is a debate between NARA and NAQDA, whether NAQDA should conduct research, the above conflicting use of words should be clarified. It is recommended to delete the words 'assist in' to signal that NAQDA can do (development) research, and thus make the research environment more competitive by being more institutions performing research.
- The Aquaculture Management (Disease Control) Regulations, 2000 and The Aquaculture (Monitoring of Residues) Regulations, 2002 should replace the reference to DG DFAR with DG NAQDA, and then they should be updated technically, and there should be clear references to different accredited/approved disease laboratories mentioning also their field of expertise, for the aqua-farmer to know whom to contact.
- The Aquaculture Management Regulations of 2011. The regulations should be updated.
- It is recommended to stop using license fees, as it likely is more costly to administrate, than the revenue they bring in (<1% of the total income of NAQDA). Instead introduce a standardised area lease fee for corporate investors based on size of (public) area used, and not related to type of production, to make it easy to manage.

There is a need for developing a whole set of new regulations to accommodate modern large volume marine fish farms including:

- Main marine farm regulation. Introduce e.g. 15-20 year permits. Put as preconditions in the permit that the aquaculturist has to submit annual status reports describing the species farmed, farm sites in use, stocking volume, production achieved, sales channel (i.e. whether sold domestic or exported), diseases/mortalities encountered, feed used (brand), number of staff.
Likewise farms larger than a certain size, and using feed input, should submit annual Environmental Impact Monitoring (EIM) reports made by one of the environmental agencies

or approved consultants. In the permits it should also be a precondition to use only pellet feed and disease screened juveniles (also for the small-scale farms).

- There should be a regulation covering chemicals and drugs permitted to be used in aquaculture (a so called positive list – not a list of banned chemicals and drugs), including approval procedures for new chemicals and drugs
- There should be a regulation for imports of feed, approval procedures, including testing for unwanted chemicals or drugs.
- There should be a regulation for procedures for imports of fertilised eggs, juveniles and broodstock of aquatic organism for aquaculture, including also procedures for introducing exotic species. Incl. list of permitted species. The regulations could be developed based on FAO's regional guide for transboundary movement of aquatic organism
- There is a need to stop the use of giving 1-year renewable licenses across all the agencies in SLA. They are a very constraining and are a deterrent factor for an investor.

Ref. Chapter II: Aquaculture policies and strategies

- MFARD has policy and strategy documents. But the present policy and strategy documents tend to focus on reporting the status, and thus the policy priority message of MFARD tends to get lost. It is suggested that the documents show better the priorities and encouragement to the private enterprises and to the development of the commercial sector.

Ref. Chapter III: Aquaculture application procedures

- Make a manual of procedures for getting an Aquaculture Management License, including a clear flow chart, and post it on a more user friendly NAQDA website (look at CEA website for inspiration). Make direct links to all relevant acts and regulation for people to download. Likewise make direct links to the different line agencies involved in the application process. Make it possible for people to send questions via web to NAQDA to avoid sitting in front office waiting for simple questions.
- Transparency in application process. All the committees involved in evaluation of an application should have clear and published mandates, as well as standards for their evaluations. At the moment, there are no exact written standards, for how an application is being processed. It basically depends on the discretion of the licensing officer, how to process an application.
- Another issue is all the applications that an investor has to file and follow up on. As many of the line agencies have their own technical committees, often with representatives from the other line agencies, where they themselves also are member of their committees, it should be possible to have an application discussed at one meeting, where all relevant agencies are called instead of the many meetings taking place in each of the different agencies. This could e.g. be solved by having a coordinating 'one stop shop', who sends the electronic version of the application to the relevant line agencies and collect their response, to be communicated with the applicant. This would likely cut some of the processing time, as the number of meetings should be reduced. The one stop shop could be in the MFARD (Investor Facilitation Cell), or it could be a function at NAQDA, if preferring to keep aquaculture separate.

- To facilitate the above action the use of E-application procedures should be introduced instead of hard copy applications. It can be done in SLA. E-visa application is an example – taking less than 3 minutes to get a visa. This would also facilitate involvement of the local governments, including the political Provincial Council and district administration, as aquaculture should also take place according to the development plan of the region to avoid user conflicts. With E-applications a lot of travelling time to Colombo would be saved.

Ref. Chapter IV: Discussion on institutional framework related to aquaculture

- NAQDA has been given the mandate to do both management and service functions. This double function can in some cases create a conflict of interest. Hence the functions should be considered to be separated.
It is recommended to move up the function of aquaculture and inland fisheries management to the level of a (new) department under MFARD with full authority for aquaculture and inland fisheries management and development, including issuing regulations.
The service functions of NAQDA, such as extension and training, analytical lab facilities, juvenile production and entering PPP's should be moved to a new semi-governmental "Aquaculture and Inland Fisheries Support Center" with reference to the new (NAQDA) department.
- NAQDA should have a seat in the Governing Board of NARA, as well as in its (aquaculture) scientific and technical committee. NAQDA should have a stronger role/function to guide the research needed for aquaculture sector development.
- It is recommended to establish a research council in MFARD, which develops the research agenda of MFARD financed Research & Development, to insure research, paid by MFARD, at NARA and NAQDA is in line with the MFARD policy. In the council representative from private sector organisations could also have a seat to assure input from the private sector.
- The identified research agenda should be made public available for universities and even private sector, in addition to NARA and NAQDA, to submit EoI's or technical proposals with budgets supported by CV's of key project staff. This would ensure an element of competition and better value for money, and it would open up for involvement of expertise from universities.

Ref. Chapter V: Environmental legislation

- Getting the marine aquaculture farm approvals from Ministry of Environment involves filing separate applications to three different departments in the Ministry: Central Environmental Authority (CEA); Coastal Conservation Department (CCD) and Marine Environment Protection Authority (MEPA). This is not very user friendly, and it is recommended that they at least coordinate applications inside their own Ministry.
- The MEPA tax imposed on marine aquaculture is recommended changed into a more understandable, annual, water surface area lease to be paid by marine aquaculture companies based on the area of all sites commissioned to the company, whether in use or not, and irrespective of which species is involved, because already the tax is calculated on the water volume 'in use', and not pollution caused. As it then is a simple area usage fee, it should be discussed, if MEPA is the rightful owner of the lease, or if the revenue more rightfully belongs to the respective province.

Ref. Chapter VI: Investing procedures in Sri Lanka, including incentives in custom, taxes and financing

- BOI should communicate openly and transparently on their website, which incentives or concessions, the coming new investment act can offer foreign investors in the different sectors, for them to know before they start the application process.
- If BOI cannot organise a real, functioning one stop shop, MFARD should organise similar inside MFARD only for fisheries and aquaculture.
- Incentives or concessions for aquaculture investments are recommended also in future and to include:
 - tax grace, as it will encourage production;
 - tax/duty etc free imports of input factors (such as feed), if they are not produced locally, and if at least 80 % of the production is exported
 - it is recommended to offer even better incentives if investments are made in poorly developed provinces/districts, or if investment will bring in a desired technology.

REF. ANNEX 2: STRATEGIES FOR BUILDING HUMAN RESOURCES, RESEARCH AND TECHNOLOGY WITH A FOCUS ON MARINE AQUACULTURE

- It is suggested to establish a demonstration/training marine fish farm, both to document modern farming approach of large and small scale cages. The location is suggested to be Palk Strait/Delft Island and as a centre under NAQDA open also for carrying out research or trials by NARA and universities. It should also be available for vocational training involving the staff of the demonstration farm as trainers in addition to e.g. the Ocean University. In modern marine fish farming trained, skilled staff are compulsory, as they handle large values and have to be able to make informed decisions.
- It is suggested to send extension staff of NAQDA and teachers of Ocean University for training at RIA-1's demonstration farm in Vietnam in modern marine fish farming.

REF. ANNEX 3: MODELS FOR ENCOURAGING COMMERCIAL DEVELOPMENT IN MARINE AQUACULTURE

Ref. Chapter 1: Private companies, joint venture with foreigner

Several actions/issues mentioned in this chapter have already been mentioned in the above actions such as training facility for farm staff; stop burdening import of input factors for a primary production such as feed with import taxes, levies and tariffs; abandon the use of one-year renewable license and use multiple year permits. Other recommendations are:

- Disease management, including biosecurity are especially important in risk management to achieve successful large-volume fish farming. There are several aquatic disease laboratories, but they should build their diagnostic capacity to include marine fish diseases. This could be a topic to be promoted for bilateral cooperation with Norway, Japan, South Korea or others.
- A new JV with Norwegian investors and competence plans to establish a large-volume marine fish farm, which is very much in line with the MFARD strategic plan. Therefore it is recommended to give this initiative all possible administrative assistance from MFARD and NAQDA, as there are not many of this type of initiative.

Ref. Chapter II: Buy Back arrangements

- If a Buy Back (BB) arrangement, made between small-scale producers and a buyer, involves government support in the form of a PPP supporting the BB partner, there should be provisions ensuring that the exclusivity and fixed BB price take duly regard to the development in the open market pricing to avoid unfair sharing of profit margins.
- Seaweed farming. Even the small livelihood farmer has to apply to NAQDA for a renewable one-year aquaculture management license. To simplify administration load of NAQDA and of the livelihood seaweed farmers, it is recommended to abandon the 1- year licenses, and let the local communities manage themselves, within an overall area permit given by NAQDA.

Ref. Chapter III: Public-Private-Partnership arrangements

- Apart from when NAQDA is entering a PPP, it should consider to sell its expertise to companies on commercial terms through paid consultancy, fees plus direct costs. Provisions are already in the NAQDA Act. It is ok to support the pioneers, as they are taking a risk of being the pioneer, but the following companies should be charged. If demand for expertise is higher than the (permanent) staff of NAQDA can deliver, NAQDA can consider hiring in additional (project employed) staff paid among others by the fees, thus having expertise available to the sector. If NAQDA keeps offering all consultancy for free, the private consultant sector will not develop.

Ref. Chapter IV: Aquaculture parks

- History with the Batticaloa Aquaculture Park shows that the planning should be made with better involvement of the local governments to reflect their priorities. Apart from the North Western Province the local provinces seem not well enough integrated in the aquaculture development and licensing. In many countries in the region, the local provincial governments are in charge of the aquaculture development in their own province. MFARD/NAQDA should find an approach, where the local planning is better involved in their initiatives.
- SLA has only Koddigar Bay (Trincomalee) with water depths potential for a limited number of modern large-volume cage farms. Realistically the potential area resources for marine fish farming are the areas of 8-12m depth, especially in Palk Strait from Mannar up to Jaffna, but they are only suitable for small-volume cage farming. Therefore, it is recommended that NAQDA makes a small-volume cage farm zone (a model aqua park) in e.g. the Delft Channel, which has some 60 km² potential suitable area. Everything should be planned and cleared by NAQDA, and infrastructure provided at sea such as mooring blocks installed. The farmers could be fishers, who only operate one raft or company/cooperative structures having several rafts.

Ref. Chapter VI: Other models to encourage commercial development

- It is recommended NAQDA to make a demonstration, training and trial farm in conjunction with the above recommended marine aqua park model for 'small-volume' cage farming in the Delft Channel, south-west of Jaffna.
The demonstration farm should develop a SLA marine fish farming model transferring some approaches from the modern large-volume cage farms, such as biosecurity and relevant 'scale of efficiency' topics, but using 'small-volume cages' suitable in the shallow waters. The presence of NAQDA staff in the zone would make it easier to perform ad hoc extension services and to inspect and enforce the preconditions stated in the farming permits. It should e.g. be compulsory that the farmers in the cage park have participated in the training

course in Best Management Practises (BMP) including biosecurity and modern fish farming management principles at the NAQDA demonstration farm.

Whether using large or small-volume cages, there is a need for trained/skilled workers, when handling large values of biomass in the cages, thus the training should also be open for the large-volume farms of Koddiiyar Bay. The training could possibly be offered in cooperation with e.g. Ocean University (having a college in Jaffna) or other universities.

- Zoning of the coastal areas can facilitate commercial aquaculture development. It is not only a mapping based on physical data, but should consider other stakeholder uses and plans, hence the local governments are crucial in the process to make it meaningful. It is urgently recommended to make a zoning plan for large-volume marine cage farming in Koddiiyar Bay (Trincomalee), as it is the only relevant area of SLA for large-volume cage farming. The planning should include carrying capacity estimates taking into consideration all sources of 'nutrient loads' from agriculture and towns via river impact, and shrimp farms, as well as water exchange/currents etc. etc. Based on carrying capacity estimates the estimated maximum nutrient loads permitted without negative environmental impact can be calculated. This figure should be used to estimate maximum permitted volume of feed, which in turn can be transformed into maximum volume of fish production permissible.

The fish production volume figure can be used in the management of the area, to make a political decision on number of sites and recommended size of the concessions to give to single farms. The sites or concessions is recommended to put in a tender process made e.g. every second year, where present or potential investors are invited to submit proposals. Through this tender process NAQDA can manage the development, i.e. guide a sustainable development based on performance, volume and cost efficiency, and market demand.

- NAQDA should make a plan/zoning for Tambalagam Bay in Trincomalee for bivalve farming. It is a large, shallow water bay covering at least 1,500 ha. Due to river effluents and the shallow depths, it has a unique, large natural bivalve production.

The mapping should include, which are the areas of the natural bivalve resources, species and volumes, and if areas mainly have spat. To open for export, a monitoring program for toxic algae/phytoplankton and water hygienic, sanitary standards should be established.

A plan for farming development could be made in phases. First make licensed plots with natural bivalve stock, which would improve harvest strategy and thus volume. If areas are identified with large proportion of spat settlement, these areas could be turned into community managed areas, from where spat is harvested and transferred to the grow-out plots. SLA has a lot of experience of local management from the tank fishermen associations, which may be copied.

Establishing the value-chain and access to export market are preconditions for success, as the domestic market for bivalves is insignificant. It is recommended to introduce private companies with this expertise maybe in a Public-Private-Community-Partnership. Several companies have expressed their interest to the consultant to get involved in processing and marketing of bivalves from Tambalagam Bay. If not identifying large natural spat settlement areas, it would be necessary to establish areas with spat attracting devices (oysters and mussels) or bivalve hatcheries (especially clams). In this respect NAQDA or private

companies would have the financial/technical capacity, and it could be part of the Public-Private-Community-Partnership.

REF. ANNEX 4: WHY SHOULD FOREIGN INVESTOR LOOK INTO SIR LANKA?

Ref. Chapter III: How to mobilize foreign aquaculture investors - by Sri Lanka

- At the moment the incentives of direct relevance to aquaculture, including tax grace, reduction of import taxes/duties/levies are not clear. It is recommended that MFARD/NAQDA work directly with BOI (or relevant agency) to make them appreciate and consider 'aquaculture', so that the incentives relevant to aquaculture, become clear and transparent to the investor (and are available in a written format). MFARD/NAQDA should also discuss with BOI/relevant agency to have preferential incentives in regions in need of development, like Northern and Eastern Provinces. Aquaculture - as a primary production – is a very suitable intervention for development in rural areas. Or MFARD/NAQDA should discuss to have preferential incentives to encourage those investors, who through technology transfer can bring technological innovation to SLA. The information regarding incentives should be posted on the websites of MFARD and NAQDA.
- One competitive advantage in SLA that the consultant has experienced, is the very active role NAQDA has taken in entering especially PPP's with companies entering pioneering activities. This is unique to SLA. It would be interesting to an investor to read a small paragraph on the conditions NAQDA can consider, and within which fields PPP's can be entered. It may also be opportune for the investor to read the exit strategy of NAQDA from the PPP, when the intervention has shown sustainability, as some investors eventually like to be in full control. This information should also be posted on the NAQDA website.
- In addition to the brochure and video, MFARD and its agencies should actively make articles on achievements or case stories from farms (relevant to foreign investments) and submit these to international aquaculture sector media such as Fish Farming International etc. It is believed that this will better target the professional aquaculture investors and build up the image of SLA, which eventually will catch the interest of an investor. The articles could e.g. describe examples of PPP's.

ANNEX 1: REGULATORY, LEGAL AND INSTITUTIONAL FRAMEWORK CONDITIONS RELATED AQUACULTURE

This issue is two folded:

Conditions specifically related to the commercial aquaculture sector i.e. investors.

Conditions related to investment/foreign investor in general in SLA and operation of a company incl. labour law.

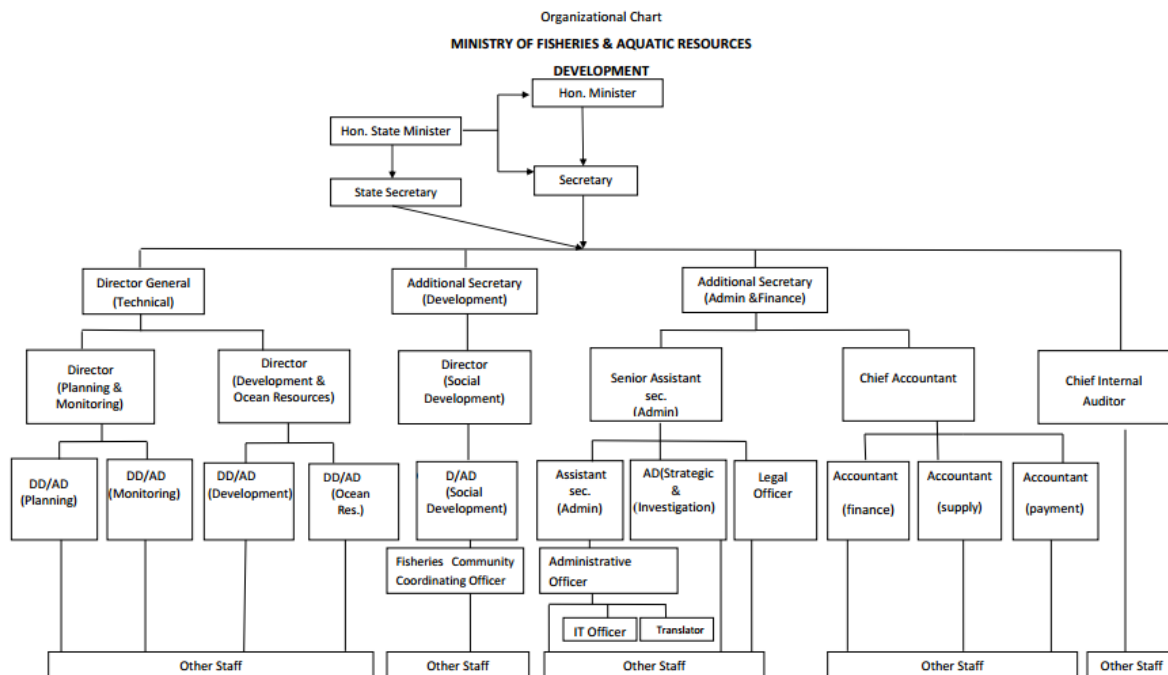
The coming chapters deal with the aquaculture related regulatory and legal framework, as well as the roles of the major involved institutions, i.e. the institutional framework, their mandates and how they support in specific the development of the commercial sector.

I. AQUACULTURE RELATED ACTS AND REGULATIONS

To appreciate the acts and regulations, the institutions involved will be introduced in a short version in connection with the relevant acts and regulations. The more detailed introduction of the institutions, and a discussion on conflicting issues and recommendation for changes in the institutional framework, will be made in chapter IV.

Ministry of Fisheries and Aquatic Resources Development:

MFARD has the responsibility of development, management and supervision of the fisheries sector. It formulates the national fisheries development policy, strategy and the implementation plan about every 6 year. MFARD also implements projects for enhancing the country's fishing capacity; welfare of fisher communities; promotion of private sector investments and of seafood export; as well as some externally funded projects for development of fisheries. The development of new acts, amendments, and announcement of regulations are done by MFARD.



Source: www.fisheries.gov.lk

MFARD does not itself undertake activities related to management and development of aquaculture, but of the six institutions² under its purview, three have been given mandates related to aquaculture by act or by de facto reality:

² Other institutions under MFARD: [Ceylon Fisheries Corporation \(CFC\)](http://www.fisheriescorporation.gov.lk) www.fisheriescorporation.gov.lk related to purchase and sale of fish and fisheries products and provision of cold room facilities. [Ceylon Fishery Harbours Corporation \(CFHC\)](http://www.cfhc.gov.lk) www.cfhc.gov.lk responsible for construction and management of fishing harbours and anchorages. [Cey-nor foundation](http://www.ceynor.gov.lk) www.ceynor.gov.lk "providing inputs for the fisheries industry". There is also a so-called 'Affiliated Body' to

- Department of Fisheries & Aquatic Resources (DFAR).
- National Aquaculture Development Authority (NAQDA)
- National Aquatic Resources Research and Development Agency (NARA)

a) Department of Fisheries & Aquatic Resources

DFAR is responsible for management, regulation, conservation and development of fisheries and aquatic resources in marine and brackish waters. It was established in 1940 and now enforces the provisions of the Fisheries and Aquatic Resources Act, No. 2 of 1996 and later amendments.

www.fisheriesdept.gov.lk

English versions of the following acts, amendments and regulations³ related to DFAR have been consulted, to see, if there are any provisions with implications related to aquaculture:

- 1) The Fisheries and Aquatic Resources Act, No. 2 of 1996 (21 pp)
- 2) The Fisheries and Aquatic Resources (Amendment) Act, No. 4 of 2004 (4 pp – hard copy only)
- 3) The Fisheries and Aquatic Resources (Amendment) Act, No. 22 of 2006 (14 pp)
- 4) The Fisheries and Aquatic Resources (Amendment) Act, No. 35 of 2013 (29 pp)
- 5) The Fisheries and Aquatic Resources (Amendment) Act, No. 2 of 2015 (4 pp)
- 6) The Fisheries and Aquatic Resources (Amendment) Act, No. 2 of 2016 (8 pp)
- 7) DFAR collected in March 2016 THE COMPENDIUM OF HIGH SEAS FISHING LEGISLATIONS IN SRI LANKA based on the above Fisheries and Aquatic Resources Act, No. 2 OF 1996 including all above amendments (available on www.fisheriesdept.gov.lk) (54 pp)

The technical aspects are regulated by the following regulations:

- 8) Spiny Lobster and Prawn (Shrimp) Regulations, 1973 (6 pp)
- 9) The Inland Fisheries Management Regulations of 1996 (5 pp)
- 10) The Aquaculture Management Regulations of 1996 (6 pp)
- 11) The Export and Import of Live Fish Regulations, 1998 (8 pp)
- 12) The Fish Products (Export) Regulations, 1998 (27 pp)
- 13) The Fishing (Import and Export) Regulations 2010 (10 pp)
- 14) The Fishing (Import and Export) Regulations, 2010 amendment 2013 (1 p)
- 15) The Inland Fishing Operations Regulations, 2011 (6 pp)
- 16) The Fishing Operations Regulations of catching Chank or Lobster in the South Coast (Hambantota District) Fisheries Management Area, 2012 (2 pp)
- 17) The Fishing Operations Regulations of catching Live Ornamental Fish or Lobster in the South Coast (Matara and Galle District) Fisheries Management Area, 2012 (2 pp)

Comments to The Fisheries and Aquatic Resources Act, No. 2 OF 1996 including all above amendments (ref bullet 7 above):

The main content of this act and its amendments relates to the industry “i.e. fisheries and aquaculture” but also detail issues related to DFAR incl. mandate and appointment of members of advisory council, Director General (DG), administrative procedures, staffing empowerment etc.

MFARD, the National Fisheries Federation www.slnffcs.lk, which has the mission to facilitate the sustainable development fishing communities - socially, technologically and material wise.

³ Apart from one amendment (ref bullet 2) the documents are available from combining the websites of FAOLEX <http://faolex.fao.org/faolex/index.htm> and Dept. of Government Printing <http://documents.gov.lk/en/home.php>

As the principal act dates back to 1996, it should be appreciated that NAQDA was not established until 1999. Thus the act and some regulations before 1999 (ref bullets 9, 10 and 11 above) have provisions related to aquaculture and DFAR, but they have been amended, repealed or detailed in later regulations (see below under NAQDA). However even all aquaculture and inland fisheries related divisions and staff have been transferred to NAQDA, and even management of aquaculture has clearly been added in the 2006-amendment to the NAQDA Act there are some 'leftover' procedures still referring to DFAR, as DG DFAR confusingly still is the pro forma in power for issuing the Aquaculture Management Licenses.

The Export and Import of Live Fish Regulations, 1998 (ref. bullet 11)

This regulation especially relates to protection of certain fish species in capture fisheries against live export. In the regulations "live fish" actually means any live 'seafood'. Any export or import has to be licensed. Some species are listed, as either prohibited or restricted to export live, especially marine species. There is a short list of freshwater fish species prohibited to import live, while no mentioning of any marine species being prohibited to import. There is also no mentioning about other requirements with imports such as health certificates or having permit from Department of Animal Production and Health (see end of this chapter I)

The Inland Fishing Operations Regulations, 2011 (ref. bullet 15) make all authority references to the DG DFAR, although the inland fisheries at this date had been transferred to NAQDA, as it was established in 1999. NAQDA is not mentioned, and only in the application form for an inland fishing license (or renewal) 'aquaculture staff' are mentioned, as the recommendation can be given by the Assistant Director of the District/District Aquaculture Extension Officer/Regional Aquaculture Extension Officer. It is informed that in reality DG NAQDA has been authorised to issue the inland fisheries license as well as the inland culture based fisheries license (ref. amendment to act 2006). Thus this regulation should be amended/updated to reflect this clearly.

b) National Aquaculture Development Authority of Sri Lanka

NAQDA was established in 1999 under the National Aquaculture Development Authority of Sri Lanka Act, No. 53 of 1998. NAQDA's functions include development and management of all freshwater aquatic resources i.e. inland fisheries, which are generally culture-based, and the aquaculture industry including sea farming (MFARD: Fisheries Sector Development Strategy 2010-2013).
www.naqda.gov.lk

The following act and amendment⁴ constitute the provisions for establishing and operating NAQDA:

- 1) The National Aquaculture Development Authority of Sri Lanka Act, No. 53 of 1998 (22 pp)
- 2) The National Aquaculture Development Authority of Sri Lanka (Amendment) Act, No. 23 of 2006 (pp 14)

Most of the principal NAQDA Act (ref bullet 1) is of little relevance to the investor, as it is related the transferring of staff and functions of the Aquaculture Development Division and Inland Fisheries Development Division of DFARD, establishing administrative procedures and empowerment of functions within NAQDA.

⁴ The documents are available by combining the websites of FAOLEX <http://faolex.fao.org/faolex/index.htm> and Dept. of Government Printing <http://documents.gov.lk/en/home.php>

In the 2006-amendment to the principal Act, there are however some significant adjustments. In Section 2: "to develop aquatic resources and the aquaculture industry" was substituted by the wording: "to develop and **manage** aquaculture, aquatic resources and aquaculture operations" thus importantly "manage" appears, showing clearly that NAQDA has a government management function in managing aquaculture.

The functions or mandate of the NADA were also revised as follows ref section 11 in the amendment (if only single words have been added, they are shown **in bold**):

- a) to develop aquaculture, aquaculture operations and culture based fisheries in perennial reservoirs and seasonal reservoirs, with a view to increasing fish production and fish consumption in the country;
Old version: To develop aquatic resources and the aquaculture industry, with a view to increasing fish production in the country;
- b) to promote the creation of employment opportunities through the development of freshwater aquaculture, **brackish water aquaculture**, coastal aquaculture and **mariculture**;
- c) to promote the farming of high valued fish species, including ornamental fish, for export;
- d) to promote the optimum utilization of aquatic resources through environmental friendly aquaculture programmes;
- e) to promote, **facilitate** and develop small, medium and large scale private sector investment in aquaculture;
- f) to manage, conserve and develop, having regard to the need to conserve biodiversity, aquaculture, aquatic resources used for aquaculture and the aquaculture operations and culture based fisheries in perennial reservoirs and seasonal reservoirs;
Old version: to manage, conserve, and develop, aquatic resources, and the aquaculture industry;
- g) to assist persons carrying on business, as an importer, exporter, seller, distributor and supplier of aquatic resources and engaged in aquaculture and the development of aquatic resources as an importer, exporter, supplier and distributor and seller of aquatic resources,
Old version: to carry on business as an importer, exporter, seller, supplier and distributor, of aquatic resources;
- h) to prepare and implement plans and programmes for the management, conservation and development of aquaculture and aquaculture operations and culture based fisheries in perennial reservoirs and seasonal reservoirs;
Old version: to prepare and implement plans and programmes for the management and development of aquaculture and aquatic resources;

The most important change in the above is that the general term 'aquatic resources', which would include coastal and marine resources, has been substituted by 'culture based fisheries in perennial reservoirs and seasonal reservoirs' reflecting that only "inland waters fisheries and especially that of culture based fisheries" is managed by NAQDA irrespective of the later, conflicting Inland Fishing Operations Regulations, 2011 (look under DFAR). It should be appreciated that more than 85% of the production from 'Inland fisheries' originates from 'culture based fisheries in perennial reservoirs and seasonal reservoirs', i.e. production of carp, tilapia and freshwater prawn through stocking of hatchery produced seed.

Another clear change in mandate is that the 'business role' of NAQDA has been limited (ref bullet g) above), indicating a clearer management function as the new bullet h) also confirms. However there are still several issues related to having both a management and a service function within the same government institution, which raises a potentially risk of a 'conflict of interest', at least in the public opinion. Therefore such a double function is commonly avoided in the government systems. This issues will be addressed in chapter IV of this annex.

As for the power of NAQDA to carry out its functions (section 12 in the act) only two changes were made in the 2006-amendment (the new words shown in bold). Apart from these two reformulated functions, the below list only shows those functions related to NAQDA's commercial tools and thus of possible relevance to investors, but at the same time they indicate again the potential conflict of interest mentioned above:

- a) initiate and conduct researches, and resource surveys **and assist in conduct of research** to ascertain the development potential in water and land resources, for aquaculture;
The wording in the new version seems conflicting, as it first writes "conduct researches", but then has been added "assist in conduct of research", which is a different role (chapter IV)
- c) establish, **maintain** and manage aquaculture centres for the promotion and development of aquaculture;
- d) assist entrepreneurs, technically, financially or otherwise, engaged in aquaculture and aquatic resource development and provide financial or technical or managerial assistance to inland fishermen and fish farmers;
- e) acquire and hold, take or give on lease, mortgage or hire, or sell or otherwise dispose of, any movable or immovable property: provided that no immovable property of the Authority shall be sold without the prior approval in writing of the Minister;
- f) levy and charge fees or any other charges for services rendered, or for facilities and equipment provided, by the Authority;
- g) enter into, perform and carry out, whether directly or through any officer or agent authorized in that behalf, or by way of joint venture with any person in or outside Sri Lanka, all such contracts or agreements as may be necessary for the discharge of t
- h) he functions of the Authority;
- n) accept stocks or shares or debentures⁵ or other securities of any company, society or undertaking in payment or part payment for any service rendered by the Authority to such company society or undertaking or for any sale made to or debt owing from any such company, society or undertaking by or to the Authority. and which is likely to promote or advance the objects of the Authority;

Especially bullets g) and n) could potentially create a risk of 'conflict of interests' with the government management function of NAQDA.

The sections 13 and 14A in the amendment describes a clearer mandate of the DG of NAQDA than before. The DG NAQDA is the Chief Executive Officer of the Authority being responsible for exercise and discharge of the powers and functions under the NAQDA Act. Aquaculture (and inland fisheries)

⁵ A bond/loan without collateral, which can be exchanged into stocks in the company

is managed by NAQDA and not by DFAR anymore, however it seems that the NAQDA function of managing aquaculture development is undermined by some leftovers empowering DFAR.

