



Conducting an Assessment on Subsidies Harmful to Biodiversity and Options Available for Re-purposing in Sri Lanka Final Report



September 2022

Submitted by

Joint Venture



EML Consultants Ltd

Level 02 & 03

No. 6/10 Rajamahavihara Road,

Pitakotte, Sri Lanka

Tel: + 94 11 5535880

Fax: + 94 11 2854762

Email: info@emlconsultants.com

Web: www.emlconsultants.com



**International Institute of Development
Training (Pvt) Ltd**

Level 04, No. 6/10 Rajamahavihara Road,

Pitakotte, Sri Lanka

Tel: + 94 11 5535880

Fax: +94112854762

Email: info@iidt.org

Web: www.iidt.com

Table of Contents

Table of Contents.....	1
List of Tables	4
List of Appendices	4
List of Abbreviations	5
EXECUTIVE SUMMARY	6
1. Introduction.....	8
2. Literature Review.....	8
3. Methodology	10
4. Objectives of Study and Selection of Subsidies for Repurposing	11
4.1. Objectives of Study	11
4.2. Definition of Subsidy	11
4.3. An Overview of Sectoral Subsidies in Sri Lanka.....	11
4.4. Detailed Assessment of Selected Subsidies	18
4.4.1 Livestock Development	18
4.4.2 Marine Fisheries.....	20
4.4.3 Tea, Rubber and Other Plantation Crop Development	21
4.4.4 Irrigation Development.....	22
4.4.5 Agriculture Development.....	23
4.4.6 Land Development.....	23
4.4.7 Export Agriculture and Minor Crop Development.....	24
4.4.8 Coastal Aquatic Resources Development.....	24
Indirect Subsidies.....	25
4.4.9 Rural Industrial Promotion	25
4.4.10 Power and Sustainable Energy.....	25
4.4.11 Samurdhi Development	27
4.4.12 Transport.....	27
4.5. Final Selection of Subsidies	28
5. Results of the Study	29
5.1. Marine Fisheries.....	29
5.1.1 Introduction.....	29
5.1.2 Subsidies in the Sector	30
5.1.3 Environmental Impacts	31
5.1.4 Social Distribution and Gender Impact.....	31
5.1.5 Administrative and Institutional Issues.....	32

5.1.7	Suggestions for Repurposing of Subsidies	37
5.1.8	Impacts of Repurposing	39
5.2.		39
5.3.	Energy Sector	39
5.2.1	Introduction.....	39
5.2.2	Electricity Sub Sector	40
5.2.3	Subsidies – Electricity Sub Sector	42
5.2.4	Petroleum Sub Sector.....	43
5.2.5	Subsidies – Petroleum Sub Sector	44
5.2.6	Environmental Impacts	45
5.2.7	Social Distribution and Gender Impact.....	45
5.2.8	Administrative and Institutional Issues.....	47
5.2.9	Extended Cost-Benefit Analysis	50
5.2.10	Suggestions for Repurposing of Subsidies	53
5.2.11	Impacts of Repurposing	54
5.4.	Agriculture Sector	54
5.3.1	Introduction.....	54
5.3.2	Subsidies in the Sector	55
5.3.3	Environmental Impacts	57
5.3.4	Social Distribution and Gender Impact.....	57
5.3.5	Administrative and Institutional Issues.....	59
5.3.6	Extended Cost Benefit Analysis	60
5.3.7	Suggestions for Repurposing of Subsidies	65
5.3.8	Impacts of Repurposing	66
5.5.	Coastal Aquaculture Sector	66
5.4.1	Introduction.....	66
5.4.2	Subsidies in the Sector	67
5.4.3	Environmental Impacts	68
5.4.4	Social Distribution and Gender Impact.....	69
5.4.5	Administrative and Institutional Issues.....	70
5.4.6	Extended Cost Benefit Analysis	70
5.4.7	Suggestions for Repurposing of Subsidies	74
5.4.8	Impacts of Repurposing	74
5.6.	Transport Sector	75
5.5.1	Introduction.....	75
5.5.2	Subsidies in the Sector	76
5.5.3	Environmental Impacts	77

5.5.4	Social Distribution and Gender Impact.....	78
5.5.5	Administration and Institutional Issues	79
5.5.6	Extended Cost-Benefit Analysis	81
5.5.7	Suggestions for Repurposing of Subsidies	84
5.7.	Summary of Results	86
5.6.1	Environmental Impacts	86
5.6.2	Cost Benefit Analysis	87
5.6.3	Administration and Institutional Issues	87
5.6.4	Social Distribution and Gender Impact.....	88
References.....		89
Appendices.....		92

List of Tables

Table 3.1	Type of Impacts on Environment Due to Subsidies	10
Table 4.3:1:	Subsidies and Environmental Impacts by Sub Sector	12
Table 4.3:2:	Value and Type of Subsidy by Sub-Sectors	16
Table 4.3:3:	Examples of Type of Subsidies	17
Table 4.3:4:	Type of Subsidies	18
Table 4.4:1:	Cattle Population by Type of Farming System.....	19
Table 4.4:2:	Monthly Electricity Bill With and Without Subsidies.....	26
Table 5.1:1:	Marine Fisheries – Subsidy and Environment Costs	34
Table 5.1:2:	Value of Marine Eco System Services	35
Table 5.1:3:	Extended Cost and Benefits of Marine Fisheries.....	37
Table 5.2:1:	Power Source for Generation of Electricity.....	41
Table 5.2:2:	Tariff Rates for Low Domestic Use (Below 60 Units)	42
Table 5.2:3:	Tariff Rates for High Domestic Use (Above 60 Units)	42
Table 5.2:4:	Estimated Cost of Refined Petroleum Products in Sri Lanka (26-6-2022).....	44
Table 5.2:5:	Power and Energy – Subsidy and Environmental Cost	51
Table 5.2:6:	Carbon Emission Costs by Electricity Production Method	52
Table 5.2:7:	Extended Cost and Benefits of Energy Sector.....	53
Table 5.3:1:	Agriculture – Subsidy and Environmental Costs.....	61
Table 5.3:2:	Damage Costs of Nitrogen Fertilizer (Euro/kg of N) in 2019	62
Table 5.3:3:	Cost of Pollution from Fertilizer Use in Sri Lanka.....	63
Table 5.3:4:	Damage Costs to Biodiversity Due to Agricultural Activities.....	64
Table 5.3:5:	Extended Cost and Benefits of Crop Agriculture	65
Table 5.4:1:	Coastal Aquaculture – Subsidy and Environmental Cost.....	71
Table 5.4:2:	Valuation of Coastal Ecosystem Resources.....	72
Table 5.4:3:	Extended Cost and Benefits of Aquaculture Fisheries	73
Table 5.5:1:	Transport – Subsidy and Environmental Cost	82
Table 5.5:2:	Motor Vehicles in Operation and CO2 Emissions in 2019.....	83
Table 5.5:3:	Extended Cost and Benefits of Transport Sector	84
Table 5.6:1:	Summary of Costs and Benefits of all Selected Sub Sectors.....	87

List of Figures

Figure 4.3.1 : Types of Subsidies	14
Figure 5.2.1 : Power Source for Generation of Electricity	39

List of Appendices

Appendix 1: Notes on Stakeholder Interviews
Appendix 2: Outcomes of the Workshop – 16/06/2022
Appendix 3: Recommendations on Fisheries and Aquaculture
Appendix 4: Workshop Recommendations on Transport Sector
Appendix 5: Meetings with Stakeholders – Photos
Appendix 6: Photos of the Workshop – 16/06/2022
Appendix 7: Summary Table

List of Abbreviations

ASMP	Agriculture Sector Modernization Project
BIOFIN	Biodiversity Finance Initiative
CEB	Ceylon Electricity Board
CFC	Ceylon Fisheries Corporation
CFHC	Ceylon Fishery Harbors Corporation
CKD	Chronic Kidney Disease
CPC	Ceylon Petroleum Corporation
CPSTL	Ceylon Petroleum Storage Terminal
CSIAP	Climate Smart Irrigated Agriculture Project
CTB	Ceylon Transport Board
DFAR	Department of Fisheries and Aquatic Resources
DMT	Department of Motor Traffic
DOA	Department of Agriculture
GHG	Green House Gas
GMO	Genetically Modified Organisms
HH	Household
LECO	Lanka Electricity Company (Private) Limited
LIOC	Lanka Indian Oil Company
LNG	Liquefied Natural Gas
MSY	Maximum Sustainable Yield
MT	Metric Ton
NAQDA	National Aquaculture Development Authority
NARA	National Aquatic Resources Research and Development Agency
NBRO	National Building Research Organization
NCRE	Non-Conventional Renewable Energy
NPV	Net Present Value
PUCSL	Public Utilities Commission of Sri Lanka
SAPP	Sustainable Agricultural Partnership Program
SLSEA	Sri Lanka Sustainable Energy Authority
SLTB	Sri Lanka Transport Board
SOE	State Owned Enterprise
ToR	Terms of Reference
TOU	Time of Use Tariff
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar

EXECUTIVE SUMMARY

Sri Lanka's rich biodiversity is in danger of deterioration due to the high use of its biodiversity and natural resources for the livelihoods of the population. The resources allocated for the preservation of the biodiversity are meagre compared to that allocated for other development purposes. There are several incentives or subsidies provided for various activities whose impacts may be harmful to biodiversity but has not been studied or understood well. The overall objective of this study is to study the impacts of some of the subsidies most harmful to the environment and recommend ways and means of repurposing such subsidies and to assist in the sustainable management of biodiversity in Sri Lanka. A review of available literature on the subject seems to suggest that damage to environment due to subsidies may be high in the agriculture, livestock, fisheries, energy and transport sectors.

Initially several subsidies identified as harmful to the environment were selected for further analysis and review. These subsidies were subject to a review process and filtered through the following three conditions: First, the subsidies had fulfilled the intended economic, social and environmental objectives. Second, the subsidies had a built-in review process to effect corrections. Third, the subsidies had addressed any social welfare or equitable distribution issues. If the subsidies failed to meet all of the above three conditions, such subsidies would be identified for repurposing. Subsidies can be defined as concessions granted by the public sector without any counter consideration of a market nature. Based on an initial analysis, 16 subsidies were selected for further detailed analysis. These subsidies were subject to a more detailed analysis and filtered through the three conditions described above. Five out of the 16 subsidies failed to meet all three conditions and were selected for repurposing. The subsidies in the five sectors selected for repurposing were in the following sectors, agriculture, marine fisheries, power and energy, aquaculture fisheries and transport.

In the agriculture sector, subsidies were provided for fertilizers, for cultivation of several crops, commercial farming, production villages, crop diversification, commercial farming and crop insurance. In the crop agriculture sector, the total value of the subsidies was about Rs 51 billion (0.283 billion USD) and the cost to the environment was estimated at Rs 84 billion (0.467 billion USD) and the total economic benefit was estimated at Rs 216 billion (1.2 billion USD). In the marine fisheries sector, fuel subsidies were provided to boat owners up to a total value of Rs 1.85 billion (0.01 billion USD) annually. The cost to the environment was estimated at 77 billion (0.428 million USD). The net benefit from marine fisheries was estimated at Rs 41.2 billion (0.228 billion USD). In the energy sector, the cost of the subsidy was estimated at Rs. 67.6 billion (0.376 billion USD) and the cost to the environment was estimated at Rs 74 billion (0.411 billion USD). The estimated benefits to the consumer was estimated at Rs 509 billion (2.823 billion USD). The GDP in the production of electricity was estimated at Rs 88 billion (0.489 billion USD). In the aquaculture sector, the cost of the subsidy was low at Rs 0.25 billion (0.001 billion USD) and the cost to the environment was high at Rs 23 billion (0.128 billion USD). The benefits from this sector was estimated at Rs 6.3 billion (0.035 billion USD). In the transport sector, the cost of the subsidy was estimated at Rs 87 billion (0.483 billion USD), while the costs to the environment was estimated at Rs 148 billion (0.822 billion USD). It was not possible to estimate the economic benefits in this sector from available data. The GDP for the transport sector was Rs 1550 billion (8.611 billion USD) in 2019.

The repurposing strategy suggested for the marine fisheries sub sector is that the subsidies provided through a lower price for kerosene fuel should be continued for a period of time (say 3 years) and then discontinued thereafter. If the kerosene price is increased then a cash grant can be given to compensate the price rise during this period. The income of the fishermen is expected to increase over a period of time due to higher prices for fish or higher catch. Then it will be an opportune time to remove the subsidy. Only the targeted person should receive the subsidy, not the well to do fishermen or a fish business owner. The subsidy should be certified by the Fisheries Inspector after a visit once a year to ensure that the owner is using the boat for fishing purposes. When the subsidy is given in cash the amount of the subsidy can be varied for individuals or groups of fishermen, such as large or small boat

owners. Other safeguards like registration with the Department of Fisheries should be continued. A fishing quota system could also be implemented to reduce overfishing.

In the power and energy sector, it is proposed to remove the subsidy progressively over a period of time. During the interim period, the quantum of subsidy could be reduced, rather than the number of households receiving the subsidy. At the end of the prescribed period the subsidy should be completely removed. In the agriculture sector it is suggested that integrated fertilizer application be promoted and subsidies should be given only to persons using this system of application. Soils should be tested and zoned according to the fertilizer needs and the amount of fertilizer subsidized should be equal to the recommended amount. In the aquaculture sector, the subsidies for shrimp culture should be completely removed after a period of time (say three years). However, subsidies for other aquaculture activities should be continued. Tax relief for aquaculture activities should be continued for the next five years to provide only an initial support for new investors not for continuing activities. In the transport sector the subsidies for school children and for serving under served routes should be continued. Subsidies for railway and public transport should be withdrawn over a period of time. All other subsidies should be removed. The impacts of repurposing do not appear to be severe as most of the subsidies addressing socio economic issues were not removed. Many subsidies were recommended to be removed over a period of time to reduce any immediate hardships faced by the beneficiaries.

Impacts of Subsidies on the Biodiversity of Sri Lanka

1. Introduction

The majority of the Sri Lankan population use the country's diverse ecosystems, species and genetic resources for their livelihoods and therefore contribute to the deterioration of the eco systems and biodiversity. This irreplaceable biodiversity is now under severe threat because of extensive anthropogenic land use changes that began over two centuries ago, under colonial rule, and continues to the present day. The threat to biodiversity stems from not only the legal use of biodiversity resources but also due the illegal exploitation of these resources. Although biodiversity per se contributes substantially to the economy, the resources allocated for its conservation has been meagre. Sri Lanka also has a plethora of legislation for the protection of the environment, however the implementation of these laws is deficient. Thus concerted efforts are needed to ensure that our biodiversity resources are protected for the well-being of the future of the country.

The future of Sri Lanka's status as a "biodiversity hotspot" is under threat, with a large geographical area facing a loss of natural habitats, resulting in a significant cost to the environment. Further, the Sri Lankan government has offered incentives in the form of direct and indirect subsidies to various sectors of the economy to catalyze economic growth. The impacts of these subsidies and incentives on the country's natural resources have not been studied or understood well. Thus, there is a need to study such impacts and determine how the biodiversity-negative impacts can be minimized while serving the original objectives of subsidies. The conservation and sustainable use of biodiversity needs to be balanced with the economic objectives of the country as well as the lives and livelihoods of the population.

A study on the impacts of government subsidies on the biodiversity of Sri Lanka was undertaken under the global initiative of the Biodiversity Finance Initiative Phase II (BIOFIN II) Project of UNDP, Sri Lanka. The UNDP engaged EML Consultants Ltd. to conduct the study and submit a report after stakeholder consultation process. The study is expected to estimate the real costs and benefits of subsidies and their impacts on the biodiversity of the country and recommend ways and means of repurposing such subsidies. The overall objective of this assignment is to understand the impact of different types of subsidies on the sustainable management of biodiversity in Sri Lanka and identify potential repurposing strategies available, enabling the government and UNDP to prioritize its policy support on biodiversity. The findings will be shared with the key officials and policy makers to ensure that harmful subsidies will be phased out and repurposing strategies will be made available to the policy makers.

2. Literature Review

Not many valuation studies of ecological resources are available for Sri Lanka. There are even fewer studies on the impacts of subsidies on the environment. We have to depend to a large extent on studies conducted in this field in other countries to complete this task of estimating the economic value of damage caused to the biodiversity by subsidies. In a study conducted on Greening the National Accounts, Prashanthi Gunawardena (16), 2007, estimated the damage costs of weedicides used in agriculture in Sri Lanka at Rs 2.38 billion (13.2 million USD), the damage costs of pesticides at Rs 1.38 billion (7.7 million USD) and that of fungicides at Rs 0.27 billion (1.5 million USD). The damage costs due the emission of Methane, Nitrous Oxide and Carbon Monoxide from agriculture was estimated at Rs. 11.2 billion (62.2 million USD) and the damage costs of soil erosion due to agriculture at Rs. 22.33 billion (124.1 million USD). E. P. N. Udayakumara , estimated soil erosion costs at Rs 605 million (3.36 million USD) in present value terms in the Uma Oya watershed.. Fertilizer subsidy may have contributed to the increase in crop production, but the subsidy may not have reached the intended beneficiary as the subsidized fertilizer may be sold by the beneficiary, Jeevika Weerahewa (35). Thus the socio economic objectives of the subsidy may not have been achieved. The external cost of fertilizers was estimated at about 0.3 Euro/kgN, much of that due to global warming by N₂O and CO₂ emissions

during fertiliser production and N₂O emissions from fertilised fields, Harro von Blottnitz, Tim Taylor (17). Changes in the prices of fertilizer and paddy do not have a significant effect on fertilizer usage, which points to the fact that the fertilizer subsidy is not a key determinant of the use of fertilizer in paddy cultivation. There is a relatively higher correlation between fertilizer use and paddy price than between fertilizer use and fertilizer price. These findings suggest that the fertilizer subsidy could be withdrawn gradually over time, Ekanayake (12), 2006.

The damage cost to coastal marine fisheries due to fisheries activities was estimated at Rs 113.3 billion (629.4 million USD) by Prashanthi_Gunawardena (16) in 2010. A valuation of marine system services undertaken by Austen et al (3) in 2019, estimates the value of marine fisheries services at Rs 93 billion (516.7 million USD) and accompanying carbon emissions at Rs 163 billion (905.6 million USD). A study completed by H.D.Wimalasena and K. Rupamoorthy (37) in 2000, found that in Sri Lanka, multiday fishing boat owners earned more than twice the amount earned by one day and other small boat owners and the exploitation of fisheries resources was also much higher by multiday owners than small boat owners. A study on *“Fuel Subsidy in Sri Lanka Fisheries; Data Analysis and Possible Improvements”* by Ragavan Nadarajah (27), suggests that subsidies appear to promote higher fishing efforts and consequently greater harm to the environment and biodiversity. The catch per unit effort declined in small-scale fisheries while profitability declined in large scale fisheries, when fuel subsidies were removed.

The government of Sri Lanka has been providing subsidies on electricity for many decades. Seventy-five percent of the domestic consumers in Sri Lanka enjoy the electricity subsidy [26]. The intention of the electricity subsidy was to give relief to low income people. The subsidy was implemented on the assumption that low income people consume less electricity. Filtering low income people is both difficult and complex. From sample studies it has been identified that there is no direct relationship between income and electricity consumption. Some of the primary objectives of the electricity subsidy have not been achieved. One of the most subtle negative impacts of the electricity subsidy was the encouragement it provided to subsidized consumers to use energy inefficient equipment. W.D.A.S. Wijayapala (36), 2016. Diversion of rivers for power generation resulted in losses in recreation, forest cover, non-timber products, loss of home garden productivity, etc. The loss was estimated at NPV of USD 11.3 million for a power project. In order for the project to be viable at least 9% of the generated electricity should be diverted to the poorest households, U.A.D. Prasanthi Gunawardena (15), 2010.

Ministry of Transport issued the following details about the transport sector in Sri Lanka. About 88% of the vehicles in Sri Lanka are old and 97 % of transport sector fuel consumption is by the road sector. The average fuel efficiency of vehicles is low compared to developed countries with only 12% of the fleet considered as fuel efficient. Private motorists are the beneficiaries of about 67% of the subsidy on petrol and 49% of the subsidy on diesel fuel. The vehicles are also not maintained adequately contributing to the pollution.

3. Methodology

The first step of this assignment was to identify the different harmful subsidies practiced in Sri Lanka. Secondly an assessment was made on the economic costs and benefits of such subsidies, costs to the environment and the country and the benefits to the beneficiary and the country. Subsidies harmful to biodiversity including input, output, direct, indirect subsidies in all key sectors such as agriculture, fisheries, power and energy, industry, services such as tourism, transport, health were evaluated and potential impact of the subsidies were identified.

The level of harm to the environment caused by the subsidies was identified as high medium or low according to the criteria developed in Table 3.1.

Table 4.1: Type of Impacts on Environment Due to Subsidies

No	Environmental Impacts
1	Biodiversity loss
2	Deforestation
3	Land degradation / soil erosion
4	Algae formation
5	Eutrophication of water and soils
6	Acid rain and acidification
7	Greenhouse gas emissions (CO ₂ , Methane, N ₂ O and Water Vapour)
8	Emission of SO ₂ , NO ₂ , CO, phosgene (COCL ₂), chlorine , sulphur, fly ash and particulate matter
9	Dust, dirt, noise and air pollution
10	Flooding
11	Reduction in river water flows
12	Reduction in groundwater resources
13	Pollution / degradation of water bodies
14	Increase in potassium levels in water and soil
15	Coral destruction and loss
16	Coastal erosion
17	Ghost fishing
18	Leakage of fuel and chemicals in marine waters
19	Outflow of heated and polluted water into marine waters / environment
A	High Impact - 5 or more impacts
B	Medium Impact- 3 to 4 impacts
C	Low Impact - 1-2 mpacts

The severity of the impact was categorized into (1) High Impact (5 or more impacts), (2) Medium Impact (3-4 impacts) and Low Impact (1-2 impacts) according to the possible environmental impacts caused by subsidies identified in Table 3.1 above. Sub-sectors with subsidies with high impacts on the environment were identified based on the above table. Next, the financial / economic costs and benefits of the subsidies were assessed including budgets earmarked for subsidies and policy interventions that may minimize the impacts on biodiversity identified. Based on the above, subsidies most harmful to the environment that needed to be repurposed were prioritized. Options available for repurposing them while causing minimum disturbances to the social, economic and cultural positive impacts of the existing subsidies were then identified.

A total 16 subsidies harmful to biodiversity were identified and these subsidies were filtered through three stages.

Stage I - Assessed whether the relevant subsidies had fulfilled its intended objectives in terms of social, financial and environmental impacts.

Stage II - Identify whether the subsidies had a built-in review process which would lead to corrections of the impact and if such correction processes were unavailable, assessed the public perception about the existing subsidies using secondary data.

Stage III - Assessed whether the existing subsidies are addressing any social welfare / equitable distribution of wealth related issues.

If the subsidies had failed all three above mentioned filters, then the respective subsidies were identified for the repurposing process.

4. Objectives of Study and Selection of Subsidies for Repurposing

4.1. Objectives of Study

The objectives of the study is to understand the impact of different types of subsidies on the biodiversity of Sri Lanka. After identifying the potential environmental impacts of the different subsidies, an analysis should be made to determine the different repurposing strategies which may be needed to re-structure the subsidies to reduce or prevent future harm to the environment. The identified harmful subsidies should be repurposed or phased out for the future sustainability of the environment.

4.2. Definition of Subsidy

There is no unique single definition of the term "subsidy", either in financial literature or in practice. Subsidies are essentially concessions granted by the public sector to agencies without any counter-consideration of a market nature. Subsidies include direct financial assistance or tax concessions and can comprise of capital subsidies, which are usually one-time in nature and reduces the investment cost to the beneficiary. Recurrent or operational subsidies reduce the operational expenditure of the subsidized activity and can be of an annual nature. The state uses subsidies to intervene in many aspects of the economic production process and of individual consumption decisions by households. The reasons given for this are many and varied, but such interventions are rarely justified from an economic point of view. As a general rule, subsidies violate the polluter pays principle, i.e. the - that the polluter (or party responsible) pays for the pollution. Thus subsidies distort competition, resulting in suboptimal functioning of input and product markets which lead to inefficient market results and offloading of the consequences of the subsidies onto society in general.

4.3. An Overview of Sectoral Subsidies in Sri Lanka

The Sri Lankan government has instituted several subsidies in many sectors of the economy for socio economic, cultural or other reasons. Some of the subsidies have been changed or modified over time to take into account current socio economic and other conditions. Many have remained unchanged over long periods. A review of several subsidies were undertaken and the current status of the subsidies and probable impacts on the environment are provided below. Subsidies and impacts on environment are presented for 16 sub sectors in Table 4.3.1. All rupee values stated in this report are in 2019 SL Rupee and can be converted to the US dollar at the exchange rate of Rs. 180 per US dollar that prevailed in 2019. If a different value is used in any part of the report, it will indicated in the particular section.

Table 4.3:1: Subsidies and Environmental Impacts by Sub Sector

No	Sub Sector	Total Subsidy Cost (Rs Billion)	Environmental Impacts
1	Inland and Ornamental Fisheries	0.1	The main impact of ornamental and inland fisheries is that the waste water can be sent to the natural environment polluting the natural environment and water bodies. Imports of banned varieties of ornamental and other fish varieties for breeding can cause loss of biodiversity if let out into the natural environment. Local fish varieties living in tanks and reservoirs may become extinct due to rapid breeding of imported fish varieties causing loss of biodiversity.
2	Livestock	1.8	Contributes to land and water degradation, biodiversity loss, acid rain, coral reef degeneration and deforestation. Some local genes and characteristics of local breeds may be lost due to use of exotic blood for breed improvement.
3	Plantation crops	4.1	In both tea and rubber plantations, application of fertilizers, chemicals and fungicides for pest and disease control can harm the environment. Also if tea and rubber new plantings are done in forest areas, it can cause losses in bio diversity. If proper soil conservation measures are not taken, it can cause erosion in tea lands
4	Minor Export and Other Crops	7.2	Biodiversity losses incur only when land is cleared for new plantings, particularly in sugar cane cultivation where forests may be cleared for such cultivation. Environmental harm is minimal and limited to cultivations near forest areas in the case of sugar cane. In the case of most of the other minor crops the environmental damage is also minimal.
5	Irrigation	3.2	Deforestation and displacement of population during construction of dams. Waste of water as irrigation water is provided free of charge. Reduction in river water flows.
6	Potable water supply	1.2	Extraction of water from sensitive or biodiversity rich areas and over-extraction from ground water resources. Algae formation during water supply operations
7	Rural industries	1.1	The damage to the environment due to the promotion of these industries is considered to be minimal as the growing of the crops is promoted in own lands and any industrial wastes are disposed of safely as per the requirements for obtaining the subsidy. Clearing of forest lands for cultivation of above crops is not allowed
8	Tourism	0.2	Dumping of garbage in environmentally sensitive areas including plastic waste. Removal of plant species in nature reserves, leading to biodiversity losses

9	Samurdhi	72.0	The environmental impacts are minimal with the subsidies assisting agricultural development or setting up of industries using local raw materials produced in their own villages. These are small village level development programmes set up mostly on bare or scrub land, with little or no environmental impact. Waste from small industries is disposed of in an environmentally friendly manner.
10	Land Development	NA	Environmentally sensitive areas such as forests, scrub forests, pasture lands are subject to much stricter criteria before they are leased out. The District Development Committee must give approval for land lease. Issues such as impact on wild life, forestry, marshes, etc. also looked at prior to leasing.
11	Gem and Jewellery	0.1	Abandoned mines can cause harm to biodiversity. Use of Cadmium, Nitric acid, Sulphuric acid, Mercury and Pottasium Cyanide in Jewellery making can cause environmental damage when these chemicals are sent into soils or water bodies after use by the jewellery makers.
12	Marine Fisheries	1.85	Pollution of marine water from leakage of fuel and other chemical wastes, destruction of corals through illegal fisheries activities such as blast fishing, use of illegal fisheries equipment, bottom trawling and methods that cause the destruction of habitats and loss of corals, increased coastal erosion and reduced sustainability of fisheries. Ghost nets or nets abandoned in the ocean are made of plastic and nylon and do not decompose, wreaking extreme havoc on the wildlife and ecosystems that they interrupt
13	Energy	67.6	GHG emissions, fly ash, sulfur and nitrogen oxides are emitted to the atmosphere from thermal power plants. This can cause acidification or eutrophication of habitats and greenhouse gases contribute to global warming. Construction of major as well as mini hydro power plants lead to environmental degradation and negatively impact on biodiversity of downstream as well as on site. Failing to release minimum water flow from mini hydro power plants negatively impact on downstream habitat and biodiversity. Energy production from wind and biomass can also damage biodiversity.
14	Agriculture	51.0	Pollution of soil and ground water due the use or overuse of fertilizers and agrochemicals. Eutrophication of water and soils . Algae formation due to dissolved nitrogen in excess nutrition flowing into water bodies causing harm to inland water life and to humans drinking such water.
15	Coastal Aquaculture	0.25	Pollution of natural water bodies, ghost fishing and algae formation due to nutrition and feed waste into water bodies and increase in potassium levels harmful to inland water life.

16	Transport	210.1	The construction of roads causes dust emission, noise pollution, air and water pollution, ground water level decline, dirt accumulation, flooding etc. Pollutants in the transport sector include greenhouse gas emissions, sulphur dioxide, oxides of nitrogen, carbon monoxide or particulates and CO ₂ . These affect human health, lead to acidification and eutrophication of water and soils, and cause damage to nature and buildings as well as cultural assets.
----	-----------	-------	---

In the fisheries sector, subsidies are provided in the inland and aquaculture fisheries sub sectors. Kerosene is subsidized for all users of this fuel including marine fishermen and the general population. The world market price kerosene is generally higher than the actual price in the local market so that everyone benefits from this subsidy. In the case of marine fishermen, the value of the subsidy with regard to purchases of kerosene fuel is estimated at Rs 1.85 billion (10.3 million USD annually)¹. The benefits of the subsidy include reduced cost of production and consequent increase in the incomes of fishermen. However, the subsidy may have caused overfishing but it is not certain whether the subsidies also encouraged the use of illegal methods of fishing. Although, the removal of subsidies may reduce fishing effort, it may not reduce the use of illegal fishing methods, which is difficult to detect due to lack of adequate human resources in the state sector for detecting and punishing the users of illegal methods of fishing.

In the inland fisheries sector, a one time subsidy of Rs 100,000 (556 USD) is provided for 1400 fishermen for establishing ornamental fisheries and boats are provided free of charge to inland fishermen at Rs. 70,000 (389 USD) per boat. The total subsidy in the inland fisheries sub sector is Rs.4.5 billion (25 million USD). Ornamental fisheries provides a good income of up to Rs 50,000 (278 USD) per month per fisherman and exports account for 4% of world exports (*Source: NAQDA and Fisheries Statistics, Ministry of Fisheries, Sri Lanka*). Ornamental fisheries can harm local breeds if they are let out into local water bodies. The main impact of ornamental fisheries is that the waste water is sent to the natural environment polluting the natural environment and water bodies. Imports of banned varieties of ornamental fish for breeding can also cause harm to biodiversity if let out into the natural environment.

In the aquaculture sub sector, subsidies are provided for shrimp farming, pond and cage culture, sea weed and sea bass culture, fish feed production, for boats and dry fish production. The total cost of subsidies is estimated at Rs 250 million (1.4 million USD) per annum- for the coastal aquaculture sub-sector (*Source: NAQDA*). The fishermen have generally benefited from the subsidies through higher production and incomes obtained by utilizing the subsidies. Environmental impacts of aquaculture includes, pollution of natural water bodies, ghost fishing and algae formation due to nutrition and feed waste into water bodies and increase in potassium levels harmful to inland water life.

In the agriculture and lands sector, subsidies are provided for fertilizers and for crop production for paddy, other field crops, plantation crops and other minor export crops. The value of fertilizer subsidy is estimated at Rs 37 billion (0.21 billion USD), subsidies in the rubber sub-sector is estimated at Rs 1.1 billion (6.1 million USD), in the tea sector Rs 2.95 billion (16 million USD), in the minor export and other minor crop sector Rs. 7.2 billion (40 million USD) and cultivation subsidies for other crops Rs 15 billion (83 million USD). The farmers are benefited through the additional output obtained as a result of using the services and inputs provided through the subsidies. Lands are leased out for various purposes including agriculture, commerce and industries. There is a built-in mechanism to ensure that land leases do not harm the environment through a committee comprising of relevant officials such as officials from the forestry, wild life and building research organizations. The main environmental impacts from agriculture include the pollution of soil and ground water due the use or overuse of

fertilizers and agrochemicals. Other impacts include algae formation due to dissolved nitrogen in excess nutrition flowing into water bodies causing harm to inland water life and to humans drinking such water.

In the livestock sector, subsidies are provided for animal improvement in dairy farming, goat farming and heifer calf development. Loans with subsidized interest are also provided for livestock including poultry development. The total value of the subsidies is estimated at Rs 1.7 billion (9.4 million USD) per annum. The environmental impacts of livestock farming can be high, it contributes to land and water degradation, biodiversity loss, acid rain, coral reef degeneration and deforestation. Some local genes and characteristics of local breeds may be lost due to use of exotic blood for breed improvement.

In the water sector subsidies are provided for potable water consumed by low consuming households and in the irrigation sector there are no subsidies but irrigation water is provided free of charge to the farmer. The operation and maintenance of the reservoirs are also undertaken by the government, with a small contribution of labour by the farmers. Thus farmers and households have benefited from the subsidies for drinking water provided to low using households and the farmers by getting free water to irrigate their crops as well as almost free operation and maintenance. The farmers also benefit from water security for irrigation and to some extent water for domestic use, as well as flood protection. The cost of subsidy in the potable water supply subsector is estimated at Rs1.2 billion (6.6 million USD) per annum. The main environmental impacts of providing potable water to households stem from the extraction of water from sensitive or biodiversity rich areas and over-extraction from ground water resources. A total of 2.7 million M3 of water is extracted per day from rivers, tanks, and ground water for the water supply. Other impacts such as algae formation occurs during water supply operations. In the case of irrigation water the government spends Rs 2.3 billion (12 million USD) for operation and maintenance of irrigation structures. The main environmental impact includes deforestation and displacement of population during construction of dams. The farmers also waste water as irrigation water is provided free of charge.

In the tourism sector there are not many subsidies, the total amount of subsidies was Rs 180 million per annum (1 million USD), Rs 60 million (0.333 million USD) for 60 tourist SMEs and material subsidies for women headed tourist enterprises, up to Rs 60,000 per enterprise, adding up to Rs 120 million (0.666 million USD) per annum. The tourism sector is vital for Sri Lanka as it brings in much needed foreign exchange into the country. While foreign tourists generally care for the environment, the domestic tourists are not concerned about the environment. More often they dump garbage in environmentally sensitive areas including plastic waste. Both local and sometimes foreign tourist remove plant species in nature reserves which can lead to biodiversity losses.