E.g. the amended NAGDA Act includes that the DG NAQDA may (*only*) nominate NAQDA officers to be appointed as Licensing Officers by the DG DFAR. It is also written that NAQDA has to submit to DG DFAR an annual report of the work performed by the Licensing Officers, indicating that DFAR still has the power. Likely therefore the fees for the aquaculture management licenses are also collected by DFAR, but in both the 2006 amendments to the principal Fisheries Act and the principal NAQDA Act the collected fees have to be transferred to NAQDA monthly.

Thus it seems inconsistent and confusing that in the amended Act, NAQDA is management responsible for aquaculture, but still the important aquaculture management licensing is under the final power of the DG DFAR, even if performed by Licensing Officers from NAQDA. It is however informed that in reality the DG NAQDA has been authorised license officer by DG DFAR, and he can authorise others such as e.g. the Director of Coastal Aquaculture Development.

Thus the procedures would seem more appropriate, more transparent and avoiding inefficient double administration (of fee collection) etc., if NAQDA was given the complete direct power for the aquaculture management licensing and the fee collection, as it has been given the mandate for aquaculture management. Therefore the NAQDA Act needs to be updated by a new amendment.

Regarding issuing regulations, the Section 37 in the principal NAQDA act was repealed in the amendment, as it mentioned that: 'the Minister (under the NAQDA Act) may make regulations regarding management of aquatic resources'. In the amendment this is now specified to: 'make regulations, how aquaculture operations are conducted in inland waters ...'. This is consistent with the mandate of DFAR, which is to manage the (*natural*) aquatic resources.

As a new topic, it is specified under the amended NAQDA Act that: 'regulations can be made for taking fish and other aquatic resources for aquaculture' (*like e.g. juveniles of lobster, milkfish or sea cucumber*). This seems to involve management of the natural aquatic resources, and thus may actually belong as a provision in a regulation under the Fisheries Act.

The following aquaculture regulations have been consulted⁶:

- 3) The Aquaculture Management (Disease Control) Regulations, 2000 5 pp
- 4) The Aquaculture (Monitoring of Residues) Regulations, 2002. 10 pp
- 5) The Shrimp Aquaculture Management (Operation of Crop Cycle) Regulations, 2008. 2 pp
- 6) The Live Rock Culture for Export Regulations No. 1 of 2011 2 pp
- 7) The Aquaculture Management Regulations of 2011 (10 pp - only paper copy)
- 8) The Regulations of 2012 (Amendment to Regulations No. 1 2011) 1 p
- 9) The Regulations of 2012 (Amendment to Regulations No. 1 2011) 2 pp

Regulations in bullet 3 and 4 regarding disease control and monitoring residues have very detailed provisions of procedures to be followed and are as such technically quite clear, however the 'competent authority' in charge is again the DG DFAR, who even at this time (2000) does not have any specialist aquaculture staff any longer. Thus this should be updated to DG NAQDA (ref 2006 amendment to NAQDA act) as well as the general technical content is more than 15 years old!! In

⁶ Apart from one important regulations (ref 7) the documents are available at the websites mentioned in footnote 4. But this important one (ref 7) should also be available electronically to the investors!

the disease control regulations, the reference is made to seeking advice from NARA, whereas now there is disease competence at several places, such as the brackish water fish and shrimp health management and environmental monitoring laboratory complex (ADB activity 2009) of NAQDA in Puttalam District, as well as ornamental fish disease competence at the NAQDA Center at Rambadagalla, and an aquatic disease lab built at Faculty of Veterinary Medicine & Animal Science, University of Peradeniya (also activity of the ADB project). As there continuously will be new diseases identified, it is suggested not to list names of diseases in the regulation, unless there are special provisions related to those diseases. The regulation should however make clear references to different accredited/approved laboratories and their expertise, for the aqua-farmer to know whom to contact. It is known that one marine farm sends samples of diseased seabass to Thailand for analyses, indicating a possible need for capacity building at some facility inside SLA (further discussed in Annex 2).

The shrimp regulation dated 2008 (ref bullet 5) is also technically detailed and seems updated with DG NAQDA being the authority.

Regulations on 'live rock' (ref bullets 6, 8 and 9) are special regulations regarding production and transport/sales of artificial rock pieces, which has been submerged in the sea to have a natural in fauna/flora grown on it, used in the marine ornamental aquarium trade.

The Aquaculture Management Regulations of 2011 holds the most relevant issues to the investor. These are presented in below bullet points. The first 'Aquaculture Management Regulations of 1996' was made before NAQDA was established and has been fully repealed.

- (regulation 3) If wanting to establish/operate an aquaculture activity/company, it is compulsory to apply and have an aquaculture management license issued by DG NAQDA
- (reg 6.2) A license is given for 1 year and is renewable upon application.

This is a negative condition for an investor, as it introduce a degree of uncertainty. It limits the company negotiation power with a bank for borrowing operational funds, it also put a constraint in depreciation if following international standards, and finally it increases the risks of the renewal process becoming subject to malpractice – either way.

- (reg 6.2 and 14) A license is not transferable. If a licensed company changes ownership the new owner will have to apply for renewal of the license.

This also affects the attractiveness of being an investor, as it is limiting the open trading of an investment. It reduces the bargaining power of the company trying to sell its assets, and this also increases the risk of malpractice during the process.

- (reg 9; 10; 11 and 12) The license application may be approved (or refused) following a procedure, which depends on the Category of aquaculture enterprise (ref Table 1), and what the DG NAQDA or license officers **deem necessary**. I.e. if a Category A the license officer will decide by him/herself, if a license can be granted. But if Category B and C the license officer will decide by him/herself, if a license can be granted or deem, whether it **may** need a consultation in the Aquaculture Management Technical Committee. If a category D the license officer **may** call for approval under the National Environment Act of 1980 or **may** request an Environmental Impact Assessment (EIA) Report, which **may** be referred to pass the Aquaculture Management Technical Committee.

Thus apart from a Category A there are no exact standards for how an application is being processed, because the licensing officer (now DG NAQDA or his appointed) decide how to process an application. This gives the applicant little transparency on rights, or which standards the application is measured by, which could be avoided by having simple standards for the process.

It is also unclear, why the DG NAQDA may request an EIA for a Category D farm, as it is a precondition in the application form for the aquaculture management license to attach the environmental protection licenses issued by the environmental line agencies such as Central Environmental Authority or Coastal Conservation Department, and they would already have requested an EIA during their license process, if it was necessary or an Initial Environment Examination (IEE), if that was sufficient.

Table 1: Aquaculture categories related to application procedures

Category "A" activity	Annual license or renewal fee (Rs)
Fish culture in seasonal tanks	
- Up to 0.5 hectare	500
- More than 0.5 hectare	1,000
Freshwater and brackish water pond culture of fish, crabs and freshwater prawns of extent not exceeding 1 hectare of extent not exceeding 1 hectare.	200
Small scale ornamental fish production (up to 10,000 per annum)	200
Pond culture of post larvae up to fingerling level of extent of 0.5 hectare	250
Pond culture of post larvae up to fingerling level of extent of 0.5-1 hectare	500
Pond culture of post larvae up to fingerling level of extent more than 1 hectare	1,000
Category "B" activity	
Cage culture of extent not exceeding 0.1 hectare	300
Pen culture of extent not exceeding 0.1 hectare	500
Seaweed culture of extent not exceeding 0.1 hectare	300
Raft culture not exceeding 0.1 hectare	300
Medium scale ornamental fish production (up to 10,000 - 100,000 per annum)	1,000
Category "C" activity	
Freshwater pond culture of extent 0.1 hectare up to 4 hectares	500 per ha.
Brackish water pond culture of fish and crabs up to 1 hectare	750
Brackish water pond culture of shrimp up to 1 hectare	1,000
Shrimp hatchery annual post-larvae production 5 million per annum	1,000
Shrimp hatchery annual post-larvae production each 1 million above 5 million per annum	3,000
Freshwater fish and - prawn hatchery	
- Post larvae production 5 million per annum	2,000
- Post larvae production each 1 million above 5 million per annum	1,000
Cage culture of extent 0.1 hectare up to 4 hectares	1,000
Pen culture of extent 0.1 up to 4 hectares	1,000
Seaweed culture of extent 0.1 hectare up to 4 hectares	1,000
Raft culture of extent 0.1 hectare up to 4 hectares	1,000
Ornamental fish production 0.1 million up to 1 million	1,500
Category "D" activity	
Brackish water pond culture of fish and crabs 1 hectare and above	750 per ha.
Brackish water pond culture of shrimp 1 hectare and above	1,000

Freshwater pond culture of fish and crab above 4 hectares	500
Cage culture of extent 4 hectares and above	3,000
Pen culture of extent 4 hectares and above	3,000
Seaweed culture of extent 4 hectares and above	3,000
Raft culture 4 hectares and above	5,000
Ornamental fish production above 1 million fish per annum	3,000
Holding facilities for exporting fish and aquatic plants	2,000
Local sales centers of ornamental fish and aquatic plants	500
Other aquaculture systems	2,000

Ref. Aquaculture Management Regulations of 2006

Already several of the capture fisheries license fees have recently been cancelled. With reference to Table 1 it is suggested to remove all of the license fees. It likely is more costly to administrate the fee collection than the revenue they bring in (<1% of the total income of NAQDA).

In most countries the small/household aquaculture holders do not pay any fee, while the corporate farms pay an annual lease fee based on the area occupied, irrespective of which species or production type. The lease fees would normally be paid to the local provincial government, and the lease rate differs, if it is public land or sea area. If using private land, there would not be any fee. This would simplify procedures incredibly.

- (reg 9b) A license application may be refused primarily, if the activity it is deemed to cause irreversible damage or hazard to humans or environment

As written previously, this would already have been assessed by the environmental line agencies during their own licensing process. Thus it is unclear, why it is mentioned in this regulation. If the environmental issues are to be assessed again during the process for the aquaculture management license, it seem to be unnecessary bureaucratic (and inefficient). However this double (overlapping) work does happen, shown by the fact that the environmental line agency would already have called for their own technical committee meeting for evaluating the aquaculture project, likely with many of the same participating persons or line agencies, as those involved in the Aquaculture Management Technical Committee (see chapters III and V).

To the investor it would be much more appropriate to mention exactly, which are the compulsory, prior approvals/ licenses necessary for submitting an application for the aquaculture management license. At the moment some of this information is given indirectly 'hidden' in the application form, but why not make a manual on the website of NAQDA – just like some of the environmental agencies are doing?

It would also be conducive to the investor if they were given more details on other issues, which could have an impact on an application. Like if the activity is in line or not with the strategy of MFARD, or the local planning (e.g. tourism) or other stakeholder uses (navy, shipping lane, fisher activities, RAMSAR etc.), or if it has to be proven technology. I.e. mandates or technical standards/issues used by the committees and/or the licensing officers in their evaluation process should be public available.

- (reg 8) The number of licenses issued in an area may be decided to be limited (*by NAQDA*) in the interest of national economy and protection of the environment.

This is one example of informing investors of relevant issues in the application process. SLA has e.g. large brackish water and marine areas, but many of the areas are environmentally vulnerable such

as many of the barrier lagoons, lagoons with small outlet mouth or heavy human impact. Many of these areas do not have potential for unplanned aquaculture development. The most attractive area for large volume marine fish farming development, such as the large Koddigar Bay, Trincomalee would also have its limitations for various reasons, and there it would be compulsory to assess the carrying capacity, map the present and planned users and make an overall bay management plan, if the large volume marine fish farming sector is to develop sustainably. This regulation (8) gives the provisions for regulating the number of licenses that can be given, this is not only for protecting the environment, but in fact also will protect the farm investments itself by making the development sustainable. The Trincomalee case story will be further discussed in Annex 3.

The environmental legislation and regulations relevant to aquaculture is described in chapter V of this annex. However NAQDA always request Central Environmental Authority (CEA) for an environmental recommendation i.e. to hear if EIA is needed or if only IEE.

c) Department of Animal Production and Health

The last institution, which has aquaculture relevance, is the Department of Animal Production and Health (DAPH) under the Ministry of Livestock and Rural Community Development. They have a quality control system for certification of export shipments of ornamental fish, and they are involved in approval of juvenile imports (e.g. seabass juveniles). The regulations found are very general for 'live animals':

- Prior to applying the importer must send a request to DG DAPH specifying the type of import and the country of origin to obtain the updated health requirements. Based on this information a health certificate should be obtained from the responsible state authority of the exporting country.
- Application should be accompanied by the health certificate

There is no information as to any sampling or quarantine procedures for fish. SLA should appreciate its isolated island status and short aquaculture history, as a competitive edge. Thus little transboundary movements of at least marine 'fish material' have taken place, meaning that SLA has not been burdened with many introduced diseases and parasites. Especially one should be cautious with imports from areas with a long aquaculture history, as risks will be higher.

The consultant only knows that juveniles of Asian seabass are imported over the last years from Australia, and milkfish juveniles have been imported frequently from Indonesia (and Taiwan). However this means that the import procedures should be quite thorough especially with requirements for sampling/testing and having possibility for keeping in quarantine conditions, till test results show no diseases.

d) Recommendations

As a conclusion in addition to above comments for improvements, it is suggested that new regulations are to accommodate modern large volume marine fish farms including:

- Chemicals and drugs permitted used in aquaculture (make a positive list) including approval procedures for new chemicals and drugs (like documentation and trials)
- Imports of feed, approval procedures including testing for unwanted chemicals or drugs
- Procedures for imports of fertilised eggs, juveniles and broodstock of aquatic organism for aquaculture including also procedures for introducing exotic species. Incl. list of permitted species. (Imports of live fish is under the DAPH, but there are no mentioning of standards for sampling and quarantine. Likewise in the regulation of DFAR (1998), there are no direct mentioning of procedures for introduction of new marine species (it is basically regulating

export)). The regulations could be developed based on FAO's regional guide for transboundary movement of aquatic organism

- Marine farm regulation. Introduce e.g. 15-20 year permits. Put as preconditions in the permit that the aquaculturist has to submit annual status reports describing the species farmed, farm sites in use, stocking volume, production achieved, sales channel (i.e. whether sold domestic or exported), diseases/mortalities encountered and actions, feed used (brand), number of staff and annual Environmental Impact Monitoring (EIM) reports made by one of the environmental agencies or an approved consultant. Possibly the need for making an EIM report should be for farms, larger than a certain size, and only requested for farms using feed input.

Also it should be put as a precondition to use pellet feed; disease screened juveniles (also for the small-scale farms). The regulation should include the standard to be used for the different types of farming activity based on internationally-recognised, best practice techniques.

II. AQUACULTURE POLICIES AND STRATEGIES

There are a few policy and strategy documents, which includes aquaculture.

In the Ministry of Finance and Planning: The Development Policy Framework of Government of Sri Lanka (2010-2020) there are some aquaculture related policy directions, however mostly related to increasing inland culture based fisheries and ornamental fish production.

The policy direction will be implemented through the following strategies and projects:

"All inland water bodies will be converted into fishing grounds through increasing the supply of fish seed and releasing them into the inland water bodies. Development of existing aquaculture centres and establishing new centres at strategic places will be accelerated in the programme."

"The annual production of fingerlings will be increased to 80 million by 2020. Fishery production from aquaculture will reach 130,000 metric tons by 2020".

"The other strategy focus will be to become the leader in the tropical ornamental fish and aquatic plants trade in the world. The demand for planting material for aquatic plants will be met through tissue culture".

"Cage farms will be established in Batticaloa, Trincomalee, Hambantota, Negombo, Chilaw, Elephant Pass and Puttalam on the public private partnership basis" however it seems not related to marine fish farming as it only mentions: "Shrimps, Prawns, Crabs, Lobsters and Sea Cucumbers will be grown intensively in cage farms. This will be promoted as an alternative livelihood activity. Producers will be insured with an insurance scheme to manage the risk of farming".

Table 2; Activity output matrix for aquaculture

Policy thrust	Strategies/activities	Indicator	2010	2015	2020
Promotion of ornamental fish, inland fisheries and aquaculture	Develop inland fisheries in reservoirs, tanks and ponds	Inland fish production '000 t/year	43	80	130
		Production of fingerlings millions	26	50	80
		Coverage of water bodies with proper management %	20	40	80

		No. of ornamental breeding centers	2	4	6
		No. of aquaculture centers	4	7	10
		No. of cage farms	150	2000	5000

It is noted that there are **no direct strategy references** made to **farming of marine fish, seaweed or mollusc**.

In MFARD's: Fisheries Sector Development Strategy 2010-2013, there are the following strategies related to aquaculture.

Food security is a major policy direction, and a focus in the strategies. The ambition is to have a national average seafood consumption of about 22kg/capita/year 2013 by producing affordable fish, especially through a doubled production for the inland culture based fisheries and reduce imports.

Apart from inland fisheries, attention will be placed on development of farming non-traditional products such as seaweed, seabass, sea cucumber, oyster/mussels and ornamental fish for the purpose of export. The only specific activity mentioned is that of making a seabass hatchery. However the policy or strategy is to expand the sea farming and aquaculture especially in the Eastern and the Northern Province. This is an important guiding message to the potential investor.

The MFARD's Midterm Policy Framework 2013-2016 for Fisheries Sector Development is a status on the achievements of the 2010-13 development strategy as well as widening the period to include 2013-2016

It comes with an important statement or observation: "compared to fish produced by marine fisheries, fish produced by inland fisheries and inland aquaculture is cheaper, and helps maintain fish prices within a reasonable range. Thus inland fisheries benefit particularly the rural poor... who cannot afford to consume marine fish, by providing them with an alternative source of animal protein, which is cheap. Inland fisheries also provide livelihoods to the rural communities in the interior districts. Aquaculture, particularly coastal aquaculture also contributes to export earnings through the production of exportable aquaculture products such as shrimp, seabass, etc."

Emphasis of stocking with juveniles was given to perennial reservoirs, since they make the biggest contribution to inland fisheries production, but an increasing number of seasonal reservoirs scattered in the dry zone also have been stocked.

As a new resource it has been identified that estate ponds has the potential for production of fish through pond aquaculture. There has hardly been any pond farming. Reasons are several, one of them being the difficulty in transforming paddy land into ponds (Department of Irrigation).

Also as a new intervention stocking of lagoons with shrimp larvae is tested out.

"A large number of brackish-water ponds covering an estimated extent 2500 ha, which had been used a few years back for shrimp farming remains abandoned. NAQDA has identified that these shrimp ponds could be utilized for aquaculture of alternative species such as milkfish, seabass and tilapia, which are cultivable in brackish water ponds. However, the lack of fish seed has become a major constraint for this. To overcome this problem NAQDA has taken steps to establish hatcheries for production of milkfish and sea-bass seed through public-private partnerships. Breeding in captivity of these two species is in progress, and it is anticipated that their commercial-scale breeding would be possible by the end of 2012."

The document finds that the export of products from fisheries, like lobster, sea cucumber, marine ornamental fish and chank (large sea snail), have to be managed carefully in order to prevent over-exploitation. Therefore there is not much scope for increasing the export volumes from fisheries, unless it can be produced from aquaculture such as shrimp and freshwater ornamental fish. Furthermore increasing volumes of export fish products may affect the local supplies of fish.

“Non-traditional Aquaculture is one of the newly emerging aquaculture systems that have the potential to contribute significantly to the economic development of the country. Several pilot projects on sea cucumber fattening, seabass cage culture and oyster culture have become successful. Under an MOU signed with the Government of Vietnam, experts visited Sri Lanka to design a sea cucumber and mud crab hatcheries (?) and spiny lobster farming.”

Finally there are some important observations regarding research and development. “Due to institutional weakness, “research and development” services have not been able to contribute adequately to the development, as it has not addressed the crucial issues. Further, the research initiatives have not been adequate. There is a vacuum between the scientific research and development activities in the fisheries sector. This weakness could mainly be seen in the poor communication that has prevented even the limited research findings from dissemination to the prospective users.” It has been mentioned at meetings, but this is first time, the inadequate performance of the research has been mentioned in a report.

The last strategy document consulted is the MARD: 2015-performance report. This presents an overview, in addition to widening of the strategic plan for 2013-16. The outcomes still include bringing up the level of fish consumption per capita, as the major objective out of three. The other two are increased employment and increased foreign exchange income.

The major contribution of MFARD/NAQDA to the aquaculture sector is to increase inland fish production by stocking fish fingerlings (Chinese, Indian and common carps and Tilapia) mostly free of charge; aquaculture training programmes; distribution of fishing crafts; fishing gears; and development of non-traditional aquaculture.

In the first 9 month of 2015 about 42 mill fish fingerlings were produced by NAQDA, of which nearly 14 million were stocked free of charge.

During the same period about 18 mill post-larvae (PL) of freshwater prawn were produced by NAQDA, of which about 8 mill were stocked free of charge. The 18 mill was an increase of 182% compared to same period of 2014.

This is very successful compared to other countries in the region, which are striving against very low survivals and growth of freshwater prawn, such as in Myanmar. SLA has obviously a good gene pool of prawns, even work is carried out to improve it.

Freshwater prawn production is gradually increasing. There are mainly two companies engaged in export of freshwater prawn, and 21, 21 and 141 tons were exported in 2012, 2013 and 2014 respectively. Up to September 2015 totally 350 tons were harvested, of which 106 tons were exported.

Six research and development projects were carried out as part of the aquaculture strategy (see chapter IV). It is notable in this contexts that many of them are funded by FAO and carried out at some of the NAQDA facilities – and not NARA.

Again the non-traditional aquaculture is considered to have the potential to contribute significantly to the economic development of the country. Several pilot projects on sea cucumber hatchery and fattening, seabass hatchery and cage culture and oyster culture have been carried out as part of the strategy.

Production of ornamental freshwater fish was started in SLA in 1952. About 60-70% of the export consists of guppy breeds, but it should be appreciated that ornamental fish contributed 21% more in foreign exchange earner in 2015 than shrimp. Value of shrimp export was SLR 1,971 mill versus ornamental fish SLR 2,392 mill.

NAQDA is supporting the subsector in development of new ornamental fish strains, development of technology, providing brood stock, fish disease diagnosis, providing training and technical assistance etc. A tissue culture laboratory has also been established by NAQDA for ornamental aquarium plants.

In summary MFARD has policy and strategy documents. The present policy and strategy documents tend to focus on reporting the status, and thus the policy priority message of the MFARD tends to get lost. It is suggested that the documents show better the priorities and encouragement to the private enterprises.

III. AQUACULTURE APPLICATION PROCEDURES AND LICENSING

A flow chart of necessary permits (preconditions) and some of the process for getting an Aquaculture Management License is presented by the consultant in Figure 1

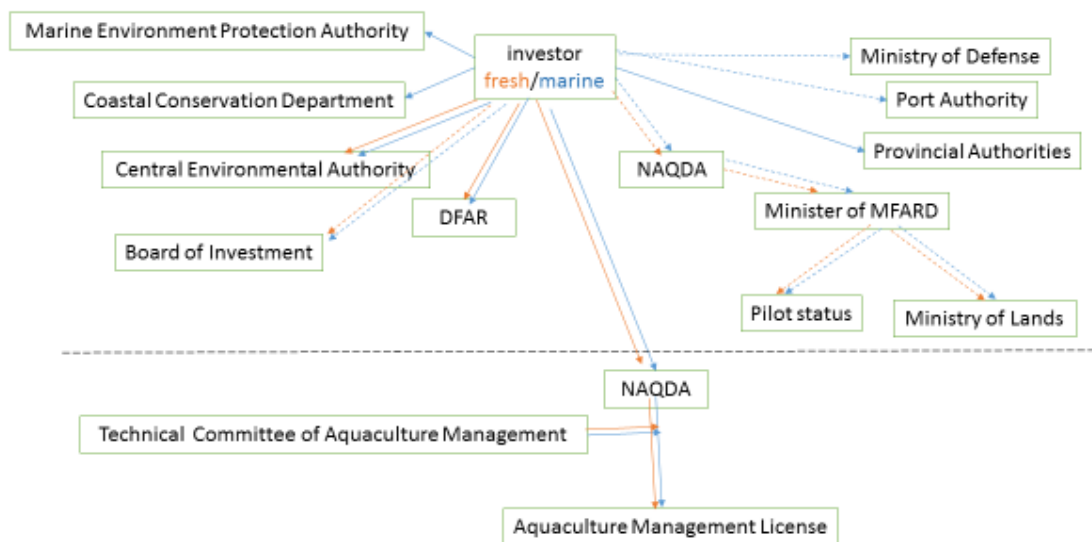


Figure 1: Process of getting an Aquaculture Management License

The first step, if the project involves leasing a sea or land site, is to send project description to NAQDA with the mentioning of the land/sea area request. NAQDA will forward it to MFARD, who may recommend it to the Ministry of Lands (ML) holding the authority over the land and sea area (until 10 nautical miles). The procedure at ML is very time consuming, and 2-3 years has been

mentioned. The lease period normally would be up to 30 years and in rarer cases 50 years, but extendable. Under the State Land Ordinance the lease document has to be approved by the President.

If the investor owns the land in question, there is no need to apply ML. As for sea area it has to go via ML, unless the sea area is inside area of the Port Authority, such as some areas of Koddigar Bay (Trincomalee). In this case lease arrangement may be entered with the Port Authority, which is said to be faster.

When having the area permits, the project and relevant application form should be sent to Central Environmental Authority (CEA) for Environment Protection License and to Coastal Conservation Department (CCD) for a 'No Objection Letter', depending on the location of the exact sites involved (pls see details in chapter V in this annex). During this procedure it is decided, whether there is a need for an Environmental Impact Assessment (EIA), an Initial Environmental Examination (IEE) or if they issue an Environmental Clearance. The process will at least take 3 months.

The project application should also be sent to DFAR, who may issue a 'No Objection Letter'

If the area is of army/navy interest, the Ministry of Defence should likewise be contacted and they may issue a 'No Objection Letter'.

The local provinces may have a 'mirror application process' within their own ministries or departments, which in that case also should receive applications.

The Board of Investment (BOI) does not need to be involved unless the company is a Joint Venture (JV) with a foreign investor, and even in this case some foreign JV informed that they did not use BOI. If however wanting to benefit from some concessions or incentives, BOI are the ones, who can grant (see chapter VI of this annex).

If ML procedures are very slow, it may also be possible to apply the Minister of MFARD for the status of a pilot production. This will be possible without the lease agreements with ML, however it is a short term solution, as it cannot be renewed for long time.

Having now the licenses, company ownership document, lease agreements and 'No Objection Letters' the application form with the project description and attachments can be sent to NAQDA, who will call its technical committee.

The Technical Committee of Aquaculture Management (NAQDA)

- National Aquaculture Development Authority (DG; D; aquaculturist; license manager)
- Department of Fisheries and Aquatic Resources
- National Aquatic Resources Research and Development Agency
- Department of Wildlife Conservation
- Coast Conservation and Coastal Resources Management Department (correct name of Coast Conservation Department)
- Central Environmental Authority
- Department of Irrigation
- Department of Forest
- Provincial Environmental Authority of North Western Province
- Ministry of Fisheries of North Western Province
- The applicant may be invited

NAQDA will organise the Technical Committee Meeting, which normally is held every 1-2 months.

Having received the recommendation from the technical committee the DG NAQDA will issue a renewable one-year Aquaculture Management License. Renewal takes place by NAQDA HQ having received the renewal application with recommendation from the NAQDA regional office.

The reason, why there are representatives from the North Western Province in the committee, is that this province has had the most applications (shrimp farms). If the activity relates to other provinces, they are told to be involved in the hearing process.

The flow chart for getting an Aquaculture Management License (Figure 1) illustrates all the approvals (above the dotted horizontal line) necessary, before even submitting an application to NAQDA. It also shows that even within Ministry of Environment, the applicant may have to apply 3 different offices. It has truly been said that the decision-making authority is highly fragmented in SLA.

Furthermore, each of the above line agencies only give license/permit for 1 year, then it has to be renewed. This is a bureaucratic burden to the investor, which would not be similar in most other countries. Apart from that it is not legally possible for a foreign investor to own the majority of an aquaculture company, it also is clear that one has to have a local partner to manoeuvre with all the applications.

It was told that foreign investors and their partners often would discuss their proposal for investment directly with the Minister or Secretary (incl. DG technical) of MFARD to speed up process.

The issue of 1 year license is a bureaucratic constraint for making business in SLA, but it is common in all line agencies, and e.g. also applies to processing plants and fishing vessels. It also introduces a degree of uncertainty, which e.g. makes it difficult to negotiate loans with a bank. One officer explained that the reason for using 1 year licenses is, because the legal task of stopping an activity/company is very complicated. Then it is easier not to renew a license?

- However, if it is basically due to environmental concerns or human hazards, it should be introduced as a precondition in the permit instead of using the 1 year renewals. The aquaculturist should instead have it as a precondition in the permit to submit annual production reports and **an annual Environmental Impact Monitoring (EIM) report** made by one of the environmental agencies or an approved consultant. Possibly the need for making an EIM report should be for farms larger than a certain size, and only requested for farms using feed input.

The general status reporting will make it easier for NAQDA to keep an overview of the sector performance, and it will make the sector more transparent towards the public, which they should be, as they are using public area resources.

The local NAQDA staff can then, if deemed necessary, make a control visit and hold the findings up against the submitted report.

- Make a manual of procedures for getting an Aquaculture Management License including a clear flow chart and post on a more user friendly NAQDA website. Make direct links to all relevant acts and regulation for people to download. Likewise make direct links to the different line agencies involved in the application process. Make it possible for people to send questions via web to NAQDA to avoid sitting in front office waiting for simple questions. Use website of CEA as a sample.

- Transparency in application process. All the committees involved in evaluation of an application should have clear and published mandates, as well as standards for their evaluations. At the moment apart from a Category A approval, there are no exact written standards, for how an application is being processed. It basically depends on the discretion of the licensing officer, how to process an application.
- Another issue is all the applications that an investor has to file and follow up on. As many of the line agencies have their own technical committees, often with representatives from the other line agencies, where they themselves also are member of their committees, it should be possible to have an application discussed at one meeting, where all relevant agencies are called instead of the many meetings taking place in each of the different agencies. This could e.g. be solved by having a coordinating 'one stop shop', who sends the electronic version of the application to the relevant line agencies and collect their response, to be communicated with the applicant. This would likely cut some of the processing time, as the number of meetings should be reduced. The one stop shop could be in the MFARD (Investor Facilitation Cell), or it could be a function at NAQDA, if preferring to keep aquaculture separate.
- To facilitate the above action the use of E-application procedures should be introduced instead of hard copy applications. It can be done in SLA. E-visa application is an example – taking less than 3 minutes to get a visa. This would also facilitate involvement of the local governments, including the political Provincial Council and district administration, as aquaculture should also take place according to the development plan of the region to avoid user conflicts. With E-applications a lot of travelling time to Colombo would be saved.

IV. DISCUSSION ON INSTITUTIONAL FRAMEWORK RELATED TO AQUACULTURE

a) Department of Fisheries & Aquatic Resources

DFAR is responsible for management, regulation, conservation and development of fisheries and aquatic resources in marine and brackish waters. It was established in 1940, and now enforces the provisions of the Fisheries and Aquatic Resources Act, No. 2 of 1996 and later amendments. The aquaculture and inland fisheries divisions were moved to NAQDA, when it was established in 1999, and now there are no aquaculture or inland fisheries related staff in DFAR.

The DFAR Head Office has presently 6 divisions:

1. Fisheries Management Division
2. Fisheries Industries Division
3. Monitoring, controlling and surveillance Division
4. Fishery product Quality control Division
5. Finance Division
6. Administration Division

Additionally a High Seas Management Unit and a Lagoon Management Unit is also functioning under this department. Latest is the Vessel Monitoring Center, which manages the high seas fisheries.

DFAR has 15 District Offices in the coastal districts with 148 Fisheries Inspectorate Divisions covering all fishing villages.

b) National Aquaculture Development Authority of Sri Lanka

NAQDA was established in 1999 under the National Aquaculture Development Authority of Sri Lanka Act, No. 53 of 1998. NAQDA's functions include development and management of all freshwater aquatic resources i.e. inland fisheries, which are generally culture-based, and the aquaculture industry including sea farming (MFARD: Fisheries Sector Development Strategy 2010-2013).

NAQDA has published the following Vision and Mission

- Our vision is to be an apex body in the region responsible for sustainable development and management of aquaculture and inland fisheries to ensure food security in order to improve the quality of life of the people.
- Our mission is to contribute to the improvement of the socio-economic conditions of rural societies through alleviation of poverty by increasing freshwater and brackish water fish production and introducing new technologies for utilization of aquatic resources for small, medium and large scale enterprise development.

NAQDA has 3 (technical) departments at headquarters: Freshwater Aquaculture Development; Coastal Aquaculture Development and Extension. It operates 11 regional aquaculture development centres that provide seed of fish (especially Indian and Chinese carp, tilapia), freshwater prawns and shrimp; 22 regional and district aquaculture extension offices; a brackish water fish and shrimp health management and environmental monitoring laboratory complex, and a National Inland Fisheries and Aquaculture Training Institute (NIFATI). A 12th center, a marine fish hatchery is under construction under FAO supervision in Batticaloa. The staff of the offices includes about 20 district officers and 110 aquaculture officers with diploma from either technical colleges or Ocean University. Totally with workers there are about 400 staff.

NAQDA is financially independent or self-sufficient, paid by its services and production, however NAQDA does normally not charge for its consultancy, even they have provisions to do. It is exempt tax on any income or profit, and received an initial capital, when established. Some years ago the sale of juveniles contributed about 66% of the revenue. Income from Public Private Partnerships (PPP) contributed about 16%, while training/courses about 6% - and license fees only 0.5%

NAQDA has been given the mandate to do both management and service functions. This double function can in some cases create a conflict of interest.

In other countries the functions have been separated, and this solution should be considered. I.e. moving up the function for aquaculture and inland fisheries management to the level of a (new) government department under MFARD with full authority for aquaculture management and development, including issuing regulations.

This department of aquaculture and inland fisheries should not be reliant or involved in on generating income for self-sufficiency such as PPP, as this would potentially create conflict of interest against its management and development role. E.g. there are two companies collecting and exporting freshwater prawn, one of which NAQDA has entered a PPP with.

The service functions of NAQDA such as extension and training, analytical lab facilities, juvenile production and entering PPP's should be moved to a new semi-governmental "Aquaculture and Inland Fisheries Support Center" with reference to the new (NAQDA) department, or directly under the purview of MFARD. As a semi-governmental center, it can have the freedom to both have permanent staff and project employed staff depending on the demand situation, such as if there is an increased expert demand when developing PPP. This center could also further exploit the

development of a consultant team, which could assist the sector development in a professional and paid manner.

The new center should be able to involve in development and trial projects, as the center has the facilities, and its extension function would be a warranty for bringing the findings to the end users. It can also involve in certifications, where the department has developed the standards. This would also then be open to any private sector involvement in certification.

When looking at the organisations DFAR and NAQDA, as well as their principal acts, the new structure (followed by a new act) would eliminate some of the confusion that are embedded in the present administrative provisions, where the DG DFAR seems being the final in power for some aquaculture and inland fisheries related issues.

If choosing not to separate the management and service functions and continue NAQDA with its present mandate, it is suggested to make the management function completely clear with reference to above confusion related to role of DG DFAR still having officially power related to aquaculture and inland fisheries, even there are no specialist staff left in DFAR. Thus the acts should be modernised/ amended. In fact the compendium made by DFAR of the principal fisheries act incorporating all its amendments is a good step towards transparency, however as an example the part VI related to aquaculture needs a thorough updating to the present de facto conditions, where inland and aquaculture it is not under DFAR. It should be considered to make an aquaculture act or law as the NAQDA act is more for the purpose of describing NAQDA, than aquaculture, which actually is what the investors are interested in.

c) National Aquatic Resources Research and Development Agency

NARA www.nara.ac.lk was established in 1982 under the National Aquatic Resources Research and Development Agency Act, No. 54 of 1981 and amendment No 32 of 1996 for the purpose of conducting research and providing advisory and consultancy services on scientific, technological and legal matters relating to exploitation, management, conservation and development of aquatic resources. It has 9 research divisions covering inland aquatic resources and aquaculture, marine biological resources, socio-economy and marketing, fishing technology, environmental studies, post-harvest technology, oceanography, hydrography and monitoring/evaluation and information technology. Apart from its main research centre located in Colombo it has 5 regional research centers. There is about 80 scientific staff of which 25 is working in the inland fisheries and aquaculture division.

d) Research

The main issue in the present appraisal is to look into the research performed in aquaculture, whether it is commercially relevant, and how the results are passed to the end user; how the research agenda is decided; and look into the overlap with activities of NAQDA.

It is informed that the research agenda (list of topics) is made by NARA reflecting 'national requirements' set in the development plan; feedback from community project consultations; input received through industrial partnerships and regional trends. It is then presented at an annual stakeholder meeting with participation of some 100 people, from government, universities and private sector. NARA incorporates the feedback and send an annual work plan within their budget to MFARD for approval.

However there is now a criticism that the research agenda does not reflect the commercial needs. It is expressed like:

- “There is a need for establishing research activities leading to commercially viable projects”.
- “Develop a commercial platform in research”
- “NARA/NAQDA should be able to give more technical assistance – should be more commercial. How to commercialise NARA?”
- “Should NAQDA do more research?”

In the latest MFARD: Midterm Policy Framework 2013-2016 for Fisheries Sector Development (2012) there are some strong conclusions: “Aquatic resources research and development is one of the most significant services required for fisheries sector development. However, due to several institutional weaknesses, the aquatic resources research and development services in the country have not been able to contribute adequately to the development of fisheries sector. The scientific research on aquatic resource development has not identified and addressed the crucial issues in development of the fisheries sector. Further, the research initiatives have not been adequate. There is a vacuum between the scientific research and development activities in the fisheries sector. This weakness could mainly be seen in the poor communication that has prevented even the limited research findings from dissemination to the prospective users.

This is first time, the inadequate performance of the research has been mentioned in public. To be fair it should be appreciated that this comment is towards research for fisheries sector in general and not only aquaculture.

There is competition between NARA and NAQDA. NARA wants to do all the research aspects, while NAQDA should focus on implementation and extension (according to NARA). NAQDA on the other hand likely feels that they (as management responsible for aquaculture) have little influence on the aquaculture research agenda of NARA. This is maybe even clearer, as the NARA Chairman is in the Governing Board of NAQDA, while the Chairman of NAQDA is not in the Governing Board of NARA. NAQDA should have a seat in the Governing Board of NARA, as well as in its (aquaculture) scientific and technical committee. NAQDA should have a strong role/function to guide the research needed for sector development. The persons in the committees should preferably have a technical background.

The consultant has gone through some lists of research and development projects carried out by NARA and NAQDA, and many of them have the character of development projects and not strictly applied research. Hence it is clearly in the mandate of NAQDA to do these development type of projects, though in the amendment to the NAQDA act it is mentioned that NAQDA also should assist in conduct of research.

NAQDA has the hands on staff/extension officers qualified to do development projects, as they also have a deep knowledge of the needs of the aquaculturists in the areas. Meaning that they know what is possible to implement in real situation. They are also extension workers, which maybe provides better assurance that the project results are passed to the end users.

The projects NAQDA performs are either requested by MFARD or e.g. FAO (mainly projects in the districts). Smaller projects NAQDA finance themselves, if they see the need for making. This may be justifiable, as NAQDA also has the management function, whereas NARA only has the service function.

Thus to the consultant the issue is perhaps that there is little real political or ministerial management influence in making the prioritisation of the research agenda. Of course there are people from MFARD in the Governing Board of NARA and NAQDA, however this is not where the research agenda should be made. It is therefore suggested to make a research council in MFARD,

who develops the research agenda. In this council representative from private sector and their organisations can also have a seat to assure input from the private sector.

The identified research agenda can then be made public, and research and development institutions, universities and even private sector can submit technical proposals with budgets supported by CV's of key project staff. This would likely bring better value for money - and it would open up for involvement of universities, NGO's, private sector incl. consulting companies, if they have the required competence.

Having a research council would also limit the chance of overlapping projects. It is seen that NARA and NAQDA have both been working with sea cucumber hatchery and grow out; oyster pilot farming; tissue culture of freshwater ornamental plants; kappaphycus farming just to mention some. The funding likely not from the same source, however it is still overlapping

The research and development projects should be followed up by an extension activity – or even assisting with PPP development – the link towards commercialisation from making the pilots (introducing the technology) has for a long time been weak. It was seen already in the early 2000 when the consultant worked in SLA that several new coastal/marine technologies had tested 'successfully,' but never they materialised into commercial development, most likely, because of the low domestic market demand and weak extension. To the consultant it seems, as if the situation is much better now, meaning that people/farmers are getting better involved in commercialising the results, even maybe still in too few a number.

It was also questioned, if there was a strong overlap in extension activities. However NARA informs that they do extension sometimes, but only in connection with on farm/community research.

Finally it should be mentioned that there are many examples of good cooperation between the two institutions. An example was that the DG NAQDA wanted to promote some potential sites in the north for coastal aquaculture to the ministerial cabinet some coastal sites for aquaculture. He requests Chairman of NARA to let a GIS expert join the trip to deliver a small report with potential and coordinates. NAQDA would cover the direct costs, and NARA would not charge any fee. Similar with a GIS assessment used for the Batticaloa aqua park development

V. ENVIRONMENTAL LEGISLATION

The environmental permits are very important for the approval process of an aquaculture project. Therefore NAQDA, first of all, always request Central Environmental Authority (CEA) for an Environmental Recommendation, i.e. to hear if Environmental Impact Assessment (EIA) is needed, or whether an Initial Environmental Examination (IEE) will be sufficient (or if they just issue an Environmental Clearance).

a) In the coastal zone

If the project is in the coastal zone i.e. 2 km seawards and 300 m inland, or 2 km inland, if there is a river or lagoon, then it is Coastal Conservation Department (CCD), who can issue a 'major permit' for 1 year with an application process taking 3 months. The DG CCD may require the applicant to perform an EIA (through CEA). On the CCD website <http://www.coastal.gov.lk/> a brochure: **Developers Guide for Developments in Coastal Zone** can be downloaded. It explains very detailed the procedures; including which other permits are necessary for the different type of constructions, and the buffer zones that should be respected.

b) Outside the coastal zone

If it is outside the above mentioned coastal zone i.e. in case the marine cage site is situated more than 2 km ashore, or if there are structures further inland than 300 m, an environmental approval has to be issued by CEA, who will decide, if they need an EIA, or if an IEE will suffice. If the environmental impact of the project is not very significant, then the applicant may be asked to do an IEE, which is a relatively short and simple study. However, if the potential impact appear to be more significant, the applicant will be asked to do an EIA, which is a more detailed and comprehensive study of environmental impacts. There are also so called prescribed projects, which needs either an EIA or and IEE, and an aquaculture project exceeding 4 ha is on that list.

Application procedure:

(taken from www.cea.lk):

It is not necessarily CEA issuing the Environment Protection License (EPL). CEA has appointed a number of government line agencies, as Project Approving Authorities, which can grant approval after having obtained the concurrence of the CEA. Relevant to an aquaculture project are the following possible agencies:

- MFARD
- CCD
- CEA
- BOI
- Department of Wildlife Conservation.
- Department of Forest

However for simplicity CEA is put as the issuing authority in below procedures:

Request for environmental recommendation

Firstly the CEA should be requested to issue an **Environmental Recommendation** i.e. to hear if Environmental Impact Assessment (EIA) is needed, or whether an Initial Environmental Examination (IEE) will be sufficient.

Submission of preliminary information.

The applicant should submit CEA information regarding the nature, location and impacts of a proposed project that requires an EIA/IEE.

Environmental Scoping

Environmental scoping is an early and open process for determining the issues to be addressed. The CEA will invite all concerned agencies, including the applicant, for the scoping process. The CEA will issue the ToR for the EIA/IEE after the scoping process.

EIA/IEE Report Preparation

It is the responsibility of the applicant to prepare the EIA or IEE report and submit it to the CEA for evaluation. Preparation of EIA reports may require the services of consultants, and a list of consulting firms, who can prepare EIA reports, is available on the CEA website.

Public Participation & Evaluation of the Report

EIA reports must be kept open for public comments for 30 working days. IEE reports have been exempted from this requirement, but they are public documents, and as such open for inspection by the public.

Subsequent to the public commenting period, CEA will appoint a Technical Evaluation Committee to evaluate the EIA report, and make its recommendations.

Decision Making:

Based on the recommendation by the committee, CEA decides whether to issue an EPL

Compliance Monitoring (or ?EIM):

The EPL is generally given with some conditions, which the applicant has to meet. The CEA will monitor the implementation of these conditions and their effectiveness. While the EPL has to be renewed annually, the compliance monitoring only needs to be carried out every 3 years!

When having the EPL, the applicant can approach CCD again (if needing a permit in the coastal zone)

There are exceptions to the above procedures. I.e. if the project is located within one mile from the boundary of a national park, then the applicant should contact the DG of Wildlife Conservation.

If the applicant is registered with Board of Investment (BOI), the EPL is issued by BOI, but in concurrence with CEA.

For an activity situated in the North Western Province, the EPL has to be applied through the North Western Provincial Environmental Authority. The North Western Provincial Council has its own statutes, and EPL is administered by them.

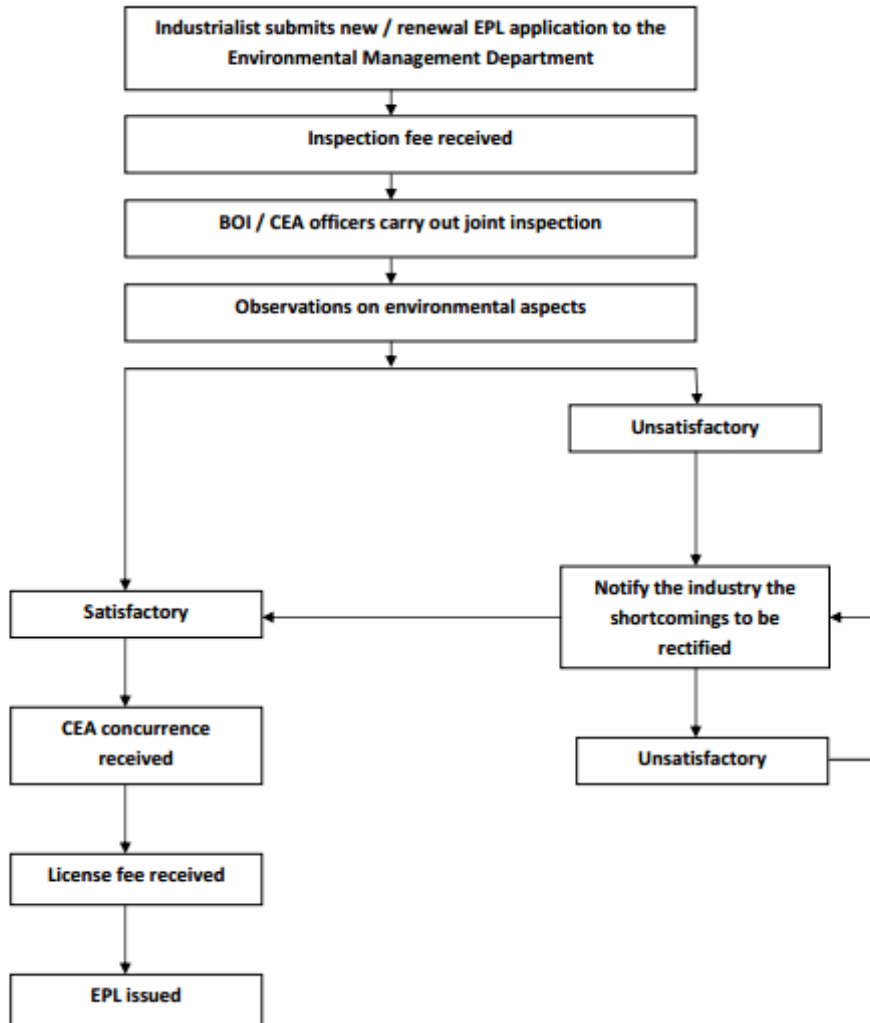


Figure 2: Steps for issuing Environmental Protection License at BOI

In the above process with BOI (Figure 2,) the EIA is for approval of the location of the project, while the EPL is for the approval of the operation.

Both CCD and CEA have very informative websites. Very user friendly, comprehensive and inclusive, especially that of CEA. They should be used as inspiration by other government line agencies.

c) Marine Environment Protection Authority (MEPA)

Under the Marine Pollution Prevention Act, No. 35 of 2008 and the Marine Environmental Protection (issuance of permits for dumping at sea) Regulations No. 2013, there are provisions for charging a tax for a permit to discharge effluent from aquaculture.

MEPA's mission is to prevent, control and manage marine pollution in SLA waters especially from shipping, dumping and oil activities. They put a permit tax on 'dumping pollution' to the marine environment, however it is not necessarily related to the degree of pollution or impact. Their jurisdiction is from the shore (middle low tide mark) and 200 nautical miles out.

They charge shrimp hatcheries, not for their pollution/BOD contribution, but simply according to how many cubic meter of water they discharge (about SLR 10,000 per 5,000 cubic meter). So far shrimp farms do not pay, simply because they don't do. The Minister of Environment tried to

enforce a fee, but MFARD did not sanction. Likewise a marine fish (cage) farm should pay a fee, but so far there is only one in Koddigar Bay, and they do not pay.

It was not possible to learn, on what basis they calculate the permit fee for a cage farm, e.g. whether volume of feed used or volume of fish produced. It was only informed that a farm with 7-8 larger cages should pay SLR 10,000/year (likely based on 'water volume use')

In the coastal zone, there is an 'overlap' with CCD, but they explained that CCD basically is responsible for approving constructions or erosion structures, while MEPA is appraising the pollution and hence the national resource exploitation.

The EIA mentioned in their act has the purpose to assess the environmental impacts of the material proposed to be dumped on the following:

- the marine, coastal, port, fisheries or estuarine activities
- the promotion of tourism and the preservation and development of tourist attractions in the territorial waters of SLA, or any other maritime zone, or on the foreshore including beaches and coral reefs
- the living marine resources and wild life

The EIA can be made by CEA (likely their approved consultants) or NARA

In conclusion 'procedures seems very clear, but elaborated'.

However there are 3 institutions in the same Ministry of Environment, which needs to be approached individually, if wanting to start a marine farm. There are no established communication between the three, such as making a common approval process of a project by the same Ministry.

- This is not very user friendly, and it should at least be possible to make a one stop shop within the same ministry to coordinate applications inside their own organisation?

It is not fully appreciated by the consultant, why BOI has their own Environmental Management Department, as they still only would issue the EPL with the concurrence of CEA, unless this department just is the name for the work inside BOI, as a Project Approving Authority authorised by CEA, as they also have been done with many other line agencies.

The tax imposed by MEPA is primarily targeting dumping in the seas of toxic waste or sediments e.g. excavated from harbours to prevent excessive use. Thus it is not appreciated, why it has been decided by that authority also to consider a marine fish farm as dumping pollution, and why the tax is calculated on the water volume 'in use', and not pollution?

If it is only based on water volume/area, this tax should be changed into a more understandable, annual, water surface area lease to be paid by marine aquaculture companies based on all sites commissioned to the company, whether in use or not, and irrespective of which species is involved.

Then, as a simple area use fee, it can be discussed, who should cash in this lease. In other countries in the region, the sea lease fee enters the revenue of the respective province and not a central office.

VI. INVESTING PROCEDURES IN SRI LANKA, INCLUDING INCENTIVES IN CUSTOM, TAXES AND FINANCING.

For a holistic review or overview of the investment climate in SLA it is advised to read the yearly updated "U.S. Department of State. Sri Lanka, Investment Climate Statement 2016"

<http://www.state.gov/e/eb/rls/othr/ics/investmentclimatestatements/index.htm?year=2016&dld=254491>

The present chapter focus on the procedures of relevance to an aquaculture investment, while Annex 4 looks into "why investing in Sri Lanka".

There are many sectors, where the government allows 100 percent foreign investment. Others are restricted to 40 percent foreign ownership among others deep-sea fishing, **and it was informed to include aquaculture**, although the consultant never saw this in writing. Foreign ownership in excess of the 40 percent must be preapproved on a case-by-case basis by the BOI. However even if possible to have 100% ownership, the consultant would recommend to have a local JV partner among others to "to navigate the cultural and political landscape" and to deal with the continuous license application and renewal process.

Foreign investment is not permitted at all in coastal fishing.

The land ownership law prohibits foreigners from owning land. Most investors and authorities say acquiring land (including leasing) is often the biggest challenge for any business development in SLA. Private land ownership is limited to fifty acres per person. The government owns approximately 80 percent of the land in SLA. State land for industrial use is usually allotted on a 33 or 50-year lease, the government may approve 99-year leases on a case-by-case basis, however the lease process takes about 2-3 year and even the President has to approve.

a) Board of Investment (BOI)

The Board of Investment (BOI) www.investsrilanka.com, an autonomous statutory agency, is the primary government authority responsible for investment, with a focus on foreign investment. BOI has 9 key sectors for Foreign Direct Investment (FDI) and fisheries (incl. rearing i.e. aquaculture, and processing of fish) are included under Agriculture. MFARD is listed in the list of 'relevant line agencies'.

Currently, the principal law governing foreign investment is the BOI Act No. 4, of 1978 with amendments. However the investment act and incentives are under revision. Thus the below may soon be outdated.

The present BOI Act provides for two types of investment approvals.

Under Section 17, the BOI is empowered to recommend concessions to companies satisfying certain eligibility criteria on minimum investment. Such companies are eligible for investment concessions or incentives, including exemptions from laws such as Inland Revenue, Exchange Control and Customs.

However these concessions were not seen in writing (or communicated during interview), as they are very much decided case by case, in addition to it was informed that e.g. tax grace was put on hold waiting for a new 'regime'.

- Hopefully with the new investment act, it will be more transparent, explaining exactly what the investor may expect of conditions, before starting the application process.

Investment approval under Section 16 of the BOI Act permits companies to operate under the "normal" laws of the country and applies to investments that do not satisfy eligibility criteria for BOI incentives. These projects are subjected to Inland Revenue Laws, Custom Laws and exchange control regulations. The reason to seek a Section 16 approval is only to facilitate the entry of foreign investment. But also it was said that any export-based investment faces fewer problems, if the company was registered with the BOI. At present the minimum investment requirement to qualify for the section 16 projects is USD 250,000.

This also means that, if the company only involves local investor, they would normally not use the services of BOI. Even a JV company in aquaculture with FDI was informed to operate without BOI approval.

There is a third possibility for company registration with FDI. From 2008 to 2015, the Strategic Development Project Act of 2008 provided tax incentives for large projects that the Cabinet identified as Strategic Development Projects. This type of investments are expected still to be covered by the new Investment Law.

The Strategic Development Projects Act No 14 of 2008 is for special projects, which are in the national interest. The projects should be of benefit to the public; create substantial inflow of foreign exchange to the country; generate substantial employment; and include important technology transfer.

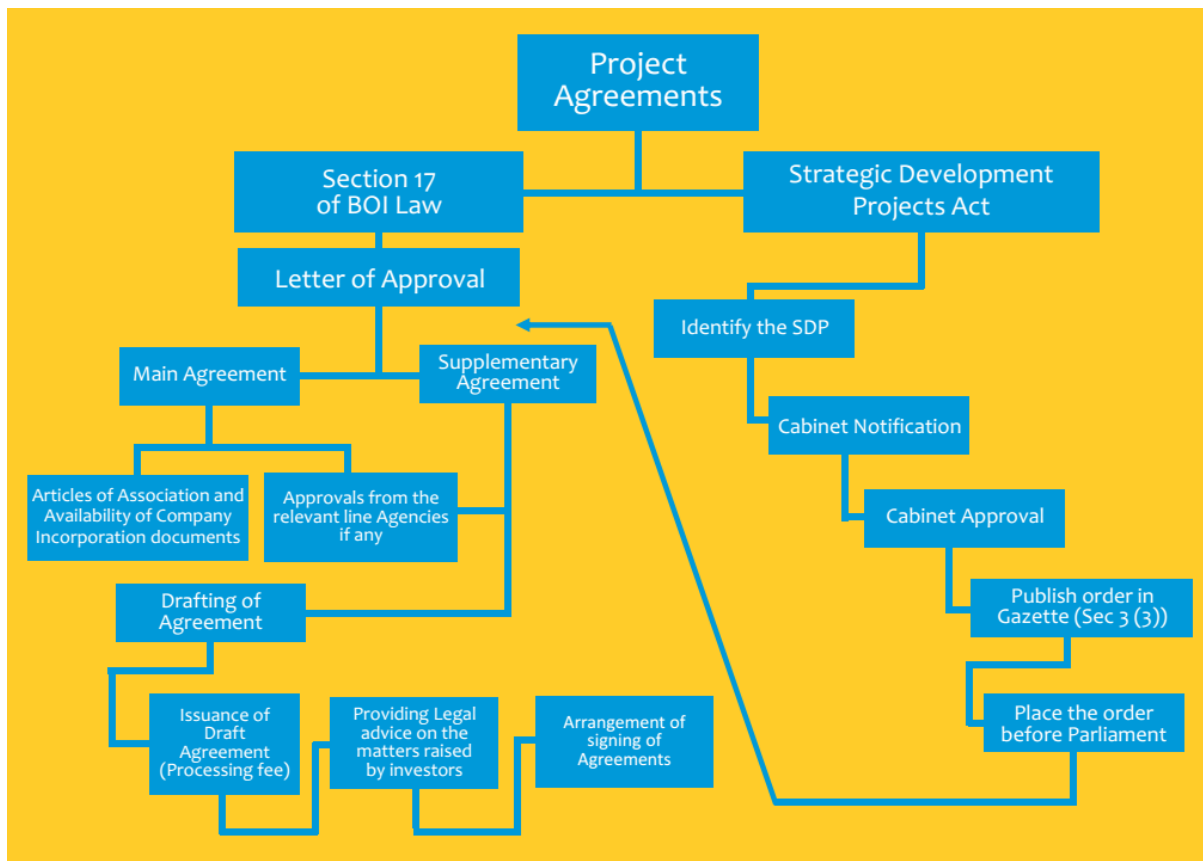


Figure 3: Flowchart for investment process under 2 of the schemes

When receiving incentives and other benefits eligible for investors, there is no discrimination between local and foreign investors, if they invest in SLA under Section 17 of BOI Law or Strategic Development Projects Act.

Likely The Strategic Development Projects Act is not relevant for aquaculture, however if a larger investment in e.g. large-volume marine fish farming, involving a very high degree of technology transfer, it should be considered to be promoted through this act.

Application:

The investor should first send project description and forms to BOI to get license/proof of ownership. BOI will call MFARD/NAQDA and other line offices for meeting.

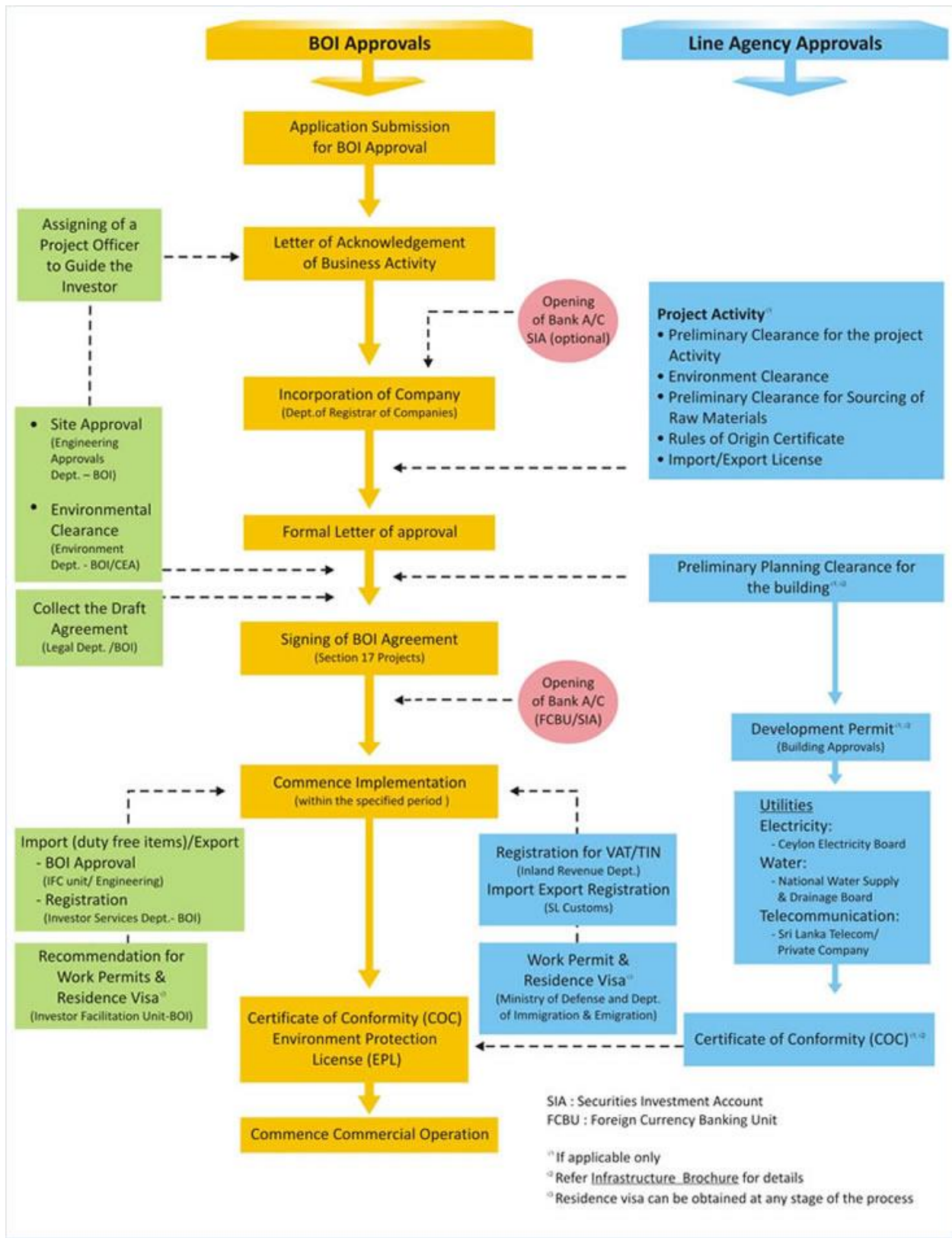


Figure 4: The flowchart applying through BOI

b) One stop shop

From the website of BOI:

Their One Stop Shop (OSS) is envisioned "to be the effective and efficient single point of contact for investors and to provide a total solution in realizing investments in Sri Lanka".