In the power and energy sector, most of the pollution is from the generation of power using petroleum products as well as coal. There are several subsidies including for kerosene, capital subsidies for biomass burners and subsidies for energy efficient bulbs and equipment and subsidy for roof top solar units. The lower power consuming households are also subsidized (for households consuming less than 120 kWh per month) to the tune of Rs 53 billion (294 million USD) per annum. The high amount of subsidy is due to the fact that over 50% of the households consume less than 120 kWh per month and are eligible for the subsidy. The total value of all subsidies is estimated at Rs. 87 billion per annum. Subsidies in electricity consumption are also provided for small industries. Electricity production using fossil fuels produces air pollutants that have impacts such as acidification, eutrophication and the emission of greenhouse gasses contributing to global warming.

In the transport sector subsidies are provided for the transport of school children and students of higher education institutes as well as for the armed forces, both in trains and buses. In addition season tickets at concessionary rates are also provided for certain categories of people. An operational subsidy is provided for plying on non-remunerative or under served routes for state bus transport services. Subsidies are also provided to meet losses incurred by the state bus and railway transport services. These subsidies may not be needed if the state transport services are made more efficient. Transport mostly uses energy sources that generate GHG emissions with 88% GHG from road transport and 12%

from rail transport. The GHG emissions cause acidification and eutrophication of water and soils and damage to infrastructure and cultural assets.

In the rural industrial development sector subsidies are provided for developing entrepreneurship and for setting up cultivation villages. Low interest loan schemes are available for cultivating raw materials for rural industries and for developing rural industries. The total value of the subsidies is estimated at Rs 1.1 billion (6.1 million USD). The damage to the environment is estimated to be low, as crops are cultivated in own lands and industrial wastes are disposed of safely. Under the Samurdhi programme, livelihood grants are paid monthly to poor households. Grants are also provided for the development of common infrastructure and for the production of raw materials. The total cost of the above programmes is estimated at Rs 72 billion (40 million USD) per annum and the environmental impacts are said to be minimal.

In the gem and jewellery sector there are only indirect subsidies including assistance for the welfare of the worker and family. Abandoned mines can cause harm to biodiversity. Use of Cadmium, Nitric acid, Sulphuric acid, Mercury and Potassium Cyanide in Jewellery making can cause environmental damage. After use these chemicals are sent into soils or water bodies. The subsidies have fulfilled their objectives by encouraging the investors and employees to develop the sector. Some social welfare issues are addressed by the subsidies such as education and pension schemes.

Table 4.3.2: Value and Type of Subsidy by Sub-Sectors

Selected Sub-Sectors	# Type of Subsidy	Subsidy Budget (USD Billion)	% of GDP – 2019 (84 Billion USD)
Agriculture	Direct Transfer (Rs 41 Billion-0.227 Billion USD), Duty and Tax Waivers for imports of Machinery and Equipment (Rs 10 Billion -0.05 Billion USD)	0.2833	0.34
Transport	Implicit Income Transfer (Rs 36 Billion – 0.2 Billion USD), Price support to state transport agencies (Rs 51 Billion – 0.283 Billion USD)	0.4833	0.57
Power and Energy	Implicit Income Transfer (Rs. 68 Billion)	0.3778	0.45
Marine Fisheries	Implicit Income (Rs 1.85 billion)	0.01	0.012
Coastal Aquaculture	Direct Transfer (Rs 0.225 Billion – 0.00125 Billion USD), Tax Relief (Rs.0.025 Billion – 0.000139 Billion USD)	0.0014	0.001
Total Selected Sub Sectors	Rs 212 Billion	1.17	1.4
Studied Sub-Sectors			
Inland Fisheries	Direct Transfer (Rs 0.144 Billion)	0.0008	0.0009
Rural Industries	Direct Transfer (Rs. 0.9 Billion – 0.005 Billion USD), Subsidized Loans (Rs.0.15 Billion – 0.00083 Billion USD)	0.0058	0.007
Samurdhi Development	Direct Transfer (Rs 72 Billion)	0.4000	0.48

Livestock	Direct Transfer (Rs. 0.2 Billion – 0.001 Billion USD) and Price Support (Rs. 1.6 Billion – 0.009 Billion USD)	0.0100	0.01
Potable Water Supply	Implicit Income Transfer (Rs 1.2 Billion)	0.0067	0.008
Irrigation	Implicit Income Transfer (Rs2.3 Billion – 0.0128 Billion USD), Direct Transfer (Rs 0.9 Billion – 0.005 Billion USD)	0.0178	0.021
Tourism	Direct Transfer (Rs. 0.2 Billion)	0.0011	0.010
Gem and Jewellery	Direct Transfer (Rs 0.11 Billion)	0.0006	0.0007
Tea, Rubber and Other Plantations	Direct Transfer (Rs. 4.1 Billion)	0.0228	0.027
Export and Minor Crop Development	Direct Transfer (Rs. 7.2 Billion)	0.0400	0.048
Land Development	Implicit Income Transfers as land leased at less than market value	NA	NA
Total	Total GDP – US \$ 84 Billion in 2019 Total Subsidies - Rs 302 Billion in 2019	1.6775	2.0

Sources: Department of Agriculture, Fertilizer Secretariat, Ministry of Transport, Ministry of Power and Energy and CEB, Ministry and Department of Fisheries, National Aquatic Resources Development Authority, State Ministry of Samurdhi Development, State Ministry of Tanks, Reservoirs, Irrigation and Rural Development, State Ministry of Livestock Promotion, Department of Animal Production and Health, National Water Supply and Drainage Board, Department of Irrigation, Sri Lanka Tourism Development Authority, Gem and Jewellery Development Authority, Ministry of Plantations, State Ministry for Company Estates, Estate Reforms and Factory Modernization, State Ministry of Development of Minor Export Crops and Other Minor Crops, Land Commissioners Department

Total subsidies of the selected five sub sectors was Rs 212 Billion (1.17 Billion USD) and made up 1.4% of the GDP for 2019. The total subsidies of the other studied sub sectors was Rs 302 Billion (1.7 Billion USD). The subsidies of the studied sub sectors only, accounted for 2% of the GDP of Sri Lanka of US\$ 84 Billion in 2019. (Source: Central Bank of Sri Lanka Report 2019)

Table 4.3:3: Examples of Type of Subsidies

Type of Subsidy (CBD)	Examples
Direct Transfer	Fossil fuels, roads, ship capacity, transport
Potential Direct Transfers	Nuclear energy and liability
Income / Price Support	Agricultural goods , water
Tax Credits	Land donations / Lease or use restrictions
Exemptions & Rebates	Fuels
Low Interest Loans & Guarantees	Fishing fleet expansion / modernization
Preferential treatment and use of regulatory support mechanisms	Demand quotas / Feed in tariffs
Implicit income transfers by not pricing goods or services at full provisioning cost	Water / Energy / Access to fisheries

Figure 4.3.1 Types of Subsidies

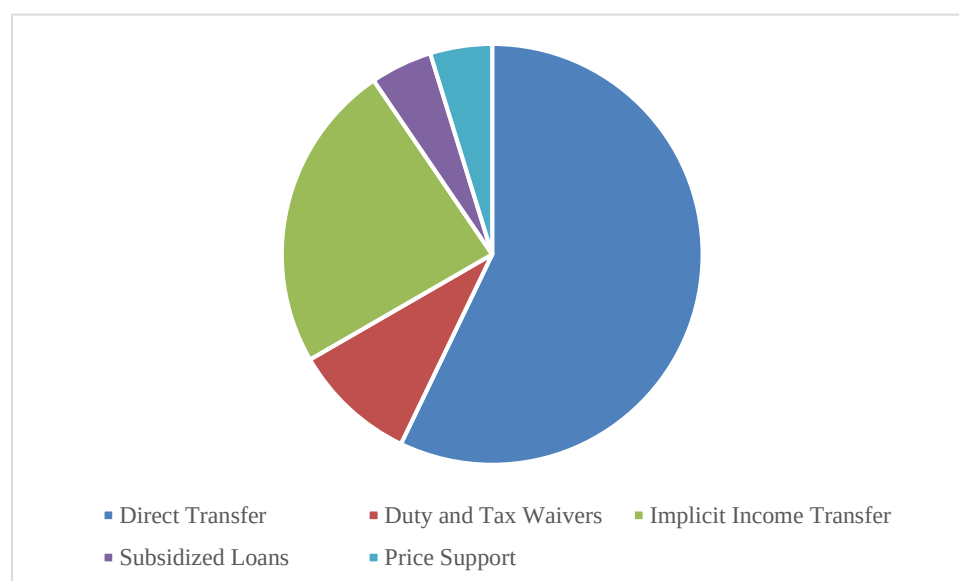


Table 4.3.4: Type of Subsidies

Direct Transfer	Agriculture, Inland Fisheries, Rural Industries, Samurdhi Development, Livestock, Irrigation, Tourism, Gem and Jewellery, Tea Rubber and Other Plantatons, Export and Minor Crop Development
Duty and Tax Waivers	Agriculture, Coastal Aquaculture
Implicit Income Transfer	Transport, Power and Energy, Land Development, Marine Fisheries
Subsidized Loans	Rural Industries,
Price Support	Livestock

*Source: Table 4.3.1

4.4. Detailed Assessment of Selected Subsidies

A total of 12 institutions/sectors were selected for further analysis based on initial data collected on subsidies from relevant government institutions and through interviews held with officials from these institutions and a review of the possible environmental harm caused by the subsidies. A detailed analysis of the data on subsidies based on the three criteria described above was conducted for the 12 selected institutions and five institutions providing subsidies most harmful to the environment were selected for detailed analysis. A brief summary of the analysis and selection process is presented below.

Direct Subsidies

4.4.1 Livestock Development

In this sector subsidies have been provided for Artificial Insemination for dairy animals and goats for a total value of Rs 100 million (0.55 million USD) per annum. Stud bulls are also purchased for animal breeding at a 50% higher price than the market price. Goat farming is encouraged through subsidies valued at Rs 40 million (0.22 million USD) per annum. There are also enterprise loan schemes at

subsidized interest rates for livestock farming. A subsidy of Rs 6500 per calf is provided for heifer calf development. Total subsidies in this sector are estimated at Rs 1800 million (10 million USD) per annum. (Sources: Ministry of Livestock Development and Department of Animal Production and Health)

These subsidies have provided a financial incentive for improvement of the livestock sector, particularly dairy and goat farming and have fulfilled the objectives in terms of social and economic impacts. Environmentally there is some impact mostly in dairy farming. The impacts are low in the cut and carry systems but high in extensive livestock farming where cattle are allowed to graze and may cause harm to biodiversity. The highest proportions of intensive dairy farming systems are found in the hillcountry districts such as Nuwara Eliya (65%), Kandy (38%), and Badulla (27%) and in the coastal districts of Colombo (30%) and Gampaha (25%). A total of 230,000 out of the total of 1.5 million animals or 15% of the cattle population are found in the above 5 districts. (Sources: Ministry of Livestock and Department of Livestock Statistics) A majority of the animals in the above districts are high bred animals and are usually stall fed (intensive management). The hill country districts are more suitable for high yielding breeds and the other two districts with high levels of intensive dairy farming are highly urban and have very little pasture land for extensive dairy farming. In the rest of the 20 districts a semi-intensive or extensive type of dairy farming system is mostly practiced and the highest levels of extensive dairy farming systems are practiced in the districts of the Eastern (68%), Northern (44%), Southern (38%), North Central (35%), North Western (33%) and Uva (32%) provinces. See Table 4.4.1

Table 4.4.1: Cattle Population by Type of Farming System

Province	Cattle Population		Dairy Farming System#			Forest Cover (%) of Total Land Area
	No of Animals	% of Animals	Extensive %	Semi Intensive %	Intensive %	
Northern	336,943	22.2	44	47	9	38
Eastern	276,779	18.2	68	25	7	29
North Western	246,066	16.2	33	61	6	10
North Central	198,918	13.1	35	53	12	31
Central	165,912	10.9	17	47	36	28
Uva	125,267	8.2	32	47	21	26
Southern	74,809	4.9	38	53	9	10
Western	64,269	4.2	11	61	28	5
Sabbaragamuwa	32,097	2.1	20	68	12	17
Total	1,521,060	100.0	39.3	47.4	13.3	29.9

Sources: Ministry of Livestock Development and Department of Animal Production and Health

- Extensive system – free range of animals in demarcated pasture and other lands; Semi-intensive – Mixed type with free range of animals as well as stall feeding; Intensive - Stall feeding or cut and carry system (cut grass, foliage and concentrates to feed animals reared in stalls).

Total area under forests is estimated at 1.9 million hectares or about 30% of the total area of the country. Approximately 167,000 hectares is considered as primary forests or the most biodiverse form of the forest and the rest are medium to low or scrub forests (Source; Ministry of Forestry and Wildlife). Although, livestock farming has a vast environmental footprint, contributing to land and water degradation, biodiversity loss, acid rain, coral reef degeneration and deforestation and methane emissions, the impact of livestock farming (mainly cattle and to a small extent goat farming) may be less due to the relatively low numbers of cattle and goat population. Further, 70% of the animals are

concentrated in the four provinces, Northern, Eastern, North Western and North Central Provinces, and a majority of the animals (30%-70%) in these provinces are reared under extensive farming or free ranging system in pasture lands or nearby forest lands. In these areas, most of the cattle feed on existing pasture lands, harvested paddy lands, roadside vegetation and also forage in adjoining scrub forest lands. The government does not permit the development of pasture lands through the cutting down of forest lands, only existing common pasture lands can be used for grazing of livestock. The cattle are usually allowed to graze in the common pasture lands and normally do not venture into thick forest lands or highly biodiverse areas.

The total area under pasture lands and open scrub land is estimated at 610,000 hectares (9.3% of total land area of Sri Lanka of 6.5 million hectares) and over 80% of this land is found in the flat dry zone areas of the country (*Source: Department of Census and Statistics*). A further 200, 000 hectares of unirrigable highland and scrubland suitable for pastures are available for development. Subsidies, therefore have little or no impact on the areas under pasture, as extensive livestock farming will continue with or without subsidies. There is no real increase in area brought under pasture land by cutting down of forests due to subsidies, most of the forests are cut down illegally by the population for housing or agriculture by landless population in these areas and this is a greater threat to biodiversity than cattle grazing. Some proportion of the dung is also used as manure by the crop farmers. Use of organic manure also has some detrimental impacts on the water and soils.

In the environmentally sensitive provinces such as Central, Uva and Sabbaragamuwa the cattle population is about 21% of the total and a high proportion (10%-36%) of the animals are reared under the intensive farming system (Cut and carry feeding system and no free ranging). One of the main drivers for adopting this system is the lack of pasture lands in the hill country upland areas as most of these areas are under tea or rubber plantations or forests. Free ranging is not possible due to the steep terrains which the cattle find difficult to traverse. Thus one may consider the environmental impacts of livestock farming as relatively less harmful in hill country areas (where the most biodiverse forests are found) compared to the flatter dry zone areas, where the bulk of the cattle population is found. When exotic blood is introduced into local cattle through breeding and AI, some local genes and characteristics of local breeds may be lost. Resistance to climate change and other characteristics may be also lost.

The subsidies do have a built-in review process through close monitoring of the impacts of the subsidies. Initial bottlenecks have now been overcome and the programme is running well with positive results. The subsidies have helped to improve the incomes of dairy and goat farmers, by enabling them to earn additional incomes through breeding of improved animals with higher productivity and to develop stud bulls for breed improvement. The social welfare issues of livestock farmers have been addressed through these subsidies and incomes of these farmers have increased. Subsidies should be continued for livestock farming for some time. In the future this sector will need only guidance, feeding systems upgrading and technical advice to improve the sector. If the subsidies, which are mostly for herd improvement through AI and stud bull rearing, are removed it is unlikely to reduce the impacts on biodiversity as most of the damage is done by poor or low yielding local breeds of cattle reared on an extensive basis in the dry zone areas and this type of livestock rearing will continue with or without the subsidies. The main drivers for extensive farming are the availability of large areas of pasture lands and scrub forests, the poor quality of animals with low milk yields, which are uneconomical to rear under the intensive system and the lack of good management practices essential for rearing upgraded animals and the slow process and difficulties encountered in upgrading of these animals.

Thus the subsidies have mostly met all of the three conditions or filters as per ToR for the selection and is therefore not selected for repurposing.

4.4.2 Marine Fisheries

A fuel subsidy (diesel, petrol and kerosene) was provided for all registered owners of fishing boats using a coupon system, in 2012 and 2013. In financial terms, the subsidy reduced the cost of fishing to a certain extent. All fishermen whether they were small boat owners or large boat owners received this subsidy. There was no social discrimination, with both poor as well as rich fishermen receiving the

subsidy. There were some issues including misuse of this subsidy and the subsidy was withdrawn after two years of operation. Thus one could say that the financial objective of the subsidy may have not been achieved. In terms of social objectives too, the poor fishermen was not given any preferential treatment over the rich fishermen. After the removal of the subsidies the fishermen purchased kerosene which was sold at a subsidized price (below world market price) to all users of kerosene. The previous subsidy given to fishermen subsidized all fuel prices including that of diesel, petrol and kerosene. Currently, fishermen are able to benefit only from the kerosene subsidy. Subsidies generally provides incentives for greater fishing efforts, consequently the environmental impacts can be severe. This is dealt with in more detail in a later section of the report.

This subsidy on kerosene (the local market price was always set below the world market price for socio economic reasons) has been in force for about 10 years without any review during this period and is applicable to all citizens. There is no data on public perceptions about the subsidy. In August 2022, the kerosene price was raised up to 80% of the world market price (or the cost of production of kerosene in Sri Lanka), whereas the price was only 20% of the world market price at that time. However, the fishermen have opposed the recent price rise in kerosene and want some kind of subsidy given to them according to public statements made by fisheries organizations. The subsidy is not addressing any social welfare or equitable distribution issues as the subsidy is applicable to all citizens. The review process for this subsidy was not effective until the recent ad-hoc increase made in August, 2022.

Thus the subsidies provided in this sector have mostly failed all of the three conditions or filters as per ToR for the selection and is therefore selected for repurposing

4.4.3 Tea, Rubber and Other Plantation Crop Development

There are several subsidies currently in force for Tea and Rubber crop development. In the rubber sector, this includes machinery and equipment for rubber tapping and latex protection, livelihood development for rubber smallholders, inter cropping, bee keeping, pineapple cultivation, poultry keeping, mushroom and medicinal plants cultivation and growing of export crops. Subsidies are also in place for equipment and materials for rubber nursery development, rubber sheet improvement, irrigation facilities for rubber cultivation in dry areas, home garden development, under and replanting of rubber, smokehouse development for small holders and rubber productivity improvement. Total value of subsidies in the rubber sector was Rs 1.1 billion (0.006 billion USD) in 2019 (*Source: Ministry of Plantations*).

In the case of tea crop development, subsidies have been provided for new method of planting, new planting and replanting, irrigation facilities for tea cultivation and livelihood development of tea small holders. Other subsidies provided include, tea nursery development, shade tree cultivation equipment, soil rehabilitation. The total value of subsidies in the tea sector was Rs.2.95 billion. In the coconut plantation sector, subsidies were provided for seedlings. Subsidies were also provided for both organic and inorganic fertilizers for tea, rubber, coconut and minor export crops. In the case of sugar cane, subsidies were given for planting and the environment can be affected if forest or other lands are cleared for planting. Intercropping in sugar cane can reduce environmental impacts.

According to the officials interviewed, rubber planting is environmentally beneficial, as it is a type of tree cover. However, new planting should be done on private lands and not in forest lands. Officially, permission is granted only for planting on own lands (Must show land deeds before getting subsidy). In both tea and rubber plantations, application of fertilizers, chemicals and fungicides for pest and disease control can harm the environment. Also if tea and rubber new planting is done in forest areas, it can cause losses in bio diversity. If proper soil conservation measures are not taken, it can cause erosion in tea lands. Inspection of lands to be planted or replanted with tea is undertaken prior to granting of the subsidy to ensure that proper soil conservation measures are taken prior to planting / replanting.

The objectives of subsidies can be considered to have been achieved to some extent. High market prices promote replanting or new planting and thus subsidies alone may not be the motivating factor. Further, the low country teas, rubber and coconuts are grown on flat or gently sloping lands and the soil erosion is less compared to high country tea. Thus the removal of the subsidies have been in place for a long time (more than 40 years) and have contributed to the annual increase in re-planting as well as a moderate increase in new plantings mostly in own lands. The replanting subsidy is provided to smallholders, to replace aged plants with new high yielding varieties with shorter maturity periods. Productivity has also increased, particularly in small holder tea, rubber and coconut cultivations, to which sub-sectors the subsidies have been targeted. Furthermore, even those not eligible for the subsidy do replanting or new planting with their own funds. The main driver is the world market prices for these products. The subsidies therefore may not have much impact on biodiversity. However, delays in implementation of subsidies have been observed in the case of some subsidies. Subsidies in both tea, rubber, coconut and minor export crops sectors are subject to annual reviews and can be modified as required. Most subsidies are addressing the social welfare and wealth distribution issues, as these subsidies are available only for small holders and not for big private companies. Thus the subsidies provided in this sector have mostly met all of the three conditions for non-selection or filters as per ToR and is therefore not selected for repurposing.

4.4.4 Irrigation Development

Subsidies are provided for tree planting on tank reserve areas, provision of fingerlings for inland fish production, seed production for vegetables and rice, crop diversification and production villages and demonstration for commercial farming near tanks. Total cost of above subsidies was Rs. 900 million. Fish breeding in seasonal tanks is not harmful to environment as the tank dries up and the fish is harvested prior to that. Some subsidies are also provided in this sector for safeguarding the environment such as Teak planting on adjacent areas of tank which improves water sources as well as the environment. Bare or scrubland is used for commercial cultivation, environmental impacts may be marginal.

Technical Assistance is provided for effective water management and distribution of water, as well as maintenance of capital assets of irrigation systems. Capital allocation for irrigation development and infrastructure for irrigation is provided annually for identified irrigation projects by the government. In 2021, the government spent Rs 8.5 billion (0.047 billion USD) on capital expenditure and Rs 2.3 billion (0.0127 billion USD) for operation and maintenance of irrigation systems. (*Source: Irrigation Department*)

The benefits of development of reservoirs for irrigation include, water security for irrigation, provision of water for domestic purposes, flood protection and drainage facilities to lands affected by floods, increased agricultural production and food security and improvement in the quality of life of the rural population. Other benefits include income generation, recreational facilities, improvement in the ecological systems and ground water table and provision of water to wild life. The negative impacts of irrigation development include displacement of population in reservoir area, deforestation, wastage of irrigation water as it is given free of charge and negative impact on the downstream areas such as reduction in water flows in rivers and reduction in water available for environmental purposes. The expenditures made by the government are for investing in the development of water resources for irrigation and for maintaining and operating the assets developed. Since the irrigation water is provided free of charge, this can be considered as a subsidy to the farmers as maintenance charges are not levied from the farmers. If this subsidy is removed and the farmers are charged for the water, then it is likely that farmers will conserve the water and reduce any wastage. However, the socio economic repercussions of charging for water will be very high and the government may not be able to handle the political fallout of such a measure at the current juncture. The subsidy is addressing economic and social welfare issues of the farmers and the subsidy has fulfilled the objectives of increased production and incomes of farmers. Although there is a review process for the subsidy, the public perception for the need for this subsidy as expressed by farmers whenever the issue of payment for irrigation water comes

up, suggests that this subsidy should not be removed. Thus this sub-sector has not been included for repurposing.

4.4.5 Agriculture Development

Fertilizer subsidy (inorganic fertilizers) for paddy and other crops is a major subsidy for this sector. When the cost of fertilizer was Rs 4000 (22.22 USD), the subsidized price was Rs 350 (1.9 USD) per 50 kg. bag (*Source: Fertilizer Secretariat of Sri Lanka*). When giving subsidies, which is based on area cultivated, the actual land area cannot be verified as the deed may show more area while actual cultivated area may be less (data on this not accurate). Thus the actual amount of subsidy given may be more. Soil testing is now being done before providing fertilizer, the requirements of fertilizer differs for different crops, and different soil types and soil moisture content. With regard to organic fertilizer, currently available fertilizer is not of good quality. Liquid organic fertilizer is not recommended for paddy as these fertilizers are absorbed through the leaves and since leaf size is small in paddy, the absorption is less, resulting in wastage of fertilizers. The total cost of fertilizer subsidy was estimated at Rs 37 billion (0.205 billion USD) in 2019 (*Source: Fertilizer Secretariat of Sri Lanka*).

Other subsidies are also given for promoting the following crops: maize, green gram, chillies, potato, onions red, onions large, soya beans, groundnut, kurakkan, cow pea, tala, paddy and vegetables. Subsidies are also provided for seed and planting materials production, crop production and diversification, production villages, demonstration farms for commercial farming, crop insurance and other purposes. The total value of the above subsidies was Rs 14 billion 0.078 billion USD) in 2019. (*Source: Ministry of Agriculture*)

Some of the subsidies had been misused for example, subsidy on fertilizers may have led to overuse of fertilizer which can be detrimental to production. While there may be no additional output due to overuse of fertilizer, the cost of production may go up. Environmental impacts also increase with the overuse of fertilizer as the main cause of environmental harm is the use of fertilizer for agricultural production. Fertilizer subsidy has been in place for a very long period and although there is no built-in mechanism for review of the subsidy, reviews have been made from time to time, particularly at times of changes in government in order to fulfill election promises. The farming communities do not want any changes or reviews to subsidies but want the subsidies to be continued. Since the subsidies are available for all farmers and all crops, there are no social welfare or equitable distribution issues in the provision of subsidies. Any farmer, whether rich or poor is able to have access to these subsidies. Thus the subsidies provided in the agriculture sector have mostly failed all of the three conditions or filters as per ToR for the selection and is therefore selected for repurposing.

4.4.6 Land Development

The Land Commissioner's Department is responsible for the management of state lands. According to the Land Commissioner, government land can be given for productive activity, mostly for agricultural purposes. Large areas of land can be leased out for periods from 30-50 years for commercial and agricultural development. However, lands are mostly given for agriculture and also for commercial and industry activities on a small scale. Area leased is limited to 2 acres and mostly poor quality lands are leased out. Environmentally sensitive areas such as forests, scrub forests, pasture lands are subject to much stricter criteria before they are leased out. The District Development Committee must give approval for land lease. The Committee includes representatives from the Department of Wild Life and Forestry Department and the National Building Research Organization (NBRO). Issues such as impact on wild life, forestry, marshes, etc. also looked at prior to leasing. The lease value is determined according to the purpose for which the land is used. Rental for agriculture and other social uses is generally low, while rental for large commercial ventures is high. There is a subsidy element when lands are leased at low rental rates. Since most lands that are leased out are marginal lands, the environmental impacts are low.

The subsidies in the land sector addresses the social issues such as landlessness among the poor and provides a means of improving their economic status. As observed there is a strict built-in review process before lands are released and all aspects such as impacts on biodiversity, wild life, and socio economic status of lessees are evaluated prior to leasing. Social welfare and equitable distribution are also addressed prior to leasing. Thus the subsidies have mostly met all of the three conditions or filters as per ToR for the selection and is therefore not selected for repurposing.

4.4.7 Export Agriculture and Minor Crop Development

Subsidies are provided for mango, pepper, cinnamon, sugar cane, maize and other minor crops as well to develop home gardens. For most crops, especially tree crops and perennial plants there is not much environmental damage. In the case of sugar cane, there are environmental issues, such as water table decline, bio diversity loss due to land clearing, etc. The total value of subsidies is estimated at Rs 7.2 billion (0.04 billion USD) per annum (*Source: Department of Export Development and Minor Crop Development*).

The subsidies have fulfilled the intended objectives of promoting minor export crops as well to meet local requirements. Biodiversity losses incur only when land is cleared for new plantings, particularly in sugar cane cultivation where forests may be cleared for such cultivation. However sugar cane is a high income generating crop and growing this crop improves the economic status of the farmer. Environmental harm is minimal and limited to cultivations near forest areas in the case of sugar cane. In the case of most of the other minor crops the environmental damage is also minimal.

The subsidies are reviewed annually in order to improve the effectiveness of the subsidy and changes made if necessary. New subsidies are also introduced when there is a need to promote other crops. Social welfare issues are also being addressed through these subsidies. Subsidies provide an additional source of income to farmers and assist in equitable distribution of incomes among farmers. Thus the subsidies in this sector have not failed any of the three conditions or filters as per ToR for the selection and is therefore this sector is not selected for repurposing.

4.4.8 Coastal Aquatic Resources Development

There are several subsidies for coastal aquaculture, including for shrimp farming, pond culture, cage culture, small and large scale fish feed production, sea weed and Sea Bass culture, dry fish production and for boats. Subsidies are provided for cage materials, infrastructure development, backup generators, electricity connections, and tax relief provided for import of shrimp feed, aerators for shrimp farms, high density polythene and equipment. Total value of subsidies is estimated at Rs 250 million (1.38 million USD) per annum (*Source: NAQDA*). Major impacts on environment include pollution of water bodies, ghost fishing, use of illegal fishing methods, Other impacts include algae formation through nutrition and feed waste flowing into water bodies and increases in potassium levels which is harmful to inland water life.

The original social and financial objectives appear to have been fulfilled to some extent. However, the environmental impacts are quite high and has increased pollution. The beneficiaries of aquaculture fisheries are not the small fishermen but rather the well to do entrepreneurs who invest large sums in this activity. The workers who are employed by these large entrepreneurs are the indirect beneficiaries. Although there are small scale operators in this sector, the majority beneficiaries are the large scale businesses, who export the output. Thus in terms of social and financial terms the small scale fishermen are not benefited much. They earn low incomes in small scale aquaculture or earn wages as workers in larger operations.

Although there is a review process for these subsidies, but such reviews do not take place on a regular basis. The subsidies have been instituted largely to promote aquaculture through investment relief rather than to improve the incomes of the poor fishermen. However the livelihoods of some fishermen will be improved by obtaining employment in aquaculture enterprises. The fishermen who fish in lagoons using

small boats may benefit from subsidies provided for boats, but may not benefit from other subsidies. The subsidies are not addressing any social welfare or equitable distribution issues but rather promoting aquaculture for increased production and exports. Thus the subsidies provided in this sector have mostly failed all of the three conditions or filters as per ToR for the selection and is therefore selected for repurposing.

Indirect Subsidies

4.4.9 Rural Industrial Promotion

A 100% subsidy is provided for common machinery used by beneficiaries for their small industries up to Rs 1 million (0.005 million USD) per machine (Total Rs 100 million (0.55 million USD)) for common use by beneficiaries. A further subsidy of 75% of the cost of establishing a new industry or expanding an existing one (A maximum of Rs 100,000 (555 USD) per industry) is also provided to current and future owners of village industries. Concessionary loans to small industries are provided to 5000 beneficiaries at a subsidized interest rate of 4%-6% interest rate, while the market rate is 12%-15%. A subsidy of about Rs. 800 million (4.44 million USD) is provided to develop one entrepreneur per Grama Niladhari Division for a total of 14,016 entrepreneurs. Loans at subsidised interest rates are also provided through a local revolving fund scheme for cultivating raw materials (A total of 435 acres, of Jute, Rattan, Reed and other raw materials cultivated in all 9 provinces in the country, to create a raw material bank). Rs 100 million (0.55 million USD) is allocated for a program in 263 cultivation villages that are coming under this programme. In 2019, allocation for all subsidies was Rs. 1050 million (5.83 million USD). (Source: State Ministry of Rural Traditional Industries, Rattan, Bamboo, Brass and Pottery Development)

Subsidies has helped to improve incomes of beneficiaries and fulfilled the objective of providing a stable source of income for the rural population. As far as possible, the raw materials are obtained in an environmentally friendly manner. There is a program to grow raw materials such as rattan, reed, rush, grass etc. in home gardens or private lands, due to the difficulties faced in importing raw materials as some countries exporting such raw materials have banned exports to fulfil their own local demand. Overall, the subsidies have helped to reduce the poverty levels of the rural population. The damage to the environment due to the promotion of these industries is considered to be minimal as the growing of the crops is promoted in own lands and any industrial wastes are disposed of safely as per the requirements for obtaining the subsidy. Clearing of forest lands for cultivation of above crops is not allowed.

The subsidies being provided are monitored closely by the institutions concerned and modifications needed if any to improve the administration of the subsidy are effected as a part of the monitoring process. The feedback from the beneficiaries suggests that the majority of the subsidized enterprises are operating successfully and that there is a considerable number of applicants for inclusion in the subsidy programme. The subsidies had helped mostly the households / entrepreneurs who are in the borderline or just above the poverty line so that both welfare and equitable distribution of wealth have improved as a result of the subsidies. Thus the subsidies have mostly met all of the three conditions or filters as per ToR for the selection and is therefore not selected for repurposing.

4.4.10 Power and Sustainable Energy

In this sector subsidies are provided for low power consuming households (less than 120 kWh per month) in the domestic sector and for power producers by purchasing at a price higher than the cost of production of the CEB. Government subsidy is also provided for energy efficient equipment and energy efficient bulbs distributed to poor households, which are beneficial to the environment. About 30%-50% capital subsidies are provided for biomass burners, including water boilers and spice dryers. There is a subsidy for roof top solar units but not for large scale solar plants.

The subsidies provided for roof top solar units, energy efficient equipment and energy efficient bulbs do not have much impact on the environment. These subsidies have fulfilled their social and financial objectives of the subsidies as they have benefitted mostly the low and middle income groups, without much impacts on the environment. Subsidies for energy efficient equipment have benefited all citizens through the reduction in the prices of energy efficient equipment

In the case of domestic electricity consumers, 90% of the households are subsidized (all households consuming below 120 kWh / month), Of this proportion 23% (consuming 0-30 kWh/month) receive an average subsidy of Rs 500 (2.77 USD) per month/ household, 33% (consuming 31-60 kWh/month) receive an average subsidy of Rs 1300 (7.22 USD) per month/household, 25% (consuming 61- 90 kWh/month) receive an average subsidy of Rs 1200 (6.67 USD) per month/ household /HH and 10% (consuming 91-120 units/month) receive an average subsidy of Rs 750 (4.167 USD) per month/household. (Sources: Sri Lanka Sustainable Energy Authority and CEB)

Table 4.4:2: Monthly Electricity Bill With and Without Subsidies

Units Consumed (kWh)	Monthly Bill		Ave. Monthly HH Exp. 350 USD (2019 Census Survey Data)		Ave. Monthly Exp. 233.33 USD (2/3rds. of 2019 Census Value)	
	With Subsidy	Without Subsidy	% of Exp. With Subsidy	% of Exp. Without Subsidy	% of Exp. With Subsidy	% of Exp. Without Subsidy
No	Rs (USD/month)	Rs (USD/Month)	%			
30	Rs 104 (0.58)	Rs 585 (3.25)	0.2	0.9	0.3	1.4
60	Rs 280 (1.56)	Rs 1544 (8.58)	0.4	2.5	0.7	3.6
90	Rs 610 (3.39)	Rs 1787 (9.93)	1.0	2.8	1.5	4.2
120	Rs 1312 (7.29)	Rs 2059 (11.44)	2.1	3.3	3.1	4.8

Sources: Household Income and Expenditure Survey 2019, Department of Census and Statistics, Sri Lanka and “ Sri Lanka Energy Assessment, Strategy, Road Map” , World Bank, 2019.