The OSS will endeavour to implement the following functions:

- With delegated authority, OSS will review completeness of all applications received through OSS for investment services.
- Responsible for updating information on the OSS website.
- Authority to follow up with other agencies as required.
- OSS shall be the single communication platform at any stage of an application for new and expansion Projects between Government of Sri Lanka and investors/developers.
- OSS shall provide all information that is required by an investor (foreign and local) to invest in Sri Lanka. The information may include – guidelines, application forms and procedures, document requirements, necessary approvals incentives, fees etc.
- OSS shall be a virtual platform. The platform shall have the capacity to receive application and fees electronically, forward application automatically to respective agencies.
- The Board of Investment of Sri Lanka (BOI) under the purview of the Ministry of Development Strategy & International Trade shall be the lead Government Agency of OSS to facilitate FDI related services. The OSS shall consist of key regular Government Line Ministry/Agency/Department representative members. Given the mandate and relation with FDI related services, any other Government Line Ministry/Agency/Department shall be Co-opted to the OSS, as and when required.

There is a list of 25 Regulatory Agencies that will be part of the OSS by Cabinet decision, however MFARD is not found in this list?

As the reader may have appreciated from the use of words like envision and endeavour, the above OSS was not put in place in September 2016.

At that time BOI explained to the consultant that the OSS service available, included that BOI would explain to the investor, whom to apply to, and the investor could inform BOI, if there were any problems with the applications. Then BOI would follow up. However that was not yet a one stop shop.

a) Labour law

Exerts from the U.S. Department of State. Sri Lanka, Investment Climate Statement 2016:

... Sri Lanka's labour laws afford many employee protections. Many investors consider this legal framework somewhat rigid, however, making it difficult for companies to reduce their workforce even when market conditions warrant doing so. The cost of dismissing an employee in Sri Lanka is calculated based upon a percentage of wages over an average of 54 salary weeks, one of the highest in the world.

In March 2016, the Parliament approved a law to introduce a national minimum wage for the first time. The new national minimum wage is set at SLR 10,000 (USD70) per month or SLR 400 (USD2.75) per day. Previously, 44 "wage boards" were established by the Ministry of Labour to set minimum wages and working conditions by sector and industry in consultation with unions and employers. The minimum wages established by these sector-specific wage boards tend to be higher than the new national minimum wage. The minimum wages established by these wage boards were limited to their respective sector. Informal sector

workers are not covered by any wage board and so have only the new (and lower) nationwide minimum wage.

SLA law does not require equal pay for equal work (men/women). The law prohibits most full-time workers from regularly working more than 45 hours per week without receiving overtime (premium pay). In addition, the law stipulates a rest period of one hour per day. Regulations limit the maximum overtime hours to 15 per week. The law provides for paid annual holidays, sick leave, and maternity leave. Occupational health and safety regulations do not fully meet international standards.

.... the government interferes in private sector wage setting from time to time. The government announced a SLA 2,500 (USD 17) wage increase to private sector workers from 2016. The increase is to be given to all private sector workers currently earning a salary below SLA 40,000 (USD 278) per month.

Of relevance to marine fish farming is the working hours regulations, which would influence the worker schedule, as the cage sites would need constant staffing 24/24 to avoid theft, to be able to act fast, if physical damage appears and finally to feed the fish early morning at sunrise. In Vietnam there are also quite fixed regulations, which however can be followed by having people work three weeks and one week off.

Typically the staff get much higher than a minimum salary, as they are working at sea, they are trained, meaning they are valuable for the company and thus they should not leave the company. Depending on duties, including diving, the salary would be about USD 250-300/month in Vietnam, but then they are also very efficient.

b) Incentives

Incentives has already been mentioned several times in above chapters. It has also been written that incentives are in the process of being changed. Hence it will not be very detailed below, as the investor would have to be updated directly by BOI.

In Department of National Planning, Ministry of Finance and Planning: The Development Policy Framework of Government of Sri Lanka (2010-2020) it was written that the incentives for investment will shift from an over dependence on tax and duty concessions to genuine business opportunities that will emerge and evolve in an environment of peace, availability of quality infrastructure, stable financial environment and the optimization of the use of educated and skilled workforce???

- The consultant questions, if this is feasible, because concessions are a useful tool used by competing countries in managing development (attracting investment).
- As examples special incentives could be given to attract companies to less developed regions such as Northern and Eastern provinces. This is commonly used in other countries in the region.
- One also has to adjust incentives according to the conditions of the sector in SLA, if the investment is desired for the sector to develop. Thus it is suggested to grant duty/tariff free imports on input factors/raw materials (and capital goods), if they are not produced in SLA, and if the production targets export such as 80%.

As an example. There are no aquafeed production in SLA, and at least all feed for marine fish farming has to be imported. As it is the policy and expectation of SLA that the marine fish production especially should target export (while the more affordable freshwater production should target domestic market) the marine fish farms should not be burdened with different import taxes or duties if their production is for export. This BOI has to appreciate, as they have rearing of fish inside their priority sector list.

The present import duty/tax etc. of 15 % on a feed not being produced in SLA will increase production costs of a SLA farm by 9 % in addition to extra transport costs. Only when there is a demand of 80,000 tons of feed (combined livestock and aquafeeds) it will be feasible for a domestic feed production.

One large-scale marine fish farm was informed to have 4 years of tax grace. Depending on investment this could even be 5 years. To the consultant tax grace is a good incentive, as it only has a benefit, if the farm has a production. This means, it directly encourages production. Other types of incentives, like Malaysian loan facilities, does not necessarily result in production, and actually can lead to losses in their Government Agricultural Bank.

The consultant discussed the possible incentives with BOI especially related to tax grace and duty free imports of input factors for the production (e.g. feed). It was however said that incentives "have been put on a hold" especially that of tax grace, as new regulations were underway. Thus any investor should seek the latest information directly from BOI.

c) Financing/funding

Looking at the World Bank report 'Doing business' SLA is rated no 82 in 'Getting Credit', while India is rate much higher 44.

This is the general conditions, and for aquaculture it is said that there are no funding from banks, because of their experience from shrimp farming collapse some years ago. However it was told that ornamental fish producers could get credit arrangements, but this would be on a very small scale compared to necessary credit arrangements for a large volume marine fish farm spending millions of USD on feed.

ANNEX 2: STRATEGIES FOR BUILDING HUMAN RESOURCES, RESEARCH AND TECHNOLOGY WITH A FOCUS ON MARINE AQUACULTURE

An important part of the research and technology development has already been described in Annex 1, Chapter IV discussing the institutions under the purview of MFARD, such as NARA and NAQDA, thus this annex focus especially on the Human Resource Development activities outside MFARD.

I. UNIVERSITIES

There are several SLA universities offering fisheries and aquaculture courses or programs, and it seems that attracting students is quite competitive.

The linkage between the universities and the sector institutions NARA and NAQDA seems to the consultant well established within Human Resource Development, as the universities often use the centres and facilities of NAQDA and NARA for training of their students or internships. Whether the research performed, at the universities is sufficiently of relevance to the aquaculture sector development will be discussed in below chapter III.

The following universities is not a full list of universities⁷ having aquaculture in their course programs, but they are those seemingly having the most dedicated fisheries and aquaculture programs:

a) University of Peradeniya

This university is situated close to Kandy and is among the highest ranking universities in SLA.

They have both relevant 4-year BSc program in Animal Science and Fisheries under the Faculty of Agriculture as well as an additional 2-year MSc program in Aquatic Bio-resources Management and Aquaculture under the Postgraduate Institute of Agriculture.

Importantly for aquaculture this university was supported by the large ADB funded Aquatic Resource Development and Quality Improvement Program to establish the "Centre for Aquatic Animal Disease Diagnosis and Research" at the Faculty of Veterinary Medicine and Animal Science.

A memorandum of understanding was signed between the faculty and NAQDA in 2004 for the establishment of this facility. The scope of the centre was to be a national centre for diagnosis of freshwater fish diseases; research on agents responsible for fish diseases to develop preventive and control measures; and to provide training to extension staff of NAQDA, farmers, veterinarians and for veterinary undergraduates.

The centre was opened in 2008, and included labs for: advance analyses; basic diagnostics; bacteriology; histopathology; parasitology; virology and water quality. According to the website there are 4 PhD's employed in addition to the staff operating the labs, and as such it should hold the best expertise available in SLA in its field. To compare, NARA has one staff presently doing her PhD in fish disease in China.

b) University of Kelaniya

Kelaniya is just east of Colombo city limits. This university is also ranked among the top, and offers likewise a range of undergraduate and postgraduate programs of relevance to aquaculture. Under Faculty of Science the Department of Zoology and Environmental Management is the main contributor to 2 BSc programs relevant to aquaculture, i.e. BSc (General) degree in Zoology and the BSc (Special or Honours) degree Zoology, the latter having the most aquaculture related topics. The department also offers a two-year fulltime MSc program in Aquaculture and Fisheries Management. Facilities are also available for PhD programs in specific areas in Zoology and Environmental conservation and Management.

c) University of Ruhuna

The University of Ruhuna is the only one located in the south (Matara). The Faculty of Fisheries and Marine Sciences & Technology has among others the Department of Fisheries and Aquaculture.

The faculty offers a four-year BSc (Special) in Fisheries and Marine Sciences program, where the student can choose to specialize in among others aquaculture. The curriculum seems very detailed for aquaculture.

The Norwegian College of Fishery Science at University in Tromsøe had a cooperation with University of Ruhuna and is in process of seeking a continuation.

⁷ Uwa Wellassa University, Badulla and University of Sabaragamuwa, both located in the central part of the island, do also have some aquaculture related topics in their BSc programs, however the extent is not fully clear to the consultant.

d) University of Sri Jayewardenepura

This university is situated in Nugegoda in the southern outskirts of Colombo. It dates back to 1873 and is a university with more than 12,000 students. Under the Faculty of Applied Sciences, its Department of Zoology offers undergraduate and postgraduate courses of relevance to aquaculture.

The BSc is offered in two versions – a general and an additional special. From the topic lists it seems very comprehensive and most course topics are aquatic and relevant to aquaculture.

The postgraduate courses offered are MSc degree or graduate diploma – either 2 or 1 year – in fisheries and aquatic resource management. The degree program is very relevant for a management role in a large investment marine aquaculture company.

e) Wayamba University

Wayamba University is located at two premises, Kuliyaipitya and Makandura. The Faculty of Livestock, Fisheries and Nutrition was established in 1999, when the Wayamba Campus in Makandura about 60 km northeast of Colombo was given university status.

The faculty has four departments, one of which is Department of Aquaculture and Fisheries established in 2001. Since 2009 the faculty offers a 4-year BSc program in Food Production and Technology Management. The students following this course have the options to specialize in aquaculture and fisheries.

The students get in-house trainings at Fish Breeding and Training Center at Rambodagalla as well as the Aquaculture Development Center at Dambulla (both belonging to NAQDA) as well as at NARA facilities.

f) University of Jaffna

From old time the Jaffna University had a very good academic reputation in the near region of South Asia, which is being revived after the peace.

The Department of Fisheries was established in 2009 (being a centre before). It is understood that the Department is still depending very much on visiting lecturers from other universities, as they only have few staff. The department offers 2 BSc degree programs: A general BSc and a special BSc in Fisheries Science. They are 3- and 4-year programs respectively, and the curricula seems comprehensive.

g) Ocean University

This is the youngest university. Previously it was called National Institute of Fisheries and Nautical Engineering (NIFNE), the education and training arm under MFARD, for the purpose of developing manpower for fisheries and other maritime activities.

In 2014 NIFNE became upgraded and named Ocean University with the wider scope including ports, marine transport, non-living marine resources in addition to fisheries and aquaculture. Currently it functions under the Ministry of Youth Affairs and Skills Development. The ambition is to develop Ocean University into a major marine university.

Ocean University has 8 colleges at Mattakkuliya (next to NARA), Negombo, Jaffna, Trincomalee, Batticaloa, Tangalle, Galle and Kalutara and 4 more are planned.

The objective of the university is to conduct academic and professional education, and vocational training activities.

It offers the following BSc programs of relevance to aquaculture:

- Fisheries & Marine Science (2 courses: a special and a general)
- Integrated Coastal & Marine Resources Management (2 courses: a special and a general)

The Ocean University has a special profile compared to other universities, as it offers a range of diploma and certificate level courses, several with potential high importance in HRD for the marine aquaculture sector.

The 12-month diploma courses includes Integrated Coastal & Marine Resource Management and Aquaculture & Aquatic Resources Management, both of them relevant to large volume marine fish farming.

The certificate programs has a duration between 1 to 10 months (most are 6). There is only one directly related to aquaculture: Ornamental Fish Culture and Management. However there are several relevant to skilled workers at a large-volume marine fish farm, which will bring safety standards up to international levels such as: Scuba; Repair, maintenance and operation of outboard engines; Life Saving; and Skipper (for work boat).

The competitive edge of Ocean University is its vocational training and the countrywide distribution of its 8 campuses/colleges, thus they are especially equipped to provide the skilled workers needed, when handling a fish stock in one cage worth up to USD 100,000.

h) Conclusions

Without having appraised the quality of the under- and postgraduate training at the universities, it seems that SLA education-wise is very well equipped for developing its human resources in aquaculture.

Likewise it seems the universities are linked quite well together and with the sector/line agencies as for using their facilities for training of their students.

Looking at the curricula at the websites, marine fish farming was not seen as a topic at any university, though of course it may be included under some general topic headings.

As the marine fish farming is only slowly emerging in SLA, it is suggested to establish a demonstration and training marine fish farm – both documenting operation of small and large scale cages. The facility should be open for carrying out research or trials using modern farming approach, i.e. the practical operation is made by farm staff, but the research cooperation open for NARA or universities. Furthermore it should be available for vocational training involving the staff of the demonstration farm as trainers in addition to the agencies involved such as Ocean University. It is suggested to be a centre under NAQDA, as their centres and facilities already are being used in extension and by the universities and colleges. The location should be in an area with the larger potential for developing marine fish farming such as Trincomalee or Jaffna (Palk Strait/Delft Island).

Possibly the latter location will have the larger impact for developing modern – small volume marine cage farms, as large volume marine fish farming will develop in Trincomalee area without making supporting interventions, as the conditions are optimal. Jaffna area has the largest area potential, however for small volume cages only, because of shallow water. Thus a demonstration facility, which can train in modern farming approach (even in small volume cages) would be important. A facility in the north could also support the development in the northern region.

It is suggested to send extension staff of NAQDA and teachers of Ocean University for training in Vietnam in marine fish farming. The business model to use to operate the demonstration farm could

also include a PPP based on a contract that the facilities also are to be used as demonstration. This model is made between a large fish farm company and a vocational school in Norway.

II. FOREIGN MULTI- OR BILATERAL COOPERATION IN AQUACULTURE

Donor projects still have a large role in capacity building and technology development in SLA, hence below is presented an overview made by MFARD (Planning) of projects carried out at MFARD and its line agencies during the last 2 decades or so.

Table 3: Overview of donor projects carried out at MFARD and its line agencies

	Project name	Funding	Costs	Duration	Area/objective
1	Delimitation of Outer Edge of Continental Margin of Sri Lanka	Norad GoSL	USD 5.2 mill (soft loan) USD 2 mill (grant) SLR 83 mill	2003-12	Preparing submission to UN (in 2018) to claim SLA's legal continental shelf
2	Aquatic Resources Development and Quality Improvement Project	ADB	SLR 2,646 mill	2003-10	All SLA through NAQDA
3	Provision of new boats destroyed by Tsunami		SLR 624 mill		Tsunami affected districts
4	Provision of ice plants, fish transport vehicles and cold storage facilities	JICA	USD 7.4 mill		Colombo CFC HQ
5	Minimum Standards for Fish Handling and Reduced Post-harvest Losses	Spain	USD 519,800	2009-10	Selected tsunami affected communities
6	Rehabilitation of fishery harbours	China	USD 9 mill		Panadura Beruwala Kudawella
7	Rehabilitation of fishery harbours	Japan	USD 7 mill		Tangalle Galle
8	Rehabilitation of fishery harbours	USAID	USD 10 mill		Mirissa Puranawella Hikkaduwa
9	Introduction of two 50ft offshore boats with long line technology	Japan	SLR 64.12 mill		CFC HQ
10	Coastal Resources Management	ADB	USD 80 mill	2000 - 08	
11	Extension of Southern Breakwater at Panadura Fishery Harbour	China	SLR 200 mill	2008-11	
12	Tsunami affected area rehabilitation project	ADB	USD 17.9 mill	2005-10	
13	Post-tsunami Livelihood Support & Partnership Programme	IFAD	SLR 670 mill	2007-09	Providing housing etc. Communities managing coastal resources.
14	Capacity Enhancement Programme of NARA for undertaking surveys and Stock Assessment in the Selected Fisheries in the Coastal Waters of Sri Lanka	CIDA & IFAD	USD 2mill	2008-10	Lobsters, Sea cucumber Chunks, Shrimps and Ornamental Fish
15	Aquaculture Development in Southern Province	FAO	USD 375,000	2009-10	Galle, Matara, Hambantota
16	Restoration and Improvement of Fish Landing Centers with Stakeholders Participation in management	FAO	USD 5 mill	2009-11	Tsunami affected districts

17	Construction of State-of -the-art Central Fish Market Complex	ADB GoSL	SLR 1903.74 mill	2007-11	Peliyagoda Colombo
18	Post Tsunami Coastal Rehabilitation & Resource Management Programme	IFAD	SLA 3844.49 mill	2006 -12	Providing housing etc. Communities managing costal resources.
19	Regional fisheries livelihoods programme for S and SE Asia	FAO	USD 2.4 mill	2009-13	
20	Improving post-harvest practices and sustainable market development for Long -line fisheries for tuna and other large pelagic fish species in the Indian Ocean Region.	FAO	USD 85,800	2011-12	
21	Construction of Dickkowitz Fishery Harbour	Netherland and GoSL	SLR 8,500 mill Eur 33.7 mill Loan Eur 11.3 mill Grant SLA 8.0 mill	2009-11	
22	Construction & upgrading of fishery harbours, anchorages & landing site	GoSL & Netherland	SLR 5,734 mill	2013-	
23	Vessel Monitoring System	GoSL	Euro 4.2 mill	2015 -	
24	Sustainable Management of Bay of Bengal Large Marine Ecosystem	GEF, SIDA, Norway, NOAA, FAO	USD 31 mill for 8 countries	Phase I 2009-15	Coastal Districts
25	Fishery harbour development	ADB	USD 62 mill	2016-18	Northern Province

It is seen that the vast majority of projects are related to fisheries and only few aquaculture.

However some are not included or not visible in Table 3. Vietnam supported SLA/NAQDA about 2 years ago by sending 3 staff of Research Institute for Aquaculture no.3 to train in sea cucumber breeding and farming, seaweed and lobster farming.

Under this project pilot projects were initiated and technology transfer and training of officers and farmers were carried out with the assistance of Vietnamese experts. Total estimated cost was SLR 4.55 mill.

Pilot projects are in progress in following sites.

- Sea weed farming – Valaipadu. Around 70 tons of seaweed were harvested in 2014.
- Sea cucumber hatchery at a private hatchery at Ambakadawila, Chilaw. 424,000 juveniles were produced in 2014.
- Sea cucumber farming in ponds at Pulinchikulam 595.2 kg of sea cucumber were harvested in 2014 and farming of sea cucumber in pens at Kiranchi
- Lobster fattening at Valaipadu. 290 lobsters were stocked in 4 cages.

Importantly the Table 3 does not show 'in pipeline' projects, and as it is clear that many organisations and countries are still involved in bilateral cooperation with SLA within the 'fisheries sector', it should be considered to arrange donor coordination/consultation meetings where the MFARD can present its Research and Development policy (and strategy) towards potential donors to

avoid 'only' to receive what the donor likes to give but also to avoid duplication of funding. It was mentioned that a donor meeting or forum is organised by Ministry of Finance, but it should be considered by MFARD to actively guide the donors, by presenting the development policy and thus avoid some isolated or less coherent projects.

a) FAO

FAO has a very prominent role in R&D projects in fisheries and aquaculture in SLA. FAO has its HQ in Colombo (also covering Maldives) and two district/regional project offices with some 23 staff. However it also has 50-60 staff working especially with decentral staff of NAQDA. It may seem a large number of staff, but it should be appreciated that FAO also covers agriculture and forestry as well emergency response related to resettlement of conflict displaced populations in the east and north.

Thus there are many 'food security' activities of FAO/NAQDA related to especially freshwater aquaculture not mentioned in Table 3.

The European Union Support to District Development Program (EU-SDDP) is one example. Total funds for 2012-2017 includes EUR 60 mill, of which FAO coordinates a share of EUR 13,320,000.

The program involves 'livelihood generation' in the North and East including other agencies like UNDP and UNICEF. Thus it includes livestock, dairy and fish juvenile stocking in small and medium tanks.

The implementing agencies are: Department of Agriculture, Department of Animal Production & Health, Department of Fisheries, NAQDA and Department of Irrigation.

Within aquaculture:

Management and new genetic material of Indian and Chinese carp. This also included construction of freshwater hatcheries.

Of special relevance to this report is a multispecies marine (fish) hatchery at Batticaloa with the EU funding. The marine hatchery is under construction and was designed by locals and design sent to FAO for verification. Thus there are no foreign experts directly involved. The hatchery belongs to NAQDA and it is envisaged that after having operated it for a couple of years to open for a PPP with a local company.

(There has been a few other attempts to start up marine fish hatcheries as PPP by NAQDA. One related to Asian Seabass is operating in Chilaw. Production capacity is informed to be 30 M/year, but the current 2014? production was about 12 M. OceanPick, the large volume marine fish farm in Trincomalee said that they cannot depend on supply from the domestic hatchery. They were not specific as to whether production is not consistent in number or quality) hence they import from Australia. Another PPP hatchery for milkfish with AquaNGreen which failed).

FAO has a Country Programming Framework (CPF 2013-2017) which defines the priority areas in SLA's agricultural and food security development objectives. It provides FAO and the related ministries a medium term strategic plan for action and a roadmap for planning FAO technical assistance. This is felt necessary to keep coherence in goal like poverty and food security as there otherwise was a risk in too many 'fragmented' proposals.

The CPF mentions as Priority Area 1: Achieving a sustainable food and nutrition security in the country while developing livelihoods in the rural agricultural sector

Specifically for the fisheries sub-sector:

Outcome 1: Increase in fish consumption to improve nutritional status.

Output 1.1 Inland capture fish industry has high production levels.

Output 1.2 Farmed and cultured fish industry has high production.

Output 1.3 Increased participation of women in farmed and cultured fish industry.

Outcome 2: Increase in income fish/aquatic products.

Output 2.2 Volume and value of aquatic products have increased.

Whether the following projects are part of this CPF is not known to the consultant, but FAO has been requested to develop a masterplan for aquaculture and inland fisheries including - together with NAQDA - a zoning to be linked to the masterplan.

FAO completed a Strategy for Aquaculture Value Chain Development together with NAQDA covering both freshwater and brackish water productions.

FAO is discussing data collection on sharks (CITES) with NARA to estimate population size and migrations. This will be a similar activity to one already carried out at Maldives (budget USD 30,000)

Since FAO according to its mandate is livelihood and food security oriented, especially NAQDA has been engaged by FAO as implementing agency, as NAQDA has the organisational structure and local presence needed.

III. STRATEGIES FOR RESEARCH AND DEVELOPMENT PROJECTS TO SUPPORT SECTOR DEVELOPMENT

Research and development policies and strategies are described in the different documents of MFARD (Annex 1 Chapter II), but they may benefit from being better reflected in the implementation.

It would seem as if the topics performed are not always following the large scope within the strategy of the MFARD. Especially the research of NARA sometimes could be questioned, whether it reflects the political direction that MFARD sees necessary to achieve their management direction.

It is appreciated that NARA has a stakeholder meeting, where a research agenda is presented and discussed, and suggestions received may be added. However when reading in the midterm evaluation document the projects implemented do not seem to support actively a development direction.

In Annex 1 IV it was suggested to make a research council under MFARD, which annually or biannually, in a research policy document, presents the research scope/topics that the ministry or the council on behalf of the ministry put a priority to. Many projects now – although possibly of good research quality - seem not related to any strategy but more a list of topics, which are 'interesting' research topics related to the sector– possibly also related to the expertise and ideas of the scientific staff in the system. This has also been expressed by outsiders that R&D in SLA within fisheries and aquaculture shows 'a silo' view, i.e. the projects promoted does not serve a common goal such as sector development/ livelihood/food security.

The MFARD research policy document should be distributed publically calling for project proposals from line agencies of MFARD, universities, private companies or NGO's, who have documented capacity. This way the competence held at the universities may also be mobilised to contribute to development of the sector. Furthermore the institutions of MFARD will experience an encouraging competitive environment providing better focus on applied research and commercial development of the sector.

The commercial stakeholder input at the NARA research planning meeting is positive, but also it has to be put in an overall context and evaluated, whether it is topics, which are moving the sector forward (so called precompetitive research), or if the issues promoted by the private sector actually are benefiting single companies. In the latter case the respective company should enter with co-financing.

Therefore it should be considered to have two R&D support programs under the research council:

- one for overall sector development mainly to finance precompetitive R&D in the public sector (MFARD agencies and universities - possibly private consulting companies),
- one for commercial R&D. The latter would evaluate an application from a company, where this company may have subcontracted (or not) a research partner (whether public or private). The company should cover part of the development budget – e.g. 50% of the eligible costs. These costs could include cash and in kind – e.g. the time of the company staff involved etc. based on approved norms (including norms for the research partner) – and direct costs. The results developed under this scheme will be owned by the private company.

Though it is difficult to assess the research performed by the universities, they are in nature typically basic (aquaculture) research and often related to the teaching programs or student's thesis work. Some fellow professionals characterised the 'aquaculture' research at universities as mostly being related to environment and climate change issues, which maybe is a little simplistic.

Whether the research performed at the universities is sufficiently of relevance to the aquaculture sector development can be argued, but this should be with due respect to the basic science that universities are supposed to perform, contrary to sector institutions such as NARA. However one way to encourage universities and their expertise to be better involved in sector relevant or applied research would be to establish the research council in MFARD and also invite the universities to submit project proposals within the research strategies laid out by the MFARD (research council).

The research council of MFARD could have private stakeholder representation such as people appointed by their professional organisations/associations, who do not represent single private interests. If having a council member representing the institution of an applicant this person would need to abstain from participating in that specific evaluation.

A research council model will also better support capacity building in new technologies – if they are identified as necessary in the policy outline, as the criteria for support would be moved to a 'higher level' instead of making an evaluation based only on the capacity already held by the applicant.

This could also open for technology transfer studies/training in selected, identified technologies abroad if described in the policy document. The topics could e.g. be within marine fish hatchery where expertise, at the present needed level, is in the region; it could be further improvement of the disease diagnose skills to include marine fish species. This is of major importance as the only large

volume marine fish farm at present sends samples for analyses in Thailand – expertise is in the region but also e.g. Norway.

ANNEX 3: MODELS FOR ENCOURAGING COMMERCIAL DEVELOPMENT IN MARINE AQUACULTURE

Several business models for encouraging especially commercial development in marine fish farming are discussed in this annex. Some with little direct involvement of government agencies, while others with stronger involvement. They include:

- Private companies, joint ventures with foreign investors
- Buy Back (BB) arrangements
- Public Private Partnerships (PPP)
- Clusters/cooperatives
- Aquaculture parks
- Aquaculture in ports
- Other models

I. PRIVATE COMPANIES, JOINT VENTURE WITH FOREIGNER

a) OceanPick

OceanPick is taken as a SLA 'case story' model of a large volume marine fish cage farm, which is the commercialisation of the sector that MFARD seeks to encourage. They produce Asian seabass or Barramundi.

They are the pioneer and at present the only large volume marine fish cage farm, not only in SLA Lanka, but also in South Asia. It was incorporated in late 2011 by Irfan Thassim. The founder did not have any previous seafood background, but a vision to use SLA's sea area resources for sea farming. Going to Europe, specifically Britain, to gain knowledge on salmon farming technology, he met with a Scottish salmon farming and equipment company, which later became his JV partner.

Partners

Aberdeen Holdings (PVT) Ltd. (<http://www.aberdeenholding.com>) is the majority owner. It is a Khassim family owned group involved in a large range of businesses all over the world, ranging from agricultural commodities, patisseries, aviation, solar energy, packaging, courier services etc. etc. and then the strategic investment OceanPick.

Minority investments from other SLA companies, include a supermarket chain (Keels), which has introduced the fish in its outlets.

The foreign joint venture partner is the Scottish Kames Fish Farming Ltd., established in 1972, farming mainly trout, but also selling equipment through Kames Fish Farming Equipment Ltd., which has supplied fish farming equipment internationally for some 25 years. Kames Fish Farming Ltd has no other international involvement in farming.

The owner of Kames Fish Farming Ltd. visited Trincomalee and was encouraged by the pristine water quality. He sees SLA well positioned for the international market, which he expects will see increasing seafood prices. His son is working on the farm.

Investment

The company was launched in 2012 with an initial investment of USD 4 mill. By 2014 it was USD 4.6 mill. One informant told the Scottish partner invested about 10% in kind and in cash.

Expertise

The initial expertise came via the JV with the Scottish company. They sent an expert to make the site selection and perform current studies. Following this an expert was hired in to carry out modelling to estimate the environmental impact and assess carrying capacity of the proposed sites. Having the approvals Kames Fish Farming Ltd. provided all cages, nets, moorings, work boat etc.

Later when established OceanPick advertised for a general manager. A foreign tropical marine fish farming expert with experience from the Americas was hired in for the first 3 years of the operation.

OceanPick does not seem to link much up towards expertise from SLA institutions apart from the licensing renewals.

E.g. when they need to have a fish disease diagnosed, they send the fish to Bangkok/Thailand and not to local labs.

Sites

OceanPick has leased six sea sites at Trincomalee - two sheltered and four exposed - covering 73 ha. The sites are both inside the Trincomalee Port area and in the general Koddigar Bay. At present two sites, Powder Bay, inside the port area, and Minden Rock just outside the port area, 3-4 nautical miles apart, are in use with 14 cages (8 x 40m circumference and 6 x 50m) with a stated production capacity of 400 tons.

Additionally OceanPick purchased a 15 acres coastal land at Koneshpuri north of Trincomalee and constructed their onshore, flow through, marine borehole water fed nursery with 12 tanks.

Import of juveniles

There is a private barramundi hatchery at Chilaw, but it was explained to be inconsistent in production volumes and quality, and therefore juveniles/fry of 0.2g are imported from two hatcheries in Southern Australia (Mainstream and Robarra). They are airlifted via Singapore in numbers of up to 50,000. They spend two months at the nursery facility, before they are stocked into the grow-out sea cages.

Import of feed

Feed accounts normally about 60% of the production costs in marine fish farms, and as such it is the most important economic input factor. But there are no local feed producers of feed for marine fish, thus OceanPick depends on imports. Feed has been imported from Zeigler Brothers (USA), Skretting (Tom Boy) or EWOS (Cargill) both from Vietnam. But in addition to the extra transport costs SLA adds additional tariffs i.e. CID, surcharge, PAL, Cess, VAT, excise, RIDL, SRL and NBT. The consultant is not a tax accountant, thus some of the tariffs may be zero, but it was informed that an accumulated amount of 15% had to be paid on imported feed. This is a burden not seen in any other competing countries. Previously in Vietnam, before feed companies started producing marine fish feeds,

farming companies did not have to pay tax on imported feed, if minimum 80% of the fish product was exported. It is understood that BOI has been empowered to reduce the tariffs, and that this is widely given within input items for agriculture – thus it should also include aquaculture.

Staff:

The information on staff/labourer salaries is not consistent. At a visit to Trincomalee, it was informed that salaries varied from SLR 20-30.000/mth for a 20-day working month. It was mentioned that with this salary workers are not stable i.e. leaving for other higher paid jobs. Other salary levels informed were SLR 15,000/mth and for a cage manager Rp 25,000. At least the latter salaries are low compared to a similar farm in Vietnam and considering that the single worker in the end is responsible for a cage holding a potential biomass worth of up to USD 100,000 just in production costs.

The company was told to have a staff of 37 people or about 50 including nursery and sales team, which seems as many for the present production of possibly 150 tons. To compare at a government institution demonstration farm in Vietnam the staff for a 110 tons production is 7 persons including manager and accountant. Sales and net cleaning/repair people are additional part time or day workers, but would add 2-3 full time positions.

The workers are understood to be mainly Tamil, while all management functions are basically taken care of by Muslims reflecting the ownership.

Modern large volume fish farming involves specialized work, for which training is essential to make sure staff can make informed decisions, when handling a fish stock worth up to USD 100,000 in e.g. a 60m cage. At the moment the training is in house, but it should be considered to invest in having the skilled workers trained through a dedicated training program – even if necessary to send some abroad. The importance of skilled staff is highly unappreciated in Asia compared to Norway. Currently there are eight BSc graduates employed, among others the nursery manager, who graduated from Ocean University in Tangalle.

The market

OceanPick's fish are harvested on demand and supplied to leading restaurants and hotels in Colombo within 48-72 hours. They have started branding the fish with the Round Island brand name and expect it to reach major retail chains, such as the minority shareholder Keels.

OceanPick does not have processing facilities. The processing is either customer processing, i.e. OceanPick is in control of the marketing - or processing and export made through 3rd party. One processor informed that they purchase at about USD 5/kg round fish. At the farm site, the price was quoted at between LKR 600-900/kg round (USD 4-6) depending on customer and size of fish. The fish for export is processed into fillets and sold on international markets such as USA, Russia, Australia and EU.

In 2011-12 AquaN'Green (see later) sold barramundi to TESS/TROPIC and Ceylon Fresh Foods roughly at USD 2.7/kg for small fish (800-1000 grams) and USD 3.1/kg for large fish (over 1 kg). The fish was filleted, and TESS sold the fillets from 1.5 to 2.5 kg fish at USD 12-14/kg of which USD 8.16 would cover the costs of the (fish) raw material input, thus leaving little or no profit once labour, packaging, freezing, storage, freight and other costs are added.

At a meeting with the consultant TESS/TROPIC said that the price of farmed, round marine fish had to be USD 2/kg for it to be attractive to the processors. They need minimum 500kg shipments and

preferably 2-3 tons/ day. They mix it with grouper, red snapper and parrot fish fillets for sale (to China) at a common price.

But it is not possible to profitably produce any farmed, **marine** fish at USD 2/kg. Thus it would not be right strategy to sell a farmed marine fish in a mixed bag with other fish from capture fisheries.

Government involvement

Being a JV with a foreign partner, OceanPick involved the BOI in the application process, also because they highly depend on imports of input factors (cages/feed/juveniles), where BOI says it can assist, when importing from abroad. Likewise BOI granted a 4 year tax grace to OceanPick. However importantly to the information of the consultant, BOI did not reduce any of the taxes/tariffs/levies on imported feed, which left OceanPick less competitive in the export market compared to other barramundi farms in Asia. This policy is strongly recommended to be revised.

OceanPick - like any other farmers – are given the 1 year aquaculture management license from NAQDA, however in connection with loan financing of operational costs, it was informed that the policy of issuing 1 year licenses was a constraint to the company, as the banks did not consider this a sufficient warranty. NAQDA is well aware of this constraint and was told to attend the issue.

One issue that would benefit marine fish farms is, if the government had a training program for labourers – could be at facilities, which should be established at NAQDA or Ocean University.

Disease management/husbandry/biosecurity are other very important topic, which should get strong attention by MFARD/NAQDA/NARA, meaning among others that the diagnostic capacity to diagnose marine fish diseases should be built at relevant local institutions. This could be a topic to be promoted in bilateral cooperation – with Norway, Japan, South Korea or others.

Marketing is possibly a fundamental challenge. It is important that production price is as low as possible meaning the input factors should not be burdened by domestic (SLA) tariffs. Likewise the number of staff employed at OceanPick indicates that the efficiency of the work is not optimal. Among others this can be improved by having better trained and skilled staff, which MFARD also can initiate.

Whether government or professional associations should assist in marketing is an issue often debated – maybe at least in providing market intelligence. However only when the production cost is competitive, it will serve any purpose.

b) Ceylon Seafood Limited

This is a new 3-party JV company between Norwegian investors and competence and a local company, taking care of all local matters. The latter has been a trading partner to the Norwegian investors (in a completely different sector) for many years. They are looking into starting shrimp and large-scale marine fish farming. They used a Norwegian consulting company Akvaplan-Niva to help identifying potential sites and are in process of applying for sites. Originally they looked into the north, but there were several unsettled landowner issues, making it complicated to purchase/lease the land for shrimp farming. Hence they instead looked towards the north east.

As for the marine fish farming, the plan is to establish several dozen of large cages, which would make it a significant investment and development for SLA, and very much in line with the Government/MFARD strategic plan.

- Therefore it is recommended to give this initiative all possible administrative assistance from MFARD and NAQDA, as there are not many of this type of initiative.

II. BUY BACK ARRANGEMENTS

This model is in reality/practise not only a simple Buy Back (BB) arrangement, but it is often linked up towards a donor or government support, as a Public Private Alliance (PPA) or a Public Private Partnership (PPP).

The major benefit from this type of arrangement is that it removes the marketing risk of the (small-scale) producer and that it, in its most simple model, involves providing the stocking material (like propagules of seaweed or post larvae of freshwater prawn or juveniles of seabass), as well as the technology transfer/training to small-scale farmers. Apart from carrying the production risk, the major risk involved for the small-scale producer in a BB arrangement is that the producer is tied by an exclusivity contract, for whom they can sell to, and exclusivity rarely leads to open market pricing. If the stocking material is provided free of charge, the benefits to the producer may somehow seem balanced, however if the price of the stocking material produced by the BB partner later is deducted from the fixed buying price, it involves large risks carried by the producer.

If this arrangement is a purely commercial business to business relationship, it is the rule of the game in business, however if the setup involves government or donor PPP supporting the BB partner, there should be provisions ensuring that the pricing takes duly respect to the open market pricing.

It is often promoted as a price guarantee given to the producers, but in fact it often works out as a fixed price agreement, where the trader (BB partner) avoids taking any risk in production, but at the same time takes the benefit from selling in the open market. Two examples will be described in this chapter, but also there is one BB arrangement mentioned in the PPP chapter.

a) Hailey's

In 2013-14 Hayleys Aquagri Pvt. Ltd., a subsidiary of Hayleys Group, one of SLA's largest multinational business conglomerates, initiated a seaweed farming project (*Kappaphycus alvarezii*) in the Mannar District in the northwest to help fishing communities to rebuild their lives (after the civic war) and generate a steady family income. This was done in cooperation with NARA, NAQDA and UNDP in a PPP like structure, where NAQDA among others took the responsibility to import the stocking material (propagules).

Kappaphycus seaweed farming is a proven, low tech, low investment and most successful intervention in S and SE Asia creating livelihood options among the poorest coastal fisher families. They can reach very attractive income levels with only minute investments and fast cropping cycles. The very crucial element is though that the farmers need market access, and this is what Hayleys offers, but based on exclusivity. However the other crucial element for the farmers to achieve the real benefit is that the volume of production is large enough (by multiplication of the number of farmers) to attract more buyers, which in the end may better ensure an open market pricing. This has been the experience gained in most countries having several farmed seaweeds for decades.

In 2015 UNDP in SLA partnered again with Hayleys Aquagri, to expand seaweed farming on three islands west of Jaffna. This is implemented by the third phase of the Northern Livelihood Development Project funded by the Government of Norway. The aim is to promote local economic development through enhancing market-based livelihood opportunities.

UNDP in collaboration with MFARD/NAQDA, Department of Co-operatives and Fisheries Co-operative Societies identify the beneficiaries to be supported by this partnership. UNDP assist the new farmers by providing grow out structures (bamboo rafts with netting and mooring) and initial stocking material (propagules). This is done via their partnership with Hayleys Aquagri Pvt. Ltd.

In turn Hayleys contributes 'business development support' and technical support (among others via cooperation with the Tamil Nadu AquAgri Processing Ltd) to the farmers, and they enter into a BB arrangement with each farmer 'to ensure a good price'. It should be appreciated that this arrangement (as most BB) works on an exclusivity arrangement with Hayleys with the risks of the farmers getting less than the open market price, but at least having a fixed and stable price.

According to <http://hayleysagriculture.com/aquagri/production.php> a 12x12 feet bamboo raft stocked with 60kg of cuttings (propagules) will generate 260 kg of seaweed in 45 days. 60 kg is used for restocking, while 200kg is harvested and dried into 20 kg. These are 'standard' figures for growing Kappaphycus on rafts in common also with experience e.g. from Tamil Nadu.

According to their website, the price paid to the farmer is SLR 50/kg (USD 0.36) dry matter. They use the example of a farmer family having 45 rafts, producing 900kg, which generates an income of SLR 45,000 every 45-day.

It should however be appreciated that it will normally not be possible to have a crop every 45 days i.e. 8 crops a year, as it is influenced by the monsoon rain - both grow-wise and drying ability.

It was informed by NAQDA that in 2015 there were 500 growers, and production was 160 tons dry weight. Using the example from the above website: If farmers had 45 rafts, and if they produced 6 crops a year, it would mean that each farmer would produce 5.4 tons/year, meaning that there would only need to be about 30 farmers to produce the 160 tons. Thus if having 500 farmers, it would mean that the average farmer either has much less than 45 rafts or much less than 6 crops a year. The website of course presents, which income is possible, but reality is likely much more modest.

Some commenting to the 'fixed price' offered, if the farmer wants to be beneficiary of the project (against sales exclusivity).

The consultant has also worked in Tamil Nadu, India, Khanh Hoa, Vietnam and Sabah, Malaysia analysing the seaweed farming.

In Tamil Nadu the average price of dried seaweed in 2008 was USD 0.23-0.28/kg. It was at that time purchased by one company owned by PepsiCo. In 2010 USD 0.29 was quoted paid by the main buyer (who took over from PepsiCo), while a new buyer from Chennai started paying USD 0.33/kg dry. In 2016 price had increased to USD 0.52/kg (pers. comm. Dr Sakthivel). The increase likely happened because of open market forces i.e. arrival of more buyers. The recent production was estimated at about 20,000 rafts producing 500 tons dried seaweed.

But it means that just on the other side of Palk Bay or Gulf of Mannar, the seaweed is paid USD 0.52 at farm gate against USD 0.36 in SLA i.e. 44% higher, which if Hayleys are selling to their partner in Tamil Nadu at that price, would be their 'profit'. In Tamil Nadu they also have to do training, baling and transport.

In Vietnam seaweed farmers claimed that prices dropped to USD 0.75 to 0.85/kg dry in 2012-13, and they had no benefit. Only with a price of USD 1 or more they have profit.

In 1995 in Sabah, Malaysia, there was a production of about 1,200 tons of dried seaweed, which only attracted one exporter, and the farmers were paid USD 0.29/kg. In 1999 the volume produced had tripled to 3,600 tons and attracted 3 exporters. The ex-farm price increased to USD 0.61/kg. The exporters would sell at USD 1.1/kg, but would dry the product further and bale it.

Two processing plants for Semi Refined Carrageenan (SRC) were being planned in Sabah in year 2000. It is a rather simple technology, and one of the planned refineries was quoted to have a capital requirement of about USD 1½ mill., of which USD ½ mill. in investment in equipment. The necessary SRC production was 400 tons i.e. an input of 1,600 tons dried seaweed.

According to "The Economics of Kappaphycus Seaweed Cultivation in Developing Countries, 2015" the 2009-price in India was USD 0.33/kg, while in Philippines USD 1.09 and Indonesia USD 0.85. The production of Indonesia in 2014 (FAO FishStatJ) was nearly 900,000 tons of dried seaweed. Overall the prices in the latter two countries fluctuated between USD 0.60 and 1.40 over 5 years, and if farming was more 'remote' compared to a processing plant, the price was down to USD 0.50/kg, which still is considerably higher than the fixed/good price offered in the 'BB exclusivity deal' in SLA.

In SLA there is no processing apart from the dried seaweed being baled, using simple machinery, and exported, likely to India or Indonesia? The Tamil Nadu partner of Hayley is doing some SRC processing even volume seems small.

A case story of starting seaweed farming and being outside the BB arrangement.

The Niguthary (Nayinativu) Island was visited by the consultant. The fishers association had been involved in seaweed farming since 2014 using the same raft principle. They informed that they were not part of the BB setup and had to purchase propagules from Hayleys, 1,000 kg at LKR 20/kg. However in 2016 the fishermen stopped farming, as they lost one crop, due to structural failure because the bamboo had not been matured? and with that all the savings of the society. The prices they mentioned were a little confusing, like they mentioned they were paid a price of SLR 35/kg dried (USD 0.23), but offered up to SLR 40-50, but only if they entered an exclusivity arrangement with Hayleys.

Other potential SLA buyers mentioned are: Luckyland Biscuits and Monty?

From discussions with other farmers doing sea cucumber farming in nearly similar sea conditions as seaweed farming, considered to start double cropping with seaweed, as the floating rafts would not interfere with the sea cucumber. Having different financial capacity, they wanted to sell the seaweed on the open market. It would seem like a good idea, as they already occupy the sea area, and actually both productions do not cause any pollution. Furthermore in sea cucumber farming a major task of the work force is simply to be present to avoid theft, and that time might as well be used for attending the seaweed culture.

Government role:

The seaweed farmers, even they are very small, still have to apply to NAQDA for a one-year aquaculture management license!

To simplify administration load of NAQDA and of local, possibly less educated farmers, this should be decentralised and managed by the local communities, within an overall area permit given by NAQDA.

It should be considered, when having a setup involving public or donor co-funding, to establish a steering committee with participation of the government/donor or NAQDA on their behalf to make

sure that 'public' assistance is used in a sustainable manner by assuring that the BB pricing reflects a fair sharing of risks and work and profit margin. If not, there is the risk that the farming activity gets a bad reputation as not being feasible.

b) Aqua N'Green Ltd

This following is an example of a failed BB arrangement. Much of the information below is taken from Mid-Term Performance Evaluation of the Integrated Aquaculture Project (IAP) under USAID's Public Private Alliances Program in the Northern and Eastern Provinces of Sri Lanka July 23, 2012.

This BB arrangement, like the previous, involved donor support, in this case the United States Agency for International Development (USAID), and likewise the donor support was given through a SLA company, in this case Aqua N'Green (ANG).

The seabass cage farming project was initiated by USAID as a PPP between ANG and USAID called the IAP with start-up sites in Trincomalee district, eventually to reach Batticaloa, Jaffna and Mullaitivu districts as well.

The ambition of IAP was to mobilise approximately 1,300 new small-scale farmers in the Northern and Eastern Provinces with more than 50 % women, to raise seabass and sell on a guaranteed BB arrangement to ANG. To fund the partnership, USAID provided USD 1 mill., while ANG committed to invest USD 3.2 mill.

The USAID funding was to pay for materials and construction of two cages per grow-out farmer up to a ceiling of 500 farmers; pay technical training of the farmers and pay construction of a processing plant (as there were none in the area). The budget was given to ANG, and though the cages were given and operated by the farmers, they were still owned by the company. Over a 3-year period 1,300 new farms was to be established with an annual production of about 2,000 tons of fish. ANG was to train the participants in best practices; oversee certification under Global G.A.P standards; partner with the Bank of Ceylon to arrange the micro-loans for the farmers (ANG could not provide the collateral so the farmers themselves had to present two guarantors) to pay the fingerlings (from ANG's hatchery in Negombo) and trash fish to feed the fish (intended later to be pellet feed from a new feed plant of ANG in Trinco area). ANG was to enter a BB contract with the farmers to purchase a specified amount of marketable fish for 1 year (which was to 2 six-month growth cycles) at a fixed price of LKR 250/kg (about USD 2), which was to be used to pay back part of the loan, and cash in the rest (supposedly about USD 150).

In short this project was too ambitious, and to the consultant the SLA company seemed never to have had the financial strength and capacity to partner this project, unless profiting from the direct funding and/or the profit generated by the price difference between BB and market prices. ANG deemed the price difference was necessary to cover the costs of fingerling transport and ice and to provide 'working capital' for trainers and their staff salaries. One wonders if the transport costs was not included in the sales price of the fingerling, which would be the normal pricing policy. But actually it seems that ANG did not invest in sharing any costs. But the problem was also that the ambitions put in the business plan were unrealistic, and that likely created a financial vacuum, when the fast 'capital rotation' went missing, as production never picked up due to unrealistic production expectations.

E.g. "seabass will be marketable in 6 months i.e. having 2 crops a year and sold via ANG to processing companies (TESS and Ceylon Fresh Foods)". But the average size of the fish achieved after 6 months is not suitable for filleting. Specialised seabass farm companies producing fillets calculate 12-13 months to reach the right minimum 1.1 kg size of fish. The fixed BB price was not attractive to

the 'beneficiaries' to enter fish farming, as the farmers took a large risks by taking up a loan to finance purchase of juveniles (from the BB partner ANG) as well as purchasing the feed (trash fish). In the plan the FCR on trash fish was put at 5.9 , which is not feasible for newcomers (who did not receive in depth training).

ANG even were not able to supply the number of juveniles the farmers paid for. USAID would pay construction of cages for the first 500 farmers, meaning that ANG should finance the cages for the additional 800 farmers to reach the business plan target of 1,300 mobilised new farmers. Likely only about 100 farmers were mobilised, meaning that ANG did not make any investment.

The BB price paid by ANG of LKR 250/kg was well below the market price at that time LKR 350-400/kg. This of course led some farmers to sell the product to other customers, which in turn also led some farmers to fail repaying on their loans, which in the end made Bank of Ceylon stop the loan scheme at least for a while. But also it is difficult to imagine, how one can produce and sell a marine predator fish at LKR 250/kg or about USD 2 (at that time), pay back your loan and still make a profit?

Thus in the end, it boils down at: the newly mobilised farmers were facing all the production risks - and had to pay everything themselves (via their loan) - only they were given 2 cages free for use - and a BB contract of selling the fish at USD2/kg??

The consultant does not have information on whether all the USD 1 mill. fund was utilised by ANG.

At a meeting with seafood export companies, it was explained that the IAP/ANG lack of success was because of lack of capacity to invest (by ANG), and that the market development was not the issue. Likewise they said the production costs were too high, and the technology was not proven or more likely, ANG lacked the experience.

NB: It was also informed that a PPP was developed with the said company to produce milkfish fry, but not successful.

III. PUBLIC-PRIVATE-PARTNERSHIP ARRANGEMENTS

Public-Private-Partnership (PPP) in its pure form is one of the more common intervention used by NAQDA to initiate a desired commercial development with the purpose of attracting pioneers by reducing some of the risks.

This risk reduction can be in different shapes. One common is that NAQDA provides/transfers the technology by having its experts involved in technology transfer completely free of charge, and the private contributes e.g. with land and infrastructure and/or do the operation (incl. financing) and sales. It can also be NAQDA providing infrastructure e.g. a hatchery, which then is operated by a private company, the latter financing the operational costs. In common is that NAQDA in return has a share of the profits.

One should be cautious, if the PPP setup involves some kind of monopoly-like incentive given to the private (with NAQDA sharing profits), as this – from a competing (outsider) company – would seem to be in conflict with NAQDA's government "management role".

Depending on the type of intervention NAQDA will make an open announcement calling for a private partner in 3 newspapers, if the intervention is completely new. If e.g. related to shrimp, NAQDA will invite directly members of the shrimp farmer/hatchery association to put in an Expression of Interest (Eoi), in which the company describes technical and financial information. The PPP can involve a SLA

company only or a JV with a foreign partner. A committee consisting of members from MFARD, NAQDA and local government will make the selection.

Case stories:

a) Shrimp hatchery at Batticaloa

This hatchery commenced operation during 2011 as a PPP with NAQDA. A private company, King Aqua Services dating back to 1995, manages the hatchery, and e.g. 19.2 mill post-larvae were produced in 3rd quarter of 2015. The development purpose of starting this hatchery was that previously there were no local shrimp hatchery in the East to cater the shrimp Post-Larvae (PL) requirement of the expanding shrimp industry in the Batticaloa District. The PPP involvement of NAQDA should also be seen as an intervention to avoid/restrict exchange of PL material from the west coast, which has a history of severe shrimp diseases.

This seems like a very straightforward PPP that should not prevent other investors, when they see the demand.

b) Divron

Freshwater prawn production has shown a gradual increase after stocking of post-larvae in the reservoirs began, and has resulted in enhancing income of inland fishermen. Stocking with freshwater prawn PL's from NAQDA's two hatcheries created a new fishery in the inland waters and a new export. However the stocking volume was below the potential and several potential tanks remained un-stocked. Today, there are mainly two companies engaged in exporting of freshwater prawn and 21, 21 and 141 tons were exported in 2012, 2013 and 2014 respectively. In 2015 a total of 465 tons were harvested, of which around 144 tons were exported.

One of the main companies involved is Divron Bioventures, a JV between a local and a Canadian investor. They established a freshwater prawn hatchery in a previous shrimp hatchery in Negombo, and entered a PPP arrangement with NAQDA, who allocated an extension officer/expert from Chilaw, covering his salaries and direct costs to transfer the hatchery technology. The PPP included mobilising communities, site (reservoir) selection by NAQDA, and NAQDA entered exclusivity arrangements with the fisheries societies of 50 reservoirs.

The Divron hatchery started production in 2015 with a capacity of 30 mill. PL's.

The PPP provides the seeding of the tanks against a BB arrangement of marketable prawns from the fisheries societies of the involved tanks. The majority of the prawns are exported fresh/chilled on ice to Thailand, China, Japan and Singapore, while a smaller volume is sold in the local market. There is no processing involved, and export is done by Divron themselves.

As in previous mentioned BB arrangements by ANG so called 'side selling' by the fishermen to competitors, who does not contribute any input factors, sometimes does occur, however the seriousness or threat to the PPP was not informed.

The partners in Divron are:

Mr Shan, a local entrepreneur previously involved in export of live fish from capture fisheries and jelly fish, as well as he was involved in selling live oyster and seafood locally. It was in this capacity he participated as one of the partners in a 3-year Canadian aid project starting in 2011 with the aim to improving (sea)food security.

The Canadian project included: Management of health (shrimp farms); Inland culture based fisheries in seasonal tanks and Bivalve culture. Mr Jim, the other partner in Divron, was the project manager on the project with a Canadian veterinarian background, as well as he had been involved in practical oyster farming (in Canada), and this brought him together with Mr Shan.

When the aid project terminated in 2014, they joined forces, and they purchased an obsolete shrimp hatchery in Negombo to turn it into a freshwater prawn hatchery to develop culture based fisheries in the tanks. During the establishing of Divron they worked directly with the minister (MFARD) and NAQDA and did not involve BOI.

Apart from adapting infrastructure and procedures for freshwater prawn, as designed and supervised by a NAQDA specialist, they also had to invest in some critical infrastructure including ice production and cold storage. The NAQDA specialist participated in the first production cycles.

To the consultant it is an interesting company due to their wide experience and interests, and their focus on the value chain. They are also involved in a women community oyster farming development in Kalpitya, with the scope of selling hygienic safe oysters to the Colombo hotels.

c) Marine fish hatchery Batticaloa

NAQDA is in the process of constructing a SLR 150 mill. multispecies marine fish hatchery at Batticaloa. The project is managed by FAO with EU funding. The design is made by a SLA consultant together with NAQDA and verified by FAO specialist. Look into making same strategy as e.g. on Bali where the government hatchery (and broodstock keeper) supplies fertilised eggs (or fry) to backyard or private company hatcheries/nurseries – the same strategy also used in SLA's freshwater fish fingerling production. At the moment NAQDA pays OceanPick to keep about 100 seabass in their cages. NAQDA is also establishing a broodstock of milkfish at a farm in the Mannar area.

It is not fully decided, but after operating the hatchery for a couple of seasons, NAQDA most likely will call for EoI for making a PPP with a private company to operate.

d) Recommendations

- Avoid de facto monopoly/exclusivity to the private partner when making a PPP. This means e.g. avoid giving large (unique) area concessions, which would prevent other companies from entering the field simply because the relevant area resources have all been allocated to the PPP.
- Avoid that the expertise/technology transfer is not available to other investors. I.e. if others in addition to the pioneering PPP partner are interested in the technology, it should be made available, but on commercial terms through paid consultancy – fees plus direct costs (provisions are in the NAQDA Act). It is ok to support the pioneers, as they are taking a risk, but the following should be charged, as government should not pay the development, if it already has shown to be commercial viable (via the PPP). If demand for expertise is higher than the (permanent) staff of NAQDA can deliver, NAQDA should consider hiring in additional (project employed) staff and given them the relevant training. This temporary staff could eventually later be employed by the company requesting the technology transfer and as such create job opportunities for skilled staff. Furthermore if NAQDA keeps offering all consultancy for free, the private consultancy sector will be difficult to develop.

IV. AQUACULTURE PARKS

Two aquaculture industrial investment parks have been planned by NAQDA at Batticaloa and Mannar.

A major purpose of this intervention is to get the 'block' permission for the land areas from the Ministry of Lands to make this available to investors, who thus would cut short 1-2 years of their application procedures, and avoid much of that administration work, in addition to that the sites have been selected by NAQDA (with NARA expertise) as being appropriate. Furthermore NAQDA would provide some necessary infrastructure like roads, in/outlet channels and power supply. The general areas - Batticaloa and Mannar – were selected based on their development potential, and the investors were to be selected through an EoI process like the PPP's.

a) Batticaloa

The planned Batticaloa Aquaculture Industrial Park at a LKR 100 mill investment included 1,120 ha mostly for shrimp farming, but also some area for sea farming. Some area clearance was already given by the district land use, but the planning seemed not to have been done with sufficient involvement of the local (political) government councils and their development plans. Thus the process was put on hold. The reasons mentioned were that the shrimp farming development would cause pollution and impact the mangrove, as well as the development would restrict possible tourism development, which eventually was thought to bring better local benefit such as employment. The reason to make the aquaculture park in Batticaloa is that the area had not experienced any significant shrimp farm development. This is now a competitive edge, and making the 'park/zone' would insure a more sustainable approach than the development made on the west coast decades ago.

b) Mannar

The other park under planning is in Mannar and involves 1,500 ha. This is not as far in planning process as the one in Batticaloa. Of course this may have some local opposition, and the realism was informed also to be uncertain.

c) Recommendation

- It is appreciated that the procedures involved in leasing land from the Ministry of Lands is a major constraint to the investors, but history with the Batticaloa Aquaculture Park shows that the planning should be made with better involvement of the local governments to reflect their priorities. In many countries in the region, the local provincial governments are in charge of the specific aquaculture development in their own province. MFARD/NAQDA should find an approach, where the local planning is better involved in their initiatives.
- Shrimp farming in the general Asian region seems economically attractive and needs little government interventions to develop, apart from regulations guiding use of good management practises. It makes however sense to make planning/zoning for the shrimp farming to assure that effluent water from some farms is not mixed with inlet water of other farms. Batticaloa Aqua Park could have been such a planning/zoning as shrimp farming only has developed little.
- SLA has only Koddigar Bay (Trincomalee) with water depths potential for a limited number of modern large-volume cage farms. Realistically the real potential area resources of SLA for marine fish farming are the areas of 8-12m depth, especially in the area of Palk Strait from Mannar up to Jaffna, which is suitable for small-volume cage farming. Thus for SLA to

achieve a large production of farmed marine fish and to make use of its real area potential, it is suggested that NAQDA makes a small-volume cage farm zone (a model aqua park) in e.g. the Delft Channel, which has some 60 km² area, which seems potentially suitable.

Everything should be planned and cleared by NAQDA, and infrastructure provided at sea such as 2-4 tons mooring concrete blocks installed. The planning (mooring) should accommodate rafts of maximum 12 units of square HPDE cages each e.g. 5x5x5m plus a work/guard platform.

The farmers only should have to apply to NAQDA, possibly through a tender process or EoI. The farmers could be fishers, who only operate one raft or company/cooperative structures having several rafts. Having a cage aqua park it would necessitate that farmers follow some common rules to avoid jeopardising biosecurity. Use of pellet feeds and approved health certificate of fish juveniles to be stocked should be compulsory, and violations should lead to loss of farming permit.

Having a cage farm zone would produce larger volumes of fish, which will make the market access easier, as it would attract more buyers, such as distributors or processing companies. Being many farmers in the same zone would also open for farmers to organise themselves in 'purchase groups' with a better negotiation power (by volume) for purchase of feed and juveniles. This should be on a volunteer basis to avoid an organisation structure, which needs a budget to sustain its activity. In the earlier days this was also seen in Norway, where farms cooperated in negotiating larger feed contracts.

- At the aqua park, NAQDA should operate one unit for demonstration, training and trialling, to document the economy and approach to the local farmers (Pls. see Chapter VI a).
- One added benefit from making a cage farming zone with scattered 2-4 tons mooring blocks is that it will prevent illegal fishing by the Tamil Nadu trawlers coming into SLA shallow waters during the night.

V. AQUACULTURE IN PORTS

Acknowledging that getting government land/sea site approvals are a several yearlong process at ML, NAQDA looked into another supplementary strategy for developing marine aquaculture. They made a site survey for potential aquaculture areas in some commercial ports of the Sri Lankan Ports Authority under the Ministry of Ports and Shipping, as the latter was experienced to be more accommodating or at least considered to be faster in their decision procedures. Five sites, of which three are in Trincomalee Harbour, one in Galle and one in Olivil Harbour, were identified. However the criteria used would not accommodate modern large-volume cages, as the sites are very shallow, and the areas would only qualify for 'traditional' small-volume cages or other types of marine aquaculture, such as longline mussel or seaweed farming.

a) Galle Harbour

Galle Harbour is a natural harbour in the south, which has its harbour facilities constructed in the inner center of the bay, well protected from the dominant WNW wind direction. The bay has maximum depths of 12-14m. It is unclear to the consultant the exact criteria used for selecting the 25 ha site identified. It is a rather shallow area (5-8 m), and according to Google Earth, it is situated

on top of the coral reef of Bona Vista in the eastern part of the bay. The site has a 1.5 km fetch to the dominant wind direction, as well as it is exposed to the SW winds, which is the direction 20-25% of the time, although not with strong winds (windfinder.com). Galle Harbour is said to be the only harbour in SLA providing facilities for pleasure yachts, and all together Galle Harbour offers limited areas for marine aquaculture. The main shipping lane to the harbour is in the western part of the bay, and thus the eastern part is the only possibility. With the shallow waters either small volume cages or mussel farming on longlines seems the most technical feasible. In 2001 a 'successful' brown mussel raft farming trial was reported by Fish Farming International in Rumassala Bay, which is in the south-eastern part of Galle Harbour. However it was discontinued after the project (financing), likely because of limited market demand. If entering mussel farming it would seem more appropriate to use long-line technology under the physical conditions of Galle Harbour.

b) Oluvil Harbour

Oluvil Harbour in Ampara District, Eastern Province is a newly constructed harbour (2013) with a commercial Northern and a fishing Southern part. The commercial harbour with the entrance, is still not in use, and the 15-20 ha area identified is inside the southern part of the commercial harbour just next to the fishing harbour. However sand is building up at the southern arm of the entrance forcing the fishing boats to pass the identified area to reach their harbour. The depth is 8 m, thus only a few small volume cages could be established, but only after having confirmed that the water exchange is sufficient.

c) Trincomalee Harbour

The mapping of potential areas in Trincomalee harbour also focussed on rather shallow water sites, and some are competing with other 'normal harbour' stakeholder uses.