Table 4.4.2 shows that the % of household expenditure on electricity (in 2019), ranged from 0.2% to 2.1% with subsidy and 0.9% - 3.3% without the subsidy, of average household income in 2019 (Census and Statistics Department, HIES 2019) of Rs 63,000 (350 USD) per month. If we assume that average household income is two thirds of the average income estimated by the Census Department, or Rs 42,000 (233.33 USD) per month then the % of expenditure on electricity would range from 0.3% to 3.1% with subsidy and 1.4% to 4.8% without subsidy. Thus the maximum proportion spent on electricity without subsidy would be 3.3% (HH Exp of Rs 63,000 (350 USD)/Month) and 4.8% (HH Exp. of Rs. 48,000 (266.67 USD) per month). This shows that the maximum proportion of household expenditure on electricity would be about 5%. without subsidies and 3% with subsidies. Thus the additional expenditure for electricity by the household would be 2% of total household expenditure, suggesting that most households will not be burdened much by the removal of subsidies. Thus one of the socio economic objectives of the subsidy of reducing the financial hardships of the household may have not been fulfilled, except perhaps for the lowest power consuming groups (below 60 kWh/month), On the other hand the environmental harm of the subsidy is high. There is a built-in review process for subsidies through the Public Utilities Commission of Sri Lanka (PUCSL), the overseeing authority for economic infrastructure such as water, electricity, and other utilities. The PUCSL reviews the subsidies from time to time and provides recommendations to the authority or the Ministry responsible for the subjects of power and energy on policies in the sector. However, changes or modifications to such subsidies are also made on an ad hoc basis, say when there is a change in government or a new minister

takes over the subject. Minor changes in the electricity tariff have been made two or three times over the last 20 year period.

According to a study conducted by Public Utilities Commission of Sri Lanka (PUCSL) “ *Survey on Affordability of Electricity and Safety of Household Electrical Appliances* ” in 2020, the proportion spent on electricity was low for the lower consuming groups and high for higher consuming groups. The proportion of expenditure spent on electricity increased from 1.6% for the lowest consuming group to 8.7% for the highest consuming group. In comparison, expenditure on communication ranged from 3.8%-4.9%, water from 0.8% to 1.5%, transport from 5.2% to 6.9% and gas from 2.1% to 2.4% with the higher consuming groups spending a higher proportion. Almost 80% of the HH indicated that they could afford to pay the electricity bill. The highest affordability was reported by the lowest consuming group (90%) and it declined gradually with increased consumption of electricity to (53%) which was reported by the highest consuming group. Thus it appears that most households felt that current electricity bills were affordable. The removal of subsidies will not have a major impact on their livelihoods or income.

The subsidies in domestic electricity rates cannot be considered as addressing any social welfare or equity issues as they are not large enough to have much impact on their incomes. The proportionate increase in charges will be around 2% if subsidies are removed. On the basis of the above discussion, any intended social or economic objectives have not been met, while the review process has only been partially fulfilled with only a few ad-hoc changes being made in tariffs over a long period and furthermore the subsidies have not addressed any social or equity issues. The subsidies provided to domestic electricity consumers in this sector have mostly failed all of the three conditions or filters as per ToR for the selection and is therefore selected for repurposing.

4.4.11 Samurdhi Development

Apart from monthly livelihood grants paid to low income households, the Samurdhi programme provides subsidized loans for livelihood development. The programme also provides grants for agriculture and industry using local raw materials, local skills, and grants for common infrastructure, all of which are considered a success. Payments are also being made for disabilities and CKD patients. Total subsidy for all the above programmes is estimated at Rs 72 billion (0.40 billion USD) per annum. (Source: Ministry of Samurdhi, Home economy, Self Employment and Business Development). Low interest loans are also given for COVID affected enterprises. The environmental impacts are minimal with the subsidies assisting agricultural development or setting up of industries using local raw materials produced in their own villages. These are small village level development programmes mostly on bare or scrub land, with little or no environmental impact. Waste from small industries is disposed of in an environmentally friendly manner.

Most of the subsidies have fulfilled their socio economic and other objectives, while having minimal environmental impacts. These subsidies also have a built-in review process through effective monitoring systems and are able to take effective remedial actions. The subsidies are mainly addressing socio economic and welfare issues among low income households. Impact on biodiversity is low, but depends on the type of activity.

Thus the subsidies in this sector have not failed any of the three conditions or filters as per ToR for the selection and is therefore not selected for repurposing

4.4.12 Transport

Loans from multilateral agencies are obtained for highway/expressway construction, while Treasury funds are used for the construction and maintenance of other roads. Public parking in most places are free of charge which encourages the greater use of vehicles. Road construction expenditure was more than Rs. 150 billion (0.83 USD) in 2019, but recovery of costs has remained below 10% of expenditure. Normally a EIA is done before construction and recommended mitigation measures taken during

construction and maintenance. Subsidies in this sector include Rs 12 billion (0.07 billion USD) for the public transport agency (CTB), Rs 24 billion for school, higher education students and the armed forces, Rs 6 billion for serving under-served routes and Rs 13 billion (0.13 billion USD) for the Railways, for a total of Rs 55 billion (0.31 billion USD) per annum (*Sources: Ministry of Transport and State Ministry of Highways*).

The construction of roads causes dust emission, noise pollution, air and water pollution, ground water level decline, dirt accumulation, flooding etc. Pollutants in the transport sector include sulphur dioxide, oxides of nitrogen, carbon monoxide or particulates, and CO₂ and can affect human health. The effects of pollution are widespread, affecting air, soil and water quality. Nitrous oxide contributes to the depletion of the ozone layer, which shields the Earth from harmful ultraviolet radiation from the sun. Sulfur dioxide and nitrogen dioxide mix with rainwater to create acid rain, which damages crops, forests and other vegetation and buildings. **Oil and fuel spills, nitrogenous wastes and particulates from vehicle emissions from cars and trucks seep into the soil near highways and discarded fuel, contaminate lakes, rivers and wetlands and lead to acidification and eutrophication of water and soils, and cause damage to nature and buildings as well as cultural assets.**

The subsidies for the state run transport service is just to cover up expenditures of an inefficient state enterprise. Private sector transport services operate at a profit with the same ticket prices. The pollution from transport is high. The objectives of running an efficient and profitable state transport service has not been met. Thus socially, financially and in terms of environmental impacts, the objectives of the transport service have not been met. Apart from subsidies for operating in under-served areas and for school children, which have some social benefits, the other subsidies do not have any social or economic justification for continuation. The subsidies also do not have a regular review process and consequently very few changes have been made to the subsidies in the recent past. These subsidies are also not addressing any social welfare or equity issues and therefore need not be continued. Thus the subsidies have failed all of the three conditions or filters as per ToR for the selection and is therefore selected for repurposing.

4.5. Final Selection of Subsidies

Based on the above a minimum of five subsidies were selected for repurposing. The five selected subsidies were in the following sub sectors, marine fisheries, power and energy, agriculture, aquaculture and transport. The selected subsidies were further analyzed for designing potential approaches for repurposing including navigating the political economy. These approaches identified whether there are any alternative technologies/options that need to be developed/ supported instead of existing subsidies and any reforms to subsidies. Finally, an economic analysis was conducted to identify the potential impact of the alternative options proposed in lieu of existing subsidies. Special attention was placed on social justice and equitable sharing of the wealth while reducing the harmful impact on the biodiversity.

An initial literature study was undertaken to identify government institutions that were providing subsidies. The status regarding the subsidies was further probed through calls to relevant officials in the identified institutions. Based on the details obtained through this process, about 20 government institutions providing subsidies were identified. At the next stage, the consultants interviewed officials who were assigned by the heads of the institutions to coordinate with the consultants in this work. After completing exhaustive interviews with the assigned officers along with other persons with knowledge on the topic in the institutions, a fairly comprehensive data base on subsidies as well as impacts of subsidies on biodiversity was gathered.

Next an analysis of the data gathered was undertaken along with an assessment of the impacts of the subsidies on the biodiversity/environment. Based on this assessment, subsidies in about 12 sectors were identified for further analysis. The subsidies identified were subject to the three stage assessment

described above, which involved detailed analysis of data gathered through interviews, literature studies, cost benefit analysis and brainstorming of the results obtained from the data gathering exercise. Based on the results of this process five subsidies most harmful to the biodiversity of Sri Lanka were identified.

A stakeholder workshop was held with participants from institutions administering these five subsidies to validate the findings of the consultants and to suggest ways and means of repurposing the subsidies. The outcome of the workshop was very useful with pertinent observations and suggestions provided by the participants. These suggestions were reviewed by the consultants and incorporated in the report where appropriate. Further in-depth analysis was conducted including an economic cost benefit analysis as well as a PESTEL and DPSIR analysis and final recommendations provided on repurposing of these subsidies including a review of the possible economic and social and other impacts of repurposing.

5. Results of the Study

5.1. Marine Fisheries

5.1.1 Introduction

Sri Lanka, having an extensive coastline has considerable potential for coastal and deep sea fisheries. The large number of river and streams that flow into the sea provide nutrition to the fish population of the coast and promotes the breeding of fish in the coastal water. Marine fisheries are of considerable social and economic importance around the entire 1770 km of Sri Lanka's coastline. The marine area from shore to the edge of the continental shelf is referred to as the coastal sub-sector. The area beyond the continental shelf and out to 200 km boundary is considered the offshore and deep-sea subsector. The fishing industry in Sri Lanka is taking place in both sub-sectors. Marine fish production contributes nearly 90% of the total fish catch, of which the coastal fish catch is 60% while the rest is from deep-sea fish catching. Varying climatic conditions throughout the island promotes fishing all year round with fishermen moving from one coast to another when fishing is not possible due to weather conditions in one area.



This sector plays an important role in the social and economic livelihoods of over 250,000 fishermen who are involved in coastal and deep sea fishing. In addition, this sector also provides employment for

a further 100,000 persons in providing services to this sector (*Source: Fisheries Statistics 2019, Ministry of Fisheries*) . The Department of Fisheries focuses mainly on promoting environmental fishing methods, by providing technical support for the fishermen to upgrade their boats and gear enabling them to transfer to more sustainable methods of harvesting. Sustainable management of fisheries may require reducing total catch, affecting the livelihoods of fisher and processor. A comprehensive multifaceted plan of action is needed to upgrade this sector.

5.1.2 Subsidies in the Sector

In this sector there are no subsidies for production activities. However, a fuel subsidy was provided to fishing boat owners in 2012 and 2013. It is estimated that there were about 32,000 motorized boats operating in this sector in 2019. The total number of active fishermen in the marine sector was estimated at 225,000 in 2019. Every year about 1000 new boats are registered by the Department. (*Source: Fisheries Statistics, Ministry of Fisheries 2019*). Each boat owner was entitled to a subsidy on an annual basis. A coupon system was used for providing subsidized fuel. Coupons are issued to the value of the subsidy for each boat owner on an annual basis. The coupon could be redeemed at the fuel shed. The boats needed to be registered one time (free of charge) and the fishermen were also required to obtain an operating license for Rs 5000/ (27.78 USD) annum with the Dept. of Fisheries, in order to undertake fisheries activities and be eligible for the subsidy. This subsidy was done away with in 2013 after operating for about two years as it did not fulfill the objectives of the subsidy. However, a subsidy was in operation in the case of kerosene fuel used by fishing boat owners since that period. This subsidy was not specific to fisheries boat owners but applicable to all citizens. Kerosene was subsidized by the government in order to provide relief to poor households including fishermen. In 2019, there was a subsidy of Rs 8 per litre of kerosene as the local price was Rs 87/ Litre while the price in the US market was Rs 95 (US \$ 0.21 per litre in 2019) (*Source: US Energy Information Administration*). *World market prices were difficult to estimate as only countrywise data was available and that included any subsidies provided in the country.* It was estimated that there were about 35,000 fishing boats operating in 2019 (*Source: Fisheries Statistics, Ministry of Fisheries 2021*). The majority (nearly 80%) of the boats or 27,500 boats use kerosene fuel and if we assume that about 80% of the boats (22,000 boats) operating on kerosene fuel on any day, used around 35 litres per day per boat over a fishing period of about 300 days per year, then the total fuel used will be 216.3 million litres per annum. The average subsidy per litre was estimated at Rs 8 per litre and the total cost of the subsidy would be Rs 1.85 Billion in 2019. With the recent increases in kerosene fuel prices, the fishermen are requesting for a subsidy.



The Sri Lanka government has also spent about Rs. 2.5 billion (0.01 billion USD) for the rehabilitation and improvement of fishery harbour and anchorages to improve infrastructure facilities in the marine fisheries sector.

5.1.3 Environmental Impacts

Fisheries activities have been identified to cause several negative environmental impacts. These include pollution of marine water from leakage of fuel and other chemical wastes, destruction of corals through illegal fisheries activities such as blast fishing, use of illegal fisheries equipment and methods that cause the destruction of habitats and loss of corals, increased coastal erosion, the reduced sustainability of fisheries and consequent reduction in yields. There is considerable biodiversity loss and destruction of the marine environment due to dynamiting of fish, which though illegal is practiced by many fishermen. The majority of the fishermen operate in the coastal area. Thus overfishing in the coastal fishery areas is another cause of biodiversity loss. Overfishing in coastal water, i.e. fishing above the Maximum Sustainable Yield (MSY) levels could result in the gradual reduction of fish output in the future with disastrous consequences to the fishing industry.

Use of illegal fishing gear and methods of fishing also causes biodiversity loss. There are over 17 methods of fishing and some of these are not legal and are prohibited in Sri Lanka, including bottom trawling. Use of surrounding nets and gillnetting also causes impacts on biodiversity. The scraping of the ocean floor in bottom dragging or trawling is devastating to coral, sponges and other slower-growing Benthic species, which provide a habitat for commercial fisheries species, and these organisms do not recover quickly after such trawling activities. Ghost nets or nets abandoned in the ocean are made of plastic and nylon and do not decompose, wreaking extreme havoc on the wildlife and ecosystems that they interrupt. Fishing and pollution from fishing are the largest contributors to the decline in ocean health and water quality. According to a study conducted in 2019 on “*Fuel Subsidy in Sri Lanka Fisheries; Data Analysis and Possible Improvements*” the number of active fishing boats increased by 100 in Jaffna district during the period when subsidies were in place in 2012 and 2013. A year later when subsidies were removed the numbers of active fishing vessels dropped by 300 in 2014 and by 1000 in 2015, in the Jaffna District. This seems to suggest that the fishing effort increased due to the direct consequence of the fuel subsidy. The results of the study indicated that fuel cost contributed differently to small scale and large scale fishing activity. Fuel cost accounted for more than 90% of the operational cost in the coastal fisheries and about 65% of the operational cost in large scale fisheries.

Profitability in fisheries was reduced due to the removal of subsidies. There was a negative impact on profitability of all motorized fishermen when the prices of fuel increased. The catch per unit effort declined in small-scale fisheries while profitability declined in large scale fisheries, when fuel subsidies were removed. Thus subsidies appear to promote higher fishing efforts and consequently greater harm to the environment and biodiversity. However, subsidy is not the only factor contributing to the environmental impacts of fisheries, other drivers may include such facts as i) it is the sole livelihood of the fishermen and they have no alternate livelihood options, ii) use of illegal methods of fishing is a driver for seeking higher short term profits, and iii) too much exploitation of coastal waters due to a large number of small boats and a lack of adequate number of deep sea vessels to undertake deep sea fishing.

5.1.4 Social Distribution and Gender Impact

Women and men play different roles in the fishing sector, although geographical and ethnic variations exist. Fish harvesting is predominantly done by men and only about 10% of the women are involved in fishing mostly in catching fish, prawns, crabs, clams, and mussels in the near coastal regions. The production of dried fish is mainly done by women (90% involvement of women). Women also often fill important roles in household financial decisions and attend fisheries meetings while men are away. Women must therefore be included in fisheries management planning activities.

Boat fishing that is dominated by men is usually considered as “fishing”, while women’s gleaning and post-harvest activities are not considered as “real” fishing or fisheries activity. It is necessary to highlight women’s activities as mainstream fisheries activity so that fisheries policies will more seriously consider addressing concerns faced by women in fisheries. The perception that men are fishers and women are helpers undervalues women’s contribution. Perceptions should be changed so that both women and men are considered main players in fisheries. There are women specific barriers in fisheries such as restrictions on mobility, access to skills, technology and information that need to be addressed. Time constraints of women because of their household work and other activities create disadvantages for them to be involved in fisheries. Women’s decision-making power is often weak inside the household as well as in the community, as can be seen in the absence of women in fisher organizations. The beneficiaries of subsidies are mostly men. Such lower status of women in the household and community can also lead to gender-based violence.

Based on various cultural norms women are excluded from certain fishing-related activities such as women holding decision-making positions in the fishing societies, women not being allowed to come to the beach with the belief of experiencing rough sea as a result of women’s presence on the beach and different intersectionality issues which have structurally marginalized women in the marine fishing industry. In general, fishing is an industry primarily associated with men while women are supposed to play ancillary roles. Though fishery officials and the leaders of community-based organizations deny the role played by women in the fishing industry there are many women living by the coast who engage in lagoon-based fishing, preparation of dry fish, repairing fishing nets, and selling fish in local markets to support their family income.

The post Tsunami strategy for construction and development of the fisheries sector has offered an opportunity for restoring the fishing industry with an approach to address the issues faced by fishing communities specifying disaster preparedness through proposing sustainable management practices. Improving the living conditions of the fishing community, employment generation, private sector development, and poverty alleviation had been the main concerns in the development of the fisheries sector. These development programs provide the opportunity of promoting conflict sensitivity, community empowerment, and transparency in marine fisher communities. The livelihood development plans should be inclusive and gender-sensitive to address the challenges and the diverse concerns of men, women, and the vulnerable groups in the sector.

5.1.5 Administrative and Institutional Issues

The institutions responsible and participate in provision of subsidies in the Marine Fisheries sector are as follows:

Ministry of Fisheries

Ministry of Fisheries is the policy making umbrella organization of the fisheries sector in Sri Lanka. Directly under there are only two institutions; the Department of Fisheries and Aquatic Resources (DFAR) as its main regulatory body and the Northsea Ltd. which is a 100% Treasury owned Fishnet Manufacturing Company, established in June 2001 under Companies Act No. 17 of 1982 and re-registered under new Companies Act No. 07 of 2007.

All other institutions applicable to fisheries sector; National Aquatic Resources Research and Development Agency (NARA), National Aquaculture Development Authority (NAQDA), Ceylon Fisheries Corporation (CFC), Ceylon Fishery Harbors Corporation (CFHC) and Cey-nor Foundation Ltd have been declared by gazette under the State Ministry of Ornamental Fish, Inland Fish and Prawn Farming, Fishery Harbor Development, Multiday Fishing Activities and Fish Exports. However, presently under the circumstance that State Ministries are defunct in Sri Lanka, those institutions are also administered by the Ministry of Fisheries.

However, only the Department of Fisheries and Aquatic Resources (DFAR) and Ceylon Fishery Harbors Corporation (CFHC) are the two organizations responsible for implementation of the subsidies in the fisheries sector.

Department of Fisheries and Aquatic Resources (DFAR)

Presently the Department of Fisheries and Aquatic Resources (DFAR) is responsible for enforcing the Fisheries and Aquatic Resources Act 1996, No. 2 of 1996 which had been revised from time to time by Act, No. 22 of 2006, No. 35 of 2013, Act, No. 2 of 2015, No. 2 of 2016 and Act, No. 11 of 2017. Previous Ordinances and Acts such as Whaling Ordinance 1936, Ordinance No. 2, Chank Fishery Act of 1955 and Pearl Fisheries Ordinance of 1960 have been repealed for enforcement of the Fisheries and Aquatic Resources Act. The major responsibility of the DFAR is to function as the main regulatory body associated with Management, Development and Conservation of the Fisheries and Aquatic Resources of Sri Lanka.

DFAR is mainly focused on directing fisher folks towards a responsible fisheries industry in compliance with international conventions, laws and rules. Therefore, the department implements some socio-economic development programs for fisher folks to facilitate them to exploit high quality fish harvest by means of upgrading their living standard while protecting and regulating limited fisheries and aquatic resources of the country for future generation through proper management of fishing fleet and fishing gear. For the fisher folks to qualify for such benefits including fuel subsidy when it was implemented and to be eligible for all other benefits, they need to be registered with the department administered through the regional Assistant Directors in-charge of their respective areas.

Ceylon Fishery Harbors Corporation (CFHC)

Ceylon Fishery Harbors Corporation (CHFC) was established in 1972 and is primary responsible for delivering quality fishery-harbor related services and providing the fishing community with modern infrastructure and facilities. CHFC has facilitated fisher folks by developing and maintaining 19 Fishery Harbors and providing and maintaining 16 Anchorages and 76 Boat Landing sites all around the country. Dredging Unit Of Ceylon Fishery Harbors Corporation "Nil Diyawara" was established in 2008 to provide dredging services to all Fishery Harbors as an infrastructure development program as a subsidy to fisher folks of Sri Lanka.

Also the CHFC provide facilities such as Vessel Berthing, Vessel Slipways and Boat Lifting at highly subsidized rates for Sri Lankan fisher folks while the competitive rates are charged in foreign currency from all vessels registered outside Sri Lanka.

5.1.6 Extended Cost Benefit Analysis

The costs can be categorized into: a) the actual financial costs of the subsidy or the loss incurred by the government in providing the subsidy; and b) the cost to the environment or biodiversity due to implementation of the subsidy. The benefits of the subsidy can be categorized as; a) the actual financial and economic benefits to the beneficiary; b) the financial and economic benefits to the country; and c) benefits to the environment if any

Methodology for Cost Benefit Analysis

- Financial costs have been estimated using market prices. Subsidy costs are the actual budgeted values.
- Economic costs such as environmental costs have been estimated using market prices if available. If market prices were not available, the method of benefit transfer was used. This

involves using data from other similar studies done within the country or in other countries and using the results to estimate the economic costs.

- Financial benefits have been estimated using market prices. For example, the actual profit earned is valued at market prices if such market prices are available.
- Economic benefits have been estimated using the benefit transfer method, wherever, market prices were not available.

Costs and Benefits

- The costs can be categorized into: a) the actual financial costs of the subsidy or the loss incurred by the government in providing the subsidy; and b) the cost to the environment or biodiversity due to implementation of the subsidy.
- The benefits of the subsidy can be categorized as; a) the actual financial or economic benefits to the beneficiary; b) the financial or economic benefits to the country; and c) benefits to the environment if any.

Assumptions Made for the Cost Benefit Analysis

- Resource values of the environment estimated in the referenced study “Valuing Marine Ecosystems - Taking into account the value of ecosystem benefits in the Blue Economy” on value of marine eco-system services, such as value of marine fisheries and carbon emissions were converted from the original Euro value to SL Rupee at the prevailing exchange rate of 1 Euro = Rs 200 in 2019.
- As there were no local data on the level of damage done to the environment by marine fisheries, it was assumed that the damage to the environment due to marine fisheries would be 30% of the total value in the two categories of marine fisheries and carbon emissions estimated by the above referenced study.

Estimated Financial and Environmental Costs

Estimated Financial and Environmental Costs to implementation of the subsidy. The costs can be categorized as; a) the actual financial cost to the government b) the environmental costs to the country.

Table 5.1:1: Marine Fisheries – Subsidy and Environment Costs

Marine Fisheries	Subsidy Cost (USD Million)	Type of Subsidy
Fuel subsidy (Rs 1.85 Billion)	10.27	Implicit Income Transfer
Total	10.27	
Cost to Environment (Rs 38.5 Billion)	213.89	

I. Financial Cost to Government - The cost of the subsidies in the sector :

Fuel subsidy – Rs 1.85 billion (0.01 billion USD) – Kerosine fuel is provided to all citizens on a subsidized basis. Thus fishermen can use this subsidy when using multiday and traditional motorized boats for fishing. The subsidy is an implicit income transfer to about 27,500 boats of registered boat owners using kerosene fuel. If we assume that about 80% of the boats (22,000 boats) operating on kerosene fuel on any day, used around 35 litres per day per boat over a fishing period of about 300 days per year, then the total fuel used will

be 231 million litres per annum. The average subsidy per litre was estimated at Rs 8 per litre and the total cost of the subsidy would be Rs 1.85 Billion in 2019.

- II. Environmental Cost – The environmental cost includes biodiversity losses due to overfishing, dynamiting of fish, spillage of fuel which can be toxic to the fish, use of illegal methods of fishing like bottom trawling and ghost nets abandoned in the sea which cause considerable biodiversity loss. All of the above impacts cannot be attributed to the subsidy alone. Overfishing and spillage of fuel probably have high impacts on the environment and such impacts can be considered as mostly promoted by the subsidy. Thus it is assumed that only a proportion (30% of the environmental cost can be attributed to the greater fishing efforts promoted by subsidies. The total annual value of marine eco system services was estimated at Euro 3.427 billion (Rs 685.4 Billion – 3.81 billion USD) per annum, based on a study¹ completed in 2019. Using the benefit transfer method of valuation of resources, the valuation undertaken for a similar case elsewhere may be used to estimate the economic value of local resources. Using this method of valuation, the losses due to marine fisheries from marine system services such as marine fishing and carbon absorption, except aquaculture was estimated. It was assumed that 30% of the total value of the resource will be lost due to environmental pollution of the sea, resulting from subsidies provided in the sector. Only the losses due to marine fisheries and CO₂ emissions were considered in estimating the losses due to the environmental impacts of marine fisheries. Losses due to impacts on recreation, aquaculture, waste assimilation and other causes are not included in valuing marine fisheries. For estimating the value of the impacts, 30% of the losses due to marine fisheries operations and 30% of the total value of CO₂ emissions are considered as the losses due to the subsidies provided in this sector. On this basis, the biodiversity loss due to marine fisheries and loss in carbon absorption are taken to be the losses due to marine fisheries, or a total loss of Rs. 76.98 billion (0.42 billion USD) per annum¹.

III. Table 5.1:2: Value of Marine Eco System Services

Marine System Services	Value at 2019 Euro Million	Value at 2019 USD Million	Value in 2019 SL Rs Billion (1 Euro = Rs. 200)	Losses at 30% of value of the Marine Resources (Rs Billion)	Losses at 30% of value of the Marine Resources (USD Billion)
Recreation	1600	1777.78	320.0	96.0	0.533
Marine Fisheries	464	515.56	92.8	27.84	0.145
Aquaculture	200	222.22	40.0	12.0	0.066
Carbon absorption	819	910.00	163.8	49.14	0.273
Waste assimilation	317	352.22	63.4	19.02	0.106
Other	27	30.00	5.4	1.62	0.009
Total	3427	3807.78	685.4	205.62	0.1143

1. Source “Valuing Marine Ecosystems - Taking into account the value of ecosystem benefits in the Blue Economy” Austen M.C., AndeRon P., Armstrong C., Döring R., Hynes S., Levrel H., Oinonen S., Ressurreição, ACoopman, J., Heymans, JJ., Kellett, P., Muñiz Piniella, A., French, V., Alexander, B. [Eds.] Future Science Brief 5 of the European Marine Board, Ostend, Belgium. . (2019), 32pp. ISBN: 9789492043696 ISSN: 4920-43696 DOI: 10.5281/zenodo.2602732.

In valuing marine ecosystems (marine fisheries), data for valuing the impacts was taken from a study entitled “*Valuing Marine Ecosystems - Taking into account the value of ecosystem benefits in the Blue Economy*” published in 2019. The issue here is that we used data pertaining to valuation in a location in Europe and therefore may not be appropriate for Sri Lanka. For valuing marine fisheries, the data may not be fully applicable to Sri Lanka. However, the CO2 emissions may not differ too much between European and Sri Lankan fisheries. In the case of fisheries the resources available in European waters may differ somewhat from resources available in Sri Lankan waters. Fish species are different and type of fishing methods also may be different. Thus there is a likelihood that the values may be different and thus the cost benefit calculations may differ or may be incorrect. The study is not too dated as it was completed in 2019.

In a study done in Sri Lanka “*Greening the National Accounts*”, by U. A. D. Prasanthi Gunawardena, 2010, the value of environmental costs of fisheries and agriculture was estimated. The value estimated was Rs 113 billion for both coastal, inland and aquaculture fisheries in 2010. This figure updated to 2019 values was Rs 181 billion. The figures estimated using the European study was Rs 89 billion, for aquaculture and marine fisheries, (It was assumed that the environmental cost was 30% of the total estimated value in the European study, considering the lower level of exploitation in the Sri Lankan context.). It is possible that our valuation may be slightly under-estimated compared to the study done by Prasanthi Gunawardena. Since there was no breakup of the costs among marine, aquatic and inland fisheries in the Gunawardena study, we could not use the values in the Gunawardena study. Therefore we have used the values from the European study for the estimation of environmental damage as there was such a breakup of the costs in this study.

Estimated Financial and Economic Benefits

The net benefits include the actual profits earned by the fishermen. There were also benefits to the country such as value of exports which are already included in the net benefits to the fishermen including the exporters. The net benefits to the fishing industry was estimated at Rs. 41.2 billion (0.229 billion USD) and would have declined if there was no subsidy. Total value of all exports was Rs 53.5 billion (0.297 billion USD), which includes the value added by the exporters.

- I. Benefit to Fishermen - The total marine fish production in Sri Lanka was 415,490,000 Kg. in 2019 (Source: *Fisheries Statistics, 2021, Ministry of Fisheries*). The value of production at an average price of Rs. 662 (3.678 USD)/ Kg (*Fisheries Statistics, Ministry of Fisheries, 2019*) was Rs. 275.0 Billion (1.528 billion USD). The cost of production was estimated (using data from study entitled “*Fuel Subsidy in Sri Lanka Fisheries; Data Analysis and Possible Improvements*” <https://www.researchgate.net/publication/337533303>) at Rs. 562 (3.12 USD) / Kg. Total cost of production was Rs. 233.5 Billion (1.297 billion USD) for the total production of fish in 2019, with the subsidy. Without subsidy the cost of production would be Rs. 573 (3.183 USD) / Kg. Profits will reduce from Rs 100 (0.55 USD) / Kg to Rs 89 (0.49 USD)/ Kg. without the subsidy. The Net benefit from marine fisheries to fishermen and fishing industry (profits from fishing) was estimated at Rs. 41.5 billion (0.229 billion USD) in 2019. This works out to a net income of Rs. 20,000 (111 USD) per month per fishing household in 2019.
- II. Benefits to country – Value of GDP in Marine Fisheries and Marine Aquaculture was Rs. 170 billion (0.944 billion USD) in 2019 (Source: *Central Bank Annual Report 2019*)
 Value of exports – Marine Fish – 19,900 MT – Value Rs 34.3 billion (0.191 billion USD)
 Value of exports – Coastal Aquaculture – 8,900 MT – Value Rs. 19.2 billion (0.107 billion USD) (Source: *Fisheries Statistics, Ministry of Fisheries 2021*)
 The country benefits from exports of fish and fishery products. However, this benefit is included in the net benefits accruing to the fishermen.

Extended Cost –Benefit Analysis

Table 5.1:3: Extended Cost and Benefits of Marine Fisheries

Component	Costs (Rs. Billion)	Costs (USD Billion)
Cost of Subsidy	1.85	0.010
Cost to the Environment/Biodiversity due to marine fisheries.	77.0	0.428
Total	78.85	0.438
Component	Benefits (Rs Billion)	Benefits (USD Billion)
Fishermen – Net benefits (profits) to marine fishermen	41.2	0.229
Total Government Budget Fisheries Sector – 2019 #	6.5	0.036
GDP Fisheries Sector – 2019	170	0.944
Total Estimated Benefits from Marine Fisheries	41.2	0.229
Costs – Benefits	37.65	0.209

Source: Government Budget Estimates 2021

The total cost of the subsidy and the cost to the environment were estimated at Rs. 78.6 billion (0.437 billion USD). The total net benefit (net profits) to fishermen was estimated at Rs. 41.2 billion (0.229 billion USD). Out of a total production of 415,490 MT, 20,140 MT was estimated to be exported from the marine fisheries sector. (It is assumed that about 70 % of the total exports of 28,771 MT came from marine fisheries). The total value of exports from all fisheries was Rs. 53.5 billion (0.297 billion USD), of which Rs. 37.5 billion (0.208 billion USD) was estimated to be from the marine sector (*Source: Fisheries Statistics 2021, Ministry of Fisheries*). However, the net profit from exports is already included in the net benefits estimated for the fishermen. Thus only the benefits to the fishermen and costs of the subsidy and the cost of damage of the environment can be considered in the cost benefit analysis. The costs thus exceed that of the benefits received from marine fisheries by Rs. 37.4 billion (.0.208 billion USD).

5.1.7 Suggestions for Repurposing of Subsidies

(I) In 2012 and 2013 both diesel and kerosene oil were subsidized for boat owner of multi day, one day and other motorized crafts. Since then, the subsidies have been withdrawn. Since 2013, kerosene fuel has been subsidized as the selling price was fixed at below the cost price or below world market prices in most of these years. Diesel and petrol prices were not subsidized. However, since June 26th. 2022, the prices of diesel and petrol fuel were raised due to the rise in world market prices while the kerosene fuel price remained well below the cost price and the subsidy amount for kerosene increased substantially as a result. In the case of one day and other motorized boats which mostly use kerosene, the subsidy continued. The current cost (2022) of kerosene is Rs. 409 (1.136 USD 2022) per liter, but it is sold to fishermen at Rs. 87 (0.242 USD) per liter. However, the Government has increased the price of kerosene to Rs 342 (0.95 USD 2022) per liter in late August 2022, thus reducing the subsidy substantially from 80% to 20%. Thus kerosene still remains subsidized but by a much smaller margin. The fishermen want the government to reduce the price of kerosene as the price increase had affected their livelihoods.

The world prices of Kerosene for a few selected countries are given below (prices converted to Sri Lanka Rupee at the current exchange rate of Rs 360/US\$ for comparison: In 2022, the highest price was in Seychelles Rs. 846 (4.7 USD)/liter and the lowest in Saudi Arabia Rs. 78 (0.433 USD)/Liter, and the next lowest was in Sri Lanka Rs. 87 (0.483 USD)/Liter, now raised to Rs 340 (0.944 USD) / Liter. The price per liter in a few other countries in 2022 were; Nepal – Rs. 465 (2.583 USD), Pakistan Rs. 370 (2.056 USD) and India Rs. 282 (1.567 USD). (*Source: Internet and Daily Mirror Newspaper Article,*

Sri Lanka Aug. 2022). Thus the kerosene price in Sri Lanka was one of the lowest in the world until recently or nearly in par with kerosene price in the oil rich Saudi Arabia.