Site 1 is in Yard Cove in the eastern, inner part of the harbour. The 28 ha area is between 2 and 8 m deep, but it has also been identified for building a dry dock. Being in the inner part of the harbour and having only a tide of 40-60 cm, it would also necessitate detailed current velocity measurements to assess its suitability for fish farming. The dominant wind directions are from the SW and less from NE.

Site 2 is a 12 ha area in Powder bay just south of above Yard Cove. The area is 6-11 m deep, but one of its borders is less than 100 m from one of the sites of OceanPick Company (see Chapter I in this annex). From a biosecurity point of view, it would not be advisable, neither to OceanPick nor to a new activity to make fish farming activities under different managements this close to each other.

Site 3 is in Malay Cove, which is in the western part of port area, just east of the airport. This cove has already some major harbour facilities, and there is already a development program for further harbour facilities. Thus the 17 ha of 5-9 m depth identified are not realistic for aquaculture, as harbour activity naturally would have the higher priority of the port authority.

When looking for sites for large-volume cage fish farming the minimum water depth should be 15m. Inside Trincomalee port there is especially one site at the eastern part of the mouth of the port area - the Nicholson Cove with depths of 15-30 m - being just next to the main Koddigar Bay, which to the consultant would be the first choice, if making a large volume marine fish farm. This site should hold the best water quality of the open bay, while also being well protected. There seems to be little other activity in the area than a "Jungle Beach Resort" situated in a hidden position in the bottom of the cove. From Google Earth the resort seems to have a small pleasure yacht facility. Even if this was further expanded, making a cage farm in the mouth of the cove would not collide with the yachting.

Whether the Nicholson Cove is available for aquaculture or not needs to be verified, as it maybe already has been given to OceanPick but not in use.

d) Conclusion

- Developing marine aquaculture (in specific marine fish farming) in areas under the Ports Authority will naturally meet large limitations simply due to the normal stakeholder uses of a port area. Apart from Trincomalee port area, it will only open up for a limited number of small-scale activities and as such not contribute significantly to the sector development, but of course of high relevance to small, local aquaculture companies. In Trincomalee port area the availability of the areas identified by NAQDA needs to be verified against the traditional users of port facilities. Thus there is likely some potential for developing a number of small-volume cage farms, as well as other shallow water marine aquaculture activities. Koddigar Bay may be the major area resource for small-scale fish farms on the east coast, as the other area resources, the lagoons, may be too vulnerable to the nutrient enrichment from the farming activity due to the limited water exchange to the sea due to small sea mouths and limited tidal impact.
- As for sites for large-volume cages inside the port area OceanPick has already been given 7 sites, most of which are said to be inside the port area. Thus it would need detailed planning to assess the feasible additional sites – from a technical point of view, carrying capacity as well as other traditional port stakeholder uses (see following chapter VI c).

VI. OTHER MODELS TO ENCOURAGE COMMERCIAL DEVELOPMENT

a) Demonstration, training and trial farms

A demonstration and training shrimp farm at the Air Force Base Camp in Batticaloa was established by NAQDA in 2010? using funds from the International Fund for Agricultural Development (IFAD). It trains shrimp farmers from the region in BMP and sustainable development of shrimp farming. The demonstration farm is managed by the Air Force, and 5.2 tons was harvested in 2014, and 330,000 PL's were stocked in 2015. 200 persons were trained so far from this farm. Shrimp farming is little developed in the area, and thus experienced staff are lacking. This intervention should be seen in conjunction with other NAQDA initiatives in Batticaloa area, such as the PPP shrimp hatchery, the Vakaraia Ocean Aqua Cluster shrimp farm and the Batticaloa Aqua Park (so far put on a halt), and as such they fit together as a comprehensive strategy. Since shrimp farming has hardly developed in Batticaloa region, which thus does not have the same disease history as the west coast, chances are better to make it right through guidance from NAQDA.

Recommendations

- NAQDA should consider to develop more demonstration, training and trial farms in subsectors, which have not been successfully commercialised yet, such as marine fish and bivalve farming.
- NAQDA should however not get involved in a large-volume cage demonstration farm. Koddigar Bay is the only area resource in SLA suitable for modern large-volume cages. Already one company has established and others started application process, and it is likely only sustainable to develop a limited number of farming companies in the area (see below chapter c).
- The real large marine area resource of SLA, with potential for developing a large volume output of farmed marine fish, is the shallow bay/strait areas from Mannar and north to Jaffna. As mentioned briefly in chapter IV c, it is recommended NAQDA to make a

demonstration, training and trial farm in conjunction with the recommended marine aqua park model for 'small-volume' cage farming in the Delft Channel south-west of Jaffna. The demonstration farm should develop a SLA marine fish farming model transferring some approaches from the modern large-volume cage farms, such as biosecurity and relevant 'scale of efficiency' topics, but using 'small-volume cages' suitable in the shallow waters. The presence of NAQDA staff in the zone would also make it easier to perform ad hoc extension services and to inspect and enforce the preconditions stated in the farming permits. It should be compulsory that the farmers of the cage park have participated in the training course in Best Management Practises (BMP) including biosecurity and modern fish farming management principles at the NAQDA demonstration farm. The demonstration farm should carry out training courses in:

- Understanding site selection for a marine fish farm
- Cage installation and management
- Farming characteristics of potential marine fish species
- Selecting, transportation and stocking of juveniles
- Nutrition; feed types and qualities; feeding techniques
- Inspection and maintenance of sea site installations and other ad hoc operations
- Bio-security
- Harvest and postharvest handling
- Shore base activities
- Record keeping

Whether using large or small-volume cages, there is a need for trained/skilled workers, when handling large values of biomass in the cages, thus the training should also be open for the large-volume farms of Koddigar Bay (either for free or on a fee basis). The training could possibly be offered in cooperation with e.g. Ocean University (having a college in Jaffna) or other universities.

b) Cluster/cooperative

Cluster development is normally a top/down intervention and has often shown to depend on outside support. Thus if making this - with public or donor support – it is crucial for the sustainability to have a solid exit strategy after the outside support.

The definition is not stringent and some of the interventions mentioned in this report like the aquaculture park in Batticaloa could also be perceived as a cluster development – and especially those mentioned in below Chapter d - Fisheries Mega Zones would also be cluster developments.

One example will be mentioned the Vakara Ocean Aqua Cluster (Pvt) Ltd.

This activity was initiated by NAQDA and financed by IFAD to create alternative livelihoods to coastal communities' affected by the tsunami by engaging them in 'ecosystem' shrimp farming on a concept of cluster system. A company Vakara Ocean Aqua Cluster (Pvt) Ltd was formed as a "Public-Private-Community-Partnership" with the investor (King Aqua Services), a society/shrimp farmer association formed by 27 community members (in Batticaloa region) and NAQDA as shareholders. The farm has a production capacity of 100 tons. In 2014 the profit/dividend paid each of the three JV parties was SLR 5.4 mill, meaning each of the beneficiary (in the society) received a net profit of SLR 200,000. About 3.97 mill PL's were stocked in 2015 and 33 tons harvested by September 2015. The farm employs about 20 fulltime workers and 30 part time. Thus from this point of view it is quite successful.

Whether or not it can be called a true cluster is a matter of words, but through the private investor (King Aqua Services) the company has access to the whole value chain - hatchery, processing and sales.

c) Zoning – recommendations

- Zoning of the coastal areas is another intervention, which could facilitate commercial development. Even it was suggested at one of the workshops held during the consultancy, this should not be made for the whole country, but only for selected areas in provinces, which have a positive attitude towards aquaculture.
- This zoning is not merely a GIS mapping based on physical data, but should consider other stakeholder uses, priorities and plans, hence the local governments are crucial to be involved in the process to make the zoning meaningful.

Koddiyar Bay, large-volume marine fish farming

- In the context of the report, which has a focus on development of commercial marine fish farming, it is especially urgent to make a plan and carrying capacity analysis for marine cage farming in Koddiyar Bay (Trincomalee), as this is the only relevant area for large-volume cage farming, and since it is informed that in addition to one existing farm, there are several applicants under process.
- The zoning should use relevant physical parameters such as depths more than 15 m.
- The zoning/planning should include carrying capacity estimates, which should take into consideration other sources of 'nutrient loads' from agriculture and towns via river impact, and shrimp farms, as well as water exchange/currents etc. etc.
- Based on the carrying capacity estimates the estimated maximum nutrient loads permitted without negative environmental impact can be calculated. Considering other anthropogenic impacts. This figure can be used to estimate maximum permitted volume of feed, which in turn can be transformed into volume of fish production permissible.
- The fish production volume figure can be used in the management, to make a political decision on recommended size of the concessions to give to single farms, or at least maximum size, until they have shown performance. As the number of farm sites are limited, a too large concession given to a single company without any performance demand, may block the development of the sector in SLA. Thus a performance demand (in the license) should include that the concession or part of it, may be revoked, if sites have been left unused for production!! for more than 2 or 3 consecutive years or deviating from the plan for production development described in their application. The conditions could also include a minimum production volume requirement to avoid a site being blocked by empty cages. In the application (and entered into the license), the company has to describe clearly how (and when) they will utilise the sites they are applying for - again to avoid a company to block development by none-performance. It should be appreciated that companies by nature cannot regulate themselves, and production sites are among the most important assets of a company.

- Based on this estimated number of sites available and maximum size of a farm decided politically or by the management of MFARD, it is recommended that **a tender process** is made e.g. every second year for a number of those sites, where present or potential investors are invited to submit proposals.

This tender process can be used by NAQDA to manage the development, i.e. guide a sustainable development based on performance - volume and cost efficiency - and market demand.

- If market is oversupplied, because too many concessions have been given, the price structure could become cyclic reflecting demand and oversupply. This is damaging and could further start an unproductive competition (dumping), which eventually would lead to bankruptcies (and an overall bad reputation of the whole sector among investors). Hence planning and management of the sector development is crucial.

Lagoons, multi-trophic farming

- When looking at the seemingly many thousands of ha large lagoons (alone Eastern Province mentions in an investment brochure they have 20,000 ha in Ampara and Batticaloa Districts), the water exchange may be quite restricted outside monsoon seasons as well as by small or only temporary lagoon openings. This combined with very small tidal amplitude would make many of the SLA lagoons potentially vulnerable for a feed input depending aquaculture activity, whether it is in the water or onshore.
- Therefore if developing small-volume farming in any lagoon areas, carrying capacity estimations are especially important, including to guide development of mitigating activities such as seaweed and bivalve farming. This guiding of integrated (multi-trophic) aquaculture combining farming at different trophic levels could be achieved by giving a priority to these mitigating farming activities for sites, and only, when they have established productions, permit "feed based" farming.

Tambalagam Bay (Trincomalee), shellfish water, community management

- NAQDA should make a plan or zoning for Tambalagam Bay for bivalve farming. It is a large shallow water bay (mostly between 1-2 m) in the Koddigar Bay system covering at least 1,500 ha. Due to river effluents and the shallow depths, it has a unique, large natural bivalve production, including oysters, clams, blood cockles and as the only place in SLA an abundance of green mussels.
- The natural bivalves of Tambalagam Bay are a huge underutilized/underdeveloped resource (as well as the areas for farming bivalves) with a very large export potential.

Possibly there are other areas, which, in a smaller scale could, be developed into "shellfish waters" such as areas of Puttalam lagoon.

- The mapping should include, which are the areas of the natural bivalve resources – i.e. species present, and if areas have predominantly one or multispecies – or if areas mainly have spat. The mapping should include volume estimates.
- EU have 'shellfish water' standards, which could be adapted and implemented, and they are necessary to open for export. This includes establishing a monitoring program for toxic algae/phytoplankton (NARA) and water hygienic, sanitary standards.

- The plan for farming development could be made in steps. First make licensed plots with natural bivalve stock. This would improve harvest strategy and volume, as there would be less risk that undersized bivalves are taken. Secondly, if areas are identified with large proportion of spat settlement of commercial bivalves, these areas could be turned into community managed areas, from where spat is harvested and transferred to the grow-out plots. This model can be studied in Ben Tre Province in Vietnam, which developed into a large Ben Tre clam (*Meretrix lyrata*) and blood cockle spat provider for the southern Vietnam. Only when the demand for spat in the northern Vietnam eventually picked up, bivalve hatcheries were developed in the north. The industry has now an annual production of 200,000 tons – sold fresh for domestic market and processed/frozen for export especially to Japan, Korea and EU.
- The big question is who is to partner with, to coordinate and mobilise the locals. Originally in the ToR it was envisaged that a NGO should be responsible to organise the communities, however it became clear that the weakness of an NGO in a development context is that they do not necessarily have specialised staff, such as in aquaculture, unless they have the relevant donor project. Then they would hire in staff, but with the risk that they are unexperienced, thus adding an additional risk factor to a development project. This was mentioned by several sector people as being the case. Hence the fisher communities themselves could be in a better position. SLA has a lot of experience of local management from the tank fishermen associations (tilapia and freshwater prawn), which may be copied.
- As establishing the value-chain and access to export market are preconditions for success. The present, domestic market for bivalves is insignificant. Thus it would make more sense to introduce private companies with this expertise. Maybe it could be a set up like the Public-Private-Community-Partnership described in Chapter b above. Several companies (Tropic and Divron) have expressed their interest to the consultant to get involved in processing and marketing of bivalves from Tambalagam Bay, if the volume becomes commercial. Divron is already involved in development of oyster farming in Puttalam lagoon.
- If not finding large natural spat settlement areas, it would be necessary to establish areas with spat attracting devices (oysters and mussels) or bivalve hatcheries (especially clams). In this respect NAQDA or private companies would have the financial capacity, which the local communities or an NGO do not have.

d) Fisheries Mega Zones

Ministry of Primary Industries (MPI), a new ministry, has been given the responsibility to develop 33 Mega Zones by 2020; 23 in agriculture and 10 in fisheries/aquaculture. It targets to develop two fisheries Mega Zones in 2016 and another 8 by 2020.

The aim of the program is to develop value chain interlinked industries (up, mid and downstream) in certain geographical locations (Mega Zones) to improve economy, trade and investment.

By encouraging the aquafarming community and related businesses to be part in an optimized value chain the participants will achieve higher financial returns, through increased efficiency and productivity and by reducing 'transaction costs' or 'inefficiency' by avoiding multiple layers of middlemen.

In addition to supporting the development of the value chain inside the Mega Zone, the development of commercial aquaculture will take place through increased investment, financial

assistance and support to fish farmers and local communities, who will be given training in farming practices to produce safe and quality products, and increase efficiency.

The first two Mega Zones are planned in Kalpitiya and Oluvil. In Kalpitiya focus will be given commercial farming of sea cucumber, seabass, milkfish, tilapia and seaweeds.

In both the Kalpitiya and Oluvil different bivalves such as oysters, pearl oyster, mussels, clams and cockles will also be farmed. Small-scale fishermen would be involved in bivalve farming under proper management, as the product is expected to be a major source of foreign exchange.

Conclusion/recommendation

- Establishing Mega Zones, with good value chain interlinkages, can be a very useful intervention to manage some of the constraints and risks for marine aquaculture development. One important issue is creating market access for the smaller farmer, which would be covered by a successful value-chain approach. Interventions could include establishing the appropriate processing facilities e.g. for bivalves, which would open the export market. Another issue is that at present there are no local feed production for marine fish. This combined with very high import taxes on feeds is an additional major constraint in achieving economic profitability. The MPI aims to promote aquaculture by providing sufficient incentives and support for fish farmers to commercialize their activities, one of which should be to reduce the import taxes on input factors, if they are not locally produced. Or to support the local feed production possibly in combination with a feed production for poultry/livestock.
- The weakness of the approach is that it is a cluster development approach. With the experience from other countries, it has the risk of being a top down approach, where the sustainability depends on the financial support of the 'program'. It is therefore crucial that a solid exit strategy (from the government support) is in place.

ANNEX 4: WHY SHOULD FOREIGN INVESTOR LOOK INTO SRI LANKA?

I. GENERAL OBSERVATIONS

For those interested in a holistic and in depth review of the investment climate in SLA, it is advised to read the very informative, yearly updated "U.S. Department of State. Sri Lanka, Investment Climate Statement 2016"

<http://www.state.gov/e/eb/rls/othr/ics/investmentclimatestatements/index.htm?year=2016&dliid=254491>.

Macro economy: "Sri Lanka's annual exports are approximately USD 10.5 billion, mostly tea and garments. Imports are approximately USD 19 billion, leaving an annual trade deficit of nearly USD 8.5 billion. The United States is the largest single market for Sri Lankan exports, capturing over USD 2 billion of the total. Remittances from migrant workers, approximately USD 7 billion per year, are Sri Lanka's largest source of foreign exchange and help to offset the external deficits. Tourism is a USD 2.9 billion industry with 1.8 million tourist arrivals in 2015".

Possibly surprisingly to many, the Foreign Direct Investment (FDI) in SLA has the following five main countries representing more than 50% of the investments.

Country	% FDI
Netherlands	18

U.K.	13
India	9.5
Switzerland	8
Mauritius	8
Total	56.5

The lack of China in this list seems confusing compared to all the media reports, but maybe the Chinese involvement is especially related to loans - to be followed up with concessions paving the road for planned investments?

On the BOI website www.investsrilanka.com, why to invest in SLA, the following bullet points are presented:

- Strong Resilient Economy
- Supportive Government Policies
- Educated and Adaptable Workforce
- Social Infrastructure
- Location and Connectivity
- Access to Key Markets
- Fast Developing Infrastructure
- Vibrant Business Environment
- Investment Protection and Double Taxation
- Quality of Life

As to supportive government policies they include:

- Total foreign ownership is permitted across almost all areas of the economy (*but not aquaculture*).
- No restrictions on repatriation of earnings, fees, capital, and on forex transactions relating to current account payments.
- Safety of foreign investment is guaranteed by the constitution.
- Existence of a transparent and sophisticated legal and regulatory framework. Covering all prerequisite business law enactments.
- Bilateral investment protection agreements with 28 countries and double taxation avoidance agreements with 38 countries.
- Safeguard against expropriation and non-commercial risks.

As to access to key markets

- Zero duty for export to India and Pakistan for Sri Lankan wholly produced or at least 35% locally value-added products.

This is a positive and “ideal” sales presentation, but according to the above mentioned US report, among others the following general constraints were identified:

Future growth will require improvements in productivity levels across all sectors (*this issue was also mentioned to the consultant by one investor that in one industrial zone, earlier there were 132 foreign companies, now it was reduced to 88, moving abroad because of low efficiency*), and the establishment of a more transparent regulatory... framework. Sri Lanka

needs to modernize education and improve government administration..... The bloated civil service are significant challenges for the government.

Foreign and domestic investors complain the regulatory system is unpredictable due to outdated regulations, rigid administrative procedures, and excessive leeway for bureaucratic discretion (*i.e. rules made irrespective of or without being in regulations*). Effective enforcement mechanisms are sometimes lacking, and investors cite coordination problems between BOI and the relevant line agencies (*among others the link to MFARD was mentioned to the consultant as being weak, also documented by MFARD not being mentioned as a cooperation line agency on the BOI website*).

Investors report that starting a business in Sri Lanka is relatively simple and quick and 20 percent cheaper than in neighbouring countries...Investors claim employee retention is good in Sri Lanka, but numerous public holidays, reluctance of workers to work at night and expensive to lay off workers (*compensation*).

The BOI is intended to provide "one-stop" service for foreign investors, with duties including the approval of projects, granting incentives, and arranging utility services. ... and facilitates import and export clearances. (*But*) The BOI is not yet a one-stop shop. Although the BOI is relatively effective in assisting investors, who want to establish operations within its export processing zones, it is less effective outside these zones. Sri Lanka's bureaucracy (in the line agencies) often works at cross-purposes with BOI authorities.

The government is working to establish an apex body named the Agency for Development to facilitate policy regarding investments, tourism and exports and supervise state institutions (such as the BOI) in these sectors. The government has also promised to introduce a new investment law and an incentive regime.

Most investors agree that any export-based investment faces fewer problems.... if the company is registered with the BOI... (*even*) BOI services are available to all investors.Tax incentives are available only to investors meeting certain criteria such as minimum capital levels and a minimum number of employees (*the incentives were however told to have been put on hold and await a new regime*).

There are many sectors, where the government allows 100 percent foreign investment. Others are restricted to maximum 40 percent foreign ownership, among these deep-sea fishing, (*and it was informed to include aquaculture, although the consultant never found this in writing. Even if it was made possible to have 100% ownership, the consultant would recommend to have a local JV partner, at least under the present conditions among others with many one-year renewable licenses etc.*).

The land ownership law prohibits foreigners from owning land, (*however this would presumably not apply to an aquaculture company, as it would have local majority?*). Most investors say acquiring land (including leasing) is often the biggest challenge for any new business in Sri Lanka. Private land ownership is limited to fifty acres per person. The government owns approximately 80 percent of the land in Sri Lanka, and state land for industrial use is usually allotted on a 50-year lease.

Foreign investors, who remit at least USD 250,000, can qualify for a one-year resident visa, which can be renewed. Employment of foreign personnel is permitted, when there is a demonstrated shortage of qualified local labour.Foreign employees in the commercial

sector do not experience significant problems in obtaining work or residence permits (*but why there is a need to make a USD 250,000 remittance – this is not a request in many other countries in the region*).

In the ranking of economies in the World Bank “Doing Business Report”, SLA comes out as number 110 of 189 countries in ‘Ease of Doing Business’. This rank has gradually declined from rank 99 the last couple of years. There are 10 criteria contributing to the ranking, and especially ‘enforcing contracts; registering property; paying taxes and getting credit’ are the criteria, which pulls SLA down in the ranking (<http://www.doingbusiness.org/rankings>).

Bureaucracy is one of the elements that deters investors, and SLA has very elaborated administrative procedures with many levels of approvals and renewable 1-year licenses needed. However in the above mentioned ‘Doing Business Report’ SLA is ranked 74 in ‘Ease of starting a business’, while e.g. India comes out 155. This however only really makes SLA attractive to Indian investors. It is still the feeling of the consultant that middle layer bureaucracy has to be reduced.

When all the above has been said/cited, SLA has to be congratulated. The consultant worked on an ADB project for 3 months travelling most regions of SLA during 2003-2004. Even there was a truth at that time, the impact of the civic war was obvious with destroyed infrastructure and lack of development. Nowadays the infrastructure, paved roads and railway is basically in place making traveling and moving of goods easy.

The above has to be explained to the foreigner not knowing present SLA, apart from international media. Taking Kilinochchi as an example, the former headquarter of Tamil tigers (LTTE): When visited in 2004, it was war thorn and had little commercial activities, even small shops. Nowadays it is a very vibrant town with a lot of shops and banks showing the cash economy flourishing. Likewise new school and hospital. And no ruins apart from the old water tower, which LTTE blew up, when retreating. Now it lays as a monument on the ground. Going from Kilinochchi to Jaffna one passes the notorious or legendary Elephant Pass, which in 2004 was “the end of the road”, making it impossible to continue to Jaffna. At that time the roadside in that area, having several deserted army camps, was littered with signs of mine warnings. Now this area was turned into a memorial park.

So to the foreigner, the essence of the above is that despite the reputation, SLA, in general, has put the civic war behind it, and it seems most people are quite content again being able to live ‘a normal life’ in spite the atrocities of the war.

It should also be mentioned that administrative reforms are on its way. There is a very! strong willingness from the leadership, but it was said to be difficult to see it implemented, as a thick middle layer/bureaucracy was delaying the process.

II. WHY IS FOREIGN INVESTMENT BENEFICIAL TO DEVELOPMENT OF AQUACULTURE

The reasons for MFARD trying to attract foreign investors in specific in marine fish farming are many folded:

- MFARD would like to see a substantial increase in marine fish production volume and make use of the area resources of the country.
- The local investors are hesitating to invest, as it is not yet proven technology and economic feasible in SLA.

- MFARD like to encourage – preferably Norwegian marine fish farming experience – to co-invest in SLA in modern, efficiency of scale, large-volume marine fish farming – bringing both technology transfer and investment to speed up the sector development.

III. HOW TO MOBILIZE FOREIGN AQUACULTURE INVESTORS - BY SRI LANKA

MFARD has recently published a brochure and a video to attract investors in fisheries and aquaculture (available on the MFARD website).

The brochure mentions some of the general 'incentives' for investments, but it is not detailed enough towards investments in neither fisheries nor aquaculture, and many of the incentives have actually more the character of policies. For the information to be more captivating, it is advised to have specific sections mentioning key incentives (and regulations) for the two specific subsectors. It mentions duty free imports of equipment and raw material (for processing), but this obviously does not cover aquaculture). MFARD should work towards having removed the duties/taxes/levies or whatever name is used, on imported input factors for aquaculture, which are not produced in SLA. E.g. it will be difficult to make a competitive fish production, if having to pay an additional 15% 'taxes' on the imported feeds, as informed during an interview in Colombo.

The marine fish feed, which has to be imported, as there are no domestic production, already is burdened with the extra transport costs. According to a recent World Bank study, SLA's present import regime is one of the most complex and protectionist in the world. To the consultant this is a major weakness already raised several times in previous chapters.

It has to be argued that most aquaculture, as a primary industry, is a low-margin business, and that large-volume farmed marine fish has to be exported. There is no realistic, local demand for the farmed marine fish, but how can a SLA farm be competitive in the export market, if SLA has an additional 'tax' cost of 15% on a cost item (feed) normally already contributing 60% of the production costs!

It should be appreciated that foreign investors, unless they have a special affiliation to SLA, would compare with investment opportunities in other countries in the region, which does not have such 'taxes'.

The competitive edge of SLA has to be highlighted better, i.e. mention the issues, which makes investment opportunity in SLA unique compared to other regional countries. It is not really enough to highlight the beauty – even it is very beautiful.

If it is difficult to identify and highlight unique conditions of SLA, it for sure also will be difficult for the investor to see.

- It is appreciated that the incentives of direct relevance to aquaculture, including tax grace, reduction of import taxes/duties/levies, at present is not fully clear, but then MFARD has to work directly with BOI (or relevant agency) to make them appreciate and consider 'aquaculture', so that the incentives relevant to aquaculture, become clear and transparent to the investor. At the moment it was the impression given by BOI that incentives only could be 'revealed', when having a person to person meeting with BOI. MFARD should also discuss with BOI/relevant agency to have preferential incentives in regions in need of development, like Northern and Eastern Provinces. Aquaculture - as a primary production – is a very suitable intervention for development in rural areas. Or introduce incentives to encourage those investors, who through technology transfer can bring technological innovation. The

information on incentives in fisheries and aquaculture should be posted on the websites of MFARD and NAQDA.

Foreign investors are typically looking into several potential countries, and SLA has to be competitive, or at least to be at same level. A common incentive given, is some degree of tax holiday, when foreign investments are involved. Tax grace is better than loan facilities, as it is based on achieved production, and thus does not directly burden the SLA economy.

The brochure of course does not mention constraining, negative issues, such as the 1-year renewable licenses widely used in nearly all line agencies. All the one-year renewable licenses should be abolished. It is unproductive waste of company and farmer's time and likewise waste of government staff, creating a vulnerability for malpractice in the system, a constraint in credit arrangements with banks, an accounting issue e.g. related to normal international depreciation rules. Importantly this uncertainty, when having 1-year licenses, is a deterrent against professional, international investors, if they compare investing in other countries in the region.

Instead it would be good in a brochure, if being able to write that e.g. 15 years renewable farming permits can be granted! This is for sure something that an aquaculture investor is paying attention to.

- One competitive advantage in SLA that the consultant has experienced, is the very active role NAQDA has taken in entering especially PPP's with companies entering pioneering activities. Thus minimizing risks and reducing the red tape that a pioneer would have to pass. This is unique to SLA. It would be interesting to an investor to read a small paragraph on the conditions NAQDA can consider, and within which fields PPP's can be entered. It may also be opportune for the investor to read the exit strategy of NAQDA from the PPP, when the intervention has shown sustainability, as some investors eventually like to be in full control. This information should also be posted on the NAQDA website.

As for promotion towards foreign multinational feed companies, it is not likely to bring results, as the volume of produced aquatic organism requiring feed input is too low. Cargill/Ewos was contacted by the consultant, and they informed that a minimum annual production volume of 80,000 tons of feed was required to achieve profitability. This could be a mix of 30,000 tons aquafeed and 50,000 tons of livestock feed, but 30,000 tons of aquafeed is outside the present and near future SLA demand. Cargill just purchased/started a feed mill in Andhra Pradesh, which is capable of production of high energy feed (for marine fish farming), and would therefore welcome to export to SLA.

As to attracting investments from (Norwegian) equipment producers, the history shows clearly that it is not likely, as some 10-15 aquaculture equipment or service companies already have been introduced via the Norwegian-Sri Lankan match making program. None of these contacts materialised into investments (or cooperation), as the domestic demand was too low, or the productivity and import regime were not considered competitive to start a local production.

The video produced by MFARD in connection with the brochure, is targeting a wider audience than 'investors', 1/3 of the video is used to describe general conditions and beauty of SLA, which is well deserved, thus it is very appropriate to use the video at exhibitions to attract visitors to a stand (where discussions can be held).

- In addition to the brochure and video, MFARD and its agencies should actively make articles on achievements or case stories from farms (relevant to foreign investments) and submit these to international aquaculture sector media such as Fish Farming International etc. It is believed that this will better target the professional aquaculture investors and build up the image of SLA, which eventually will catch the interest of an investor. The articles could e.g. describe examples of PPP's.

One final remark on how to attract investors in the marine aquaculture. At present there are no dedicated regulation covering marine aquaculture/cage farming. Investors want to be informed about 'their options/obligations/risks'. *(After the consultant's missions to SLA, NAQDA has informed that they have started the process of making a regulation addressing marine fish farming).*

ANNEX 5: APPRAISAL OF AQUACULTURE STATUS AND POTENTIAL WITH A FOCUS ON MARINE AQUACULTURE

The following will not be a technical/biological description of the aquaculture operations, but in the context of this report, it is will to try to identify the context/potential and issues of competitive edge or factors constraining the development, with a focus on marine aquaculture.

The focus of SLA aquaculture is two folded: food security – i.e. to increase domestic availability/consumption of seafood by developing especially the output from culture based capture fisheries in the reservoirs/tanks, as carps and tilapia are affordable for local people. Secondly increasing marine aquaculture in general has the purpose of especially increasing the export earnings.

I. AREA AVAILABILITY AND PHYSICAL CONDITIONS

Inland culture based fisheries take place in a large part of the 155,000 ha perennial and 100,000 ha seasonal tanks/reservoirs and 5,000 ha villus (floodplains). The number of perennial tanks is 736, of which 60% are less than 250 ha. The number of seasonal tanks, which still is less used for aquaculture (stocking of juveniles) is 12,000. NAQDA estimates that in fact 80-90% of the 60,000 tons inland capture fisheries originate from their stocking of fingerlings.

The brackish water potential includes 158,000 ha of lagoons and river estuaries, and 71,000 ha of mangrove, mud flats and salt marshes. In addition to this there are the marine areas – the deeper Koddigar Bay and several “100,000 ha” of shallow marine water areas from Mannar and north.