Since the price increase of kerosene in August 2022, from Rs 87 to Rs. 342 per litre the subsidy has been reduced by 80% from Rs 322 to Rs 67 per litre of kerosene. It is suggested that this subsidy be continued. In order to reduce the hardship faced by fishermen due to the recent increase in prices it is suggested that an additional subsidy be provided to fishermen for a short period (say 3 years) and gradually removed thereafter over a period of 3 years. This can be implemented by providing a cash grant equivalent to the subsidy amount only to the persons targeted by the subsidy and having a review system so that the subsidy can be reviewed periodically (once a year). If cash grant is given, the amount given as subsidy can be varied according to the category of fishermen and type of boats owned. The targeted persons could include fishermen and Samurdhi beneficiaries (who can also benefit by the subsidy). The cost of kerosene should be raised to the level of the actual market price of Rs. 421 per liter for the other consumers. In the case of the fishermen, subsidized kerosene should be issued only to the boat owners registered with the Department of Fisheries. Furthermore, the Fisheries Inspector should inspect the boat and provide a certificate that it is sea worthy and that it is actually used for fishing activities. The subsidy grant should only be given on production of such certification. The validity of such certification should only be for one year and it should be renewed after an inspection and a fresh certification by the Fisheries Inspector. In case the price of Kerosene in the world market rises further, the subsidy can be either increased proportionately or set at the old level.

The income of the fishermen is expected to increase over a period of time due to higher prices for fish or higher catch. It may then be an opportune time to reduce the subsidy, without seriously affecting the livelihoods of the fishermen. Thus it is suggested that the subsidy of a cash grant recommended by the study be progressively removed by a small proportion each time over a period of time (say 3 years) so that the fishermen will be able to absorb the subsidy loss without much difficulty. In recent public announcements, the government has indicated that it may provide a cash grant to fishermen and low income families to compensate for the reduction in the kerosene subsidy.

(II). Furthermore, license/registration/permit fees/health certification and administrative fees levied by the Department of Fisheries and Aquatic Resources should all be increased. These fees are rather low and have not been increased in the recent past and with high inflation levels, the real value has declined even further. This recommendation would lead to a soft increase in non-tax revenues of the Sri Lankan authorities corresponding to the aim of increasing this type of revenues.

(III). Fishery resources of the coastal areas have been over-exploited but it is not certain whether the maximum sustainable yield (MSY) levels have been exceeded or not. Removal of the existing financial support measures for coastal fishing could lead to an overall reduction of coastal fishery. However, this may not be a feasible option at present. Instead, an allocation system could be introduced to limit the catching of fish helping to prevent the overexploitation of coastal fishing and to protect the fragile state of the coastal zone and reefs.

(IV) A fishing permit/quota system could be implemented as an additional measure to reduce overfishing. Under this system, a maximum fishing limit should be established for each region or fishing area on a scientific basis. Such a fishing limit should be then divided among the fishing communities or cooperatives in the region, again based on past statistics or on a scientific basis. Any community or cooperative organization exceeding the limits will be charged a fee based on the amount of excess catch beyond the established limit. This fee should be paid by the cooperative or community fishery society and subsequently recovered from the members on an agreed basis.

The successful operation of this system will also depend on many factors, for example. A proper monitoring system for estimating the quantity of the catch must be available within the community and this should probably be supervised by the Fisheries Inspector of the area. There is already a system to quantify the fish catch in the community, but the system should be improved and regularized. A system

to recover the fee from individual member of the community has to be established. The fee to be paid by each individual should correspond with the number and size of the fishing vessels owned or used by the fishermen. If the annual quota has been exceeded three times in a row, then the fee should be increased threefold in order to provide incentives for keeping to the quota. Sri Lankan fishery sector has a long tradition of having property rights controlling access to water and the catch of fish. This recommendation is completely in accordance with the old and existing tradition.

5.1.8 Impacts of Repurposing

There will be a small positive impact on the income of the small boat owner by the repurposing strategy of providing a cash grant to compensate for rise in kerosene fuel increase. However, it is expected that their incomes will increase progressively in the future and that the impact of the subsidy reduction will be reduced over a period of time when the subsidy is removed each time. However, the reduction will be in small proportions over a period of time (1-3 years) so that fishermen will be able to absorb the loss without much difficulty as their incomes are also expected rise over this period. There may not be any marked opposition against any subsidy reduction by the beneficiaries if the amounts are small and it is implemented over a long period.

A further impact may be that fishermen will make a greater fishing effort and try to increase their production in order to compensate for the loss of the subsidy. This could result in overfishing and reduction in fisheries resources. However, there is still no clear scientific evidence on whether the coastal waters of Sri Lanka are overfished or not. Till such time that such evidence is available the subsidies can be continued.

The increase in registration, licensing and other fees may not have much impact as the amount may not be high enough to have much impact on incomes of the fishermen.

The quota system suggested may be difficult to implement if there is no cooperation among fishermen to conform to such a system. Enforcement of such a system may be difficult without the cooperation of the fishermen and the fishing societies.

5.2. Energy Sector

5.2.1 Introduction

Energy sector in Sri Lanka encompasses three sub-sectors, biomass, petroleum and electricity. Traditionally biomass has played a vital role in the provision of energy cooking as well the energy requirements for traditional agro-based industries in Sri Lanka. Even in the present context, nearly fifty percent of the population depends on biomass to fulfill the needs of energy for cooking (*Sri Lanka Energy Balance, 2019*). Larger quantities of firewood and other biomass resources are used for cooking in rural households compared to urban households. Electricity is subsidized for low users but this may not be the only factor for the demand of electricity. **Development and modernization has led to the prevalence in the use of electrically operated household equipment and has become a necessity for lighting, in replacing or assisting manual tasks and household chores with electrically operated equipment and very often the use of energy inefficient equipment, improvement in safety compared to lighting through the use of kerosene and improvement in the facilities that can be enjoyed by the household, such as TV, fans, brighter lights for facilitating studies at home, use of mobile phones and other comforts. Thus subsidy is one of the many drivers that contribute to the demand for electricity and not the sole one. In the following exercise of evaluating the costs and benefits of the subsidies and their impacts on the environment, subsidy is considered as a major indirect contributor to environmental damage through the use of the different types of electricity production methods, (Major and Mini Hydro, Petroleum, Coal and other renewable methods).**

Petroleum and electricity are the two main energy sources of the country. Petroleum is the main energy source for the transport sector in Sri Lanka. The use of electric vehicles is limited as they have been

introduced only recently to the country. Petroleum together with coal and biomass are the major sources of thermal energy, which supplements the renewable energy provided by sources such as hydro, solar and wind etc. Kerosene is used for cooking among the urban poor and lower middle income families, while it is used for lighting purposes in rural areas where grid connection is not available, uneconomical for the CEB to supply or is not affordable by the household. Electricity is a primary need for all industries and commercial ventures as well as households for lighting and cooking.

Even though there are many forms of energy sources available in the international market, Sri Lanka is using only petroleum fuels for its energy needs. Increasing petroleum prices has compelled Sri Lanka to examine the practicability of using other sources such as coal and Liquefied Natural Gas (LNG) to replace liquid petroleum in certain applications and it has been put to practice with inclusion of coal powered thermal power plant. Despite new energy supply technologies such as biofuels and energy carriers such as hydrogen and electricity storage have emerged as alternatives to the above conventional technologies. The use of such technologies for energy supply purposes in Sri Lanka is however extremely limited. Therefore, electricity and petroleum have remained as the major sources of energy in Sri Lanka.



5.2.2 Electricity Sub Sector

The electricity sector in Sri Lanka is basically state-owned where the private sector participation is limited to power generation in a relatively small scale. CEB could be identified as the strategically important stakeholder which is one of the largest state-owned enterprises (SOE) in Sri Lanka. However, currently CEB is one of the biggest loss making SOEs in the country and depends on government funding for its existence. During the decade prior to 2019, the CEB had accumulated a total loss of over R. 246 billion and it has been forecast that losses of CEB would continue to increase on an annual basis. Based on information from 2015 to 2021, hydropower, thermal coal and thermal oil power plants have been the key power generation sources of Sri Lanka accounting for about 92% of the total power generated during the period. Other non-conventional renewable energy sources such as wind power have contributed in a small proportion of about 08% on average over the five year period.

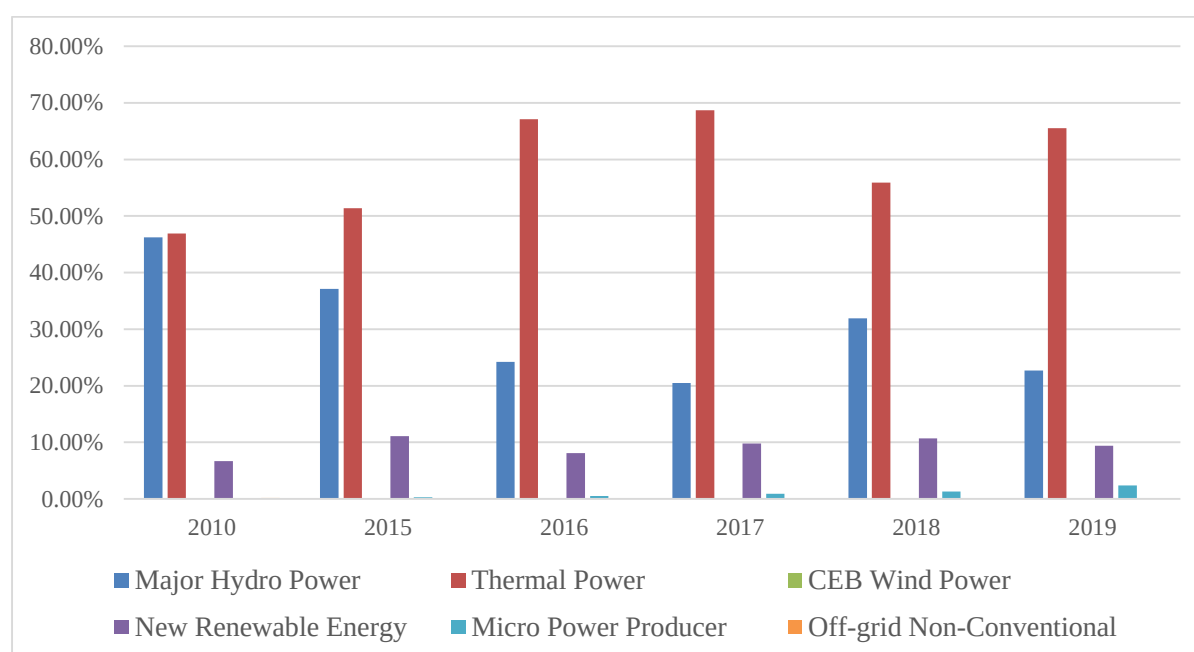
I. Electricity Generation

Electricity generated by different sources as a contribution percentage of from the total electricity generation has been depicted in Table 5.2.1

Table 5.2.1: Power Source for Generation of Electricity

Generation Type	2010	2015	2016	2017	2018	2019
Major Hydro Power	46.2%	37.1%	24.2%	20.5%	31.9%	22.7%
Thermal Power	46.9%	51.4%	67.1 %	68.7%	55.9%	65.5%
CEB Wind Power	0.03%	0.01%	0.01%	0.01%	0.01%	-
New Renewable Energy	6.7%	11.1%	8.1%	9.8 %	10.7%	9.4%
Micro Power Producer	-	0.3%	0.5%	0.9%	1.3%	2.4%
Off-grid Non-Conventional	0.2%	0.1%	0.1%	0.1%	0.1%	-

Figure 5.2.1 Power Source for Generation of Electricity



Source: CEB Annual Reports

The cost of generating power varies considerably depending on the power source. In 2020, the unit cost of generating power from hydropower plants have averaged around Rs. 5.0 (0.028 USD) per kWh while it was Rs. 10.2 (0.057 USD) per kWh in the coal power plant, Rs. 16.8 per kWh in Non-Conventional Renewable Energy (NCRE) power plants and Rs. 32.9 (0.183 USD) per kWh in the Thermal Oil power plants.

On an average the electricity generation cost per kWh from the energy mix has been calculated as Rs 23 (0.128 USD) in 2019 and Rs.21.0 (0.117 USD) per kWh in 2020. The generation cost varied depending on factors such as rainfall and demand. However since 2020 the average selling price has been Rs. 16.6 (0.092 USD) per kWh resulting in a loss of Rs. 4.40 (0.024 USD) per kWh and a total loss of Rs.62 billion (0.344 billion USD) to the CEB.

II. Electricity Tariff Structure

The existing electricity tariff structure approved by the PUCSL consist of different categories such as; Domestic, Hotels, Religious & Charitable, Industrial Consumers, General Purpose and Government. There are different tariff structures implemented for each of those categories but subsidies are applicable only to the domestic category.

Domestic Category

The electricity used for domestic purposes in private residences is charged under this rate category where there are two sub categories; Block Tariff and Time of Use Tariff (TOU). While TOU is very rarely applied for domestic customer, most of them are accounted under the Block Tariff which is calculated based on consumption blocks on a 30 day billing period and the number of units in a block would be prorated according to the number of dates in each billing period.

The tariff rates applicable to domestic low user where monthly consumption is 60 units or less per month as shown in Table 5.2.2

Table 5.2.2: Tariff Rates for Low Domestic Use (Below 60 Units)

Consumption per month (kWh)	Charge (USD/kWh)	Fixed Charge (USD/month)
0-30	0.014	0.167
31-60	0.027	0.333

Source : www.pucsl.gov.lk

Households where electricity consumption is more than 60 units per month are charged at differential rates as in Table 5.2.3

Table 5.2.3: Tariff Rates for High Domestic Use (Above 60 Units)

Consumption per month (kWh)	Energy Charge (USD/kWh)	Fixed Charge (USD/month)
0-60	0.044	—
61-90	0.056	0.500
91-120	0.154	2.667
121-180	0.178	2.667
More Than 180	0.250	3.000

Source: www.pucsl.gov.lk

5.2.3 Subsidies – Electricity Sub Sector

Subsidies are of two types in the power sector; consumption subsidies and generation subsidies.

I. Subsidies in Electricity Generation

1. Government through funds from the General Treasury annually provides subsidies to CEB for bridging the generation and transmission revenue shortfalls amounted to a total of Rs. 246 billion (1.367 billion USD) during the 10 years period from 2010 to 2019 and more than Rs. 62 billion (0.344 billion USD) in the year 2020.

2. Under an ADB assisted project, subsidies have been given to households to the value of 50 Million USD to install roof top solar power units at a subsidized interest loan of 04% per annum as an off the budget subsidy. The total distributed amount under the phase I completed in 2021 and the phase II is expected to launch in 2022.
3. Subsidy varying from 30% to 50% has been provided as capital subsidies for hot water boiler and spice dryer. This project has been successful especially in case of small scale dryer for dried fish and drying Maldive-fish.
4. Mini hydro as well as small and medium private thermal sector power producers, who generate more than 300 kWh are paid at a rate of Rs. 22 (0.122 USD) per kWh while the production cost of the CEB averaged around Rs. 16 (0.089 USD) per kWh (Cost varied between Rs. 12 – 20 (0.067 – 0.111 USD) per kWh). Thus these private power producers are subsidized and the difference between the purchase price and cost is absorbed by the CEB / Treasury.

II. Subsidies in Electricity Consumption

1. While the cost of generating electricity varies between Rs. 21 (0.117 USD) to 23 (0.128 USD) per kWh since currently electricity is generated mostly by thermal plants; 29% major hydro, 35% coal, 30% thermal and 6% - other such as wind, small hydro and solar, the domestic user or households where the monthly consumption is less than 91 kWh / per month are charged at a subsidized prices as depicted in Table 5.2.3 above.
2. Electricity market in Sri Lanka is tremendously household-oriented with a contribution of about 37% of sales while the share of electricity sold to the industry is declining but with an increasing trend in the share of sales of electricity to the commercial sector. The Domestic electricity consumer are charged at rates higher than the actual cost of generation not only to cross subsidize the losses from the subsidy given to consumer using below 120 kWh per month, but also to promote energy conservation. Cross subsidies are funded by the treasury and channeled through the national budget.
3. Street lighting in Sri Lanka is fully subsidized, with a quota for each distribution licensee. There are about 400,000 Street Lights using more than 143 GWh. annually and the cost of the subsidy is about Rs. 2954 Million (16.411 million USD) per annum amounting to 1.2% of total sales of electricity (Source: www.pucsl.gov.lk.) The quality of service provided to general public for street lighting by granting such a subsidy is questionable since the majority of street lighting equipment is of poor quality and badly maintained resulting in very high energy wastage. The efficacy of the incandescent lamps used is very poor due to operational inefficiencies and inconsistencies in types of lamps, luminaire, overhang arms and height of luminaires.
4. Under the energy efficient equipment distribution program, a government subsidy is provided for 2-5 LED Bulbs valued at Rs. 200 (1.111 USD) – Rs. 700 (3.889 USD). Such bulbs consuming less than 03 units of electricity per month are to be distributed among 01 million households, free of charge. Already 800,000 bulbs have been distributed and 200,000 bulbs were to be distributed but suspended due to the financial crisis in the country.

5.2.4 Petroleum Sub Sector

Petroleum is a complex mixture of hydrocarbons that occur on earth in liquid, gaseous or solid form. Such petroleum products encompass petrol, diesel, kerosene, aviation fuel, marine fuel, furnace oil and

liquefied petroleum gas while crude oil, natural gas and hydrocarbons whether in natural, liquid, gaseous, solid semi-solid state are petroleum resources. From the energy sources of Sri Lanka, the contribution of petroleum product is more than 43%. When compared to the global demand, the petroleum product consumption of Sri Lanka is minuscule. Since the country is still in the process of exploring petroleum resources, all its requirements need to be imported. Such imports of crude oil or refined products are used mainly for transport, power generation and industrial purposes. However, the petroleum product importation cost of Sri Lanka has increased from 430.3 million USD in January 2022 to 700 million USD in April 2022.

The price breakdown of petroleum products as of 26th June 2022 is indicated in Table 5.2.4.

Table 5.2.4: Estimated Cost of Refined Petroleum Products in Sri Lanka (26-6-2022)

Cost Component	Price in 2022 (SL Rs)					Price in 2022 (USD)				
	Petro 192	Petro 195	Diesel	Super Diesel	Kerosene	Petro 192	Petro 195	Diesel	Super Diesel	Kerosene
Cost/BBL	157	159	175	177	171	0.44	0.44	0.49	0.49	0.48
Landed Cost /Liter	364	369	404	408	396	1.01	1.03	1.12	1.13	1.10
Taxes /Liter	59	81	36	59	0	0.16	0.23	0.10	0.16	0.00
Processing Cost /Liter	21	24	18	20	17	0.06	0.07	0.05	0.06	0.05
Operation & Admin. Cost /-Liter	11	10	10	13	8	0.03	0.03	0.03	0.04	0.02
Total Cost /Liter	438	467	455	484	409	1.22	1.30	1.26	1.34	1.14
Current Sale Price /Liter	470	550	460	520	87	1.31	1.53	1.28	1.44	0.24
Profit Margin /Liter	32	83	5	36	-322	0.09	0.23	0.01	0.10	-0.89
Profit Margin without Taxes /Liter	91	164	41	95	-322	0.25	0.46	0.11	0.26	-0.89

1 US \$ = LKR 360 (2022)

(Figures in brackets are losses)

Source: CPC News Report

5.2.5 Subsidies – Petroleum Sub Sector

Until the corrective measures were taken on 26th June 2022, subsidies in the petroleum products were; (Please note Rupee prices converted at 2022 exchange rate of Rs 360 / USD) Petrol (Octane 92) – Rs. 84 (0.233 USD) per liter, Petrol (Octane 95) – Rs. 71 (0.197 USD) per liter, Diesel – Rs 132 (0.366 USD) per liter, Super Diesel – Rs. 136 (0.377 USD) per liter and Kerosene – Rs. 295 (0.819 USD). However, on 26th June 2022, fuel prices were restructured making only Kerosene subsidized while the other products were sold at profit as indicated in the Table 5.2.4. According to the table published in

2022 by the Ceylon Petroleum Corporation, the subsidy margin for Kerosene is Rs. 322 per liter after taxation. Since taxation is a negative subsidy, if taxes are eliminated, only Kerosene will be subsidized at Rs. 322 per liter while profits will be made from Petrol (Octane 92) at Rs. 91 (0.252 USD) per liter, Petrol (Octane 95) at Rs. 164 (0.455 USD) per liter, Diesel at Rs. 41 (0.114 USD) per liter and Super Diesel at Rs. 95 (0.264 USD) per liter. It has been recorded that top 30% of society in Sri Lanka consumed an overwhelming 70% of fuel sold in the country and Kerosene is almost totally used by small scale farmers and fishermen and people on or below the poverty line for their domestic lighting and cooking purposes. Use of Kerosene is only a small fraction of the 30% of fuel sold in the country which is minimal compared to other types of fuel which make profits. Therefore, it can be considered that Kerosene subsidy can be considered as cross subsidized within the petroleum sector itself without becoming a burden to the Treasury.

5.2.6 Environmental Impacts

The energy sector ranks as the largest source of GHG emissions today, around two-thirds of global total. It is also the largest source of air pollution, linked to 6.5 million premature deaths per year. Therefore, achieving carbon neutrality by 2060 would require unprecedented policy initiatives and investments in efficient technologies.

The major impacts are:

- GHG Emission from thermal power plants
- Also fly ash, sulfur and nitrogen oxides are emitted to the atmosphere from thermal power plants
- Ocean becomes highly polluted as a result of loading and unloading of coal for thermal power plants
- Hot water is released to the ocean for cooling of thermal power plants
- Construction of major as well as mini hydro power plants lead to environmental degradation and negatively impact on biodiversity of downstream as well as on site.
- Operational issue of failing to release minimum water flow from mini hydro power plants negatively impact on downstream habitat and biodiversity

Energy production places different burdens on biodiversity depending on the energy source and production method. The production and consumption of fossil energy produces air pollutants that cause acidification or eutrophication of habitats and greenhouse gases (GHG) contributing to global warming. According to the Green House Gas Inventory of the Third National Communication of the Ministry of Environment to the UNFCCC (2022) the energy (the power generation) sector contributes 32% of the total GHG emissions of the country. The thermal power plants emanate heated water to the environment temperature of water bodies to rise. But energy production from hydropower, wind and biomass can also damage biodiversity.

This is especially so for mini hydro power projects which are run on the river where the biodiversity is adversely impacted by the drastic reduction of the water to their habitats both during construction as well as during operation. With regards to wind power projects, there is danger of bird kills from the wings of turbines. The continuous noise generated by the wind turbines disturbs the life processes of fauna.

5.2.7 Social Distribution and Gender Impact

Energy services can contribute to increasing women's economic and social empowerment. Women generally spend more time in their homes and are able to reduce their chores through the use of electricity. Men, generally spend less time in their homes having to go out for work. For cooking and heating, biomass continues to be the most widely used energy source, especially in rural areas. Approximately 65 percent of the biomass entering the primary energy supply is used for cooking and

heating and 32 percent by industry. In the energy sector, several issues hinder women's participation and their ability to benefit from interventions: women's restriction largely to non-commercial (and non-monetized) activities; their low representation in decision making bodies; their limited engagement in formal communication channels and consultation processes; and the prevalent inequalities in women's knowledge, access to productive resources and financial capacity.

Energy is a critical source for women's daily tasks and in performing their duties in the domestic chores such as cooking and livelihoods activities. In the absence of energy services, women spend much time managing their routine duties showing energy and power to have a disproportionate effect on their lives. When fuel resource becomes scarce women are forced to go in search of such especially for the preparation of food for their families. Women living in the urban areas and coastal belt find this task to be very strenuous with limited items which they can find in their environment.

One of the goals of the National Energy Policy and Strategy is to provide affordable energy services to support socially equitable development among both men and women. However, the assumption that men and women benefit equally from electrification and have equal capacities to use it for satisfying their needs does not always hold true. One category missing attention in national policies is women headed households. The goal of the National Energy Policy and Strategies, for example, is to provide affordable energy services to support socially equitable development of the citizens, without specific consideration of men and women. Local women are not consulted regarding issues related to use of local resources or gender differentiated energy needs.

While women have demonstrated their abilities as custodians of local resources and as managers of decentralized energy systems, the National Energy Policy focuses more on electricity, but has no programmes for cooking fuels and biomass, except for a mention of biofuels as a source of commercial energy. While the government has a target on 100 percent electrification, there is no target for clean energy or cooking fuels. Failure to focus attention on biomass, which contributes nearly 50 percent to the total energy supply, and affects the majority of women, is a gap in the policy. At the same time, commercial development of biomass for renewable energy remains a promising, yet untapped avenue for women to engage in energy enterprises.

The energy projects being implemented, aim to cater to the need of the users which include both men and women having different energy roles, needs, and priorities. The orientation of men and women in using energy has not been addressed in energy policies and subsidies provided at different intervals. Decisions and information on electricity base services are important for women as such information can be managed effectively by women in improving their level of productivity. Electrification can support women in the income generation activities such as in agriculture, home-based industries, and the marine fisher industry. A better income would help a woman to achieve economic empowerment while earning a living to establish her self-esteem and recognition in the family as well as at the community level. The technical staff on electrification projects is mostly men and their stereotypical thinking of what a women's role should be is highly dominated by social norms which gives very limited opportunity for women to work in the energy sector.

Gender disaggregated needs in the community should be studied to understand the gender differences in the energy sector by focusing on physical access and affordability in addressing energy problems. The lack of information on energy use according to gender-based needs is the main challenge in policy making where gender sensitivity is mostly ignored in formulating energy-related policies. Issues of gender equality in the energy sector should address the gaps which exist between the energy paradigm and the local realities as women are the main energy managers on the domestic front and in their small enterprises and livelihood activities. Without an effective partnership of women to address their concerns in energy sector management, their ability to be heard is reduced and this can be considered as the main development challenge to be addressed the policy makers.

5.2.8 Administrative and Institutional Issues

The electricity market in Sri Lanka is tremendously household-oriented with about 37% of the sales originating from this sector, while the share of electricity sold to the industry is declining but with an increasing trend in the share of sales of electricity to the commercial sector. Commercial customers pay significantly higher prices than the actual cost of supplying electricity while household customers get electricity at subsidized rates especially when their consumption is less than 120 kWh per month. However, up to certain levels of consumption, even the high consuming household customers are subsidized by the cross-subsidy provided by commercial customers and the high consuming domestic customer. Electricity is subsidized for the lower consuming groups (mostly below 120 units of electricity). Currently electricity is produced mostly by coal and thermal plants; Coal 34%, Thermal 31%, Major Hydro 24% and Renewable Sources 11%. (wind, small hydro, solar).

Several institutions are involved in the production, import and sales of petroleum products (a major input in electricity production) and in the administration and policy formulation of electricity production and distribution in the country.

Under the purview of the Ministry of Power and Energy, there are several stakeholder institutions in the energy sector of Sri Lanka representing state and private sector. In addition to the independent Public Utilities Commission of Sri Lanka. Responsibilities and contribution of each of such entities are elaborated below.

I. Ministry of Power and Energy

The two sub sectors of energy; electricity and petroleum have been placed under one to several ministries in Sri Lanka from time to time. However, presently the total energy sector is under one Ministry of Power and Energy operating as two sub-sectoral entities. In addition to formulation and implementation of National Policies such as National Energy Policy applicable to the energy sector of Sri Lanka, the Ministry supervises the enforcement and implementation of legislations enacted by the government and regulations made there-under by the semi-government organizations and state owned enterprises placed under the purview of the Ministry.

II. Public Utilities Commission of Sri Lanka (PUCSL)

The Public Utilities Commission of Sri Lanka (PUCSL) which has been established under the Public Utilities Commission of Sri Lanka Act No. 35 of 2002 is the independent economic, technical and safety regulator of the electricity industry in Sri Lanka and the designated regulator for petroleum and water services industries. Also PUCSL has been assigned as the shadow regulator for the lubricant market in Sri Lanka.

The authority to regulate electricity industry of Sri Lanka has been entrusted to the PUCSL by the Sri Lanka Electricity (Amendment) Act No. 20 of 2009 and amendments to respective acts are due to be made for granting authority to regulate water services and petroleum industries.

The objectives, powers and functions of PUCSL are;

- To Promote:
 - interests of all consumers
 - competition
 - efficient operations of and capital investment, efficient allocation of and safety and service quality in public utilities industries
- To benchmark utility services against international standards where feasible
- To ensure price controlled entities are acting efficiently and do not find it unduly difficult in financing their public utility industries

- While maintaining fairness, impartiality and transparency in decision making through communicating and engaging all the stakeholders in the process.

III. Ceylon Electricity Board (CEB)

Ceylon Electricity Board (CEB) is a corporate body established on 01st November 1969 under the Act No. 17 of 1969, empowered to generate, transmit and distribute electrical energy, to reach all categories of consumers and collect the revenue by acquiring and making optimal use of required resources through application of pragmatic and time-tested managerial methods.

CEB is bound to adopt and operate in accordance with the National Energy Policy of Sri Lanka. Therefore, it is bound to provide incentives and assistance for development of renewable energy resource under its commitment to promote Non-Conventional Renewable Energy (NCRE). Such NCRE encompasses; Hydro Energy (Mini Hydro), Wind Energy, Biomass (Dendro) Energy, Agricultural & Industrial Waste Energy, Municipal Waste Energy, Waste Heat Recovery Energy, Wave Energy and Solar Energy.

Due to inflated rates paid to private sector electricity producers and subsidies granted to low consuming customers, the CEB has continued to make losses and has to be reimbursed by Government Treasury grants.

IV. Sri Lanka Sustainable Energy Authority (SLSEA)

Sri Lanka Sustainable Energy Authority (SLSEA), the governing body responsible for pioneering the sustainable energy revolution in Sri Lanka was established under the Sri Lanka Sustainable Energy Authority Act No. 35 of 2007 with the aim of facilitating the development of sustainable energy resources, such as solar, wind, hydro and bioenergy.

The objective of the SLSEA is to increase the renewable energy share in the primary energy supply of Sri Lanka and reduce energy waste across all sectors, through improvement of energy efficiency and conservation by reducing GHG emissions in the energy sector.

The depletion of conventional resources due to the continuous increase in energy demand has resulted in the depletion of ecological resources with impacts on climate change of our planet. The SLSEA thus facilitates industries and other sectors in their transition to a sustainable energy future and serves as the principal platform for cooperation, a center of excellence and a repository of policy, technology, resource and knowledge on renewable energy. Also SLSEA promotes the widespread adoption and sustainable use of all forms of renewable energy, including hydropower, wind, biomass and solar in the pursuit of sustainable development, energy access, energy security and low-carbon economic growth and prosperity.

V. Lanka Electricity Company (Private) Limited (LECO)

Lanka Electricity Company (Private) Limited is a Private Limited Liability Company incorporated in 1983 under the provisions of the Companies Act No.17 of 1982 and re-registered under the Companies Act No. 07 of 2007 with 54.80% shares from Ceylon Electricity Board, 43.60% from the Government Treasury and 0.80% of shares each from Urban Development Authority and Local Authorities.

It is one of five electricity distribution licensees in Sri Lanka to "Distribute & Supply" electricity to the customers within its franchised area in the western coastal belt encompassing areas from Gampaha, Colombo, Kalutara and Galle Districts. The company owns and operates an electricity distribution network providing medium and low-voltage electricity to more than 585,000 customers. LECO purchases electricity in bulk from the national grid owned and managed by the CEB and distributes it to customers through a modern distribution system managed by the Company.

The company has identified the need for harnessing renewable energy for sustainable electricity provision and is progressing towards increasing solar power generation, while taking adequate environmental measures to reduce its carbon footprint. The company has strictly adhered to internationally accepted safety and quality regulations in accordance with the requirements of Public Utilities Commission of Sri Lanka in operation and maintenance of its distribution network.

VI. Lanka Coal Company (Private) Limited

Lanka Coal Company (Private) Limited was incorporated under the Company's Act No. 07 of 2007 to procure and supply coal for coal fired thermal plants of Sri Lanka, as per decision of the Government. The company shareholders include Ceylon Electricity Board (60 shares), Government Treasury (20% of shares), Sri Lanka Ports Authority and Ceylon Shipping Corporation with 10% of the shares each.

The company is considered to be built upon three key pillars of safety, environmental stewardship and shareholder value and claims to abide by them in its operations since 2013. It is expected to procure and supply about 2 million metric tons of coal per annum for the 900 megawatt Lakvijaya power plant at Norochcholai.

The main functions performed by the company are, processing of procurement, entering into coal supplier purchase agreements, procurement of coal, arrangements for shipping and lightering (barging) of coal, survey and quality testing at discharge port, assuring a continuous supply of the required coal to the power plant.

VII. Ceylon Petroleum Corporation (CPC)

The Ceylon Petroleum Corporation (CPC) was established as a State Owned Enterprise by Act No 28 of 1961. Main objectives of Ceylon Petroleum Corporation are to carry out business operations as an importer, exporter, seller, supplier and distributor of Petroleum products in Sri Lanka. The subsequent amendments to the Act entrusted the Corporation to carry on the business of exploring for oil and exploiting, producing, and refining of petroleum and to carry on any such business as may be incidental or conducive to the attainment of the objectives.

CPC started its operations in 1962 to compete with international petroleum companies that operated in Sri Lanka and has been entrusted with the entire business of import, sale and distribution of petroleum products within the country from 1964 along with the Kolonnawa oil installation. The Sapugaskanda petroleum refinery commenced its operations in 1969 and modernized it in 1992. Since inception the CPC continued to hold the monopoly in all aspects of petroleum products in Sri Lanka including bunkering until Lanka Indian Oil Company (LIOC) was given about 100 fuel pumping stations in 2003 and CPSTL was formed in 2007.

VIII. Ceylon Petroleum Storage Terminals Limited (CPSTL)

Ceylon Petroleum Storage Terminal Limited (CPSTL) is a State-Owned Enterprise (SOE) duly incorporated under the companies Act No. 17 of 1982 in terms of Section 2 (1) of the conversion of Public Corporations or Government owned business undertakings into Public Companies Act No. 23 of 1987. The company owns and operates the Common User Facility (CUF) consisting of Oil Terminals, Storage Facilities, Pipelines and the Bowser Fleet, as described in the Government Gazette extraordinary No. 1310-8 dated 13th October 2003.

CPSTL is engaged in bulk petroleum storage and distribution activities with state of the art infrastructure facilities for management of downstream product handling and serve about 1300 fuel pumping stations in the island which are owned by Ceylon Petroleum Corporation and Lanka Indian Oil Corporation to meet the energy demand of the retail consumer in the country and the large number of bulk consumers in various industrial sectors through 2 main installations supported by 11 bulk depots and with a workforce of about 3000 employees.

IX. Lanka Indian Oil Company PLC (LIOC)

Lanka IOC PLC (LIOC) has been incorporated in Sri Lanka in 2003 as a subsidiary of Indian Oil Company. It is the only private oil company that operates retail fuel pumping stations in Sri Lanka. Initially Lanka IOC took over to carry out retail marketing of petroleum products and bulk supply to industrial consumers with 100 fuel pumping stations owned by the Ceylon Petroleum Corporation but it had expanded to more than 150 pumping stations to become the eighth largest Colombo Stock Exchange listed company in Sri Lanka.

In addition Lanka IOC holds a 35% market share in a highly competitive bunkering fuels market, catering to all types of bunker fuels and lubricants at Colombo and Trincomalee ports of Sri Lanka along with an oil terminal at Trincomalee with a lubricant blending plant with an annual capacity of 18,000 tons per annum and a state-of-the-art fuel and lubricant testing laboratory.

Lanka IOC also owns a one-third share in Ceylon Petroleum Storage Terminals Limited (CPSTL) which is a joint venture of Lanka IOC and Ceylon Petroleum Corporation (CPC) which operates 13 oil terminals across the country.

5.2.9 Extended Cost-Benefit Analysis

The costs can be categorized into: a) the actual financial costs of the subsidy or the loss incurred by the government in providing the subsidy; and b) the cost to the environment or biodiversity due to implementation of the subsidy. The benefits of the subsidy can be categorized as; a) the actual financial and economic benefits to the beneficiary; b) the financial and economic benefits to the country; and c) benefits to the environment if any.

Methodology for Cost Benefit Analysis

- Financial costs have been estimated using market prices and in this the cost of CO₂. Subsidy costs are the actual budgeted values.
- Economic costs such as environmental costs have been estimated using market prices of CO₂. Data from CO₂ emissions from different production methods was obtained from studies completed in other countries and using the results to estimate the economic costs.
- Financial benefits have been estimated using market prices. For example, the actual profit earned is valued at market prices if such market prices are available.
- Economic benefits have been estimated using the benefit transfer method (using data from studies completed elsewhere) wherever, market prices were not available.

Costs and Benefits

- The costs can be categorized into: a) the actual financial costs of the subsidy or the loss incurred by the government in providing the subsidy; and b) the cost to the environment or biodiversity due to implementation of the subsidy.
- The benefits of the subsidy can be categorized as; a) the actual financial or economic benefits to the beneficiary; b) the financial or economic benefits to the country; and c) benefits to the environment if any.

Assumptions Made for Cost Benefit Analysis

- Environmental costs were estimated on the basis of Carbon Dioxide emissions in the referenced study “Carbon Dioxide Emissions from Electricity”. Costs were converted from the original US \$ value to SL Rupee at the prevailing exchange rate of 1 US \$ = Rs 180 in 2019.
- As there were no local data on the level of damage done to the environment by electricity the values obtained from the above referenced study was used to estimate damage to the environment due to electricity use based on carbon emissions.
- The cost of CO2 emission was estimated at US\$ 50 per metric tonne of CO2 and the damage cost estimated on the basis of electricity produced through the various production methods used in Sri Lanka.

Estimated Financial and Environmental Costs

Estimated Financial and Environmental Costs to implementation of the subsidy. The costs can be categorized as; a) the actual financial cost to the government b) the environmental costs to the country.

Table 5.2:5: Power and Energy – Subsidy and Environmental Cost

Energy Sub-Sector	Subsidy Cost (Rs Billion)	Subsidy Cost (US\$ Billion)	Type of Subsidy
Subsidy to CEB for Electricity Production	67.6	0.376	Implicit Income Transfer
Total	67.6	0.376	
Cost to Environment	73.8		

Financial Cost to Government - The cost of the subsidies in the sector are as follows:

1. Subsidy Cost - Total cost of subsidies in the production and sale of electricity was Rs. 67.6 billion (0.376 billion USD) in 2019. Total revenue from sales was Rs. 243 billion (1.350 billion USD) and the cost of sales was Rs. 311 billion (1.728 billion USD). Total cost of subsidies in the production and sale of electricity was Rs. 67.6 billion (0.376 billion USD) in 2019.
2. Environmental Cost –

The production and consumption of fossil energy produces air pollutants that cause acidification or eutrophication of habitats and greenhouse gases (GHG) contributing to global warming. The greenhouse gases produced varies with the method of production. The emission of GHG by production method is provided in Table 5.2.6

Table 5.2:6: Carbon Emission Costs by Electricity Production Method

Production Method	Emission CO ₂ Equivalent of GHG (g/kWh)	Pollution cost at US\$ 50 / MT of CO ₂ / GWh (In 2019 US\$)	Cost / MT /GWh in 2019 SL Rupees Million (Rs. 180/1US\$)	Output of Electricity in Sri Lanka by Source (GWh) 2019	Cost of Emissions from electricity output in Sri Lanka (Rs. Billion)	Cost of Emissions from electricity output in US \$ (Billion)
Coal	820	41,000	7.380	5361	39.564	0.2198
Thermal oil	740	37,000	6.660	5012	33.380	0.1854
Natural Gas	490	24,500	4.410			
Biomass	230	11,500	2.070			
Solar PV	48	2,400	0.432			
Solar Roof	41	2,050	0.369			
Hydropower	24	1,200	0.216	3782	0.817	0.0045
Other Renewable	5	250	0.045	1761	0.079	0.0004
Total				15, 916	73.840	0.4102

Source: Carbon Dioxide Emissions from Electricity (Updated May 2021) - World Nuclear Association

The total cost of emissions of GHG in CO₂ equivalents in the production of electricity in Sri Lanka (CEB and Private Sector) was Rs 73.84 billion (0.410 billion USD) in 2019. The emission from the use of electricity by the consumer is considered negligible.

Estimated Financial and Economic Benefits

The social and economic benefits from the use of electricity are large. They include better quality of living for households, facilitation of economic and livelihood activities, facilitation of education and recreation and overall comfort and happiness. The real value of electricity is realized only when there is a breakdown in the supply of electricity. Commercial, industrial and public activities are facilitated by electricity. Breakdown of electricity will result in considerable losses in commercial and industrial outputs and indirectly in loss of exports and incomes of the private and public sector. Although it is difficult to value the benefits of electricity, it is not impossible to do so. Such a valuation was completed in a study made in Korea (See para below). In Sri Lanka, such estimation will require large amounts of data on productivity, incomes and quantification of impacts on a large number of industrial, commercial and public activities. Such a task will be painstaking and long and may stretch over several months to complete. Therefore we have used the values estimated in the following study completed in Korea.

The economic value of electricity was estimated in a study completed in Korea². According to this study the value of electricity was estimated at US\$ 4.5 per kWh. We cannot use the same value as Korea as it is a highly developed country compared to Sri Lanka and thus the value of electricity would be high. So we have used a more conservative estimate which may reflect the value of electricity in Sri Lanka. We have assumed that benefits from electricity in Sri Lanka are double that of the average cost of production of electricity of Rs 16 / kWh (CEB average COP) or Rs 32 (0.178 USD) / kWh as the value of benefits. The economic value of electricity based on this assumption is Rs. 509.3 billion (2.829 billion USD) / annum (15,916,000,000 kWh X Rs 32/kWh) in 2019 for the use of 15,916 GWh produced in Sri Lanka in 2019. However, the assumption that we have made is not based on any hard evidence from any scientific studies completed in Sri Lanka. The figures presented in the analysis based on the above estimation can be considered approximate and would vary according to the assumptions made.

² "Electricity shortage cost in Korea – An input-output analysis" H.C.Ju, S.H. Yoo and S.J.kwak in Energy Resource Part B Economics Planning and Policy 30 March 2016.

Benefits to Country

The full economic potential of the country can be realized only with a continuous supply of electricity to the consumer. The country benefits from production and exports of goods and services. This can be measured in terms of the GDP. The GDP of electricity, gas steam and air conditioning was Rs 118.6 billion (0.659 billion USD) in 2019 current prices. If we assume that electricity is the major constituent of this sector GDP or makes up 75% of this sector, then the value that can be attributed to electricity is Rs. 87.5 billion (0.486 billion USD).

Extended Cost –Benefit Analysis

Table 5.2:7: Extended Cost and Benefits of Energy Sector

Component	Costs - Rs. Billion)	Costs – USD Billion
Cost of subsidy	67.6	0.376
Cost to the environment/biodiversity due to electricity production and use.	73.8	0.410
Total Costs	141.4	0.786
Component	Benefits - Rs. Billion	Benefits – USD Billion
Estimated economic benefits to consumers due to electricity use.	509.3	2.829
Value to the country from the production of electricity (GDP of electricity sector-2019).	87.6	0.487
Total Government Budget (2019)#	1.4	0.008
Total Economic Benefits	509.3	2.829
Costs – Benefits	-367.9	-2.044

Government Budget Estimates 2021 – Ministry of Finance

The total cost of the subsidy and the cost to the environment were estimated at Rs. 141 billion (0.786 billion USD). The economic benefit to the consumer has been estimated at Rs 509 billion (2.829 billion USD). The value to the country from the production of electricity based on the GDP is estimated at Rs. 87.6 billion (0.487 billion USD). Thus total economic benefits exceed the costs by Rs. 367.9 billion (2.044 billion USD).

5.2.10 Suggestions for Repurposing of Subsidies

In the last few years there has been a growing awareness among governments as well as an increasing number of studies suggesting a significant link between carbon emissions and the presence or removal of fossil fuel subsidies. Research estimates that the removal of all fossil fuel subsidies would lead to a global decrease in carbon emissions of around a quarter (between 0.5 to 2 Gt or between 1 and 4%, globally by 2030) of the combined emissions reductions currently proposed by countries as part of the Paris Agreement (of between 4–8 Gt from fossil fuels and industry) (*Jewell et al., 2018*). Further research indicates potential reductions of between 6.4–8.2% by 2050 as against “business as usual” scenarios (BAU) (*Schwanitz et al., 2014; Burniaux & Chateau, 2014*). The research found that across 20 subsidizing countries, an average overall drop of 11% in country emissions would be achieved through a phase-out of fossil fuel consumer subsidies by 2020. This suggested average annual savings to governments of close to USD 93 per tonne of greenhouse gas (GHG) emissions removed, or a total (across just 20 countries) of 2.8 gigatonnes (Gt) of CO₂ by 2020 (*Merrill & Bassi et al., 2015*). According to the results of these studies, the overall average emissions drop increases to 18% and this could result in an additional 37 Gt of reduction by 2050 (*Gerasimchuk et al., 2017*).

It is therefore suggested that subsidies in fossil fuel used in electricity production be removed. Data from Table 5.2.4 shows that only Kerosene is currently subsidized. Kerosene is not used in the production of electricity. It is mostly used by poor households for lighting and cooking. Elsewhere in the report on the section on marine fisheries, it has been suggested to remove the subsidy progressively over a period of time. This is suggested only for fishermen using motorized boats. It is suggested that subsidies for kerosene provided for poor households be continued by giving a cash grant so that only the poor households will be targeted for the subsidy. All others should purchase at the non-subsidized price that prevails in the market place.

With respect to subsidies provided for low consuming electricity consumers, it is suggested that these subsidies should also be removed progressively over a period of time. In the meantime the quantum of subsidy should be also reduced for all categories of consumers who are receiving the subsidy. When the bills of low consuming households are analyzed, most people pay very low monthly amounts of less than Rs 500 per month. In reality these households spend more for their mobile phones than for electricity. Thus a majority of the poor households will be able to afford small increases in the bill over a long period. The bulk of the customers, about 50% fall into the low user category and the highest proportion of revenue is obtained from these households. Thus increasing the cost to high consuming households will not bring in high revenue revenues and have any impact on the losses incurred by the CEB. Thus it is suggested that reducing the subsidy given to low consuming households appears to be the policy that should be adopted. The subsidy however, could be reduced in a progressive manner and over time to reduce any temporary hardship that may be faced by the low consuming consumer. Furthermore, not all low consuming households are poor, many rich households also may be low consuming households as the number of members in the household may be low and consequently their consumption may also be low.

5.2.11 Impacts of Repurposing

The impacts of re-purposing include possibilities of income reduction due to higher electricity bills. However, when one considers the additional amount for a household with a bill of Rs 100 per month, a 10% increase will increase the bill to Rs 110 or an increase of Rs 10. This is a small amount even for a poor household and may not have much impact on their incomes. However, a 10% increase in cost will reduce the losses of the CEB considerably since the proportion of households in the low income categories is high.

5.3. Agriculture Sector

5.3.1 Introduction

The agriculture sector in Sri Lanka contributes about 8.3 percent to the national GDP. Over 30 percent of Sri Lankans are employed in the agricultural sector (O'Neill, 2022). Sri Lanka's primary food crop is rice. Rice is cultivated during two seasons. Tea is cultivated in the central highlands and is a major source of foreign exchange. Fruit, vegetables, and oilseed crops are also cultivated in the country.



5.3.2 Subsidies in the Sector

The Government of Sri Lanka has introduced a number of policies and programs to increase paddy production since independence. The fertilizer subsidy program is one of the longest lasting, most expensive, and most politically sensitive policies implemented to promote rice cultivation in Sri Lanka. It was initiated in 1962 (that is, at the onset of the Green Revolution) with the main objective of encouraging farmer. to switch from traditional rice varieties to high-yielding varieties (HYVs) that are highly responsive to chemical. Since then, however, the provision of the subsidy has become customary, and successive governments have been under tremendous pressure to continue the subsidy despite budgetary constraints. The subsidy policy has evolved over time. During the period 1962–89 the subsidy was provided for all three main types of fertilizer.—nitrogen (N), phosphorus (P), and potassium (K)—targeted primarily at paddy. Subsidies were not provided during 1990–94 but were reintroduced in 1995 for all three types of fertilizer. The subsidy was limited to urea during 1997–2004. Since 2005, the subsidy has again been expanded to cover all three types.

The price of a 50-kilogram bag of fertilizer has been set at US\$3.07 regardless of the world market price. Paddy farmers are eligible to apply for the fertilizer subsidy provided that they have legal title to their paddy lands. In 2020, Sri Lankan imports (both state and private sector) of foreign fertilizer reached US\$ 259 million, representing 1.6 percent of the country's total imports by value. Sources indicate that the 2021 import bill could potentially total in the range of US\$ 300-US\$ 400 million in current international prices. By limiting and/or banning costly foreign exchange draining fertilizer and agrochemical imports, the Sri Lankan government aimed to generate significant import cost savings. The subsidy payment constitutes 2.24 percent of total government expenditures and has become a massive burden on the Treasury. Fully subsidized fertilizer for small holder rice production, a key component of Sri Lanka's agricultural policy, inadvertently provides farmer an incentive to over fertilize their fields, (*Weerahewa et al, (14), 2010.*)

The Government's fertilizer subsidy program extends to other crops too, including tea, vegetables, and coconuts, as well as to rubber, potatoes, fruit, and minor export crops. Depending on the commodity, the Government subsidizes anywhere from 48-to-88 percent of the market price of a 50-kilogram bag of fertilizer.

In 2019, the Government distributed around 300,000 MT of subsidized imported fertilizer to other crop farmer. Of that amount, 44 percent went to paddy, 24 percent went to tea plantations, 12 percent to vegetable producer and the balance to coconut plantations, rubber, fruit, potatoes, and minor export crops' producers.

The cost of the existing subsidies for paddy and other crops are shown below;

- Seed production in 25 districts (vegetable, rice etc.) – 50% Subsidy Rs. 20 million (0.11 million USD)
- Crop diversification OFCs – 25 districts – Subsidy Rs. 20 million (0.11 million USD)
- Production villages – 1-2 crops per village – subsidy Rs. 90 million (0.5 million USD)
- Demonstration for commercial farming on uplands near tanks. The allocation was Rs. 400 million – Subsidy spent last year was only Rs. 50 million (0.27 million USD)
- Cashew - Planting material – improved seedlings provided at a subsidy – technical support for 3 years.
- Fertilizer subsidy – Rs. 37 billion (205.5 million USD)
- Cultivation subsidies – Rs. 1.6 billion (8.8 million USD)
- Subsidy for crop insurance – Rs. 1.5 billion (8.3 million USD)
- Other – Rs. 10 billion (55.5 million USD)

Other subsidies given for promoting 13 crops: maize, green gram, chillies, potato, onions red, onions large, soya beans, groundnut, kurakkan, cow pea, tala, paddy and vegetables.

Following subsidies are given for persons with < 2 ha. of land.

- Seeds and seedlings – example is the subsidy given for green gram seeds. This intends to promote local products and reduce the import of food crops.
- Machinery (pumps etc.), poly tunnels and plastic piping and other equipment for irrigation. The subsidy for this is 50%. Some foreign funded projects provide 100% subsidy for above; for example, Agriculture Sector Modernization Project (ASMP) 100% subsidy, Sustainable Agricultural Partnership Program (SAPP) -50% subsidy 50% loan, Climate Smart Irrigated Agriculture Project (CSIAP) also provides subsidies.
- Indirect subsidies given for protected irrigated agriculture programme, equipment for micro irrigation and other projects are given as a tax (Duty and Cess) waiver for imported equipment, polythene roof sheets, polythene mulch to reduce waste of water when cultivating chillies, vegetables and tomato.
- Genetically Modified Organisms (GMOs) had not been allowed to the country. Only hybrid seeds which are not GMOs had been imported by private sector. No subsidy had been given to the farmers by the Government to purchase such imported seeds. However, people prefer to purchase high yielding improved seeds over the indigenous ones especially for paddy as they provide higher yields. The indigenous crop varieties including paddy are conserved in the Plant Genetic Resource Centre to protect the germplasm for future.

In May 2021, the Government banned the import of fertilizer and agrochemicals including insecticides and herbicides. This decision was taken on the premise that rising of health care costs is brought about by the overuse of chemicals in agriculture production.

Despite the fact that the Government expected to substitute the inorganic fertilizer with organic fertilizer, it proved to be difficult to expand the organic fertilizer production capacity sufficiently to meet current fertilizer use requirements. Since the paddy rice varieties that are being cultivated are fertilizer responsive, on the face of dearth of fertilizer nutrient deficiencies crept in. Most of the vegetable and fruit crops cultivated on the island are hybrid varieties dependent on chemical fertilizer for higher yields. Tea, rubber, and coconut yields also declined with the shift to organic fertilizer and resulted in lowered export earnings. The lack of organic fertilizer productive capacity, coupled with the absence of a formalized plan to import organic fertilizer in lieu of chemical fertilizer raised the potential for an adverse impact on food security.

In response to a widespread apprehension and protest by the farmers and related stakeholders, the Government lifted the ban on the import of chemical fertilize with effect from November 30, 2021.

While subsidies have a major impact on crop cultivation, they are not the only drivers in agricultural production. Agriculture being more or less a subsistence type of activity, other factors such as high dependence on agriculture of the farming population for their livelihoods, land and water availability, lack of other skills or employment opportunities for farmers, demand and marketability of their produce and adequate input supply are other drivers that impact agricultural production. The cost benefit evaluation conducted below takes into account the subsidy as one of the major contributors to the impacts on the environment in agricultural production. Even if the subsidies are removed, agricultural production activities will continue, perhaps at a slightly reduced rate and there may not be any significant reduction on the impacts on the environment.

5.3.3 Environmental Impacts

The following adverse environmental impacts can be perceived mostly from the overuse of fertilizer and other agrochemicals;

- The intensification of farming practices cause decline in flora and fauna of the cultivated area. The freely available agrochemicals may lead to over-application.
- Excess nutrients from agriculture damage biodiversity far beyond the application and spreading perimeter of the source. This is very common for the freely dissolved nitrogen element in the fertilizer. The high nitrogen levels in the waterbodies leads to causing blue baby syndrome in infants too.
- Over-fertilization pollutes water bodies and also pollutes large land areas via airborne inputs and acidifies aquatic and terrestrial ecosystems. It can also contribute to contamination of food.
- This displaces numerous species that depend on low-nutrient habitats. This pollution is an external ecological cost.

5.3.4 Social Distribution and Gender Impact

In Sri Lanka, there is a gender role difference in paddy cultivation activities. The routine of women is to undertake time-consuming and labour intensive household tasks, while men do the ploughing, sowing, threshing, and transporting of goods to market. Women engage in 30% of all the tasks in the paddy sector. However, in dry land farming, about 65% of tasks are done by women. The obstacles for the women in participation in agricultural activities were reported as lack of knowledge and training in agriculture field, family burden, cultural and social barriers and physical constraints. Enhancing the awareness and the technical knowledge to the women in the field of agriculture would contribute to increased incomes from agriculture.

Men have the full power to intervene in decisions on agriculture and water management at the village level. However, a larger proportion of women were involved in decision making especially in the selection of crops and varieties for planting and livestock rearing. Access to credit for landless women is also impeded, as banks and financial institutions almost always require a deed of a land as collateral when obtaining loans. The woman who does not have land ownership is therefore deprived of access to capital. Women farmers face great injustice in cultivation as well as in the market. Purchasing and distributing agricultural produce is entirely a male dominant space. Economic centres are always very far from the farmlands. The bargaining process of the market is also dominated by men. Having limitations in mobility and being responsible for care work in the family, women farmers have to enlist the help of men in this process. The woman has almost no access to the market and is unable to influence the price of her produce.

Women in the agriculture sector play a significant role in the Sri Lankan economy through their contribution to agricultural production and processing. Women from all ethnic communities are engaged in agricultural sub sectors but the contribution of women from rural households is significantly higher than those from urban households.³ Nearly 30 percent (29.7%) of employed women work in all agricultural subsectors as compared with 23.8 percent of employed men (*Department of Census and Statistics 2017*). However, the engagement of women in agriculture over the years has declined in the service sector (ILO 2016) following the structural changes in the economy. The overwhelming majority of women tend to work in the informal sector, particularly in home-based activities in the informal sector but labour force participation rate (LFPR) underestimates their participation, particularly in home-based activities in the informal sector.

According to the *Agricultural Household Survey conducted by the Department of Census and Statistics* in 2016/17, agricultural households comprised 40 percent of the total number of households in the country. Of the 2.1mn people in these households, 51 percent of the householders were women. Nineteen percent of the agricultural households were headed by women. Out of the estimated 2.3 mn agricultural operators, women were 23 percent. In the unpaid family worker category, female family members were 78.9 percent while male family members accounted for 21.1 percent.

There is evidence to show that women face barriers to engage in agriculture activities due to patriarchal structures and power imbalances in the family, society and the state, cultural beliefs, gender norms, the burden of the triple role and the tasks expected from a woman at the domestic level, impact of climate change, disabilities and health concerns, domestic violence and security, poor technical skills, weak access to profitable markets, and laws related to ownership of land and difficulties in accessing services.⁴

Various studies conducted on gender mainstreaming in the agricultural sector have given effective recommendations for gender mainstreaming and promoting women in the agriculture sector.

1. Creating an enabling environment, awareness creation and capacity building on gender mainstreaming that cut across the governance and management hierarchy of the agriculture sector.
2. should identify the practical and strategic need of enhancing women's participation the sector while creating opportunities for better recognition for female farmers,
3. Sectoral approach and cross-learning should be promoted where value chains can be enriched and cross-learning can be established for greater productivity.
4. Improving the responsiveness of state agencies to respond to stakeholder and beneficiary needs and requests.
5. Training and capacity building for Gender Mainstreaming at all levels of the agriculture sector should be implemented with systematic planning.
6. Agricultural extension to be used in providing subsistence facilities in way “no woman must be left behind”, by keeping the extension and advisory services remain pro-active and reach rural women. Understanding the responsibility of agricultural extension beyond the confines of “transfer of technology” and to include ground realities faced by women and men to pursue social justice.
7. Promoting farm organizations to establish an effective mechanism through which farmer needs are met. Women producers in all sub-sectors should be targeted by expanding the farm women organizations program initiated in some sectors to promote affirmative action to ensure gender equity in participation in executive positions.
8. Advocacy to be used in bridging the gaps in eh sector
9. Strategic interventions: Undertake sector-specific value chain analysis to identify where

³s

⁴Ibid.

10. and how women can be optimally engaged and to get the maximum impact of subsidies provided.
11. Coordinated policy planning to improve the productivity of women's involvement in the agriculture sector. The apex body and the line agencies which provide support in the sector

5.3.5 Administrative and Institutional Issues

The administrative and institutional structure of the Agriculture sector applicable to subsidies can be analyzed as follows:

Ministry of Agriculture

The Ministry of Agriculture is the central Government Cabinet Ministry responsible for policy formulation and implementation relating to agriculture, food and allied agricultural crops and related subjects in Sri Lanka. The other objectives of the Ministry are establishment of food and nutrition security, stabilizing prices for agricultural products, efficiently coordinating paddy purchasing and marketing program, increasing production of selected crops and efficient and effective implementation of accelerated food production program. Department of Agriculture, Elkaduwa Plantation Company Ltd., Department of Export Agriculture and Agricultural & Agrarian Insurance Board are the implementation institutions vested directly under the Ministry of Agriculture.

Even though presently defunct, there are two State Ministries enlisted under the Ministry of Agriculture and institutions such as Department of Agrarian Development, National Fertilizer Secretariat, Ceylon Fertilizer Co. Ltd, Colombo Commercial Fertilizer Co. Ltd applicable to subsidies expounded in the present study have been declared under the State Ministry of Promoting the Production & Regulating the Supply of Organic Fertilizer, and Paddy and Grain, Organic Food, Vegetables, Fruits, Chilies, Onion and Potato Cultivation Promotion, Seed Production and Advanced Technology Agriculture. However presently all those organizations are administered by the Ministry of Agriculture.

Department of Agriculture

Department of Agriculture (DOA) functions under the Ministry of Agriculture and is one of the largest government departments with a high profile community of agricultural scientists and a network of institutions covering different agro ecological regions island wide. Objectives of Department of Agriculture are maintaining and increasing productivity and production of the food crop sector for the purpose of enhancing the income and living condition of farmers and making food available at affordable prices to consumers in Sri Lanka while main functions of DOA are Agricultural Research, Technology Dissemination, Seed and planting material production and distribution and Regulatory services.

Department of Agriculture administers subsidies such as seed production, planting materials, crop diversification, agronomy demonstrations and technical support for the benefit of farmers all over the country through different institutions under the purview of the DOA, Provincial and District Agriculture Officers and with liaison with the Department of Agrarian Development.

Department of Agrarian Development

Abolishing the hitherto existed Food Department, the Department of Agrarian Development has been established in 1957 with the objective of providing necessary facilities to Sri Lankan farmer community under the Paddy Lands Act No. 01 of 1958. Presently the department is empowered by the Agrarian Development Act No. 46 of 2000 with its subsequent amendments and the Paddy Lands Act No. 46 of 1958. In addition to its Head Office in Colombo, the department functions all over the country under the administration of Deputy and Assistant Commissioners assigned to and located in Districts. Under

those District Offices there are Agrarian Service Centers where grass root level officers from almost all agriculture related government organizations are located to coordinate with farmers of respective areas.

Those Agrarian Service Centers play the key role in provision of all facilities including agronomic, technical, planting material, machinery and financial subsidies of both direct and indirect nature to former communities.

National Fertilizer Secretariat

National Fertilizer Secretariat of Sri Lanka has been established under the Fertilizer Regularization Act No 68 of 1988 and operates a network of district offices covering all 25 districts of the island. Functions of the secretariat are coordinating and supervising the importation, mixing, distribution and trading of fertilizers by Ceylon Fertilizer Co. Ltd and Colombo Commercial Fertilizer Co. Ltd and maintaining buffer fertilizer stocks by implementation of Regulation declared under the Fertilizer Regularization Act No. 68 of 1988.

Presently the National Fertilizer Secretariat operates under the Ministry of Agriculture though it has been declared by gazette under the presently defunct State Ministry of Production and Supply of Fertilizer and Regulation of Chemical Fertilizer and Insecticides. The secretariat is expected to promote and regulate the use of quality fertilizers, train farmers and increase their awareness of the use of organic fertilizers.

Ceylon Fertilizer Co. Ltd

Ceylon Fertilizer Cooperation established in 1964, under the State Industrial Act No 49 of 1957 has been restructured, as per the provisions of the Act no. 23 of 1987 into Ceylon Fertilizer Co. Ltd. in 1992 and is re-registered under the New Company Act No.07 of year 2007 as a limited liability company under the purview of the Agriculture Ministry. The company presently operates under the Ministry of Agriculture though it has been declared by gazette under the presently defunct State Ministry of Production and Supply of Fertilizer and Regulation of Chemical Fertilizer and Insecticides.

Main objectives of the Ceylon Fertilizer Co. Ltd are to provide 60% of the paddy and 25% of other crops quota of fertilizer subsidy through Agrarian Development Centers and improving the mixing, handling and storage facilities of fertilizer. Therefore, Ceylon Fertilizer Co. Ltd plays a vital role in implementation of fertilizer subsidy in Sri Lanka.

Colombo Commercial Fertilizer Co. Ltd

Colombo Commercial Fertilizer Co. Ltd has been established in 1872 by the European Business Community and presently operates as a business venture 100% owned by the Treasury. The company also presently operates under the Ministry of Agriculture though it has been declared by gazette under the presently defunct State Ministry of Production and Supply of Fertilizer and Regulation of Chemical Fertilizer and Insecticides.

The functions of the Colombo Commercial Fertilizer Co. Ltd is to import 40% of the fertilizer subsidy required for paddy cultivation in Sri Lanka to be distributed to farmers through Agrarian Development Centers and to import and distribute required fertilizer for other crops.

5.3.6 Extended Cost Benefit Analysis

Methodology for Cost Benefit Analysis

- Financial costs have been estimated using market prices. Subsidy costs are the actual budgeted values.

- Economic costs such as environmental costs have been estimated using market prices if available. If market prices were not available, the method of benefit transfer was used. This involves using data from other similar studies done within the country or in other countries and using the results to estimate the economic costs.
- Financial benefits have been estimated using market prices. For example, the actual profit earned is valued at market prices if such market prices are available.
- Economic benefits have been estimated using the benefit transfer method, wherever, market prices were not available.

Costs and Benefits

- The costs can be categorized into: a) the actual financial costs of the subsidy or the loss incurred by the government in providing the subsidy; and b) the cost to the environment or biodiversity due to implementation of the subsidy.
- The benefits of the subsidy can be categorized as; a) the actual financial or economic benefits to the beneficiary; b) the financial or economic benefits to the country; and c) benefits to the environment if any.

Assumptions Made for the Cost Benefit Analysis

- Resource values of the environment estimated in the referenced study “*Damage costs of nitrogen fertilizer in Europe and their internalization*” Article in *Journal of Environmental Planning and Management* May 2006, was used in estimating the damage costs in Sri Lanka.
- The value of environmental damage done to the environment due to agricultural activities, was obtained from a study on damage costs in Sri Lanka “Greening the National Accounts” and updated to the year 2019.
- Assumed that the cost of production of agricultural produce to be about 55% of the value of production.

Estimated Financial and Environmental Costs

Table 5.3:1: Agriculture – Subsidy and Environmental Costs

Subsidies in the Sub-Sectors	Subsidy Cost (Rs Million)	Subsidy Cost (US \$ Million)	Type of Subsidy
Agriculture			
Seed production in 25 districts (vegetable, rice etc.) – 50% Subsidy	20	0.111	Direct Transfer of Funds & In kind provision
Crop diversification OFCs – 25 districts – Subsidy Rs. 20 million	20	0.111	Direct Transfer of Funds & In kind provision
Production villages – 1-2 crops per village	90	0.50	Direct Transfer of Funds & In kind provision
Demonstration for commercial farming on uplands near tanks. Subsidy spent last year Rs. 50 million (0.2 million USD)	400	2.222	In kind provision
Cashew - Planting material – improved seedlings provided at a subsidy – technical support for 3 years.	30	0.166	Direct Transfer of Funds & In kind provision

Fertilizer subsidy	37,000	205.55	Implicit Income Transfer
Cultivation subsidies – For several crops	1,600	8.88	Direct Tranfer of Funds & In kind provision
Subsidy for crop insurance – Rs. 1.5 billion (8.3 million USD)	1,500	8.33	Implicit Income Transfer
Other subsidies– Rs. 10 billion (55.5 million USD)	10,000	55.55	Direct Tranfer of Funds & In kind provision
Total	50,660	281.42	
Cost to Environment	83,600	464.44	

1. Financial Cost to Government

Subsidy Cost - The total cost of the subsidies in the sector is Rs. 50.7 billion (US\$ 0.2814 billion) in 2019

2. Environmental Cost

Total environmental cost was estimated at Rs 83.6 billion (464.4 million USD)

The environmental costs included the damage cost of fertilizer use, use of agrochemicals, cost of soil erosion and emission of greenhouse gasses. Details are presented below;

Table 5.3:2: Damage Costs of Nitrogen Fertilizer (Euro/kg of N) in 2019

	CO ₂ Emission	Cost of Pollution (2005)	Euro / Kg of N (2005)	Euro / Kg of N (2019)
N ₂ O from fertilizer in soil	6.09 kg of CO ₂ / Kg of Nitrogen	0.019 Euro/Kg of CO ₂	0.12 Euro/Kg of Nitrogen	0.15 Euro/Kg of Nitrogen
Eutrophication from use of N Fertilizer			0.03 Euro/Kg of Nitrogen	0.037 Euro / Kg of Nitrogen
Health Impacts – Infant Mortality			Negligible	0
Total Cost			0.15 Euro/ Kg of Nitrogen	0.19 Euro/ Kg of Nitrogen

Source: H. Von Blottnitz, A. Rabl, D. Boiadjev, T. Taylor & S. Arnold - “Damage costs of nitrogen fertilizer in Europe and their internalization” Article in *Journal of Environmental Planning and Management* • May 2006

The major impact of agriculture is the pollution of soil and water bodies. Over-application of chemicals, fertilizers and intensive farming practices cause a decline in the fauna and flora population of the cultivated areas. Other impacts include algae formation due to the excess nutrition including dissolved nitrogen flowing into water bodies, which cause harm to inland water life and blue baby syndrome in babies. Pollution also extends to large land areas beyond the cultivated areas and acidifies other aquatic and terrestrial ecosystems and can also Source:

The major impact of agriculture is the pollution of soil and water bodies. Over-application of chemicals, fertilizers and intensive farming practices cause a decline in the fauna and flora population of the cultivated areas. Other impacts include algae formation due to the excess nutrition including dissolved nitrogen flowing into water bodies, which cause harm to inland water life and blue baby syndrome in babies. Pollution also extends to large land areas beyond the cultivated areas and acidifies other aquatic and terrestrial ecosystems and can also contaminate food. Numerous species that depend on a low-nutrient habitat are also affected. There is some evidence that heavy metals in agrochemicals may be causing Chronic Kidney Disease (CKD), the exact cause of the disease is still not known. There are about 150,000 patients affected by CKD of unknown origin, primarily in rural communities.