For detailed description of the potential areas for marine aquaculture, the report “Potential and Strategies for Development of Mariculture in Sri Lanka” made by the author for the ADB Aquatic Resource Development & Quality Improvement Project in 2004 should be consulted. During the 2 month assignment, the author visited most of the potential sites for mariculture development in SLA.

Climate

Climate in SLA is strongly influenced by monsoons

January to April:	Inter-monsoon period with weak wind 2 m/sec
April to August:	Southwest-monsoon with wind speeds of 6 m/sec
September to December:	Northeast-monsoon with wind speeds of 3 – 5 m/sec

In the Jaffna area the fishermen say that they have 6 months SW winds and 6 months of NE winds. The SW monsoon is characterised by low tide/water level and high humidity, while the NE monsoon is the wet season (creating problems when drying seaweed).

SLA is a tropical island in the Indian Ocean, but even it is at the same latitude as southern Thailand or southern Philippines, the country is always vulnerable to cyclone attacks, because of being near to the ‘confluence’ zone between the three Arabian Sea, Bay of Bengal and the Indian Ocean. It is not on the ‘international radar’ compared to NE India, Bangladesh or Myanmar, but since 1990 there has been 13 cyclones affecting SLA, not including depressions and low pressures that may cause vast flooding's, as seen in May 2016.

Tide and current

The sea level shows seasonal changes of some 25-35 cm,

The tidal range in general varies from 30 to 60 cm. The resulting tidal current may be as little as 10 cm/sec, however this depends very much on the local topography and some main currents around SLA. Along the east coast the East Indian Coast Current, which flows south and round the southern tip up along the west coast into the Arabian Sea. The normal speed of this current is 20-30 cm/sec, but sometimes during March, it may reach a strong 1 m/sec current. The current along the west coast varies from 18-20 cm/sec during the NE-monsoon to 30 cm during the SW-monsoon, but around the islands of Adams Bridge and islands towards Jaffna there may be very locally stronger currents.

II. SPECIES

This will be a short introduction to the species, which can be farmed, as SLA as a tropical country has a full multispecies tropical fauna

a) Seaweed

Already in 2003 some Kappaphycus/Euchema seaweed was found washed ashore in SLA and kept by a researcher at NARA. In 2006 the NGO Sewalanka coordinated some small farming trials (SLR 50 mill) in the southeast, which according to their report was unsuccessful (though technically OK).

The first more organised farming started in 2013, when Hayleys Aquagri Pvt. Ltd., a subsidiary of Hayleys Group, one of SLA's largest multinational business conglomerates, initiated a seaweed farming project (Kappaphycus alvarezii) in the Mannar District in the northwest to help fishing communities to rebuild their lives after the civic war and generate a steady family income. This was done in cooperation with NARA, NAQDA and UNDP in a PPP like structure, where NAQDA among others took the responsibility to import the stocking material (propagules).

Now most seaweed farming is done within a BB arrangement with Hayleys Aquagri. This setup has already been detailed described in Annex 3 Chapter I la, among others the issue of the price level offered to the farmers, as the new farmers have to enter an exclusive BB arrangement with Hayleys, to benefit from the initial free grow out structures (bamboo rafts with netting and mooring) and stocking material paid by UNDP (with Norwegian funding). In addition to or as a return for the BB deal Hayleys contributes 'business development support' and technical support.

NAQDA informed that in 2015 in Northern Province there were about 500 growers with 3,500 rafts producing 165 tons dry seaweed, meaning about 1,650 tons wet weight. On the Hayleys website, it is mentioned 250 growers, but maybe this was not updated.

In 2015 the UNDP renewed the Hayleys cooperation and expanded it, again with Norwegian funding, to include three islands in Jaffna District - Analaitivu, Eluvaitivu and Nainaitivu. This is planned to provide livelihood opportunities for another 40 households (comment: it would have been interesting to see the budget for including extra 40 families).

Niguthary (Nayinativu) Island was visited by the consultant. The fishers association had already been involved in seaweed farming since 2014 using the same raft principle. They informed that, as they at that time were not part of a BB setup, they had to purchase propagules from Hayleys, 1,000 kg at LKR 20/kg. They were paid SLR 35/kg dried (USD 0.23), but offered up to SLR 40-50/kg, if they entered an exclusivity arrangement with Hayleys.

Some farmers doing sea cucumber in large net pen fenced areas consider making double cropping – sea cucumber and seaweed – as the floating rafts or long lines (as the area is fenced, which would keep out rabbit fish) with seaweed will not impact the sea cucumber living on the seabed. The sea cucumber farms does not involve a lot of work, but there is a need for constant guarding, which could be used to attend farming the seaweed, too. Already the farms occupy larger areas, and the double cropping would not cause any pollution. The sea cucumber farmers normally have a better financial background than household seaweed farmers, and they consider exporting the dried seaweed directly, which was expected to bring in USD 0.85/kg (similar to farmers in Vietnam).

The dried seaweed is only baled and exported. So far the volume produced in SLA is too small to consider any local processing into SRC, but in close future processing is predicted to be started, if the price paid to the farmers is improved.

The potential of seaweed farming in SLA is considered very large, as there are very large shallow areas especially in the northwest (Palk Strait), and there are many lagoons (especially in the north and east), which likewise may have a potential. Farming in lagoons may however be very risky, if there is very low salinity during the monsoon period, as this will cause the 'withering' of the crop. Even in open waters, the monsoon rain may cause reduced growth and losses, as experienced on the Tamil Nadu coastline.

The main challenge to the successful development of volume seaweed farming is considered to be attracting the farmers to enter by paying a better price for the dried seaweed, as SLA holds all the opportunities for large volume production.

b) Sea cucumber

Sea cucumber farming is also a relatively new activity, mainly NAQDA facilitated fattening of undersized sea cucumber in pens. 22 net pen projects with an average of 1.2 ha were carried out by private sector among others in Thewanpitti, Mannar south bay, Ambupuram, Valaipadu and Nachchikuda, all in Kilinochchi.

Under a bilateral cooperation between Vietnam and NAQDA, expertise was provided to breed sea cucumber in a private hatchery in Ambakadawila, Chilaw. In 2013 75,000 juveniles were produced, in 2014 424,000 juveniles, and in 2015, 250,000 juveniles. However a farmer told the survival was too low, and therefore they returned to use stocking with undersized collected from nature.

Apart from farming in net pens in the shallow sea, farming also is performed in ponds with or without shrimp, in the latter the sea cucumber is raised in net pen in the center of the pond, where the use of paddle wheels helps bringing in the detritus from the main pond.

A farmer in the Jaffna area holding a 4 ha, and 2 farms at Devils Point, Mannar holding together 20 ha were visited (the latter not interviewed).

The Jaffna farm produced *Holothuria scabra*. Bought first from the hatchery, but survival was low, so now he buys 80 g sizes from fisheries. After 10 months they can be harvested at the size of 2 pieces/kg (wet). He harvest about 10,000 pieces/year, each of them has a value of SLR 1,000/piece (wet). Theft is a big problem, thus he employs 4 guards. One professional diver (thief) can collect 50 animals in just 5 minutes. He dried/processed the 'sand fish' and sold it depending on the size at:

15 pieces/kg - USD 124/kg

20 pieces/kg - USD 110/kg

30 pieces/kg - USD 96.5/kg
50 pieces or more/kg at same or lower price

NAQDA informed that the farm gate price was USD 153/kg, and the export price USD 250.

This high export price (and profit margin) is an issue, as there is only given one license, to one company, to export. This was explained necessary to keeping control of the export to avoid illegal export and overharvesting of sea cucumber from capture fisheries. It was also explained that as long as farming depends on stocking undersized wild stock, it would not be possible to have open access to export. This may be right from a government management view point, but having only one exporter does not ensure the farmers to get the price of the open market.

It is also questioned by the consultant, how having only one exporter avoids illegal export and overfishing? How does this ensure an open market pricing and not a monopoly pricing? And finally if the farms are using hatchery produced juveniles, they should be permitted to export. But how will it be ensured that the production is based 100% from hatchery produced juveniles?

Thus it seems necessary to de-monopolise the trading, but still keep the exporters accountable.

It is important to improve the survival of the hatchery reared juveniles, and trials should be made to find the right size for grow-out stocking in the 'net pens' and not in the ponds.

The market among especially Chinese ethnic seems insatiable, the area resources of SLA are unlimited, and the production does not negatively impact the environment.

c) Bivalves

Tim DeJager 2010-12 project IDRC International Development Research Center

Oysters

Oyster farming was started as a public farming trial in early 2000 at a very small scale at Bolgoda Lake (lagoon), south of Colombo. In 2004 after the project funding, it was still performing, though not expanding and mainly supplying local hotels and resorts with oysters and hard clam.

In 2016 it had developed into a company Tropical Oysters, which according to their website also exports to Hong Kong, Taiwan and China, both Live and frozen oysters. Their products include: Half-shell frozen oysters, oyster meat, live oysters, oyster spats. The live oysters are exported by air, while the frozen oysters by sea freight.

They (or through local farmers) also collect oyster spat grow and grow them to near marketable size in Negombo area north of Colombo, after which they bring them to Bolgoda for relaying to improve the meat index. They also have a depuration facility, thus it seems they have appreciated developing the value chain.

Many areas of SLA have natural oyster beds, and several trials have been carried out technically successful by both NARA and NAQDA, but only few places it has been sustainable due to lack of 'value chain' operator. Without this the oyster meat product is a low-value product only collected and eaten by local fisher families, when they are not able to catch fish.

There are initiatives planned to start a megazone in Kalpitya area further north, and Divron Company is possibly in process of entering the value chain for oysters from Negombo.

An oyster farming project site in a 7,600 ha large delta area near Achchankulam, about 20 km south of Mannar was visited by the consultant. NAQDA organised a trial with local people, who used to collect oysters and market the meat in nearby Mannar.

The oyster species is a cupped oyster, Indian backwater oyster, *Crassostrea madrasensis* looking very similar to the Pacific oyster, which is the most commonly farmed oyster in the world. The local oyster grows larger up to 15-20 cm in shell – also larger than another tropical species *C. irradeleyi*, which also may be present in SLA.

At the NAQDA trial spat was collected on roof tiles (others use care tires or coconut shells), and when 1.5-2 cm they were detached and put in bags hanging from a floating raft, which was moved from site to site. During the 11 month of the project the oysters grew to 160 g, with a meat content of 60 g.

When growing bivalves in general it is important to monitor the harmful, toxic algae, which is within the competence of Nara, but also there is a need to monitor the food safety/hygiene in addition to use depuration plants for species like oysters, which are eaten raw. The latter would be the task of the company involved in the value chain.

Hard clams

There are several suitable species in SLA. *Meretrix casta* – Marcia, *Gafrarium* and *Phaphia* are some of the species, but they need a processing company to be involved, as the major world market is for individual quick frozen (IOF) product. Vietnam has a production of 200-300,000 tons of *Meretrix* species eaten locally but majority exported. *Meretrix casta* population was investigated in the Dutch Canal (close to Negombo) and it showed population densities of between 60 and 900 pieces/m². These species are also abundant in Tambalagam Bay (Trincomalee), the main bivalve area of SLA.

Mussels

Like in Tamil Nadu, which has developed a significant Brown mussel (*Perna perna*) farming in its backwaters. Brown mussel is the most common mussel in SLA. In start of 2000 a trial was made in Galle Bay, technically feasible but not continued after the trial. The Green mussels, which only is recorded in Tambalagam Bay is a better species, as it's growing to the size of the Green-lipped mussel of New Zealand, which has developed a world market for frozen half-shell mussels. The same could be done with Green mussels with the right processing partner.

d) Crustaceans

Shrimp

Black tiger shrimp farming industry is beyond the scope of the present appraisal. But as it was the darling of investors, it deserves the history in headlines: Production peaked in 2000 with a production of 4,855 tons mainly in North-western Province. The whitespot disease appeared in 1996, and the production fell to 1,570 tons in 2005. It is the reason for the bad standing of aquaculture at banks. Nowadays only ornamental fish companies can borrow money, in a much smaller scale.

NAQDA implemented various activities to rehabilitate the shrimp farming industry, such as dredging of Dutch Canal; introduction of a crop calendar and zoning; regulation of shrimp hatcheries and screening of PL's and broodstock. In 2014 NAQDA conducted 4,071 PCR screenings at its laboratory at Battuluoya, making it the most important PCR lab of SLA.

In 2014 469 Aquaculture Management licenses including 444 Shrimp Farms, 20 Shrimp Hatcheries and 5 broodstock collectors were issued, showing the importance of the sector.

Since North-western Province was the most severely affected, the strategy of NAQDA was to expand shrimp farming in North and East of the country in a more managed, planned and sustainable manner. Many of the interventions used have already been mentioned in previous chapters. An additional strategy of NAQDA is that it has opened for farming of whiteleg shrimp *P. vannamei* in Northern and Eastern Provinces.

Domestic market is not so good volume, but the price for shrimp is higher than the export price, thus presently there is little export of shrimp.

Table 4: Black tiger shrimp, price and volume data

	Export price SLR/kg	Production cost SLR/kg	Feed Price SLR/kg	SLR to USD rate	Production (tons)	Export (tons)
2008	455	410	180	108	2230	834
2009	533	423	200	115	3550	1432
2010	604	454	210	112	3480	1262
2011	649	472	215	112	4150	1380
2012	712	550	220	130	3310	1056
2013	754	576	225	130	4430	1625
2014	954	607	230	131	5054	1770
2015	676	664	242	140	7090	1650
Jan 2016	640	676	255	145	-	-

Source SLADA 2016 and NAQDA

Anecdotally: The 2015-export earnings from ornamental fish is nearly similar to export to shrimp SLR 2,425 mill versus SLR 2,392 mill.

Spiny lobster

There is presently no lobster fattening/farming though the consultant saw a lobster cage at a fisherman in Jaffna area. Asked to why he had a cage, he said the buyer instructed him as a holding facility to keep the lobsters until he came.

A trial was made under the bilateral project with Vietnam during 2014. Vietnam has the largest lobster farming producing about 3,000 tons a year, based on stocking the pueruli stage of the lobsters mainly *Panuliris ornate* and *P. homorus*.

In Vietnam the economic FCR – i.e. including the feed used for lobsters, which died during the grow-out - is 15-20. The food is a mix of crustaceans, bivalves and trash fish. With a weighted average cost of VND 10,000/kg (USD 0.43), the production cost to produce one kg of ornate spiny lobster is between VND 150,000 to 200,000 to which the cost of one juvenile/pueruli has to be added bringing the combined costs of feed and juvenile up to between VND 500,000 to VND 550,000/kg lobster (USD 22-24/kg) for ornate spiny lobster

In 2015 SLA exported 204 tons at a claimed price of USD 30/kg, much less than sales price at farm gate in Vietnam, which is USD 78-82/kg. Logistics from Vietnam to the main market China is easier than from SLA, however as long as the price is kept low in SLA there will not be any future for lobster farming. Furthermore, according to an old 1973 regulation it is only permitted to catch lobsters with a carapace length of minimum 8 cm, thus pueruli collection would not be permitted, although this

would be a major competitive edge of SLA compared to Vietnam considering the price of USD 15 for one ornate lobster pueruli.

NAQDA in a Vietnamese bilateral cooperation is testing out lobster fattening at Valaipadu. 290 lobsters were stocked in 4 cages.

Crab

A private hatchery at Ambakadawila, Chilaw started production of crablets using Indian technology. They produced 108,000 in 2014, but it is claimed to have low survival. In Tamil Nadu few grow-out farmers use hatchery reared crablets as they prefer wild collected. Farming there is both in netpens and in ponds, while in SLA all production is said to be in ponds.

SLA exports about 2,000 tons of crab a year, of which about 24 tons originate from aquaculture, making this a premature farming activity.

Freshwater prawn

Freshwater prawn (*Macrobrachium rosenbergii*) production is a success story of SLA. It is difficult to intensify the farming, because of territorial habits and different gender growth. However SLA has a competitive edge because of all the irrigation tanks/reservoirs. NAQDA started stocking the tanks in 2008 with PL's produced at their two hatcheries at Pambala and Kahandamodara (near Tangalle). The demand is high and a new hatchery is planned at Trincomalee, in addition to a private company Divron starting up a hatchery in a PPP with NAQDA (Annex 3, chapter III b). Total production capacities of the hatcheries is likely close to 100 mill PL's.

Freshwater prawn production has shown a gradual increase and has resulted in enhancing income of fishermen. In 2014, when the freshwater prawn production was 460 tons (NAQDA 2014 annual report) it contributed SLR 368 mill to the rural economy.

Table 5: Production and export of freshwater prawn in Sri Lanka

Year	Production (tons)	Export (tons)
2012	290	24
2013	572	64
2014	460	131
2015	465	144

Source: NAQDA

There are mainly two companies engaged in purchasing (and exporting) of freshwater prawn at the tanks. The price paid the fishermen is SLR 800 - 1,300/kg (USD 6 – 9), up to the size of 2-4 pieces/kg.

It can be seen in Table 5 that export still is a minor part of the production, like actually also is the case with shrimp. The global market for freshwater prawn is also much less developed and less familiar than the shrimp, and the head to tail ratio is also less than the shrimp, if tails are the marketable product.

The majority of the prawns exported are whole/fresh/chilled on ice airlifted to Thailand, China, Japan and Singapore. There is no processing involved.

The competitive edge of the tank grown freshwater prawn of SLA is that they are 'organic' and that they are of large size, making them a high-end product.

World production is about 600.000 tons/year, half of which though being the much smaller *M. nipponense*, which is very popular in China. Main producers are China, Bangladesh, Thailand and Vietnam.

The latest trend in SLA was said to be that now more freshwater prawns are stocked in private ponds than in tanks (this however needs to be verified).

In this context, a case story from Vietnam could maybe bring some ideas for expansion of farming area.

In the southern province of Ca Mau, farming of freshwater prawn has started in the rice fields. Farmers there are growing two crops of rice. After harvest of the second crop the dry season starts, and they use to allow the brackish water from the Mekong River to enter the rice fields in order to farm tiger shrimp before switching back to rice during the rainy season. If the salinity of the river water is right, they will stock tiger shrimp PL's, but if it is low, they now started stocking freshwater prawn PL's.

The freshwater prawn can only be farmed in the flooded rice fields for three months, before they have to start rice farming again. Thus they typically will be fed pellets.

However this 3-month crop may bring in a three time higher profit than the rice farming. The average yield of freshwater prawns is 150 to 220 kg/ha, which is sold at USD 5.7 to 6.6/kg. If the rice field is used for shrimp, the average production would be 540 kg/ha.

Most of the prawn is sold IQF to the USA, while small amounts are flown fresh to Europe for Christmas, where they fetch high prices under the label Rosenberg shrimps. In the high-end supermarkets they are sold at USD 108/kg.

e) Freshwater fish

This will not be discussed in details being outside the focus of the present appraisal.

Reference is given to the production figures in below Chapter IV

NAQDA informed that about 80-90% of the inland capture fisheries is based on stocked juveniles from their hatcheries. NAQDA has 7 freshwater fish hatcheries. The latest newcomer Iranamadu Aquaculture Development Center at Kilinochchi was visited, still not stocked with fish.

Totally production is 55 mill fingerlings of different carps and tilapia. The fry always comes from NAQDA, but many fingerlings are produced by private and community nurseries.

Much of the fish produced in the tanks are consumed in the local market around the tanks, and as such is an important contribution to bring affordable fish to the rural people.

- There are nowadays many paddy fields not in use, which holds a potential to be converted to private fish ponds, but problem is has shown a problem that the Irrigation Department is very restrictive about releasing water for the ponds. If having these ponds SLA could also start mass production of pangasius, which also would bring affordable fish to the local market.

f) Marine fish

At the moment there is only one operating marine fish hatchery in SLA. It is situated in Chilaw and started as a PPP with NAQDA, but is now operated by the private. In 2015 production was 250,000 fingerlings. These are sold to local small-scale cage/net pen or pond farmers, mainly in the region. Depending on survival (50-75%) and final product size (0.7-1.0 kg) this should be enough to yield a production of between 90-190 tons, which however seems not to be the case.

Local hatcheries are important to avoid risky imports of juveniles, which could introduce exotic diseases to SLA. It should be appreciated that not having a developed marine fish farming sector is actually a competitive edge, as it also means that many of the diseases haunting farmers in competing countries have not been introduced to SLA.

However OceanPick chose to import from Australia, as they didn't find the performance of the local hatchery consistent enough for their production planning, and milkfish fry has been imported from Taiwan and Indonesia for more than a decade to produce baitfish in ponds for the tuna longliners. Especially imports from Taiwan can be critical, as they have a long marine aquaculture history, and e.g. it has been documented with cobia juvenile export all over the world that they have introduced exotic parasites with these exports.

It is known that OceanPick does have some disease problems, as diseased fish has been sent to Thailand for analyses, but it is not known to the consultant, which type of diseases or parasites that may have caused the problems.

- Thus it is important that soon NAQDA will have the new marine fish hatchery at Batticaloa operational, which, when production has been stabilised and documented, should lead to a more restrictive import regime to avoid introduction of diseases from other countries with a long farming history. Otherwise the competitive edge of SLA will disappear!!!

Seabass

This is the main marine fish (for consumption) produced in SLA.

Already in Annex 3 Chapter I a the only large-scale marine fish in SLA, OceanPick has been described, and hence other seabass activities will be mentioned below.

In 2014 55 farmers were involved in seabass farming in cages and ponds and 43 tons were harvested. The farms were in Negombo lagoon, Town bay, Puttalam and Galle. In 2015 around 80 people were involved in sea bass farming in cages and ponds. 67,210 juveniles were stocked and 27 tons of seabass harvested in 2015. FAO funded 9 cages for seabass in Nawaladi, Batticaloa lagoon and 10,020 juveniles were stocked.

A total of about 78 cages and 23 ponds (each 0.4 ha) were in use in 2015, but in 2016 the extension staff informed that Puttalam had 80 cages with 40 people and Chilaw had 10 cages with 10 people involved. The cages or net pens were small - like 3 m by 3 m and less than 2 m deep. The fish were fed trash fish.

Milkfish

The milkfish farming is basically only for producing bait for the tuna longliners. Price at market is 200-300 LKR/kg

In Kalpityia area there is a collection of wild fry by women (as also takes place in Tamil Nadu), which is sold directly to pond farmers. But the main fry supply comes from imports from Taiwan and Indonesia. Even the baitfish is imported in substantial quantities.

NAQDA earlier entered a PPP with the company ANG to start a milkfish hatchery, but it failed. NAQDA is presently sourcing broodstock at a farmer in Mannar and is likely to develop a hatchery.

Others

In a previous ADB project (2004) a trial for growing pompano (*Trachinotus blochii*) was described for pond rearing in the abandoned shrimp ponds in North-western Province, but never implemented. Nowadays pompano farming has shown to be the largest volume farmed marine species in Asia, with likely more than 140,000 tons produced. CRMFI in Mandapam, Tamil Nadu has since then started juvenile production of pompano based on locally collected broodstock and is distributing juvenile along the east coast of India.

- It is suggested that NAQDA to purchase juveniles from CRMFI, when the marine fish hatchery in Batticaloa has been established.

In Vietnam it has become the largest volume, farmed marine fish species in the domestic market in only 5 years.

III. SOME INPUT FACTORS

Juveniles is an important input factor, but it has been dealt with under the species headings of previous chapter.

a) Feed

Economically this is the most important input factor accounting in average to about 60% of costs.

It is said that it is a constraint for aquafeed production in SLA that there is no domestic fish meal production, this however has not prevented many other countries to develop an aquafeed subsector also attracting 100% investments from multinational feed companies. The most important negative precondition of SLA is that there is no local volume demand.

It should be appreciated that the large culture based fisheries in the tanks depends on natural food production in the tanks, and the other sector with some volume is the shrimp farming. But the shrimp production collapsed due to whitespot disease, and only now it start picking up again to about 7,000 tons.

However to attract a professional feed company able to produce high energy aqua feeds, necessary for marine fish farming, Cargill informed the consultant that a plant has to have capacity of producing minimum 80,000 tons/year. This could be a combination of 30,000 tons of aquafeeds and 50,000 tons of livestock feeds, but even a demand for 30,000 tons of aquafeed would take long time for SLA to reach.

Thus there is only one realistic alternative, and that is to import. But again as long as the government does not appreciate to give a preferential status to imports of the feed input for a primary production like fish farming, shown by cutting the 15% import customs tax, levies and tariffs, the aquaculture of organism depending on feed - such as fish or shrimp - will not be competitive. Marine fish feeds normally attributes to about 60% of the operating costs in other countries in the region. For SLA this would even be about 70% with the present tax regime.

There is one fish meal production coming up in connection to the new Colombo fish market with JICA support. MFAR at present calls for private PPP involvement with NARA. Even when this facility is in place, it is doubtful, how much of the meal will be available to aquafeeds, as there are many other competing uses for the fish meal.

One Australian/UK/SLA JV processing company Apollo said that they were producing feed for tilapia and shrimp. It was informed that Tilapia feed was SLR 180/kg (USD 1.28), which in Vietnam is the price of high energy and protein, marine fish feed.

b) Labour

Some general conditions taken among others from "U.S. Department of State. Sri Lanka, Investment Climate Statement 2016"

- working time for a worker 48hrs/week
- max overtime 12hrs/week, payment 150%
- 14 days' vacation and 16 days' national holidays
- paid annual holidays, sick leave, and maternity leave.
- cost of dismissing an employee in SLA is among the highest in the world.
- a national minimum wage of SLR 10,000/month (USD 70) or SLR 400/day (USD 2.75).
However aquaculture farm workers were told to get the double – which would be similar amount in Vietnam.
- no requirement for equal pay for equal work for women.

To compare an aquaculturist with a BSc level in government sector may have LKR 23,000 as basic salary plus 10,000 from government and possible other benefits such as loan facility.

IV. PRODUCTION VOLUME

The most remarkable changes over the last decade or so is the substantial growth in inland fisheries in the tanks/reservoirs, of which NAQDA informs that 80-90% come from culture based fisheries depending on stocking of juveniles by NAQDA. This is somehow confusing to the below table, and to the understanding of the consultant, the statistics may use a somehow simplified nomenclature, as inland capture fisheries seems to describe the harvest from perennial tanks, while inland culture is the volume originating from fishing in seasonal tanks, irrespective if there is stocking of juveniles involved or not.

Table 6: Production from fisheries and aquaculture in Sri Lanka (tons)

Fishing Sub-sector	2011	2012	2013	2014	2015	Share (%)
Offshore/Deep Sea	162,920	159,680	177,950	180,450	183,870	35.3
Coastal	222,350	257,540	267,980	278,850	269,020	51.7
Total Marine	385,270	417,220	445,930	459,300	452,890	87.1
Inland Capture*	50,050	58,680	55,020	68,820	57,060	11.0
Inland Culture*	5,360	6,960	7,460	1,780	3,150	0.6
Shrimp Farming	4,150	3,310	4,430	5,150	7,090	1.4
Total Inland	59,560	68,950	66,910	75,750	67,300	12.9
Total Sri Lanka	444,830	486,170	512,840	535,050	520,190	100.0

Source: Statistics Unit of MFARD

Table 7: Aquaculture production in Sri Lanka (tons)

Species	Environment	2010	2011	2012	2013	2014	2015
Tilapia	Freshwater	850	2,650	1,825	14,889	19,985	
Freshwater prawn	Brackish water	3,480	4,150	3,310	4,430	5,150	7,090
Cyprinids nei	Freshwater	170	998	737	3,827	3,801	
Catla	Freshwater	1,280	964	808	2,762	2,514	
Roho labeo	Freshwater	720	1,367	528	1,558	1,272	

Common carp	Freshwater	807	1,115	1,371	1,824	836	
Mrigal carp	Freshwater	...	1	19	667	239	
Bighead carp	Freshwater	285	205	55	132	158	
Silver carp	Freshwater	205	206	48	590	78	
Labeo sp.	Freshwater	185	13	3	63	78	
Freshwater prawn	Freshwater	45	105	80	74	72	0.5
Barramundi, seabass	Brackish water	10	9	6	15	18	36
Kappaphycus seaweed	Brackish water	...	1	23	25	70	165
Grass carp	Freshwater	...	35	1	11	9	
Mud crab	Brackish water	18	12	10	10	10	24
Others	Others	3	73	25	13	0	
Sea cucumber							213
Total		8,058	11,912	8,840	30,881	34,220	

Source: FAO FishStatJ 2016 combined with NAQDA information

If the remark that 80-90% of the inland fisheries is in fact culture based – i.e. some 50,000 tons or more, then the above table does not seem to include all the culture based inland fisheries production.

V. MARKET AND VALUE CHAIN ISSUES OBSERVATIONS

SLA being an island state is remarkable, as the per capita consumption of seafood is a low 42 g/day (15 kg year), and at the same time the country has an incredible large deficit between volume of imported and exported seafood.

Table 8: Sri Lanka's import and export of seafood

2015	Volume (tons)	Value (SLR mill)
Import	120,046	30,729
Export	17,461	24,716

Source MFARD

Table 9: Selected wholesale prices at Peliyagoda fish market, Colombo (SLR/Kg)

Species	4 th week November 2015	4 th week November 2016
Seer	1090.00	842.86
Trevally	512.00	498.75
Rock fish	356.00	484.44
Sail fish	530.00	697.14
Skipjack tuna	290.00	301.67
Yellowfin tuna	452.00	490.00
Sardinella	134.00	160.00
Herrings	250.00	280.00
Anchovy	230.00	200.00
Prawns 3"	640.00	806.25
Red Bream	417.78	365.00

White Sardinella	98.00	85.00
Squid/cuttle fish	455.00	392.50
Crabs	474.00	435.71
Tilapia	278.33	

Source MFARD

The above prices do not accommodate any farming apart from tilapia. According to NAQDA the farm gate price of tilapia was SLR 140/kg, but fluctuating. And in the retail shop, it would be SLR 350/kg. Trevally is in the same family as pompano, but farm gate price of the latter in Vietnam would be USD 5-6/kg - i.e. SLR 700, which is higher than the whole sale price of tuna in Sri Lanka. Therefore there are no chance sell farmed marine fish for the local market, apart from a niche market of the high end restaurants/hotels. Therefore the only option is the export market.

SLA has 28 EU approved seafood processing plants (and 9 not approved). However they inform that they ideally look for fish at USD 2/kg, which is not feasible for a farmed, marine fish. Price up to SLR 500/kg (USD 3.57) was a limit and even this price would not make it profitable. This is close to the production price of a well operating marine fish farm.

The only solution to this would be for the farmer to have enough volume to enter international marketing him/herself, and for this volume production is a precondition. Any processing could then be made through customer processing agreement. Alternatively if a devoted processing plant start branding the product, and not mix it with fish from capture fisheries (the USD 2/kg fish). Products from aquaculture have some advantages such as it could have some GAP certification, it can be delivered in the required size and volume, when the sales order has been reached, and it would in general be of a better quality such as freshness. All qualities which could support a higher price – if it is used correctly in the marketing.

- It is therefore recommended NAQDA to organise the setup of facilities, incl. accrediting competent private companies in GAP certification for exports from farms. Aquaculture development in SLA will to a large extent depend on export market, where certification is compulsory

If a processor decides to enter the value chain for farmed, marine fish it will be possible to utilise the largest area resources of SLA - the shallow sea north of Mannar – but this will depend on the use of small scale cages, where large production volume only will be achieved by duplication i.e. number of cages. But they do not have export market access, and this could be the role of a processing company.