Using the costs estimated from the Table 5.3.2 the damage costs of fertilizer use in in agriculture (All agriculture except plantation crops and minor export crops) in Sri Lanka has been estimated and is presented in Table 5.3.3

Table 5.3.3: Cost of Pollution from Fertilizer Use in Sri Lanka

Cost Component	Euro / Kg of N (2019)	USD/ Kg of N (2019)	Cost of Pollution in SL Rupee (2009) @ Rs. 210 / Euro	Cost of Pollution in USD	Total Cost of Pollution of 121,900 MT of N (46% of 265,000 MT of Urea)
Cost of N ₂ O pollution from fertilizer in soil	0.15 Euro/Kg of N	0.17 USD / Kg of N	Rs. 32 / Kg of N	0.18 USD / Kg of N	Rs. 3.9 billion (21.6 million USD)
Cost of Eutrophication from use of N Fertilizer	0.037 Euro / Kg of N	0.04 USD / Kg of N	Rs. 8 / Kg of N	0.04 USD / Kg of N	Rs. 975.2 million (5.4 million USD)
Total Cost	0.19 Euro/ Kg of N	0.22 USD / Kg of N	Rs. 40 / Kg of N	0.22 USD / Kg of N	Rs. 4.9 billion (27.2 million USD)

It is estimated that there are about 3 million people at risk of contracting CKD and about 160,000 CKD patients⁵ in Sri Lanka and about 10,000 patients who undergo dialysis per annum. The annual cost of dialysis treatment of CKDu varies from about Rs. 665,000- Rs. 995,000 (3695 USD – 5528 USD) for a patient. Total Cost Rs. 8.5 billion (47.22 million USD)/annum at an average cost of Rs. 850,000 (4722 USD) per patient). Cost of measures needed to prevent further spread of the diseases is estimated at Rs. 712 million (3.95 million USD) and the cost of treatment of the disease at Rs. 100, 000 (555.5 USD) per patient per year at Rs. 16 billion (88.8 million USD). Thus total CKD related cost is Rs. 25.2 billion (140 million USD). If we assume that 40% of the cost is due to use of agro chemicals then total cost of damage to human well-being works out to Rs. 10.1 billion (56.1 million USD) per annum.

Damage to the biodiversity/environment as a result of agricultural activities was estimated in a study completed in 2010⁶. The study estimated the damage costs due to the use of pesticides, weedicides and fungicides, greenhouse gasses and soil erosion at Rs. 43.8 billion (243.33 million USD) in 2007. This

⁵ “Public health interventions for chronic diseases: cost benefit modelizations for eradicating chronic kidney disease of multifactorial (CKDmfo/CKDu) origin from tropical countries” Sunil J. Wimalawansa, Professor of Medicine, Endocrinology & Nutrition in Heliyon, Volume 5, Issue 10, October 2019.j

⁶ “Greening the National Accounts” U. A. D. Prasanthi Gunawardena, Department of Forestry and Environmental Science, University of Sri Jayewardenepura. Presented at the 66th Annual Sessions of the Sri Lanka Association for the Advancement of Science on 10th December 2010 held at University of Colombo. Published in the Proceedings of the 67th Annual sessions Part II: Inaugural and Presidential Addresses

works out to Rs. 68.6 billion (381.1 million USD) in 2019. (Converted to 2007 USD @ Rs. 115/USD and reconverted to SL rupees using 2019 USD conversion rate of Rs. 180/USD)

Table 5.3:4: Damage Costs to Biodiversity Due to Agricultural Activities

Component	Cost in Rs. Billion in 2007	Cost in Rs Billion in 2019	Cost in Million USD 2019
Agro-Chemicals	10.3	16.1	89.4
Green House Gasses	11.2	17.6	97.7
Soil Erosion	22.3	34.9	193.8
Total	43.8	68.6	381.1

Source: “Greening the National Accounts” U. A. D. Prasanthi Gunawardena, 2010

The above table shows the damage costs to biodiversity due to agricultural operations such as ploughing, planting, weed control and pest control, and harvesting of annual rain-fed and irrigated crop agriculture. The costs estimated in 2007 have been converted to 2019 prices using inflation rates in Sri Lanka.

The total cost to the biodiversity/environment comprises the following;

The cost to the environment by use of fertilizer – Rs 4.9 billion (27.2 million USD)

Cost to environment due to use of agrochemicals - Rs 16.1 billion (89.4 million USD)

Cost to environment due to emission of GHG – Rs 17.6 billion (97.7 million USD)

Cost to environment due to soil erosion – Rs 34.9 billion (193.8 million USD)

Cost to humans due to CHD – 10.1 billion (56.1 million USD)

Total cost – 83.6 billion (464.4 million USD)

Estimated Financial and Economic Benefits

1. Benefits to Farmers -

The total value of agricultural production (field crops including paddy) excluding the plantation and minor export crops in 2019 was Rs. 480 billion (2666.7 million USD) (*Dept. of Census and Statistics*). If we assume the cost of production to be about 55% of the value of production (author’s estimate) or Rs. 264 billion (1466.7 million USD), then the net returns or benefits to farmers would be Rs. 216 billion (1200 million USD). The total number of farmer households in the crop sector is estimated at about 750,000. Then the average income per farming household from crop production can be estimated at Rs. 290,000 (1611.1 USD) per annum or about an average of Rs. 24,000 (133.3 USD) per month in 2019.) (*Dept. of Census and Statistics*).

2. Benefits to Country –Value of GDP in Agriculture was Rs. 329 billion (1827.8 million USD) in 2019

Value of agricultural production (GDP) in field crops (paddy, vegetables, pulses, oil crops, fruits, etc.) was 329 billion. The country benefits from production of these crops. (*Source: Central Bank of Sri Lanka Annual Report 2019*)

Extended Cost Benefit Analysis

Table 5.3:5: Extended Cost and Benefits of Crop Agriculture

Component	Costs in Rs Billion	Cost in USD Billion
Cost of Subsidy	50.7	0.282
Cost to the Environment/Biodiversity due to agricultural activities in the field crop sector.	83.6	0.464
Total	134.3	0.746
Component	Benefits in Rs Billion	Benefits in USD Billion
Farmer. – Net benefits (profits) of farmer. from crop agriculture	216	1.200
Total value of crop agriculture (GDP) in 2019	329	1.828
Total Government Budget (2019)#	60.0	0.333
Total Estimated Benefits	216	1.200
Costs-Benefits	-81.7	-0.454

- Government Budget Estimates 2021

The total cost of the subsidy and the cost to the environment were estimated at Rs. 134.3 billion. The net benefit to farmers was estimated at Rs 216 billion. The benefits thus exceed that of the costs by Rs 81.7 billion.

In the case of agriculture, the costs of pollution, emission of green house gasses and soil erosion were obtained from a local study “ *Greening the National Accounts*”, by U. A. D. Prasanthi Gunawardena, in 2010, the cost of pollution from fertilizer use was obtained from a study done in 2006 in Europe “: H. Von Blottnitz, A. Rabl, D. Boiadjev, T. Taylor & S. Arnold - “*Damage costs of nitrogen fertilizer in Europe and their internalization*” Both studies are dated, however, the impacts of agriculture do not change very much as the production methods have not changed much in Sri Lanka. Thus updating the values obtained in an older study may not alter the values too much and therefore can be applied to the current times. In the case of fertilizer, the impacts may not be very much different from that in Europe than in Sri Lanka. Thus we have used this valuation for the Cost benefit analysis

5.3.7 Suggestions for Repurposing of Subsidies

Since the major damage is being done by the overuse of the agrochemicals, measures need to be taken to restrict the usage to allowable quantities and prevent the over use. This can be done as follows;

- With a view to promote integrated fertilizer application which is found to be the best solution scientifically, the subsidy for inorganic fertilizer should be continued but must be given only to persons who are using the integrated system including both organic and inorganic fertilizers. This action need to be supported by the following;
 - Requiring certification from the dealers of fertilizer.
 - Increasing the awareness of the farmer on the use of organic fertilizer.
 - Subsidize the organic fertilizer and make sure they are of standard quality
 - Conduct soil testing in the agricultural areas and zone them accordingly with the optimum requirement of the fertilizer (both organic and inorganic). Once this information is widely available on the internet and also with the agriculture department

and agrarian services offices the farmer will be encouraged to resort to the optimum fertilizer usage thus the overuse will be restricted.

- The above recommendations are for all crops including paddy.
- Local manufacturing of agricultural machinery need to be promoted as much as possible.

5.3.8 Impacts of Repurposing

The impacts of the repurposing suggestions will be positive. Farmers will however have to adopt an integrated system of organic and inorganic fertilizer use. Currently they may not have much knowledge on such integration, so it may take some time for the farmers to adopt this. They need to be provided with awareness and education on the topic before they start adopting such practices.

There could be malpractices in process of certification of organic fertilizers which may lead to the non-adoption of such practices by farmers. Thus a transparent system of certification must be established such that farmers will have confidence in the proposed integrated system of fertilizer application.

5.4. Coastal Aquaculture Sector

5.4.1 Introduction

Sri Lanka has ideal conditions to develop aquaculture with a total coastline of approximately 1,700 km. The total extent of lagoons and estuaries has been estimated to be 121,000 hectare (ha). Adjoining these estuaries and lagoons are extensive area of low-laying delta lands estimated at 70,000 hectares. Aquaculture involves growing of fish, prawns, mud crabs, sea bass, mink fish, sea weed, sea cucumber etc. in artificially created conditions such as cages, ponds, tanks and lagoon water, favorable for their culture in coastal areas.

The aquaculture industry in Sri Lanka started in the early 1980's with a few large multinational companies and some medium scale entrepreneur embarked on shrimp farming. Due to political unrest, the pioneer period developed slowly up to early 1990's. However, during the period 1992 – 1996 there was a rapid and uncontrolled development in the shrimp farming industry due to attractive public investment incentives and high economic returns. During this period, classical earthen ponds were used for producing shrimps and average yield ranged from 8,000 – 9,000 kg/ha/year. Small-scale farms with an area of around 0.5 – 1.0 ha were developed in cluster for the production of shrimps, mainly by encroaching lagoons, reservations and in ecologically sensitive areas (mangroves, salt marshes, inter tidal mud flats, coconut plantations). The total number of farms operating at that time was around 1,400 with a total area of 4500 ha, including areas used for reservoir purposes. About 70 hatcheries were also in operation for fingerlings.

Shrimp farming has great potential to diversify and secure income in rural Sri Lanka, but production has significantly declined in recent years due to civil conflicts, some unsustainable practices and devastating outbreaks of disease. Fundamental deficits in disease control, management, and biosecurity practices were observed in these farms. Farmers had knowledge of biosecurity but the lack of financial resources was a major impediment to improved disease control. Smallholder farmers were disproportionately constrained in their ability to enact basic biosecurity practices due to their economic status. Basic breaches in biosecurity will keep disease as the rate limiting step in this industry. Plans to support this industry must recognize the socioeconomic reality of rural Sri Lankan aquaculture.

Due to the lack of proper law enforcement and poor environmental planning, a large number of farms were developed. About 47% of all farms were illegally established and operating without proper licenses. Moreover, the lack of coastal zone management and infrastructure development led the industry into the so-called “self-pollution effect”. Thus, from 1996 the industry started to suffer due to disease outbreaks and environmental problems, and almost all the farming activities became restricted to a narrow coastal belt of approximately 120 km by 10 km in the North Western Province.

In 2019 there were 1003 shrimp farms operating in the Puttalam District and 44 in the Batticaloa district in 3200 ponds in 1670 ha of land with 333 million of stock and a production of 6400 MT of shrimp in that year, of which 2115 MT was exported. Apart from shrimp, 5683 MT of fish was obtained from lagoon fishing, 587 MT from pond culture, 280 MT from pen culture, 28 MT from cage culture, 15 MT from raft fishing and 11 MT from cement tank culture. Products from aquaculture in 2019 include shrimp, milk fish and sea bass (310 MT), sea weed (247 MT) and crab. (Source: Statistics Unit, Ministry of Fisheries and National Aquaculture Development Authority (NAQDA))



5.4.2 Subsidies in the Sector

Subsidies are given for aquaculture development under the Agricultural Modernization Project for livelihood development of fishermen. Growing of prawns and mud crabs breeding in coastal waters in cages, Sea Bass, Milk fish, Sea Weeds and Sea Cucumber production are also subsidized.

Electric power is needed to keep temperature and other condition at optimal level for aquaculture production. Thus subsidies are given for cage materials, infrastructure development, backup generators and electricity connections

Tax relief is provided for import of shrimp feed, aerators for shrimp farms, equipment, and High Density Polythene (40% tax relief).

Value of subsidies

- Pond culture – Rs. 13 million (0.07 million USD)
- Shrimp farming existing – Rs. 38 million (0.21 million USD)
- New shrimp farmers – Rs. 132 million (0.73 million USD)
- Cage culture – Rs. 3 million (0.01 million USD)
- Small scale fish feed production – Rs. 2 million (0.01 million USD)
- Large scale fish feed production – Rs. 4 million (0.02 million USD)
- Sea Bass culture – Rs. 23 million (0.13 million USD)
- Sea weed culture – Rs. 8 million (0.04 million USD)
- Dry fish/Smoked fish production – Rs. 2 million (0.01 million USD)
- Tax relief – Rs. 25 million (0.14 million USD)

- Total - Rs. 250 million (1.4 million USD) subsidy / annum

There are several subsidies for the promotion of aquaculture including tax relief to promote investments. Apart from the subsidies, there is motivation to expand the industry because of the prevailing high prices for aquaculture products, particularly the high income from exports. Both the large and the small fishermen benefit from this. The relatively short time period needed to grow the species to harvestable size and the ease of harvest are other factors that favour investment in this subsector. The supportive industries such as the fingerling, fish feed and other input producers are well developed to meet the needs of the aquaculture fishermen. The approval procedures for land for use in this industry has become more stringent now due to the damage caused to the environment during the early stages of development of the industry, when there were little or no hindrances for development of the industry, including the approval of land for the industry.

5.4.3 Environmental Impacts

The major impact of aquaculture is the pollution of water bodies (Madhu ganga polluted due to inland fisheries/aqua culture), Other impacts include algae formation due to nutrition and feed waste flowing into water bodies, which increases potassium levels which is harmful to inland water life. Ghost fishing – when discarded or derelict fishing gear continues to fish or trap fish, entrap and kill marine/ inland water life, while the use of gill nets affects fish population

Shrimp farming development, in particular, has resulted in extensive historical mangrove destruction in coastal Sri Lanka (*Bournazel et al. 2015*). Sri Lanka lost around 242 ha of mangroves between 2000 and 2012, at a rate of 20.2 ha per year (*Giri et al., 2015*). Clearing mangrove forests for aquaculture (e.g., shrimp farming) and salt pans, and unplanned coastal development have been recognized as the major threats to mangroves in the country (*Gunawardena and Rowan, 2005, Bournazel et al., 2015*). Puttalam lagoon mangroves, the largest mangrove ecosystem in Sri Lanka, declined by 34% predominantly due to the expansion of shrimp farming from 1992 to 2012, and 90% of these shrimp ponds were abandoned later, leaving barren landscapes (*Bournazel et al., 2015*).

The coastal belt in Northwestern province acts as the sink for prawn farming waste effluents containing high level of total suspended solids (200-600 mg/L), high BOD levels (60-180 mg/L), high turbidity, and high levels of sulfides and ammonia, which has caused eutrophication in the coastal belt, groundwater pollution, and increasing algal blooms that are often toxic, and leading to oxygen depletion and to mortality of aquatic organisms in the water bodies. The eutrophication is caused in an aquatic environment, due to the high concentration of nutrients which typically promote excessive growth of algae.

However, most countries have now banned the clearing of mangrove areas for aquaculture (FAO 2007), and there has been a realization that acid sulphate solids in which mangroves grow do not provide a good environment for shrimp culture (*Stevenson et al. 1999*), suggesting that mangrove clearing for aquaculture is abating. Nevertheless, large areas of coastal mangroves have been removed historically, and remaining mangroves are predicted to be further damaged by climate change (UNEP-WCMC 2006), which may raise additional concerns about their continued effectiveness as coastal defenses. Although the determination of optimal locations for mangrove rehabilitation is a laborious process concerning ecology, hydrology, geomorphology, and socio-economy (*Syahid et al., 2020*), these abandoned shrimp ponds are noteworthy and can be potential lands for future mangrove restoration and rehabilitation projects (*Stevenson et al., 1999; Iftekhar, 2008; Elwin et al., 2019*).

5.4.4 Social Distribution and Gender Impact

Although women make up the majority of work force in fish processing plants, they are mainly involved in low grade unskilled jobs. They are largely unwelcome in marine capture fisheries also (EC 2003). Usually women from poor fisher households are involved in fishery related activities. Women also lack opportunities to hold managerial and decision making positions.

In general, aquaculture is male-dominated but many women are also involved aquaculture activities. However women's role in fisheries appears to be largely invisible and unacknowledged (*Sivoi 2006, ICSF 2009*). The proportion of women participating is low and those who participate have formed fisheries societies and operate through these societies. The most physically strenuous work such as pond preparation is mainly done by men. Both women and men are engaged in feeding, harvesting and selling fish. Aquaculture is often considered as men's occupation, but women are heavily involved in certain aquaculture types such as seaweed and crab culture, and often are involved as workers in shrimp farms. Those women who are directly involved in fishery related activities, continue to take care of the family and maintain social networks and culture of the community. They have not changed the gender based household division of labour even with the diversification of physical, economic and social environments and circumstances. Due to their economic contribution, they play a vital role at all levels of the fishery chain. Women are also involved in fish processing, wholesale and retail marketing of fish throughout the island. Sometimes they supervise the marketing of catch.

Women are involved more in extensive aquaculture especially in homestead culture and less in commercial and intensive aquaculture. This is not only because homestead ponds are near the house, so it is easy for a woman to complete her chores, but also because extensive aquaculture does not require much investment, and does not provide high yield. Hence, it does not attract much interest from other members of the family. Higher yielding products such as carp and some cage culture, which is done mainly by men, need to be guarded. In terms of access to assets, resources and entitlements, aquaculture can provide benefits including income and food, but whether women receive these benefits equally with men depends on the power relations in the household. Cultured fish might be sold and not contribute to household food security. Women might be mobilized for their labour and time for aquaculture without earning direct income or food; furthermore, their involvement might deprive them of the time needed to produce other foods. Women might have less say in household ponds than men since they do not have land ownership. Introduction of cage and pen culture can overcome women's lack of access to land, but still, they need access to waterbodies, which might be difficult in some locations. Compared to men, women have less access to credit that they can invest in aquaculture. Even as aquaculture workers, women tend to benefit less because of their lower wages compared to men. Women self-help groups and similar collectives do help women gain much-needed resources.

There are very few women who are involved in aquaculture. There is some engagement by women in lagoon fisheries, especially for crab and prawn. While macro data is limited micro studies point to the extent of involvement of women in inland fisheries and aquaculture. In general the male fisheries officials, male community leaders and fishermen consider women's participation in fisheries as quite minimal although women do play a key, but invisible, role in fishing activities. Women's important contribution in the fisheries sector (especially in post-harvest and marketing) is frequently unrecognized.⁷ As a result, women do not receive institutional recognition and are excluded from the decision-making processes at both the household and community level. Women have a deeply subordinate role in fisheries organizations in Sri Lanka.

Women are mainly involved in small volume retail marketing of fish and seafood, and activities that add value to the fish that remains unsold after wholesale trading (which is done by men) is completed for the day. However, even though women contribute more than men in cutting, salting and drying the fish, the marketing of dry fish in larger volumes is done by men. In terms of participation of women in the in the fisheries value chains, though women's participation can be observed in inland fisheries,

⁷ FAO, 2013

dominance of male can be very much experienced in the lines of marine fishing value chains. Though there are women who catch fish in the lagoons in small boats, the numbers are negligible compared to the men. There are women who are playing the traditional role of “middle men” in the sector where they collect and buy the raw fish from the catchers and intervene at the market level.

5.4.5 Administrative and Institutional Issues

Under the policy guidelines of the Ministry of Fisheries, the National Aquaculture Development Authority (NAQDA), which has been declared by gazette under the purview of the State Ministry of Ornamental Fish, Inland Fish and Prawn Farming, Fishery Harbor Development, Multiday Fishing Activities and Fish Exports which is defunct at present, is the organization responsible for execution of subsidies in the coastal aquaculture sector in Sri Lanka.

National Aquaculture Development Authority (NAQDA)

Established in 1999 under the provisions made available by the National Aquaculture Development Authority Act No 53 of 1998 National Aquaculture Development Authority (NAQDA) is the foremost state organization mandated for the task of development of Fresh water aquaculture, Coastal Aquaculture and Ornamental fish and aquatic plant farming in Sri Lanka.

NAQDA has dedicated its major concentration including highest technological assistance and financial subsidies to Shrimp Farming since it is the operation which brings highest amount of foreign exchange to Sri Lanka from the aquaculture sector. NAQDA operates three Coastal Aquaculture Monitoring & Extension units at Battuluoya in Puttalam District, Batticaloa and Kilinochchi with all required laboratory facilities to facilitate, monitor and regulate the shrimp and other coastal aquaculture in Sri Lanka. As a public private partnership, NAQDA in partnership with a leading sea food manufacturing and exporting company has established with all modern facilities and operate and manage a Shrimp Farm at Rakawa in Hambanthota District.

5.4.6 Extended Cost Benefit Analysis

The costs can be categorized into: a) the actual financial costs of the subsidy or the loss incurred by the government in providing the subsidy and b) the cost to the environment or biodiversity due to implementation of the subsidy. The benefits of the subsidy can be categorized as; a) the actual financial and economic benefits to the beneficiary; b) the financial and economic benefits to the country; and c) benefits to the environment if any.

Methodology for Cost Benefit Analysis

- Financial costs have been estimated using market prices. Subsidy costs are the actual budgeted values.
- Economic costs such as environmental costs have been estimated using market prices if available. If market prices were not available, the method of benefit transfer was used. This involves using data from other similar studies done within the country or in other countries and using the results to estimate the economic costs.
- Financial benefits have been estimated using market prices. For example, the actual profit earned is valued at market prices if such market prices are available.
- Economic benefits have been estimated using the benefit transfer method, wherever, market prices were not available.

Costs and Benefits

- The costs can be categorized into: a) the actual financial costs of the subsidy or the loss incurred by the government in providing the subsidy; and b) the cost to the environment or biodiversity due to implementation of the subsidy.
- The benefits of the subsidy can be categorized as; a) the actual financial or economic benefits to the beneficiary; b) the financial or economic benefits to the country; and c) benefits to the environment if any.

Assumptions Made for the Cost Benefit Analysis

- Resource values of the environment estimated in the referenced study ““Damage costs of nitrogen fertilizer in Europe and their internalization” Article in Journal of Environmental Planning and Management May 2006, was used in estimating the damage costs in Sri Lanka.
- The value of environmental damage done to the environment due to agricultural activities, was obtained from a study on damage costs in Sri Lanka “Greening the National Accounts” and updated to the year 2019.
- Assumed that the cost of production of agricultural produce to be about 55% of the value of production.

Estimated Financial and Environmental Costs

Table 5.4:1: Coastal Aquaculture – Subsidy and Environmental Cost

Coastal Aquaculture	Subsidy Cost Rs Million (USD Million)	Type of Subsidy
Pond culture	13 (0.07)	Direct Tranfer of Funds & In kind provision
Shrimp farming existing	38 (0.21)	Direct Tranfer of Funds & In kind provision
New shrimp farmers	132 (0.73)	Direct Tranfer of Funds & In kind provision
Cage culture	3 (0.01)	Direct Tranfer of Funds & In kind provision
Small scale fish feed production	2 (0.01)	Direct Tranfer of Funds & In kind provision
Large scale fish feed production	4 (0.02)	Direct Tranfer of Funds & In kind provision
Sea Bass culture	23 (0.13)	Direct Tranfer of Funds & In kind provision
Sea weed culture	8 (0.04)	Direct Tranfer of Funds & In kind provision
Dry fish/Smoked fish production	2 (0.01)	Direct Tranfer of Funds & In kind provision
Other	25 (0.14)	Tax Credits
Total	250 (1.39)	
Cost to Environment	22,600 (125.56)	

Financial Cost to Government - The cost of the subsidies in the sector are as follows:

1. Subsidy Cost - Total cost of subsidies was Rs. 250 million (1.39 million USD) per annum for the various aquaculture programmes.

2. Environmental Cost

The major impact of aquaculture is the pollution of water bodies. Other impacts include algae formation due to nutrition and feed waste flowing into water bodies, which increases potassium levels which is harmful to inland water life. In addition, loss of lagoon mangroves and salt marshes for aquaculture production due to unplanned aquaculture development is a further impact due to aquaculture development. It is estimated that Sri Lanka lost around 242 ha of mangroves between 2000 and 2012, at a rate of 20.2 ha per year. Puttalam lagoon mangroves, the largest mangrove ecosystem in Sri Lanka, declined by 34% predominantly due to the expansion of shrimp farming from 1992 to 2012, and 90% of these shrimp ponds were abandoned later, leaving barren landscapes. A new study in 2015 shows that a total of 1370 Ha of Mangroves have been destroyed to establish shrimp farms and most of these farms have now been abandoned due to various reasons (Mangroves not suitable prawn culture may be one reason).

There are only a few local studies that have been done on ecosystem valuation in Sri Lanka. Most of the studies are related to pollution in the agricultural sector due to fertilizer and agrochemical use in agriculture. Studies relating to the values of entire ecosystems have not been undertaken in Sri Lanka. Thus we are adopting data from studies made in other parts of the world to attempt the valuation exercise in this study. The valuation of the coastal ecosystem resources undertaken in a study conducted on world's ecosystems in 1997 (Table 3.4.1) was used for estimating the value of these resources. The values were converted to current (2019) USD values taking into account the dollar inflation rate and the rupee value of USD in 2019. Using the valuation undertaken by the above study, the value of the environment resources lost due to aquaculture development in Sri Lanka was estimated. There is an area of 158,000 Ha in lagoons and estuaries. If we assume that about 0.5% of the area under lagoons and estuaries (790 Ha) is used for aquaculture and is polluted as a result, then the value of lagoons in aquaculture can be estimated using the ecosystem values in Table 5.4.2

Table 5.4.2: Valuation of Coastal Ecosystem Resources

Coastal Resources	USD / Ha		1 USD = Rs. 180 in 20019	1 USD = Rs. 360 in 2022
	USD 1994	USD 2019	SL Rs. / Ha	SL Rs. / Ha
Mangroves	9,990	16,728	3,010,974	6,021,948
Estuaries / Lagoons	22,832	38,233	6,881,878	13,763,756
Salt Marshes	9,990	16,728	3,010,974	6,021,948
Grassland / Rangeland	232	388	69,904	139,808
Marshland	19,580	32,787	5,901,669	11,803,338
Wetlands	14,785	24,757	4,456,322	8,912,643
Flood plains	19,580	32,787	5,901,669	11,803,338
Forest	2,007	3,361	604,947	1,209,893
Sand Dunes	9,990	16,728	3,010,974	6,021,948

Source: “The value of the world's ecosystem services and natural capital” ; Robert Costanza, Ralph d'Arge; Rudolf de Groot; Stephen Farber; Monica Grasso; Bruce Hannons; Karin Limburge; Shahid Naeem; Robert V. O'Neill; Jose Paruelo; Robert G.Raskin ; Paul Sutton; and Marjan van den Belt. In *Journal NATURE* , VOL 387, 15 MAY 1997.

- I. Value of 1370 Ha of Mangroves destroyed for aquaculture (prawn culture) and then abandoned. $(1370 \text{ Ha} \times \text{Rs. } 3,010,974 \text{ (16727.6 USD)}) = \text{Rs. } 4.2 \text{ billion (23.3 million USD)}$

- II. Value of 1760 Ha of Salt Marshes, Marshland, and Flood plains currently used for Aquaculture (prawn culture) (1760 Ha x Rs. 4,261,363 (23674.2 USD)) = Rs. 7.5 billion (41.7 million USD)
- III. Value of 1580 Ha of lagoons and estuaries in aquaculture development (1580 Ha x R. 6,881,878 (38232.7 USD)) = Rs. 10.9 billion (60.6 million USD)

The total environmental cost of aquaculture development can be estimated at Rs. 22.6 billion (125.6 million USD). In the case of Aquaculture, the values for coastal ecosystems services have been estimated from a study done by *Costanza et al* “*The value of the world’s ecosystem services and natural capital*” The study is fairly dated (1997), however, no other comprehensive study was available which has valued most of the coastal ecosystem as this one. From mangroves, estuaries, lagoons, grasslands, marshlands and wetlands to flood plains, which are the ecological resources mainly used in aquaculture, values have been estimated. Thus the estimates from this study was used to estimate the damage to ecosystem for the aquaculture sector.

Estimated Financial and Economic Benefits

1. Benefits to Fishermen -

The total aquaculture production in 2019 was 13,000 MT. Of this amount 3523 MT was exported and the balance 9480 MT was sold locally. The value of production of locally sold aquaculture produce at an average price of Rs. 564 / Kg (3.13 USD / Kg) (*Fisheries Statistics, Ministry of Fisheries, 2019*) was Rs. 5.4 Billion (30 million USD). The cost of production was estimated at Rs. 470 / Kg. was Rs. 4.5 Billion (25 million USD). The Net benefit from aquaculture output sold locally was Rs. 0.9 billion (5 million USD). The average sale price per kilogram of exported aquaculture products was Rs. 1790 per Kg. (*Fisheries Statistics, Ministry of Fisheries, 2019*) The total value of exported aquaculture produce was Rs. 6.3 billion (35 million USD). The net benefit to 22,255 aquaculture households from exports was estimated at Rs. 5.4 billion (30 million USD) on the basis of an estimated cost of production of Rs. 0.9 billion (5 million USD).

This translates to a net income of all aquaculture fishermen and industry of Rs. 35 billion (194.5 million USD) in 2019. This works out to a net income of Rs. 23,600 (131.2 USD) per month per aquaculture fishing household in 2019.

2. Benefits to Country –Value of GDP in Fisheries Rs. 169 billion (938.9 million USD) in 2019
 - I. Value of exports–Aquaculture Products (3523 MT) – Valued at Rs. 6.3 billion (35 million USD)
 - II. The country benefits from exports of aquaculture prawns, fish and fishery products. However, this benefit is included in the net benefits accruing to the fishermen. (Source: Fisheries Statistics, Ministry of Fisheries 2020)

Extended Cost Benefit Analysis

Table 5.4:3: Extended Cost and Benefits of Aquaculture Fisheries

Component	Costs Rs Billion	Costs USD Billion
Cost of Subsidy (Rs 250 Million)	0.25	0.002
Cost to the environment / biodiversity due to aquaculture fisheries.	22.6	0.125
Total	22.85	0.127
Component	Benefits (Rs. Billion)	
Fishermen – net benefits (profits) to aquaculture fishermen including exports	35.0	0.194

Net income from exports of aquaculture fisheries products (profits from exports covered under benefits to fishermen)	30.0	0.167
Govt. Budget Fisheries Sector - 2019	36.1	0.201
GDP – Fisheries Sector – 2019#	944.4	5.247
Total estimated benefits from Aquaculture Fisheries	35.00	0.194
Costs – Benefits	-12.1	-0.067

Source: Government Capital Budget Estimates 2021

The total cost of the subsidy and the cost to the environment were estimated at Rs. 22.9 billion (127.2 million USD). The total net benefit (net profits) to aquaculture fishermen was estimated at Rs. 6.3 billion (35 million USD). Out of a total production of 13,000 MT, 3,523 MT was estimated to be exported from the aquaculture fisheries sector in 2019. The total value of exports from all fisheries was Rs. 53.5 billion (297.2 million USD) in 2019, of which Rs. 6.3 billion (35 million USD) was estimated to be from the aquaculture sector. In this estimation, the net profit from exports is already included in the net benefits estimated for the fishermen. Thus only the benefits to the fishermen and costs of the subsidy and the cost of damage of the environment can be considered in the cost benefit analysis. The costs thus exceed that of the benefits received from marine fisheries by Rs. 16.6 billion (92.2 million USD),

5.4.7 Suggestions for Repurposing of Subsidies

The highest subsidies have been given for new shrimp farmers (Rs. 132 million (0.74 million USD)) and existing ones (Rs. 38 million). These subsidies will encourage more fishermen to take up to shrimp farming, which has a high impact on the environment and biodiversity. Shrimp farming provides a relatively higher income compared to other aquaculture activities. Thus one suggestion is to remove these subsidies progressively over a period time (say three years) so that it has the least impact on the livelihoods of the fishermen. The subsidies for shrimp culture should be completely removed at the end of this period. Subsidies for activities such as pond and cage culture, fish feed production, Sea Bass and Sea Weed and Dry Fish amounting to Rs. 55 million (0.31 million USD) should be continued to promote these activities. Tax relief for other aquaculture promotion activities should be continued for the next five years, with the proviso that these promotional will be discontinued thereafter, in order to provide an initial support for new investors. Those wishing to enter this field should take this opportunity during this promotional period. Tax relief should be granted only for activities that promote new investments in this field and not for continuing activities.

5.4.8 Impacts of Repurposing

Progressive removal of subsidies for shrimp culture will not have a serious impact on the industry as it is high income earning activity. Any disincentive impacts will be marginal if profitability remains high in this sector.

Most agricultural pollution is nonpoint pollution (Shortle and Abler 2001). The term “nonpoint” refers to pollution coming from diffuse sources where it can be difficult, or impossible, to estimate the amount of pollution from each source. Nonpoint agricultural pollution depends on the timing, frequency, and intensity of precipitation. These characteristics of nonpoint pollution place constraints on pollution control policy options.

5.5. Transport Sector

5.5.1 Introduction

People and goods being transferred from one location to another is a critical but fundamental human need not only in the present day world but also from the dawn of civilization. Therefore, transportation has been evolved parallel to human social development which has played an integral role in economic development and human welfare. Evolution of transportation from using animals to motorized modes has taken centuries. But in the present day world while economies are developing rapidly, motorized transportation also grows and would continue to grow rapidly. Especially this scenario could be observed in developing economies.

In Sri Lanka also the transport sector has played a crucial role in economic development and social progress. Road and rail are the major modes of public transportation in Sri Lanka using busses and trains respectively since sea and air transport are limited in the domestic transport sector. Cars, vans and motor cycles are the major modes of private transport. Para-transit vehicles are of limited use for specific purposes.



1. Road Transport:

Roads are considered as the backbone of the transport sector in Sri Lanka since they are the most preferred mode for the movement of people and goods and play an important role with about an average of 11,372 million vehicle kilometers per annum. From the average annual passenger travel of about 80 billion passenger-kilometers (pkm) in Sri Lanka, 93% are of road transport. Road transportation facilitates economic growth and poverty reduction in the country as well as 97% of freight traffic also takes place as road transport. Therefore it is evident that road transport is the most preferred mode for both passenger and freight movements.