VI. ORGANISATIONS RELATED TO AQUACULTURE PRODUCTS

Seafood Export Association

It was established more than 20 years ago especially for shrimp farmers and exporters. But when the shrimp farming was destroyed because of whitespot disease, the processors diversified into tuna. They are 20 members (seafood export companies)

Export Development Board (EDB)

This organisation promotes generic export of fisheries and aquaculture products and provides capital grants at concessionary rates to exporters for them to upgrade processing facilities. They are said to promote the “Ceylon Seafood” brand.

NGO's

Sevalanka has been involved in several aquaculture projects among others financed by Norway. They mentioned involvement in tilapia hatchery and seaweed farming, but the last years they had no fisheries expert, as they did not have projects.

The Rural Empowerment Ministry is doing grass root development and had SLR 120 billion from public savings. They made a new package with microfinance through this NGO, where they (SEVA Community Credit Ltd) borrow the money at 8.5% and forward it to the loan taker at 14% interests to cover expenses and losses.

They want to develop into a "social enterprise" becoming a commercial partner to e.g. USAid to develop business plans etc. in line with some partnerships that USAid have made with SLA companies (ANG).

They also opened "good market shops" selling organic and natural food.

Thus like many other NGO's, it seems they follow the commercial interests as other companies do, likely with a better social responsibility profile, but when entering a more commercial setup, the right commercial company may be the better experienced or professional in setting up the necessary value chain with processing and market access, if e.g. being involved in mobilising small-scale farmers (like seaweeds/bivalves/small scale cages).

The question is of course in the end, how the sharing of profit margins is performed, and if there are any difference between the NGO and the commercial companies. But since this development incentive often involves a public financing partner, whether governmental (like NAQDA) or a donor (like USAid), it should in the end be the duty of these public partners to ensure a profit margin setup, which is transparent, and which can be modified according to the price development in the open market.

The Sevalanka website is being changed at the moment, as it said that the Sevalanka is being restructured.

ANNEX 6: PEOPLE MET AND CONSULTANT TEAM

	Consultant team from RR Consult
Members	<ul style="list-style-type: none"> Mr Niels Svennevig, tropical aquaculture specialist, Vietnam, (team leader and author of report) (subcontracted), contact niels@svennevig.dk Dr Pham Anh Tuan, legal aquaculture specialist, Vietnam (subcontracted) Mr Roger Richardsen, conducting interviews with aquaculture sector companies in Norway (owner of RR Consult, Norway)

Ministry of Fisheries and Aquatic Resources Development, MFARD

Ms Mangalika Adikari, Secretary

Dr Claude Fernando, Adviser to the Hon. Minister

Mr Monty Ranathunge, Director General Technical

Mr Bharatha Ramanayake, Director of Planning Technical

National Aquaculture Development Authority of Sri Lanka, NAQDA:

Mr Nimal Chandraratne, Director General

Dr J.M. Asoka, Director, Coastal Aquaculture Department

Mr Saminda Lakmal, Aquaculture specialist, Coastal Aquaculture Department,

Ms Diluka Sumanarathne, Legal Officer

Mr. Nirooparaj Balanchandran, Aquaculture Extension Officer for Mannar and Vavuniya Districts

Department of Fisheries and Aquatic Resources Development, DFAR

Ms Kumari N Vithana, Legal Officer

National Aquatic Resources Research and Development Agency (NARA)

Dr Anil Premaratne, Chairman

Dr H.M. Palitha Kithsiri, Deputy Director General Research & Development

Dr Vasantha Pahalawattaarachchi, Head of Inland Aquatic Resources and Aquaculture Division

Mr Ajith Gunaratne, Director of Monitoring and Evaluation Division and GIS

Mr Amaralal Kariyawasam, Head of Socio-economic and Marketing Research Division,

Dr Geevika J Ganegama Arachchi, Head of Institute of Postharvest Technology

Ministry of Environment

- Mr Nimal Rajarathna, Acting Deputy Director, Coastal Resources Management Division, Coast Conservation and Coastal Resource Management Department (former Coastal Conservation Department, CCD)
- Ms, Head of Environmental Impact Assessment, Central Environmental Authority CEA
- Mr A.J.M. Gunasekara, Manager Operations, Marine Environment Protection Authority MEPA

Ministry of Primary Industries

- Hon. Minister Daya Gamage
- Mr Shehan Talagala, Coordinating Secretary
- Mr Bandula Wickramarachchi, Secretary
- Mr Nishantha Perera, R&D Officer
- Dr W.M.T.B.Wanninayake, advisor, senior marine biologist

Board of Investment BOI

- Ms M.A.S. Perera, Executive Director of Environment Department

Other government institutions:

- Mr Rangith D. Abeysekara, Coordinating Secretary, Ministry of Sustainable Development & Wildlife, North Province, Vanni District
- Mr K. Sivanathan, Secretary, Ministry of Agriculture, Irrigation, Animal Production and Development, Fisheries, Co-operative Development, Food Supply and Distribution, Eastern Province

Sri Lanka Export Development Board EDB

- Ms Indira Malwatte, Chairperson and Chief Executive
- Ms Himali Jinadasa, Acting Director General
- Ms Jeevani Siriwardena, Additional Director General, Development

Ceylon Chamber of Commerce

- Mr Yasura Samarakoon, Manager, Business and Trade Promotion

FAO

- Nina Brandstrup, Representative in Sri Lanka and Maldives

Industry/aquaculture

- Mr Irfan CEO, OceanPick
- Robinson Sivapatham, sea cucumber farmer, Jaffna
- Mr.Jude Croos, small scale seabass farmer, Negombo
- Mr Tim Dejager, Managing Director, Divron Bioventures, freshwater prawn
- Mr.Shan Meemana, Partner, Divron Bioventures, freshwater prawn
- Sulthan Muhammed Sabir, President of fishermen society, Nagadeepaya island, Jaffna, seaweed

Industry/processing

- Mr Roshan Fernando, CEO TESS and TROPIC, President, Seafood Exporters Association of Sri Lanka
- Mr Nicholas Revan Fernando, Compliance Officer,
- Ms Saumi Apeksha Gomis, Quality Assurance Manager,
- Mr Dilan Fernando, Director, Taprobane Seafood (PVT) Ltd.,
- Colonel C Weeratunga, CEO, Global Fisheries (Pvt) Ltd,
- Mr Sanjeewa Jayawardana, Managing Director, Ceylon Catch (Pvt) Ltd
- Mr Indika Abeyratne, Director, Apollo Marine International (Pvt) Ltd, and President of Lanka Seafood Processors and Exporters Association

Royal Norwegian Embassy to Sri Lanka

- Mr Knut Nyfloet, Counsellor,
- Mr L. Vijay, Senior Advisor
- Ms. Vidya Perera, Senior Advisor Development

Foreign companies and foreign persons in Sri Lanka:

- Mr Arnulf Sandvik, Managing Director, A.J. Fishing Industries (Pvt) Ltd, Sri Lanka
- Mr Asbjørn Drengsti, consultant, AquaVisor, Norway
- Mr Finn Worm-Petersen, CEO, Exilesoft, Norway/Sri Lanka
- Mr Jostein Ernoe, CEO, Unicorn Solutions (Pvt) Ltd, Norway/Sri Lanka
- Mr Owen Stevens, UK marine aquaculture consultant, Sri Lanka
- Mr Patrick White, consultant, AKVAPLAN NIVA, Norway
- Mr Ashol Kumar Talesara, Director, Seema Internet, PVT. LTD. Mumbai, India
- Mr Rohit Shah, Heena Metal Pvt. Ltd., Mumbai, India

NGO's or alike

- Dr Steve Creech, Director Pelagikos pvt ltd
- Mr Harsha Navaratne, chairman, Sevalanka

Interviewed Norwegian companies, not mentioned above:

- Akva Group AS
- Akvaplan-niva
- Cargill Aqua Nutrition/EWOS AS PLANY AS
- GENOMAR AS
- Mørenot AS
- Norsk Hummer
- OxyVision AS
- Pharmaq AS
- SKRETTING AS
- Smart Farm AS

Participants in Workshop 1

	Name	Designation	Institutions
01	Mrs.W.M.M.R. Adikari	Secretary, MFARD	MFARD
02	Mr.Claude Fernando	Advisor to the Hon. Minister	MFARD
03	Mr. Upali Mohotti (AAL)	Chairman	NAQDA
04	Mr.P.N. Chandraratne	Director General	NAQDA
05	N.B.M. Ranathunga	Director General(Technical)	MFARD
06	N.M.U. Kumudinie	CEO	Central Environmental Authority
07	Mr. Sudath Jajasekara	Assistant Director	Board of Investment
08	Dr Terney Pradeep Kumara	General Manager	Marine Environment Protection Authority
09	Mr. A. Hettiararchchi	Consultant	
10	Mr. R. Samantha Gunasekara,		Former executive officer of SL Customs
11	Mr. L.L.S.L. Jayasinghe	Biodiversity protection Division	Sri Lanka Customs,
12	Nuwani Sudusinghe	Deputy Land Commissioner	11 - Land Commissioner General's Department,
13	D.D. Anura Darmadhasa	Land Commissioner(Eastern Province)	Department Land Development, Trincomalee
14	Mrs. H.P.K. Hewapathirana,	Deputy Director	MFARD
15	Ms. Sepalika Wikramasinghe	Deputy Director, Quality control,	DFAR
16	Dr. V. Pahalawattaarchi	Head Inland Aquaculture Division	NARA
17	Mrs. Sharmila Corea	Research Officer	NARA

Sri Lanka's readiness to attract investors in aquaculture

18	Mr. S.K. Lenaduwa	Deputy Director	Provincial Environmental Authority, NWP
19	Mrs.Diluka Sumanarathne	Legal officer	NAQDA
20	Dr J.M. Asoka	Director (CAD)	NAQDA
21	H.M.K.P.B.U Herath	Director (Fresh water)	NAQDA
22	K.B.C. Pushpalatha	Director (Extension)	NAQDA
23	G.G Mahanama	Assistant Director	NAQDA
24	Mr. W.P.R. Chandrarathna,	Specialist Fish Diseases	NAQDA-Ornamental Fish Breeding & Training Center.
25	Mr. A.R. Mudalige,	Specialist Fish Genetic	NAQDA-Freshwater Aquaculture Development Center, Dambulla.
26	Mr. P.M. Vithanage	Specialist Fish feed	NAQDA
27	Mr. J.A. Saminda Lakmal	Aquaculturist	NAQDA
28	Mr Idunil Pathrana	Aquaculturist	NAQDA
29	Mr. Ravi Kumar	Aquaculturist	NAQDA
30	Mr Nirooparay Balandram	DAEO- Mannar	NAQDA
31	Mr. Saleevan	DAEO- Jafna	NAQDA
32	Mr.R.M.N.P.K.Ranathunge	Aquaculturist	NAQDA
33	Mr. A.M.D.N. Sameera Athapaththu	Aquaculturist	NAQDA
34	Mr Niels Svennevig	Consultant in Tropical Aquaculture	Presenter at WS
35	Dr. Pham Anh Tuan,	Former deputy director general of Directorate of Fisheries, Vietnam.	Presenter at WS
36	Mr Kapila Tisera	Lanka Lumbini Ornamental fish international	Ichthyology consultant
37	Mr. L. Vijay	Senior Advisor	Norwegian Embassy
38	Shehan Talagala	Coordinating Secretary	Ministry of primary Industry
39	M.N.P. Perera	R & D Assistant	Ministry of primary Industry
40	D.M.B. Rajakaruna	DAEO- Colombo	NAQDA
41	M/S.Niruama Andramana	Computer Analyst	NAQDA
42	Mr Hewagama	Computer Analyst	NAQDA
	Name	Title	University
01	Mr. J.A. Athula	Senior Lecturer, Department of Animal Science	Uwa Wellassa University
02	Dr. Champa Amarasinghe	Consultant	Ocean University
03	Dr. C.N Walpita	Senior Lecturer	University of Sabaragamuwa
	Name	Title	Company
01	Mr. S. Thayaparan	Managing Director	King Aqua Services (Pvt) Ltd, Chilaw

Sri Lanka's readiness to attract investors in aquaculture

02	Mr. Chaminda Fernando		K.M.N Aqua services(pvt) LTD, Chilaw
03	Anura Dammika Perera	Chairman	Prawn Ceylon company Mudukatuwa
04	Mr. Fasli Nayeem		Oceanpick (pvt) Ltd
05	Mrs.Lalani Liyanage		Ceylon sea weed Bandarawatta
06	Mr Kulendran Sivaram	Head, Business operation.	Hayleys Aquagri(pvt) Ltd
07	Mr Tim Dejager,	Managing Director	Divron Bioventures Negombo
08	Mr.Shan Meemana	Partner	Divron Bioventures Negombo
09	Mr. Colonel C. Weerathunga	Executive Director	Global Sea Foods (Pvt) Ltd,
10	I.H. Abeyratne	Chairman	Sea Food Processors association
10	BN Import & Export Pvt		Jaffna
12	Northern Aqua Pvt Ltd		Jaffna
13	Roy Robinson		Jaffna
14	S Suliman		Sea source Lanka Pvt Ltd Jaffna
15	S.Piusilas		Jaffna
16	A Naguleswaran	Consultant	
17	Mr.Jude Croos	Sea bass farmer	Mutturippu
18	Mr.Selvakumaran	Cucumber farmer and Processor	Pallimunei
19	Mr.Gowsala Puveenthiraraja	Marine Biologist	Tropical Fish International
20	MS.Tharindi Galhena	R & D assistant	Tropical Fish International
21	Suranjan Kodituwakku	NGO	Green movement of S.L
22	Arvid Solheim	Consultant	
23	Damith Fernando	Director	Lanka North Eastern Sea Foods Wattala
24	Person writing his name in Tamil		

Participants in Workshop 2

	Name	Title	Institute
01	Mrs.W.M.M.R. Adikari	Secretary	MFARD
02	Mr.Claude Fernando	Advisor to the Hon.Minister	MFARD
03	Mr. N.B.M. Ranathunga (Participated as representative)	Director General(Technical)	MFARD
04	Mr. Upali Mohotti (AAL)	Chairman	NAQDA
05	Mr.P.N. Chandraratne	Director General	NAQDA
06	Mr. M.C.L. Fernando	Director General	DFAR

Sri Lanka's readiness to attract investors in aquaculture

	(Represented by M Marcus, Director)		
07	Dr. Anil Premaratne	Chairman	NARA
08	Dr. H.M.P. Kithsiri	Deputy Director General (R&D)	NARA
09	Dr. V. Pahalawattaarchi	Head/ Inland Aquaculture Division	NARA
10	Mr Niels Svennevig	Consultant in Tropical Aquaculture	Presenter/moderator in WS
11	Dr. Pham Anh Tuan,	Consultant, former deputy director general	Directorate of Fisheries Vietnam
12	Mr. Duminda Ariyasinghe (represented by Mr. M. H Casseen.)	Director General (Head of Investment Appraisal and One-Stop-Shop)	Board of Investment
13	Mr. A.H. Gamini Hewage (Represented by Mr K.H.R. Sriyantha)	Director Coastal Resource Management Division	Department of Coast Conservation
14	Mr. A. Hettiararchchi	Consultant	
15	Mr. R. Samantha Gunasekara,	Former executive officer	Sri Lanka Customs
16	Mr. L.L.S.L. Jayasinghe	Biodiversity Division	Sri Lanka Customs
17	Mrs. H.P.K. Hewapathirana,	Deputy Director	MFARD
18	Mr. S.K. Lenaduwa	Deputy Director	Provincial Environmental Authority, NWP
19	Dr J.M. Asoka	Director (CAD)	NAQDA
20	Mr. H.M.K.P.B.U Herath	Director (Fresh water)	NAQDA
21	Mrs.Diluka Sumanarathne	Legal officer	NAQDA
22	Mr. J.A. Saminda Lakmal	Aquaculturist	NAQDA
23	Mr. Ravi Kumar	Aquaculturist	NAQDA Shrimp Farm Monitoring Unit, Batticaloa
24	Mr Nirooparaj Balandram	DAEO-Mannar	NAQDA Regional/District Aquaculture Extension
25	Mr. Sapumohotti	DAEO-Trincomalee	NAQDA
26	Mr.R.M.N.P.K.Ranathunge	Aquaculturist	NAQDA Shrimp Farm Monitoring Extension Units, Batticaloa
27	Mr Kapila Tisera	Ichthyology Consultant	Lanka Lumbini Ornamental fish International
28	Dr. Termy Pradeep Kumara (Participated as representative, Mr Neil Priyadarshana)	General Manager	MEPA
29	Ms. Nirupama Andramana	Computer Analyst	NAQDA
30	Mr. Hewagama	Computer Division	NAQDA
31	R.D.S.D. Hemakumari	Coastal Division	NAQDA

32	R.M. Nishani	Coastal Division	NAQDA
	Name	Title	University
01	Mr. J.A. Athula	Senior Lecturer Department of Animal Science	Uwa Wellassa University Badulla
02	Dr. Champa Amarasinghe	Consultant	Ocean University
03	Dr. C.N Walpita	Senior Lecturer	University of Sabaragamuwa
	Name	Title	Company
01	Mr. S. Thayaparan	Managing Director	King Aqua Services (Pvt) Ltd,
02	Mr.Kulendran Sivaram Mr. Ruwan Rajapaksha (Participated a representative, Mr samudra)	Director (CEO)	Hayleys Aquagri(pvt) Ltd
03	Mr. Colonel C. Weerathunga (Participated a representative, Dilan Fernando)	Executive Director	Global Sea Foods(Pvt) Ltd,
04	Mr. I.H. Abeyratne	Chairman	Sea Food Processors association
05	Mr. Damith Fernando	Director	Lanka North Eastern Sea Food (Pvt) Ltd, Wadduwa
06	Mr. Prabath Subasinghe (Participated a representative, Mr Nuwan)	Chairman	Sea Food Processes Association
07	Mr. A.R. Hanifa	Aquaculture Consultant	
08	Mr.Asbjoern Drengsti	Consultant	Aqvisor
	Name	Designation	Institute
09	Ms. Viddya	Senior Advisor	Norwegian Embassy
10	Mr. Knut Nyfloet	Counsellor	Norwegian Embassy
11	Mr. Man Tallaksen		Norwegian Embassy?

ANNEX 7: REFERENCE LIST

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Coastal Conservation Department <http://www.coastal.gov.lk/>

Central Environmental Authority <http://www.cea.lk/>

Ceylon Fisheries Corporation (CFC) www.fisheriescorporation.gov.lk

Ceylon Fishery Harbours Corporation (CFHC) www.cfhc.gov.lk

Cey-nor foundation www.ceynor.gov.lk

Department of Animal Production and Health www.daph.gov.lk

Department of Fisheries & Aquatic Resources (DFAR) www.fisheriesdept.gov.lk

FAO National Aquaculture Legislation Overview, Sri Lanka
http://www.fao.org/fishery/legalframework/nalo_srilanka/en

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http://www.fao.org/fishery/countrysector/naso_sri-lanka/en#tcN70118

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Marine Environment Protection Authority www.mepa.gov.lk/web/

Ministry of Fisheries and Aquatic Resources Development (MFARD) www.fisheries.gov.lk

Ministry of Primary Industries <http://mpi.gov.lk/>

National Aquaculture Development Authority (NAQDA)

National Aquatic Resources Research and Development Agency (NARA)

National Fisheries Federation www.slntffcs.lk

Sri Lankan Department of Government Printing Office <http://www.documents.gov.lk/en/home.php>

ANNEX 8: TERMS OF REFERENCE

Terms of Reference for consultancy on investment promotion of the aquaculture sector

Preamble:

Sri Lanka is moving fast away from donor driven cooperation into commercial and technical cooperation. During a recent visit by the Norwegian Minister for Foreign Affairs, business development in the fisheries sector was one of the key areas identified to explore and build on during 2016-17.

Following a meeting between the Norwegian Ambassador and the Sri Lankan Minister for Fisheries & Aquatic Resources Development (the Ministry), a request was sent to Norway to support a consultant to work with the Ministry to prepare better for the transition by identifying the requirements and changes needed for commercialisation of especially the marine aquaculture sector and for attracting commercial investors both local and foreign. Especially the large underutilized marine and coastal area resources is considered a unique competitive edge of Sri Lanka.

Terms of reference for a consultancy on investment promotion of the aquaculture sector

The consultant will conduct an appraisal of Sri Lanka's readiness to attract local and foreign investors in aquaculture and develop an action plan with recommendations to the Ministry for how to commercialize especially the marine aquaculture sector incl. up and downstream by developing an investor friendly environment able to attract local and foreign investors.

More specifically the assignment will include, but not necessarily be limited to, the following tasks:

- 1 Identify any needs for addressing regulatory or legal aspects or for improving the framework conditions to attract investors in aquaculture.
 - a. Appraise the legal/regulatory framework, policies and administrative procedures for being in place to attract investors in general and foreign in specific within aquaculture especially in marine aquaculture – such as regulatory framework for marine aquaculture including farming protocols, biosecurity and health protocols, transboundary movement of live aquatic organism, food safety incl. bivalves, licensing procedures, protection of investment, labour law and industry legislation etc.
 - b. Assess present environmental legislation aquaculture must comply with, and propose any revisions or amendments, in order to comply better with international standards incl. FAO Aquaculture Guidelines
 - c. Assess potential conflicts with other area users including livelihood users if aquaculture is commercialised. What is the present policy and what are lessons learned from other countries?
 - d. Analyse incentives and conduciveness measures to attract investors in general and foreign in specific in aquaculture, such as tax grace, reduced import duties, loan facilities etc. Make comparison with measures taken by other countries in South Asia/Southeast Asia region, who successfully have attracted foreign investors in aquaculture – i.e. lessons learned. Any subsidising policy in aquaculture e.g. direct subsidies, free juveniles etc.? Any risks of anti-dumping actions in export markets? Make suggestions for any new measures to be addressed by Government (local or central)

- e. Which kind of ownership is permitted within aquaculture sector incl. up- and downstream activities e.g. does majority investor have to be local or could it be foreign?
 - f. How is local availability of technology, equipment, feeds, juveniles and services, and how are regulations for import including import duties or other restrictions? How does lack of local presence influence commercial development? E.g. attracting foreign investors is mentioned as a tool for technology transfer?
 - g. Which products can foreign investors distribute in local market – such as sea food, feed, juveniles, equipment and services, or if not, which are the preconditions?
 - h. Are there constraining linkage or coordination issues between the Ministry and other government stakeholders such as Ministry of Irrigation, Board of Investments constraining commercial development of aquaculture?
 - i. Appraise the “one stop shop” model for investors (to be) developed
 - j. Appraise the financing opportunities such as national investment banks or foreign loans for aquaculture in general and foreign investors in specific
 - k. Identify recent aquaculture or investor related reforms – and their implementation. Are there conflicting new policy frameworks?
- 2 Develop strategies for building human resources, competence and technology in aquaculture
- a. Appraise availability (including geographical) of skilled and non-skilled workers, technicians, their salaries and benefits in aquaculture or similar and compare with potential competing job opportunities (incl. government sector) and compare with countries potentially competing for foreign investors.
 - b. Appraise human resources and competences (capacity and capability) in aquaculture and in specific marine at universities, NARA and NAQDA incl. at extension level in selected coastal districts. How well are the institutions linked with and servicing the aquaculture sector?
 - c. Assess aquaculture research performed by universities, NARA and NAQDA and its relevance for assisting the commercialisation of the sector.
 - d. How can capacity in applied research become better to provide relevant technical assistance to the commercial development of the sector? Suggest how to better focus on requested or applied research. Suggest mechanism – a commercial platform in research – for how to identify the Research & Development (R&D) topics and how to commission/tendering them. Look into how private stakeholders can be involved in the process
 - e. Make recommendations regarding any institutional changes including modifications of mandates of NARA and NAQDA necessary to support commercial development, but at the same time keeping the need for independent research at NARA
 - f. Suggest models for building (and documenting) competence at the institutions within some identified marine aquaculture technologies relevant to investors. Is there a need for more dedicated capacity building including organizational support, or will direct technology transfer from selected countries by Technical Assistance (TA) or abroad training or through applied R&D projects do the job.
 - g. Make overview of bilateral and multilateral donor activities during past 5 years, present and in pipeline related to fisheries and aquaculture and assess need for donor coordination

- h. Identify potential viable commercial projects (i.e. of interest to investors) where domestic universities or institutions are or should be involved, and assess the need for TA cooperation with Norwegian or other foreign institutions in this context.
- i. Analyse the role of foreign investors in technology transfer within aquaculture
- 3 Which are the constraining factors as seen by local and foreign investors?
 - a. Why are there no Norwegian investors in this sector established in Sri Lanka? Analyse experience of Norwegian companies who have been looking into developing business in Sri Lanka. Which type of business: as investor or with the purpose of selling products/technology? Interview companies to assess what made them select Sri Lanka, or made them continue or not to invest in Sri Lanka, including what importance the Norwegian support schemes made in their efforts? Did they consider or choose other countries in the region? If so, why, and where? Interview Norwegian companies having selected other countries in this region, to what extent did they consider Sri Lanka for their investments, and what was important for their decision to invest in the country selected?
 - b. Identify and analyse other foreign companies choosing Sri Lanka for investment in aquaculture and reasons why they chose Sri Lanka (Oceanpick/Divron Bioventures, Prime etc.). How is the trend in actual number of foreign-invested companies in Sri Lanka?
 - c. Analyse on a sample basis present or potential local and foreign investors including investment proposals received by the Ministry in aquaculture incl. up- and downstream. What made them enter or prevented them entering the investment? Which is the success rate in materialisation?
 - d. Are local investors looking into investing in aquaculture? Are they sourcing foreign partners for this purpose? Which profile and abilities of foreign partners are they looking for? How can foreign investors find a local partner? Can some potential local investors be identified?
- 4 Appraise and suggest models for encouraging commercial development of marine aquaculture
 - a. Assess the development and possible use of the aquaculture industrial investment parks at Batticaloa and Mannar, developed or to be developed by the Ministry, incl. how has demand and investors been identified and how is their feasibility in terms of bringing in investors compared to the infrastructure development needed.
 - b. Appraise Public-Private-Partnership (PPP) models such as: 1) NAQDA freshwater prawn project which includes mobilising community, site selection and Divron Bioventures (Canada); and 2) NAQDA agreement with private company to operate multispecies marine hatchery under construction at Batticaloa by FAO with EU funding. How is the PPP policy of Sri Lanka? Are there any need for changes in policy framework based on Norwegian or international experiences? Which are the advantages for the partners? Explore areas/topics for further development of PPP including models where different investors take different parts of the value chain
 - c. Appraise seaweed farming model in the North, farmers together with Hayley's Aquagri and UNDP. How to improve commercialisation by encouraging better value adding inside Sri Lanka – lessons learned from SE Asia.
 - d. Appraise the previous small scale farmer sea bass production model at Trincomalee with buy back arrangement of AquaNGreen (and USAID support) – lessons learned
 - e. Develop together with a Non Governmental Organisation (NGO) familiar with the aquaculture sector or having capacity in the sector, a community and gender based

value chain model (cluster) which could assist commercial development e.g. within farming of bivalves in the Eastern province (where 80% of population is informed to depend on livelihood from agriculture and fisheries/aquaculture)

- f. Analyse the marine aquaculture value chain for improved commercialisation (such as value adding)
 - g. Investors are looking for “a pioneer to take the risk”. The Ministry may reduce the risk by developing PPP or other models, including domestic demonstration farms. Discuss and suggest technologies to be demonstrated, purpose, layout, location, institution and exit strategy
 - h. Overall how do the above models serve the purpose of commercialisation of the sector and attract investors? Which are the advantages of the different models and which can be copied into other areas and productions? Lessons learned
- 5 Make suggestions for how to mobilize foreign aquaculture investors?
- a. Appraise websites, brochures or other advertisements related to investing in Sri Lanka or selected provinces especially related to aquaculture and make suggestions for improvement of content and lay-out. Other suggestions for how to mobilize foreign aquaculture investors through workshops or participating in foreign exhibitions etc.
 - b. Snapshot/brief overview of site availability for marine aquaculture in Sri Lanka
 - c. Snapshot/brief overview of the domestic and international market situation for species especially relevant to marine aquaculture in Sri Lanka, but also freshwater prawn.

Approach of consultant

All findings in above appraisals and assessments (ref. to tasks in the Terms of Reference) shall when feasible be presented in Strength-Weakness-Opportunity-Threat (SWOT) analyses to justify the concluding recommendations on procedures, guidelines and responsibilities on the Sri Lankan side on how commercialisation of aquaculture in general and marine aquaculture in specific could be improved.

The above findings, analysis and recommendations shall, before the end of the assignment, be presented by the consultant and discussed at two workshops to be arranged and moderated together with the Ministry, invitations to be sent to stakeholders including other ministries, Norwegian Embassy, NARA, NAQDA, universities, institutes, organisations, private companies and investors (local as well as foreign), and NGO's.

Having received input from the above workshop(s), the consultant will finalise an action plan with recommendations and milestones for the Ministry to undertake in order to develop a sound investor friendly environment for development of aquaculture. The action plan will take into consideration if activities already are ongoing with or without assistance of other donors.

Outputs:

- 1) Action plan with specific issues to be addressed and by whom, for increased commercialisation of the aquaculture sector in specific marine aquaculture of Sri Lanka
- 2) Annexes: Appraisals, assessments, analyses and recommendations (ref to detailed TOR) tentatively to be presented under the following annex headings (with reference to headings 1-5 in the Terms of Reference):
 - a. Needs for addressing regulatory or legal aspects or for improving the framework conditions.

- b. Strategies for building human resources, competence and technology in aquaculture
- c. Constraining factors as seen by local and foreign investors
- d. Models for encouraging commercial development of marine aquaculture
- e. Suggestions for how to mobilize foreign aquaculture investors

The consultant will identify the areas needed to be improved, and make suggestions for how to improve them in the action plan. However, the implementation such as detailing the actions or making exact formulations/wordings e.g. directly of relevance to the regulatory framework will be the responsibility of Sri Lanka or beyond this consultancy.

3) Workshops

According to the Terms of Reference, Annex 1, two workshops shall be conducted during the assignment, in Sri Lanka. The Ministry of Fisheries and Aquatic Resources Development and the Norwegian Embassy, Colombo, shall decide on the venue and timing of this, in cooperation with the Consultant. The organization and management of these workshops shall be carried out by the Consultant, in close cooperation with the Ministry. Further details shall be agreed with the Norwegian Embassy and the Ministry.

The first workshop shall be conducted only after midterm of the assignment has been conducted, i.e. approximately 20th August 2016. The second one sometime before the assignment has come to an end. The timing of this will also have to be discussed and agreed with the Ministry and the Norwegian Embassy in Colombo. Workshop Reports shall be submitted one week after the workshops in both cases.

Contracting

The Ministry and the Norwegian Embassy has requested Norad, Oslo, to have the responsibility for making the tendering process and selecting the expert(s) for this assignment. However, the Norwegian Embassy, Colombo, shall finance the assignment. The reporting shall be to all these three parties.

Staffing, timing and budget issues

A national counterpart or "liaison officer" to the consultant will be assigned and funded by the Ministry to facilitate informed discussions, information gathering requested by the consultant, and to identify and arrange meetings with relevant informants. The national counterpart is also responsible for the practical arrangement of a workshop during the last part of the mission. The national counterpart will have relevant background to support the assignment.

The Ministry will allocate workspace for the consultant within the Ministry with access to internet and printing.

REPORT FROM 1ST WORKSHOP DELIVERED AS SEPARATE FILE/REPORT

REPORT FROM 2ND WORKSHOP DELIVERED AS SEPARATE FILE/REPORT