Road network of Sri Lanka consists of about 11,700 km of major National Highways, 15,500 km of Provincial Roads, 65,000 km of Local Authority roads and about 24,000 km of roads owned or controlled by irrigation, wildlife, forest and other government departments and institutions. More 70% of the traffic in Sri Lanka is carried by National Highways.

Most popularly used vehicles in road transportation are busses owned and operated by both state and private sectors.

In the recent years from 2019, public passenger transportation has signified a reduction in performance as the total operated mileage of Sri Lanka Transport Board (SLTB) has subsided by 2.8% to 213.3 million km and 2.4 % to 540.7 million km in the case of private bus operators during the first half of 2019 while total passenger mileage of the country is reported to have reduced by 5.9% to 7,109.7 million km. This can be attributed to externalities such as security issues, COVID 19 pandemic situation and national economic crisis.

2. Rail Transport:

There are about 1,500 km of railway tracks in Sri Lanka which are mostly single gauge and have not considerably increased or expanded since independence in 1948. Currently there are about 200 diesel electric locomotives along with 46 diesel power sets which are used to carry about 5 % of total passenger traffic amounting to about 4,567 million passenger-kilometers annually.

Sri Lanka Railways (SLR) which started in 1865 played a dominant role in passenger transport in Sri Lanka until 1928, its share in passenger and freight transportation has shrunk drastically from 32% in 1979 to 01% in 1979. The rail transport in Sri Lanka has been and continually faced serious competition from road transportation, and has been adversely affected by terrorism, pandemic and economic suppression in the country.

3. Sea Transport:

In Sri Lanka, sea transport handles the bulk of freight imports and exports through the three major ports of Colombo, Trincomalle and Galle but despite being an island nation of only 65,000 square kilometers, uses sea transport only marginally for movement of passengers or freight within with in the country. The internal movement by sea transportation is restricted to fishing boats carrying both passengers and cargo. Colombo port being the main commercial port of the country is considered to be one of the premier ports in Asia. It handles both conventional cargo and containers and has been acknowledged as one of the most economical ports in the region.

Port expansion program introduced along with economic liberalization in late 1970s incorporated containerization and trans-shipment of cargo which mainly contributed to increase port traffic at an average rate of 6.5% per annum.

4. Air Transport:

Sri Lanka has two international airports, two regional airports and eleven domestic airports along with one national carrier. Enhancements of grading and infrastructural expansions have taken place but both international and domestic traffic has not developed as forecasted due to security, pandemic and economic suppression issues in recent times. However, major mode of transportation in Sri Lanka is road transport followed by rail transport while aerial and aquatic transportation modes are used only at negligible levels.

5.5.2 Subsidies in the Sector

Subsidies in transport sector encompass subsidies given for passengers and operators;

Passenger Subsidies

- Season tickets at concessionary rates are issued by Sri Lanka Transport Board to school children and students of higher education institutes while members of armed forces are issued free passes to travel between their academic center or work station respectively and their residence by trains of Sri Lanka Railway or buses of Sri Lanka Transport Board. Annually this subsidy cost about LKR 5.6 billion (31.1 million USD)
- Public parking most of the places are free of charge which encourages use of private vehicles against public transport which is a negative subsidy.
- Subsidy for School, Higher Education Students and Armed Forces - Railway season tickets and bus passes at subsidized rates. Cost Rs 24 billion (133.3 million USD).

Operator subsidies

- Subsidy for serving under-served bus routes. This has been granted to CTB to operate reliable and regular bus services during late nights and early mornings on uneconomical bus routes under a program called “Gemi Seriya” and “Nisi Seriya” along with “Sisu Seriya” to provide reliable and regular bus services dedicated to school children travelling from outskirt areas at a cost of about LKR 6 billion (33.3 million USD) per annum.
- Mostly loans from multilateral banks are provided for highway/expressway construction. Treasury funds are utilized for other roads for both construction and repairs. Road construction expenditure – 2019 – Rs 155 billion (861.1 million USD), 2020 Rs 226 billion (1255.6 million USD), 2021 Rs 200 billion (1111.1 million USD).
- CTB is granted an annual operational subsidy of about LKR 12 billion (66.7 million USD) from the treasury to meet operational losses which cannot be recovered from revenues.
- A Treasury grant is provided to the Sri Lanka Railways to meet operational costs which cannot be recovered from revenues. The amount of subsidy is about LKR 13.0 billion (72.2 million USD) per annum

5.5.3 Environmental Impacts

Pollution in the transport sector

- New construction of roads – causes dust emission, noise pollution, air and water pollution, ground water level decline, dirt accumulation, flooding etc. (Flooding in Southern highway due to poor design).
- Pollutants in the transport sector include Sulphur Dioxide, Oxides of Nitrogen, Carbon Monoxide or particulates, and the greenhouse gas CO₂ and can affect human health. The effects of pollution are widespread, affecting air, soil and water quality. Nitrous oxide contributes to the depletion of the ozone layer, which shields the Earth from harmful ultraviolet radiation from the sun. Sulfur dioxide and nitrogen dioxide mix with rainwater to create acid rain, which damages crops, forests and other vegetation and buildings.
- **Oil and fuel spills, nitrogenous wastes and particulates from vehicle emissions from cars and trucks seep into the soil near highways and discarded fuel, contaminate lakes, rivers**

and wetlands and lead to acidification and eutrophication of water and soils, and cause damage to nature and buildings as well as cultural assets.

- Normally EIA is done before construction and recommended mitigation measures taken during construction and during maintenance.
- Transport uses energy sources that generate GHG emissions.
- Road transport is responsible for 88% of the GHG emissions within the transport sector, followed by the air transport at 9% and rail transport 3%.

Fuel efficiency in transport

- Most fuel inefficient vehicles in the transport sector, when compared in terms of passenger km achieved are the diesel dual purpose vehicles, followed by vans and cars.
- The railway is the most efficient, one liter of diesel can transport 220 passenger km
- Busses can transport 116 passenger km per liter of fuel.
- Vans can transport 3.2 passenger km per liter of fuel.
- Cars can transport 1.8 passenger km per liter of fuel.

While the growth of the transport sector drives increased economic growth globally through the facilitation of specialization and trade, the sector is also fast becoming the highest emitter of greenhouse gases globally, and as a result makes a large contribution to climate change. It has been calculated that the transport sector is responsible for producing 7.0 Gt of CO₂ equivalent of direct GHG emissions, including non-CO₂ gases. Out of the 7.0 Gt of CO₂ equivalent of GHG emissions, CO₂ emissions constitute 6.7 Gt which translates to 23 per cent of the total energy-related CO₂ emissions globally Intergovernmental Panel on Climate Change (IPCC, 2014).

Ninety four per cent of total energy used for transport worldwide is sourced from a single fossil fuel, petroleum. The global transport sector's excessive reliance on fossil fuels for energy has resulted in the continued growth of GHG emissions in spite of the introduction of more efficient vehicles (road, rail, water craft, and aircraft) and of policies to encourage their use. Without the implementation of robust mitigation policies, transport emissions could increase at a faster rate than emissions from the other energy end-use sectors and reach around 12 Gt of CO₂ equivalent per year by 2050 (IPCC, 2014).

During construction of roads, land acquisition can cause habitat loss. During the implementation of constructions and repairs there is dust emission, noise pollution, air and water pollution, ground water level decline, dirt accumulation, flooding etc Habitat fragmentation also happens in addition to the introduction of invasive species during the constructions from construction equipment etc.

5.5.4 Social Distribution and Gender Impact

The transport sector is generally considered a male-dominated sector. Female representation in the transport and logistics sector in Sri Lanka was around 3.4 percent in 2019 against 96.6 percent male representation which reflects a serious gender gap despite many attempts by the authorities and industry personnel to reduce this gap. The sector accounted for 17,368 female employees and 497,102 male employees in 2019.

Out of the many aspects that can influence decision-making, one of the major factors is gender. The transportation sector is a highly male-dominated industry in Sri Lanka. Most of the decisions come from the male dominant society. Traditionally men believe, they are stronger than women in decision making and therefore women get fewer chances for representation. The traditional thinking pattern of Sri Lankan culture is a barrier in terms of the gender gap in the transport sector. However, the subsidies benefit both males and females, with probably the males benefiting more as they use transport more than the females.

Though women passengers represent a large share of public transport yet they face many barriers which tend to limit their mobility. The transport related jobs are well paid and rewarding yet have not been acceptable as a sector which women can get involved. According to ILO work place violence is one of the barriers for women to enjoy employment in the transport sector.

5.5.5 Administration and Institutional Issues

From among several institutions in Sri Lanka holding different stake of Transport sector, following can be considered as institutions responsible for directly implementation of subsidies and impacting on biodiversity of Sri Lanka.

Ministry of Transport & Highways

Formulation, implementation, monitoring and evaluation of policies, programs and projects in relation to subject of Transport and providing policy guidance in conformity with the prescribed Laws, Acts and Ordinances to Departments, State Corporations and Statutory Institutions which are the implementing agencies under the purview of the ministry to provide eco-friendly and public friendly public transport system to the commuters through linking highways and railways are the responsibility of the Ministry of Transport in Sri Lanka.

It is envisaged that the ministry in addition to formulation of sectoral policies, rules and regulations would introduce necessary measures and guidelines to establish a high standard in road facilities and develop public confidence in public transport by developing required infrastructures and by providing motor vehicle related services in a people-friendly, efficient and corruption-free manner.

Sri Lanka Railways (SLR)

Sri Lanka Railways (SLR) is a government department functioning under the Ministry of Transport and is the only organization in the country providing rail transport for both passengers and freight. However, the market share of SLR has diminished to 6% in passenger transport and 0.7% in transport of goods.

Sri Lanka Railways operates nearly 396 trains which include 67 Long Distance and 16 Intercity trains and carries about 3.72 Million passengers daily including large numbers of workforce in Sri Lanka to and from their workplaces. For the provision of its service to commuters, SLR own, operate and maintain 1561km of rail tracks, 72 locomotives 78, 565 carriages and the signaling network deploying its workforce of 17,634. Sri Lanka Railways has provided online reservation facility for its major and an cillary services.

Department of Motor Traffic (DMT)

Department of Motor Traffic (DMT) is the government department established under the Motor Traffic Act No 14 of 1951 (Chapter 203) which has been amended in several occasions of which the latest is the Motor Traffic (Amendment) Act, No. 10 of 2019 certified on 20th June, 2019. By virtue of authorities vested on DMT, the department is responsible to all aspects of motor vehicles in Sri Lanka from registration to declaring to be not roadworthy and deregistering. DMT is the authority to declare

roadworthiness of a vehicle and it is the legally authorized entity to issue licenses of competence to drive a motor vehicle in Sri Lanka. DMT has decentralized certain services to district level by deploying its staff to district secretariats. The Department of Motor Traffic is responsible for issuance of road worthiness certificates.

Sri Lanka Transport Board (SLTB)

Sri Lanka Transport Board (SLTB) is the national level state sector organization entrusted with the responsibility to provide passenger transport services to commuters by way of road transport in Sri Lanka. Presently the Sri Lanka Transport Board (SLTB) operates under the provisions of Act No 39 of 2008 which had repealed all incidental preceding legislations from Transport Board Ordinance No 48 of 1957.

After undergoing several evolutions and devolutions and failure of independent provincial transport companies, SLTB under the new legislation operates as a National Organization with 12 Regional Offices and 105 Bus Depots with decentralized management authorities. SLTB daily operates about 7,000 buses throughout the country from highways to gravel roads in remote places. The Human Resource strength of the SLTB is 32,600 of different categories of its operation.

Despite the reduction of passenger mileage since 2019, the SLTB joining hands with the National Transport Commission continued its compassionate activities to improve the public transportation system. Since 2005, as a centralized, reliable and concessionary bus service combining the services of SLTB depots and registered private bus service providers, SLTB in collaboration with the NTC operates “Sisu Sariya”, a special bus service dedicated to facilitate school children to get to and return from schools safely and timely. SLTB on every school working day contributes about 780 buses for the successful operation of the “Sisu Sariya” service which is financially not beneficial to operators.

- National Transport Commission

National Transport Commission (NTC) of Sri Lanka has been established under the provisions of the National Transport Commission Act. No 37 of 1991 which was enacted repealing the Act No 44 of 1983 and amending the Motor Traffic Act to provide legal provisions. Accordingly, in addition to policy matters, NTC has under taken some initiatives to ensure a quality, cost effective and safe integrated transport system and services that will provide for the socio-economic development across the country catering to different mobility requirements of every individual and corporate citizen of Sri Lanka which includes;

- Conducting passenger demand surveys
- Identifying required buses and their categories
- Preparation of Traffic proposals
- Determining time table and fares
- Issuing of permits for interprovincial private operations
- Periodic revision of bus fares
- Staff training of private buses
- Attending to public complaints

In addition, NTC has initiated and assured continuity of special services such as;

- “Gami Seriya” which is a rural bus service project implemented since 2008 with a view to improve accessibility of people living in rural areas in order to fulfill their day today needs. This project provides reliable and economical passenger transport service to the public who are affected by lack of transport facilities. It is implemented by identifying actual uneconomical routes through a formal procedure, and disburses funds as subsidies among the service providers of such routes who really provide socially

necessary services during uneconomic times of the day, considering their actual operating losses on uneconomic routes.

- “Sisu Seriya” which was launched in 2005 is a bus service dedicated for uniformed school children and teachers to enable them to attend schools safely, economically and without physical or mental harassment by providing a centralized, reliable and concessionary bus service combining the services of SLTB depots and registered private bus service providers. Presently there are 778 buses operating in service. It is jointly commenced and operated by the Ministry of Education, Ministry of Transport, Sri Lanka Police, Sri Lanka Transport Board and the National Transport Commission.

Bus fares under the “Sisu Seriya” program are subsidized by 75% for school children below 12 years and 50% for those older than 12 years. Each bus is supervised by a teacher who is given a free bus ticket and monitored by a committee headed by the principle of the school.

- “Nisi Seriya” is a subsidy program to encourage to reliable and regular public transport service during late night. NTC has been assisting 58 identified late night services leaving city centers by reimbursing 50% of the fuel cost of the journey. Under this program, the operator has to operate at least 90% of the journey of particular month for this entitlement. Implementation of the “Nisi Seriya” program is periodically monitored by mobile inspectors of NTC to ensure that time tables and standards are met.

5.5.6 Extended Cost-Benefit Analysis

The costs can be categorized into: a) the actual financial costs of the subsidy or the loss incurred by the government in providing the subsidy; and b) the cost to the environment or biodiversity due to implementation of the subsidy. The benefits of the subsidy can be categorized as; a) the actual financial and economic benefits to the beneficiary; b) the financial and economic benefits to the country; and c) benefits to the environment if any.

Methodology for Cost Benefit Analysis

- Financial costs have been estimated using market prices. Subsidy costs are the actual budgeted values.
- Economic costs such as environmental costs have been estimated using market prices if available. If market prices were not available, the method of benefit transfer was used. This involves using data from other similar studies done within the country or in other countries and using the results to estimate the economic costs.
- Financial benefits have been estimated using market prices. For example, the actual profit earned is valued at market prices if such market prices are available.
- Economic benefits have been estimated using the benefit transfer method, wherever, market prices were not available.

Costs and Benefits

- The costs can be categorized into: a) the actual financial costs of the subsidy or the loss incurred by the government in providing the subsidy; and b) the cost to the environment or biodiversity due to implementation of the subsidy.
- The benefits of the subsidy can be categorized as; a) the actual financial or economic benefits to the beneficiary; b) the financial or economic benefits to the country; and c) benefits to the environment if any.

Assumptions Made for the Cost Benefit Analysis

- The values for the emission of GHG and CO₂ in the transport sector by type of mode of transport was obtained from the Ministry of Transport and from World Bank data.
- The cost of CO₂ emission was assumed to be USD 50 per metric tonne of CO₂ and the damage cost was estimated according to level of CO₂ emissions in the transport sector. The value of CO₂ was based on an average prices prevailing in the world market. (Price range from USD 2 – USD 110 / metric ton)
- Environmental costs were estimated on the basis of Carbon Dioxide emissions. Costs were converted from the original USD value to SL Rupee at the prevailing exchange rate of 1 USD = Rs 180 in 2019

Estimated Financial and Environmental Costs

Table 5.5:1: Transport – Subsidy and Environmental Cost

Subsidies in the Sub-Sector Transport	Subsidy Cost (Rs Billion)	Subsidy Cost (USD Billion)	Type of Subsidy
Subsidy for public transport (CTB)	12.0	0.067	Implicit Income Transfer
Subsidy – Socially obligated bus service	5.6	0.031	Implicit Income Transfer
Subsidy for School, Higher Education Students and Armed Forces - Railway season tickets and bus passes at subsidized rates.	24.0	0.133	Implicit Income Transfer
Subsidy for serving under-served bus routes.	6.0	0.033	Direct Tranfer of Funds
Railway subsidy	13.0	0.072	Direct Tranfer of Funds
Other subsidies	26.3	0.146	Direct Tranfer of Funds
Total Subsidy Cost	86.9	0.483	
Cost to Environment	148.4	0.824	

Apart from the subsidies, high urbanization, high urban employment, concentration of good schooling facilities, entertainment and leisure facilities and markets in urban areas all tend to increase pollution due to the high traffic conjection in urban areas. Improving these facilities in rural areas will reduce urban conjection and pollution levels overall. Improving the railway services, by introducing more frequent and timely services will reduce the level of road transport services. Currently railway services are inadequate during rush hour and slower compared to road transport.

Financial Cost to Government - The cost of the subsidies in the sector are as follows:

1. Subsidy Cost - Total cost of subsidies was Rs. 86.9 billion (482.8 million USD) per annum for the various activities in the transport sector in 2019.
2. Environmental Cost –

The consumption of fossil energy produces air pollutants that cause acidification or eutrophication of habitats and greenhouse gases (GHG) contributing to global warming. The liquid fuel used in transport produced GHG gasses equivalent to 16,487 kilo tons of CO₂ in 2019. It is estimated that only 12% of the vehicles are fuel efficient and 88% are old and fuel inefficient. About 97% of the emissions are from road transport vehicles.

A total of 8,095,224 vehicles operated in Sri Lanka in 2019. The breakup is as follows:

Table 5.5:2: Motor Vehicles in Operation and CO₂ Emissions in 2019

Type of Transport Vehicle	Number	% of CO ₂ Emission	Total Emissions CO ₂ and GHG in CO ₂ Equivalent for Liquid Fuel Consumption
Motor Cars	875,864	45.1	16,486,800 MT of CO2
Three Wheelers	1,175,077		
Motor Cycles	4,668,074		
Buses	112,005		
Dual Purpose Vehicles	493,020		
Motor Lorries	375,500	29.4	
Tractors	375,601		
Trailers	72,108		
Others	1,975	2.3	
Railways		1.0	
Air Planes		11.6	
Ships		10.6	
Total	8,095,224	100.0	16,486,800

Source: Ministry of Transport 2021; World Bank Data

The total emission of CO₂ in 2019 valued at US 50 per MT⁸ works out to USD 824.34 million. This translates to Rs 148.4 billion @ exchange rate of Rs 180 / USD in 2019. Thus the total value of damage to the environment in the transport sector as measured by CO₂ emission equivalent was Rs 148.4 billion (482.8 million USD)..

Estimated Financial and Economic Benefits

1. Value of Benefits to the Population Utilizing Transport Services -

The social and economic benefits from the use of transport facilities are large. The principal role of transport is to provide or improve access to different locations for individuals and businesses. Transport thus facilitates a wider range of social and economic interactions than would otherwise be possible. They include better quality of living for households, facilitation of economic and livelihood activities, facilitation of education and recreation and overall comfort and happiness. Commercial, industrial and public activities are facilitated by transport.

2. Value of Benefits to Country –

The full economic potential of a country can be realized if there are no bottlenecks to transport. The benefits from production and exports of goods and services can be fully realized only if the transport system is efficient and adequate. One way of measuring the value of transport is to use GDP in the

⁸ . (Ref: 1.World Bank. 2021. State and Trends of Carbon Pricing 2021. Washington, DC: World Bank, Ref. 2. “Putting a Price on Pollution” Ian Parry in Finance and Development, Dec 2019.

transport sector as an indicator. The GDP of the transport sector was Rs 1,725 billion in 2019 current prices. If we assume that primary transport activities makes up 90% of this sector, then the value that can be attributed to transport is Rs. 1550 billion.

Table 5.5:3: Extended Cost and Benefits of Transport Sector

Component	Costs Rs. Billion	Costs USD Billion
Cost of subsidy	86.9	0.483
Cost to the environment/biodiversity due to electricity production.	148.4	0.824
Total	235.3	1.307
Component	Benefits Rs. Billion	Benefits USD Billion
Socio Economic benefits to consumers due to use of transport.	NA	NA
GDP in the transport sector	1550	8.611
Govt. Capital Budget – 2019#	248.6	1.381
Total	NA	NA
Costs – Benefits	235.3	1.307

Source: Government Budget Estimates 2021

The total cost of the subsidy and the cost to the environment were estimated at Rs. 235.3 billion (1307.2 million USD). It was not possible to estimate the total benefits to the consumer due to non-availability of data on the actual economic benefits of the transport sector and therefore only the costs are estimated.

5.5.7 Suggestions for Repurposing of Subsidies

1. Accessible Transport Systems:

Transport systems are designed to meet the basic transport needs of citizens and businesses and promote effective and efficient integration of all transport systems to complement each other using new technologies and related developments. Transport services should be easily accessible to all users and therefore it is recommended to:

- Improve quality and reliability of public transport services and give priority to the use of public transport. Promote public transport systems that are safe, comfortable and can provide reliable service and can easily be provided with the priority for the passage. Give priority to services that will increase the public transport mode share from users shifting from private vehicles. Subsidies for the transport of school children and for running underserved routes should be continued as the socio economic benefits are high.
- Expand public transport network and increase frequency of services with possible integration of different public transport systems. In urban environments, ensure increase in connectivity and integration with other transport modes. Provision for quick adjustments for demand variations (peak-off peak) should be considered. Plan public transport networks to minimize transfers. For rural areas provision for transporting goods in public transport vehicles should be accommodated, and subsidies for socially obligated bus services should be continued.
- Subsidies for railway and public transport should be withdrawn over a period of time so as to remove the inefficiencies in these two services and promote a more efficient and cost effective service similar to the private sector. All other subsidies that are currently in force should be removed as they will promote inefficiencies if continued.

- Improve access and minimize walking distances to stops and terminals.
- An environmental tax was introduced by the government and later withdrawn due to protests by the citizens. It is recommended to re-introduce this tax based on the level of pollution of the vehicles. Higher taxes should be levied for large vehicles and lower taxes for small vehicles such as motor cycles and three wheelers.
- Improve accessibility, equity and affordability of public transport services to promote against use of private vehicles. “Park and Ride” program can be reintroduced with better planning and use of ICT tools.

2. Energy Efficiency & Environmental Protection:

All modes of transportation should be guided towards an efficient and cost saving energy policy. Transport services to be provided in sustainable manner with minimum environmental disruptions. It is proposed to promote the use of energy efficient and less polluting vehicles with higher operation life. Energy efficiency should be considered for the entire trip/service. Emission levels from individual vehicles should be monitored. Use of renewable energy for transport could be promoted. Contribution to emission levels and fuel efficiencies in all transport interventions should be evaluated.

3. Increased Safety & Security:

Transport services to be safe, comfortable and reliable to all users irrespective of age, gender or ability. Provide safe environment for women, children, elderly and differently able people in designing transport infrastructure.

4. Positive Contribution to Economy:

Improve the efficiency and quality of transport services at a reasonable cost that would adequately meet existing and potential demand for movement of passengers and goods that would support economic and social development. Maximize the private sector investment and public-private partnerships.

5. Integration of land use and transport planning:

Integrate land use developments and transport systems developments so that travel distances are minimized and access to livelihoods, education, and other social needs of the population is improved with the help of new transport and non-transport interventions, new technologies and related strategies.

6. Public parking:

Even though there is no direct subsidy for public parking, free access for parking of private vehicles in most places in Colombo and other major cities and suburban centers have encouraged people to use their private vehicles even travelling up and down to work places and other travel where public transport is conveniently available. In order to reduce the negative impact of using vehicular operation towards environment, payment for parking in public places at market rates can be made mandatory based on charges of private car parks and not on subsidized rates. Such a managerial tool would discourage the use of non-essential private transport and earn reasonable amounts to cover the cost of maintenance of such parking spaces if administered appropriately.

7. Integrated bus time table:

Bus time tables can be made combining CTB and private buses through prioritized services to discourage competition and minimize waste of resources leading to degradation of environment and the destruction of biodiversity. This has been successfully implemented in the Southern Provinces and can be implemented in other provinces as well.

5.5.8 Impacts of Re-Purposing

Removal of subsidies in the state run road and railway transport services, will improve the profitability and quality of services. These state agencies are burdened with excess staff and profitability can be achieved only if these agencies can reduce their overheads including staff levels and adjust their services to suit the needs of the transport user.

Imposing higher taxes on road users will reduce non-essential transport. Improving the quality and reliability of public transport will increase the efficiency of transport and reduce the use of private transport to some extent.

Allowing passenger transport vehicles to transport a limited amount of goods such as vegetables and fruits from rural areas to the markets will provide a quick means of transporting perishables to the market. This is taking place to a limited extent even at present. This can be facilitated by fixing roof racks on buses and charging separately for the services. This will help in transporting a fair quantity of goods without additional costs while providing an efficient and economical transport service to the rural producer. This will increase the income of the transporter as well as provide a reliable transport service to persons using this service.

5.6. Summary of Results

5.6.1 Environmental Impacts

Illegal fishing methods and equipment as well as dynamiting of fish resources causes considerable loss of biodiversity and destruction of the marine environment. Overfishing leads to a gradual decline in fish output with disastrous consequences to biodiversity. Ghost nets or nets abandoned in the ocean are made of plastic and nylon and do not decompose, wreaking extreme havoc on the wildlife and ecosystems that they interrupt. Fishing and pollution from fishing are the largest contributors to the decline in ocean health and water quality.

The energy sector ranks as the largest source of GHG emissions today, around two-thirds of global total. It is also the largest source of air pollution, linked to 6.5 million premature deaths per year. Energy production produces fly ash, sulfur and nitrogen oxides which pollute the atmosphere. Construction of major and mini hydro power plants leads to environmental degradation and negatively impacts on biodiversity of the downstream as well on site. The production and consumption of fossil energy produces air pollutants that cause acidification or eutrophication of habitats and greenhouse gases (GHG) contributing to global warming. Construction of major as well as mini hydro power plants lead to environmental degradation and negatively impact on biodiversity of downstream as well as on site.

Excess nutrients from agriculture damage biodiversity far beyond the application and spreading perimeter of the source. This is very common for the freely dissolved nitrogen element in the fertilizer. The high nitrogen levels in the waterbodies leads to causing blue baby syndrome in infants too. Over-fertilization pollutes water bodies and also pollutes large land areas via airborne inputs and acidifies aquatic and terrestrial ecosystems. It can also contribute to contamination of food. This displaces numerous species that depend on low-nutrient habitats.

The major impact of aquaculture is the pollution of water bodies (Madhu ganga polluted due to inland fisheries/aqua culture), Other impacts include algae formation due to nutrition and feed waste flowing

into water bodies, which increases potassium levels which is harmful to inland water life. Ghost fishing – when discarded or derelict fishing gear continues to fish or trap fish, entrap and kill marine/ inland water life, while the use of gill nets affects fish population.

Road transport is responsible for 88% of the GHG emissions within the transport sector, followed by the air transport at 9% and rail transport 3%. Pollutants in the transport sector include Sulphur Dioxide, Oxides of Nitrogen, Carbon Monoxide or particulates, and the greenhouse gas CO₂. These affect human health, lead to acidification and eutrophication of water and soils, and cause damage to nature and buildings, cultural assets.

5.6.2 Cost Benefit Analysis

Table 5.6.1: Summary of Costs and Benefits of all Selected Sub Sectors

Sector	Cost of Subsidy		Cost of Environment		Economic Benefits of Beneficiaries		Country Benefits (GDP)		Subsidy and Environment Costs minus Economic Benefits of Beneficiaries	
	Rs Billion	USD Billion	Rs Billion	USD Billion	Rs Billion	USD Billion	Rs Billion	USD Billion	Rs Billion	USD Billion
Marine Fisheries	1.85	0.01	81.7	0.45	41.2	0.23	37.5	0.21	42.1	0.23
Energy	67.6	0.38	73.8	0.41	509	2.83	87.6	0.49	-368	-2.04
Agriculture	50.7	0.28	83.6	0.46	216	1.2	329	1.83	-81.7	-0.45
Coastal Aquaculture	0.25	0.001	22.6	0.13	6.3	0.04	5.4	0.03	16.6	0.09
Transport	86.9	0.48	148	0.82	NA	NA	1550	8.61	235	1.31
Total	207	1.15	410	2.28	772	4.3	2010	11.2	-156	-0.87

In this exercise, the benefits to the country are not included in the analysis as it comprises the benefits of the beneficiaries as well as the value of other activities in the value chain, such as transport, wholesale and retail, processing, exports etc. Thus only the benefits of the primary beneficiaries such as farmers, fishermen, electricity consumers, etc. are included in the cost benefit estimation. The summary results show that the costs of subsidies and that of the environment / biodiversity exceed the benefits in three sectors, namely marine fisheries coastal aquaculture and transport. In the case of the energy and agriculture sectors the benefits to the users of this resource exceed the costs. The benefits to the country are not included in the analysis as these benefits include all benefits accruing to the sector.

5.6.3 Administration and Institutional Issues

In many sectors several institutions have been established to take responsibility for the various activities in the sector. There is some confusion as to who is responsible for what, which ends up in inefficiencies in operations of these institutions. Decision making under the circumstances can be sub-optimal and lead to inefficiencies. Some institutions have a very large staff resulting in efficiency losses and high costs for administration of these agencies. Subsidies have to be provided by the government in order to operate these institutions. The administration of subsidies needs improvement as they can lead to corruption as goods and services are provided at below market rates, which have a natural tendency for corruption.

5.6.4 Social Distribution and Gender Impact

Excepting for agriculture and marine fisheries to a small extent, gender participation is low in the other three sectors under study namely, energy, transport and aquaculture. Women and men play different roles in the fishing sector, although geographical and ethnic variations exist. Fish harvesting is predominantly done by men and only about 10% of the women are involved in fishing mostly in catching fish, prawns, crabs, clams, and mussels in the near coastal regions. The production of dried fish is mainly done by women (90% involvement of women). Women also often fill important roles in household financial decisions and attend fisheries meetings while men are away. Women must therefore be included in fisheries management planning activities.

Energy services can contribute to increasing women's economic and social empowerment. Women generally spend more time in their homes and are able to reduce their chores through the use of electricity. Men, generally spend less time in their homes having to go out for work. However, the assumption that men and women benefit equally from electrification and have equal capacities to use it for satisfying their needs does not always hold true.

Women engage in 30% of all the tasks in the paddy sector. However, in dry land farming, about 65% of tasks are done by women. The obstacles for the women in participation in agricultural activities were reported as lack of knowledge and training in agriculture field, family burden, cultural and social barriers and physical constraints. Women farmers face great injustice in cultivation as well as in the market.

In general, aquaculture is male-dominated but many women are also involved in aquaculture activities. However the proportion participating is low. Those who participate have formed fisheries societies and operate through these societies. The most physically strenuous work such as pond preparation is mainly done by men. Both women and men are engaged in feeding, harvesting and selling fish. Aquaculture is often considered as men's occupation, but women are heavily involved in certain aquaculture types such as seaweed and crab culture, and often are involved as workers in shrimp farms.

The transportation sector is a highly male-dominated industry in Sri Lanka. Most of the decisions come from the male dominant society. Traditionally men believe, they are stronger than women in decision making and therefore women get fewer chances for representation.

References

- 1 ADB (2007), Sri Lanka Country Assistance Program Evaluation: Transport Sector.
- 2 ADB (2019) Sri Lanka Energy Sector Assessment Strategy and Road Map.
- 3 Austen M.C., AndeRon P., Armstrong C., Döring R., Hynes S., Levrel H., Oinonen S., Ressurreição, ACoopman, J., Heymans, JJ., Kellett, P., Muñiz Piniella, A., French, V., Alexander, B. “Valuing Marine Ecosystems - Taking into account the value of ecosystem benefits in the Blue Economy” [Eds.] Future Science Brief 5 of the European Marine Board, Ostend, Belgium. . (2019),
- 4 Biodiversity Secretariat, Ministry of Mahaweli Development and Environment, Sri Lanka’s Sixth National Report Biodiversity Profile - Sri Lanka - To the Convention on Biological Diversity 2019,
- 5 CEB Annual Report, 2019
- 6 Central Bank of Sri Lanka, Annual Report No 15, 2019, Statistical Appendix.
- 7 Communication from Fertilizer Secretariat, Sri Lanka, Fertilizer Prices in 2020 and 2021,
- 8 Costanza,Ralph, Ralph d’Arge; Rudolf de Groot; Stephen Farber; Monica Grasso; Bruce Hannons; Karin Limburge; Shahid Naeem; Robert V. O’Neill; Jose Paruelo; Robert G.Raskin ; Paul Sutton; and Marjan van den Belt.Source: “ The value of the world’s ecosystem services and natural capital” ; In Journal NATURE , VOL 387, 15 MAY 1997
- 9 Dayton, Paul, San Diego, Tundy Agardi, Sound Seas, Simon F. Thrush, University of Auckland, Environmental Effects of Marine Fishing, in Aquatic Conservation Marine and Freshwater Ecosystems • September 1995.
- 10 Department of Census and Statistics, Sri Lanka. “Household Income and Expenditure Survey 2019”
- 11 Edirisinghe, Lalith, Viraji Waidyasekara, Lakshmi Ranwala, Sampath Siriwardena, Avanthi Medawattage, Dudulie De Silva and Wajira Rathnayake. 2022. Mind the Gender Gap in workforce, including transport and logistics: the perspective from Sri Lanka and Beyond. ESCAP working Paper.
- 12 Ekanayake, H.K. J. (2009) The impact of fertilizer subsidy on paddy cultivation in Sri Lanka, Staff Studies 36 (1) DOI:10.4038/ss.v36i1.1231
- 13 Ervin, J Contributing authors: N. Sekhran, C. Petersen, D. Meyers, M. Flores, Y. de Soye and O. van den Heuvel, THE BIOFIN WORKBOOK - A Tool to Mobilize Financial Resources for Biodiversity and Development, The Biodiversity Finance Initiative, UNDP. 2014.
- 14 Gamhewage, H. I. et al. “Women’s Participation in Urban Agriculture and its influence on Family Economy”. <http://www.sab.ac.lk/media/agri-journal/volume-10/no-3/Vol-10-No-03>
- 15 Gunawardena, U.A.D. Prasanthi, Sri Lanka Energy Policy 38, pp 726-734. Inequalities and externalities of power sector: A case study of Broadlands hydropower project in Sri Lanka, Department of Forestry and Environmental Science, University of Sri Jayewardenepura, 2010

- 16 Gunawardena, U. A. D. Prasanthi, Greening the National Accounts, , Department of Forestry and Environmental Science, University of Sri Jayewardenepura. Presidential Address, presented at the 66th Annual Sessions of the Sri Lanka Association for the Advancement of Science on 10th December 2010 held at University of Colombo.
- 17 Harro von Blottnitz, Tim Taylor, Jane Turpie & Gwyn Wilson, Cost/benefit assessment of marine and coastal resources in the western Indian Ocean: Mozambique and South Africa, June 2011.
- 18 Holger Berg, Dr. Andreas Burger Karen Thiele, Environmentally Harmful Subsidies in Germany Federal Environmental Agency , 2010
- 19 Jayaweera, Don S, Transport Sector Performance Indicators, Ministry of Transport, Sri Lanka, - 2004.
- 20 Jeevika Weerawewa, Anoma Ariyawardena, Sarath S. Kodithuwakku , Fertilizer Subsidy Programme in Sri Lanka, Jan 2010.
- 21 Johnstone, William, Pollution: A major threat to prawn farming in Sri Lanka, AMBIO A Journal of the Human Environment 1998.
- 22 Journal of Environmental Planning and Management, Damage Costs of Nitrogen fertilizer in Europe and their Internalization. - May 2006.
- 23 Ju, S.U, Yoo, S.H. and S.J.kwak “Electricity shortage cost in Korea – An input-output analysis” in Energy Resource Part B Economics Planning and Policy 30 March 2016.
- 24 Kuruppuarachchi, D.S.P, Impact of Agriculture on Groundwater, , Journal of Food and Agriculture, 5(1-2), pp.1–4. Nov 2012.
- 25 Ministry of Finance, Economic Stabilization and National Policies, Sri Lanka. Annual Reports 2020, 2021
- 26 Ministry of Power and Energy. Sri Lanka Energy Sector Development Plan for a Knowledge Based Economy, 2015-2025
- 27 Ragavan Nadarajah “Fuel Subsidy in Sri Lanka Fisheries; Data Analysis and Possible Improvements” Thesis for; Fisheries Training Programme in United Nation University , University of Jaffna, 2019
- 28 Pandey, Rita, Renuka Sane, Priya Yadav, Sumit Agarwal Finance: Identification and Analysis of key Building Blocks of a Biodiversity Finance Plan in India, November, National Institute of Public Finance and Policy New Delhi, 2018
- 29 Pascal N, Molisa V, Wendt H, Brander L, Fernandes L, Salcone J, Seidl, , Economic Assessment and Valuation of Marine Ecosystem Services: Vanuatu, A report to the MACBIO project. GIZ/IUCN/SPREP, Suva, Fiji, 103 pp. 2015
- 30 Passfield, L.M. , K., McKessar, K., Davey, K., Guisado, V., Eppink, F., Conner, N. and Weeks, H. (2020). Cook Islands Marine Ecosystem Service Valuation. Report to the Cook Islands, National Environment Service
- 31 Pranovi, Fabio , Gianluca Sarà and Piero Franzoi, Valuing the Unmarketable: An Ecological Approach to the Externalities Estimate in Fishing Activities in Sustainability 2013, 5, 643-653;

- 32 PUCSL “Survey on Affordability of Electricity and Safety of Household Electrical Appliances” in 2020
- 33 Sainteny,Guillaume, Centre d’analyse stratégique (2009). Public Incentives Harmful to Biodiversity.
- 34 Sri Lanka Journal of Aquatic Sciences, Impact of women involvement in fisheries on socio-economics of fisher households in Negombo, Jan 2009.
- 35 State Ministry of Production and Supply of Fertilizer and Regulation of Chemical Fertilizer and Insecticide Use, Ministry of Agriculture. Annual Performance Report for the Year 2020
- 36 Weerahewa, J. Kodithuwakku, S.S. and Ariyawardana, A. (2010) The fertilizer subsidy program in Sri Lanka, Case study #7- 1 1 of the program:“Food Policy for Developing Countries : the role of Government in the Global Food System”; Ed. Per Pinstrup-Andersen, Cornell University, USA
- 37 Wijayapala, W.D.A.S. and T.N. Kankanamge, Assessment of the Impacts of Electricity Subsidies in Sri Lanka, ENGINEER - Vol. XLIX, No. 04, pp. [29-36], The Institution of Engineers, Sri Lanka, 2016
- 38 Wimalasena H.D and K. Rupamoorthy, Comparative Study on the Economics of Large and Small Scale Marine Fishing Operations in Sri Lanka , Sri Lanka Journal of Aquatic Science 5, (pp 105-129), NAQDA, Sri Lanka, June 2000.
- 39 Wimalawansa, Sunil J. “Public health interventions for chronic diseases: cost benefit modelizations for eradicating chronic kidney disease of multifactorial (CKDmfo/CKDu) origin from tropical countries” in Heliyon, Volume 5, Issue 10, October 2019.
- 40 World Bank “ Sri Lanka Energy Assessment, Strategy, Road Map” , World Bank, 2019.
- 41 World Bank, “Putting a Price on Pollution” Ian Parry in Finance and Development, Dec 2019
- 42 World Bank. “State and Trends of Carbon Pricing” 2021.
- 43 World Nuclear Association “ Carbon Dioxide Emissions from Electricity” , May 2021

Appendices

Appendix 1: Notes on Stakeholder Interviews

Notes of Interviews with Stakeholders on Impacts of Subsidies on Biodiversity

1. State Minister of Rattan, Brass, Pottery and Rural Industrial Promotion

Subsidies

1. Common machinery for use by all beneficiaries –100% subsidy : – up to Rs 1 million per machine – Cost Rs 100 million
2. Grants up to Rs 100,000 per individual for rural industrial development 75% of cost by government , 25% provided by beneficiary - Allocation – Rs 65 million in 2021 – 105 villages under 20 projects and over 11,000 enterprises and 700 beneficiaries for quality improvement.
3. Concessionary loans to industries – 4%-6% interest rate – over 5000 beneficiaries
4. Assistance to develop one entrepreneur per GN for a total of 14,016 entrepreneurs – cost Rs 800 million.
5. Subsidised interest loans implemented through local revolving fund for cultivating raw materials, a total of 435 acres, of Jute, Rattan, Reed and other raw materials cultivated in all 9 provinces in the country, to create a raw material bank. Rs 100 million allocated for program in 263 cultivation villages that are coming under the programme.
6. In 2022, allocation for all subsidies was Rs. 1050 million

Subsidies through National Craft Council – through Provincial Asst. Director at district level

Subsidies through Vidartha Centre – Directly by the DS.

A total of 11,000 enterprises improved and in addition 5000 additional enterprises benefited from other promotional programmes (training, technology transfer, provision of inputs) conducted by the Ministry.

Over 30 products benefited – Bamboo, Leaf products, Jute, Rush, Grass, Fabric, Cane Rattan ,Cotton, Wood, Trees (jack , Ebony) , Brass, Silver, Gold, Metal, Stones, Clay, Ceramic, Jewellery, Mineral, Leather, Sea Shells, Batik, Lace, Handloom, Embroidery, Clothes, Lacquer, Musical instruments, Food and Beverages, Herbal Products, Cosmetics, Chemical Products and other traditional products.

About 40% of the industries are not registered. In order to obtain subsidies these enterprises need to be registered.

Main reasons for not registering;

- 1.Many documents needed for registering
2. No deeds for some lands or premises
3. They fear that they will be required to pay taxes if they register
4. Many unaware of the programme

There is a Village Selection Committee at GN level to select recipients for subsidies. There is also a District Development Committee to give final approval.

Issues

1. Raw material shortage, especially cane and bamboo .
2. Many raw materials like cane, brass, etc. are imported
3. Locally some raw materials like Bamboo and Cane obtained from nearby forests – damaging environment – Bamboo needs to be harvested from time to time in order to regulate growth, so harvesting of bamboo is also needed in order
4. Other raw materials like clay obtained by digging or from tank beds. Removal of clay can cause environmental problems, if not done properly.

5. Cast problem, only people belonging to certain casts undertake some activities. Others do not want to participate in such activities.
6. Quality issues – need to improve quality in order to export.
7. High cost of cultivation for some crops that are grown as raw material for industry.
8. High cost of manufacture due to high cost of raw materials for some products.

As far as possible, the raw materials are obtained in an environmentally friendly manner. There is a program to grow raw materials such as rattan, reed, rush, grass etc. in home gardens or private lands. The growers get an income from selling the raw materials to the enterprise owners. However, some or most of the raw materials are obtained from natural sources or imported. Rattan and cane were imported from Indonesia, but this country has banned exports and consequently there is a shortage of this raw material. This can cause some harmful impacts on the environment, as the enterprises will try to obtain these resources from the natural areas, particularly rattan and bamboo. Other raw materials such as clay, ceramic, stones, leather, sea shells and minerals are also obtained locally and can contribute to environmental impacts. Raw material used in brass, silver, gold, metal, jewellery and batik making industries use imported raw materials and chemicals which can also cause pollution and contribute to environmental damage. However, the enterprises are small being at village level and the number of enterprises is not too high (around 11,000 at present) and overall the impact may not be very high. If there is a large increase or expansion in such industries due to the promotional subsidies provided (There are several subsidy programmes in this sector to promote the manufacture of the products in this sector), then there may be a substantial increase in harmful impacts on the environment.

2. Ministry of Power and Renewable Energy

Functions

Renewable energy development

Energy efficiency improvement

Assist the Ministry of Power & Energy

Policy analysis, technical support and arrange financing of sustainable energy projects.

Discuss, assess and offer for development renewable energy projects – wind, solar and biomass sectors.

Subsidies

Subsidies for power producers by purchasing power at Rs. 22 / Kwh. Small and medium sized producers and also Rs 22 for > 300 Kw. Average cost price Rs 16/Kwh (varies from Rs 12-Rs 20)

Carbon emission for 1Kwh = 750 g of Carbon

Local employment creation is about 10,000 new jobs per GW

Energy efficient equipment – government subsidy support Rs. 200- Rs. 700 per unit

Energy efficient bulbs distributed to poor households 2-5 bulbs per household consumes 3 units per month only. Bulbs sold at subsidised price. Programme to distribute 1 million bulbs, 800,000 bulbs distributed so far – 200,000 to be distributed. Original programme was for 10 million bulbs – now reduced due to lack of funds.

Subsidies for biomass burners. 30%-50% Capital subsidies for hot water boilers and spice dryers – Very successful. Small scale dryers for dryfish and Maldivian fish drying and Maadu.

Hospital also use logs changing from LP gas to firewood. Rubber wood mainly used as firewood. In rural areas firewood is obtained from home gardens or nearby jungles.

Kerosene subsidy 50% - (Rs 90/lt now sold at Rs 45) Cost of subsidy Rs 7.5 billion. Fishermen and urban poor are benefited. Now diesel vehicles also using kerosene due to shortage in 2022.

Electricity - Lower consuming groups (mostly below 120 units of electricity) are subsidized. Currently electricity is produced mostly by thermal plants; 29% major hydro, 35% coal, 30% thermal and 6% - other (wind, small hydro, solar) . Large scale solar plants also operating together with roof top solar units. There is a subsidy for roof top solar units (subsidized interest loan) but not for large scale solar plants.

Electricity sales – Domestic 37%, Religious 1% , Industrial 32%, Commercial 29%, Street lights 1% .

The SEA promotes the cultivation of forest patches in townships, green belts , planting of trees (Fruit, Jak and other varieties).

Environmental Impacts

Producers don't care about environment.

Biodiversity issues – after a 20 year period , microclimate habitat degrades or changes – considerable degradation , including loss of vegetation.

3. Ministry of Tourism - Sri Lanka Tourism Development Authority (SLTDA)

The Tourism Act of 2005 is the legal basis for the operation of the Authority. This includes registration of tourist hotels, travel agents, tour guides and other tourism related enterprises .

The organizations in the tourism sector includes SLTDA, SL Tourism Promotion Bureau, Sri Lanka Institute of Tourism and Hotel Management, Sri Lanka Convention Bureau, Dept. of Aviation, Botanical Gardens

About 50% of all categories of tourism enterprises are not registered with the Authority, eg. Small hotels, etc. There is an enforcement unit which is responsible for taking legal action against those operating illegally. However, the progress of registration is slow due to inadequate staff.

Domestic tourists cause more environmental harm than foreign tourists. They dump garbage, , empty bottles, food wrappings, shampoo packages, used masks, etc. Foreign tourists are more concerned about the environment.

Other environmental issues include setting up campfires and not properly putting them off which could result in forest fires.

Some tourists take away plant species from forest areas.

Need to have more facilities for waste disposal and promote sustainable tourism

An Investor Relation Unit is operating in the SLTDA. It includes officials from UDA, District Secretariat, Coast Conservation Authority, NBRO, Forestry & Wild Life. This unit helps in developing tourism in a sustainable way.

Local authorities give approval to guest houses, small hotels and restaurants at the local level and may not adhere to the tourism regulations. The LAs may be also be politically motivated when giving approval for such places.

For larger hotels, restaurants and tourism facilities an EIA has to be completed and an EPL obtained to operate. Environmental impacts will be minimised in this case.

The tourism sector has several organizations that assist and promote tourism related activities. These include THASL (Tourist Hotel Association of Sri Lanka) ASMET (Association of Small and Medium Enterprises in Tourism) , SLITO (Sri Lanka International Tour Operators), MICE (Meetings,

Incentives, Conferencing and Exhibitions) is a type of tourism in which large groups, are planned and brought together and Medical Tourism, where foreigners travel to other countries to get medical treatment – this is not much developed in Sri Lanka, except for Ayurvedic treatment which is becoming popular.

The authorities try to keep a low carbon footprint in the tourism sector. No paper is used for promotion, it is usually done digitally. The Authority is also in the process of registering all travel agents in order to promote tourism in an environmentally friendly manner.

In the Yala National Park, speeding vehicles is an issue causing disturbance to wild life.

Approved speed limit is 20 KMPH, however enforcement is a problem. This may be happening in other wildlife parks as well.

Plastic pollution around rivers, inland water bodies and oceans (80% of pollution in oceans). This includes wrappers. Pollution affects elephants and turtles and other wildlife.

Positive development – Efforts to protect trees are being made. Recycling of waste and water is promoted and is being adopted more and more in tourist hotels.

Subsidies

EU funded assistance for 60 tourist SMEs at Rs 1million per enterprise – total Rs 60 million for 60 SMEs.

NGO – U LEAD – promoting environmental practices – for guest houses and travel agents

Material grants for women headed SMEs in tourist sector (guest houses, catering enterprises etc.)

Grants of Rs 60,000 per enterprise.

4. State Ministry of Livestock Farm Promotion and Dairy and Egg Related Industries

Functions - Development of all livestock in the country and policy planning and development in the sector. Animal improvement, Farm management, Farm improvement, Health improvement.

Animal Husbandry is a devolved subject to Provincial Councils

1. Pig farming – environmental issues - subsidies for environmental friendly solution in reducing odour, production of bio gas and improvement of management. Most important – waste disposal. Pig waste rarely used for making organic fertilizer, can be used for biogas production for small scale < 3 Cu Metres of bio gas capacity
2. Animal manure production (Cattle and Poultry)– Animal manure waste is raw material for organic fertilizer. Methane emission of animal manure is less than in paddy production. Use for home gardening, sell excess for manure of paddy and other crops. In some areas there is a mechanism where organic manure produced in NW province, is sold to farmers in NE for vegetable production. This organic fertilizer is sold at Rs. 40,000 per load. Poultry waste is usually used for vegetables and coconut.
3. Livestock development promoted by Samurdhi under coconut
4. Livestock also promoted under Mahaweli Programme

Subsidies

1. Animal improvement - mostly for dairy and goat farming, through AI – improve milk yields of dairy herd from 2-3 litres per day to 10 litres or more. AI provided at Rs 50, while actual cost is Rs 550 per AI. Now this has increased to Rs 700. Subsidy of about Rs. 70 – 100 million per annum.
2. Animal Breeding - Stud bull purchased by Government from private farmers. Purchased from farmers at a 50% of bull value subsidised (50% higher price than market price paid for stud bull purchased by Dept.)
3. Subsidies given for goat farming - value Rs 41 million in 2020
4. Enterprise Sri Lanka and other loan schemes to promote agriculture and livestock – Jaya Isuru – for poultry and other livestock – full interest subsidised.
5. Agro-Livestock Development Loan Scheme - Dairy farming - Contribute 25% to equity - for low interest loan to develop Dairy farming.
6. Heifer Calf Development subsidy - Grant of Rs 6500/ heifer calf development. Total allocation Rs 1440 million starting 2007 (about 5000 calves /annum)

Impacts

- I. Livestock farming has a vast environmental footprint. It contributes to land and water degradation, biodiversity loss, acid rain, coral reef degeneration and deforestation. Nowhere is this impact apparent than in climate change – livestock farming contributes 18% of human produced greenhouse gas emissions worldwide
- II. When exotic blood is introduced into local cattle through breeding and AI, some local genes and characteristics of local breeds may be lost. Resistance to climate change and other characteristics may be lost.
- III. Since the type of management of local breeds of cattle involves grazing in pastureland as well as adjacent forests, there is an impact on biodiversity due to adverse impacts on wild life and forest reserves.
- IV. Dairy farming is a dying endeavour and may go down in 20-25 years. Subsidies will allow it to be prolonged. Further, dairy farmers have no social recognition in society (such farmers are looked down upon). About 600,000 persons are involved in livestock farming of which about 200,000 are in dairy farming.
- V. Subsidies should be continued for livestock farming for some time. In the future this sector will need only guidance, feeding systems upgrading and technical advice to improve the sector.
- VI. Changes or inconsistencies in policies with change of governments have negative impacts on the industry.
- VII. Animal feed production is not adequate for the industry. In the case of poultry feed 600,000 MT of maize are imported for making feed. (About 85% of the ingredients needed for poultry feed are imported).
- VIII. Cattle feed is also in short supply. Poonac is used as an ingredient for feed (makes up 35% of the feed) . However, 80% of the poonac is exported. This ingredient is now costly due to the high price of coconut and high prices fetched for poonac in the export market (Cost of Poonac is about Rs 100/kg).Much of the livestock feed or ingredients are imported from India.

Benefits

- I. The method of confining and feeding animals in sheds for improved breeds is economical and profitable for the farmer.
- II. Improving local breeds will increase productivity. However, improvement of local breeds will require improved management, better feeding and better healthcare, comfortable housing (sheds) etc in order reap the benefits of improved breeds. If not the needed benefits of high production will not materialise
- III. Poultry farming has become very successful and a high tech enterprise. There are no subsidies for poultry farming. There are no social issues or discrimination in poultry farming. Poultry farming is mostly large scale (95%) and only about 5% practice backyard poultry keeping. Poultry meat (broilers) production requires less than two months with current new breeds, 2 kg birds can be bred in 35 days.

5. State Ministry of Samurdhi, Microfinance, Home Economy, Self-Employment and Business Development

Institutions – Dept. of Samurdhi, National Secretariat for Disability, Nat. Inst. Of Social Dev., Rural Dev Bank, Rural Dev Training Inst. , National Counselling Unit

Subsidies

- I. **Samurdhi Grants** - Samurdhi Beneficiaries – 1.76 million HH – Amount of subsidy (grant) - Rs. 53 billion/Annum Grant transferred through DS to Samurdhi Banks (Total – 1078 banks)

Most HH are eligible for receiving the grants but there are many who are not eligible (Not eligible because of increase in income after some period, those not eligible even at time of initial grant). Grant varies from Rs 1500- Rs 3500 per month according to number of persons in household. – Rs 200 deducted for contribution to fund, social security etc.

Eligibility criteria developed by World Bank. Income should be certified by DS . No of beneficiaries increased from 1.4 Million at start to 1.7 million at present. Annually there are 5000 new applicants for Samurdhi grants. According to some studies 40% of the HH receiving Samurdhi grants are not eligible. Beneficiaries are eligible to obtain grants from the contributory fund for birth, death or hospital expenses and for house construction or repairs (Rs 250,000)

- II. **Subsidised Loans** - Samurdhi banks provide subsidised loans (4%-7%) to members, for self-employment, business, consumption, etc. (27 different types of loans) with a maximum loan of Rs 50,000 per HH, repayment from 3 months – one year – most loans for agriculture. Total loans Rs 43 billion.
- III. **Treasury Grants** - Treasury also provides funds for livelihood dev., infrastructure dev. , agriculture, industry based on the needs of the area-amounts ranging from Rs 200,000- Rs 500,000. Last allocation made was in 2017 (Rs 2billion). No allocation for 2020 and 2021.Samurdhi Society, Samurdhi officers, and DS monitor expenditure.
- IV. **Saubaghya Development Programme** - Rs 5 billion 2021 – Rs 700 million in 2022 – main purpose to increase income level of rural community. Rs 50,000 per individual grant , common facilities such as sales centre, etc. 670 production villages . Grants for agriculture, industry, using local raw materials and local skills. Programme considered a success. However, no monitoring done for this program.

- V. **Grama Sakthi Programme** – Given for a village (50-100 HH) Rs 670 per HH or average of Rs 50,000 for common activities
- VI. **Disability Payments** - Rs 5000 per month for disabled persons – About 72,000 people receiving this payment – Cost Rs 4.3 Billion
- VII. **Payment for CKD patients** – Rs 5000 / Month for 39,000 individuals – total cost Rs 2.3 billion

Total subsidies for all above programmes – About Rs 72 billion

- VIII. **Loans** - RDB Bank – loans for SMEs 20-25 different programmes – Rs. 60 billion loans. No subsidy involved but given with certain conditions – interest rate 12% or above – variable
- IX. **COVID Loans** – Loans for COVID affected enterprises Rs 119 billion, @ low interest rate.

Impact on Biodiversity of Above Programmes

Impact appears to be low. Loans and grants given for industry, agriculture or infrastructure/common programmes and livelihoods may have some impact on biodiversity, depending on the type of activity.

6. Ministry of Gem & Jewellery and Related Industries

Functions: Gem mining development and regulation; Gem Processing; Development of Jewellery making

No direct subsidy programmes for individuals

About 200,000 persons employed in this sector, mining, processing / heat treatment, exports.

Licensing of gem pits (5000-6000 licenses per year), licensing of lapidaries, Jewellery Manufacture – 5000 businesses. The Authority supervises between 50,000 to 75,000 mines annually. In addition, there are illegal gem mines not supervised by the Authority. Maximum number of pits allowed per licence is 10 per license. Refundable deposit for manual licence is Rs 4500 and for mechanised gemming Rs 600,000. According to G&J Authority, gems found in our country are over 2 billion years old.

The gem industry has no VAT and the tax rate is 2.5%-5%. The value of Illegal exports of gems is estimated at US\$ 300 million per annum.

Most manual mines are about 1 cubic meter in volume, going up to 500-1000 sq. ft. and 5 ft in depth. Deep mines may be 12 feet by 8 feet and over 10-15 feet in depth.

Mechanised gemming is done in an area of between 3000-5000 sq.ft. to varying depths.

Gem mining usually uses gravity separation of the soil.

Illegal gem mining – It is estimated that more than 1 million illegal mines may have been dug by illegal miners. Can cause environmental damage if done in forest areas and the mines are not closed. Most of illegal mines are not closed causing mosquito breeding and harm to environment. The Gem & Jewellery Authority (G&J Authority) has a programme to detect and close up such mines.

Mechanised gemming is also practiced – may also cause environmental damage if not done properly. The G&J Authority is responsible for licensing, overseeing and the monitoring of these mines.

Most of the small scale licensed miners close up the mines after completing search activities, according to the G&J Authority. Miners who do not close the pits may be penalised.

The G&J Authority provides scholarships to the children in Grades 6-12 of miners in the area. Rs 1500 upwards per month . About 400 children receive scholarships @ Rs200,000 or a total of Rs 80 million over the 7 year period of education. The Authority is planning to start a pension scheme for gem miners in the near future.

Subsidies

Although the G&J Authority is not giving any direct subsidies, there are indirect subsidies such as ; No VAT levied on gem exports; Other taxes are also low at 2.5% to 5%; Assistance given for education of miners' children . Pension scheme

Impacts

Abandoned mines causing harm to biodiversity

Use of Cadmium, Nitric acid, Sulphuric acid, Mercury, and Pottasium Cyanide in Jewellery making can cause environmental damage. After use these chemicals are sent into soils or water bodies. There are over 5000 Jewellery making business using these chemicals.

7. State Ministry of Export Agriculture and Minor Crop Development

Institutions -

Dept. of Export Agriculture

Agricultural Modernization Project

Cashew Corporation

Sugar Research Institute

Lanka sugar

Spice and Allied Products Board

Subjects-

Crops – Cinnamon, Cardamom, Pepper, Cloves, Nutmeg, Cocoa, Vanilla, Citronella, Coffee, Betel , Arecanut, Garcinia, Ensal, Turmeric, Ginger, Lemongrass, TJC Mango, Sugar Cane, Maize, Bee Keeping,

Subsidies

TJC Mango – 25 plants for ¼ acre, 50,000 plants @ Rs 200 per plant Total Rs 10 Million. Plan to produce 5,000,000 plants over the next 4 years through cloning. Distribute plants to home gardens, provide training, cultivate about 500 acres.

Other crops – provide planting material, training, processing techniques , field development.

Main crops Pepper 35,000 ha, Cinnamon 34,000 ha

Subsidy Rs. 7.2 billion.

Sugar cane – produce 120,000 MT – need 650,000 MT

Problem – land availability, environmental degradation, total area about 50,000 ha – no land available. Max that can be supplied is about 50% of requirement. Planting material and fertilizer is given to farmers at a subsidy. Loan is given at a subsidy for cultivation.

Factories are old and sugar recovery is low. Only at Siyambalanduwa , the factory is new 3-4 years, sugar recovery is higher.

Proposal to plant 30,000 acres in Horowapātana, Kilinochchi and Vavuniya

Maize – grown in Maha – 120,000 ha – Total production about 400,000 MT. No subsidies
Cashew - Planting material – improved seedlings provided at a subsidy – technical support for 3 years.

Environmental impacts

For most crops, especially tree crops and perennial plants not much environmental damage.
Sugar - Environmental issues - water table decline, bio diversity loss due to land clearing,
Maize – Grown mostly as rainfed crop – not adequate to meet demand for animal feeds (Mostly poultry). About 60% of requirement imported (600,000 MT). Maize cultivation in same land causes land degradation. Land clearing for new planting causes loss of biodiversity.

8. Ministry of Highways

Institutions: Maga Neguma - 3 Companies ; Construction; Consultancy ; Equipment

Road construction expenditure – 2019 – Rs 155 billion, 2020 Rs 226 billion, 2021 Rs200 billion.

New construction – causes dust emission, noise pollution, air and water pollution, ground water level decline, dirt accumulation, flooding etc. Flooding in Southern highway due to poor design.

Recovery of expenditure is only 5-10%, mostly from highway use charges.

Normally EIA is done before construction and recommended mitigation measures taken during construction and during maintenance.

Foreign cost of road development is 41%. Unplanned development also takes place in some road development.

9. State Ministry of Coastal Aquatic Resources Development

Ornamental Fisheries

This is regulated for best management practices. Annual license is required. No harmful species can be imported.

Exports earned US\$ 16 million in 2019, US\$ 36 million in 2020 and US\$ 21 Million in 2021.

Fish breeding also done in mud ponds. Different species used for this.

60 exporters – 100 varieties exported.

10,000 fish growers involved in ornamental fishing.

Small scale - < 100,000 fish growing

Medium scale - 100,000 to 1 million fish growing

Large scale - > 1 million fish

Subsidies given in previous years under Agric. Modernization Project.

Marine fish also bred for ornamental purposes. A breeding centre has been set up in Puttalam for marine fish breeding.

Sri Lankan exports amount to 4% of the world market and Sri Lanka is the 8th. largest exporter . Value of exports US\$ 21 million. Ave monthly income of small scale fishermen Rs. 50,000 per month.

Environmental Issues

Fresh water - Used water and sediments waste from growing fish is usually sent to the natural environment and can cause harm to biodiversity. Mostly grow foreign varieties.

Overgrown or oversized fish disposed of in natural streams and water bodies. These species can destroy the local varieties and cause loss of natural species.

Illegal fish imports (mostly aquarium fish) – may result in unsuitable fish species being brought into the country and cause damage to local species by being introduced into natural streams and water bodies.

Aqua-scaping - Like landscaping – arrangement in aquarium using stones, corals and water plants – illegal fish used in such aquariums. Coral also obtained illegally for this purpose. Marine fish is grown for ornamental fish using sea water. This is mostly in coastal areas. Environmental impacts are similar to fresh water aquarium fish.

Coastal Aquaculture – Mr. Ranatunge AD / NAQDA - Tel 071 8055360

Growing of prawns and mud crabs breeding in coastal waters in cages, Sea Bass, Mink fish, sea weeds , Sea cucumber.

Aquaculture mainly practiced in East and North Western areas.

Subsidies

Given under Agric. Modernization Project –under livelihood development –

Subsidies for cage materials, infrastructure development, backup generators, electricity connections,

Tax relief for import of shrimp feed, aerators for shrimp farms, equipment, High Density Polythene – 40% tax relief

Sludge from the shrimp farms used as fertilizer

Environmental Impacts

Release of sludge and water into natural environment

Aquaculture - Inland Fisheries Mr. Mahannama DD/ NAQDA – Tel. 071-8196823

Inland fisheries in 734 tanks/reservoirs

Subsidies

Boats (canoes) given free to fishermen – value Rs 75,000 per boat .

Pond culture – Rs 12.9 million

Ornamental fish – Rs 132 million

Shrimp farming existing – Rs 38 million

New shrimp farmers – Rs 132 million

Aquarium improvement – Rs 4 million

Cage culture – Rs 2.3 million

Small scale fish feed production – Rs 2.2 million

Large scale fish feed production – Rs 3.7 million

Sea Bass Culture – Rs 22 million

Sea weed culture – Rs 7.2 million

Dry fish/Smoked fish production – Rs 1.7 million

Boats 50 per annum Rs 75,000 – Rs 100,000 – Rs 4-5 million

Total - Rs 450 million subsidy / annum

Impacts

Pollution of water bodies – Madhu ganga polluted due to inland fisheries/aqua culture

Ghost fishing – when discarded or derelict fishing gear continues to fish or trap fish, entrap and kill marine/ inland water life.

Use of gill nets affects fish population

Wooden boats now replaced by fibre boats as it is less harmful to the environment.

Algae formation- nutrition and feed waste flowing into water bodies – increases potassium levels which is harmful to inland water life.

10. Ministry of Fisheries and Aquatic Resources – Mr. Wasantha Kumara –

Subsidies

No subsidies for production activities in marine fisheries – except for diesel and kerosene use in fishing boats. – About 32,000 motorized boats are operating in the fisheries sector. Every year about 1000 new boats are registered by the Department. Total number of active fishermen was estimated at 225,000 in 2019..

The boats need to be registered one time (free of charge) and the fishermen also need to obtain an operating license for Rs 5000/ annum with the Dept. of Fisheries, in order to undertake fisheries activities. . Navy helps in apprehending illegal fishermen.

A Coupon system is used for providing subsidised fuel. Coupons are issued to the value of the subsidy for each boat owner on an annual basis. The coupon can be redeemed at the fuel shed. Approx. cost of subsidy Rs. 4.7 billion. Average value of fuel subsidy per boat was Rs. 12,300 per annum in 2021

Environmental Impacts

1. Biodiversity loss due to dynamiting of fish.
2. Use of illegal fishing gear and methods causes biodiversity loss- There are over 17 methods of fishing and some of these are not legal and prohibited in Sri Lanka, including bottom trawling.
3. Use of surrounding nets and gillnetting also cause impacts on biodiversity.

11. State Ministry of Urban Development , Coast Conservation, Waste Disposal and Community Cleanliness

Functions;

1. Solid waste disposal
2. Community cleanliness
3. Urban development

Work with UDA in highway development, bus stands, and city development.

Areas of activity

Urban regeneration – about 7% of buildings > 25 years of age that need regeneration.

Housing

City development – Green city development

Junction improvement.

Subsidies – No subsidies in this sector.

Environmental impacts

Highways development, housing development , may have an impact on the environment, depending on the area where development takes place and the path taken by the road. If roads go through environmental sensitive areas such as forest areas, coasts, etc

12. State Ministry of State Company Estate Reforms, Tea and Rubber Estate Related Crops Cultivation, Factory Modernization and Tea and Rubber Export Promotion

Subsidies

Rubber Crop

1. Rubber development - machinery and equipment for rubber tapping and latex protection –Rs 5 million

2. Livelihood Development for Rubber Smallholders – Inter cropping, Bee keeping, Pineapple cultivation, Poultry keeping, Mushroom and Medicinal plants cultivation and Export Crops Rs 40,000 per HH Cost Rs 125 million / year
3. Disease control in rubber – Subsidy Rs 25 million
4. Rubber nursery development – equipment and materials – Subsidy Rs 260 million.
5. Rubber sheet improvement – Subsidy Rs 50 million
6. Irrigation facilities for rubber cultivation in dry areas - Subsidy Rs 50 million in non-traditional rubber growing areas such as Moneragala, Vavuniya, Ampara etc. beneficial to environment , improve climate and reduce soil erosion – subsidy for motor Rs 100,000 (50% subsidy), poly tubes for irrigation Rs 200,000 subsidy 500 persons.
7. Research - Development of Rubber – Subsidy Rs 40 million
8. Home garden development Rs 80,000 per person Total Rs 625 million
9. Under planting with maize, pineapple, groundnut
10. New Planting of Rubber – Subsidy Rs 100 million – soil conservation measures
11. Replanting of Rubber - - Subsidy Rs 360 million
12. Rubber productivity improvement –Rain guards – Subsidy Rs 60 million
13. Smoke houses for small holders Rs 1.5 million subsidy
14. Training and Empowerment of farmers and other – Subsidy Rs 30 Million

Total Subsidy – Rs 1100 million

Tea Crop

1. Tea new method planting (Rs 75,000 ¼ acre) – Subsidy Rs 500 million
2. Compost development – Subsidy Rs 175 million
3. Tea Small Holder (TSH) Tea new and replanting – Subsidy Rs 750 million
4. Irrigation facilities for Tea cultivation (50% subsidy) – Subsidy Rs 200 million
5. Livelihood development of Tea small holders –Subsidy Rs 1000 million
6. Tea nurseries – Jumbo Plants 425,000 plants - Subsidy Rs 50 million
7. Shade tree – cultivation – provision of seedlings – Subsidy Rs 30 million
8. Equipment – augers, pruning equipment, plucking machines – part subsidy – Subsidy Rs 55 million
9. Soil rehabilitation, new planting and maintenance, allowance for lost income, infilling, training, awareness, pest and disease control – Subsidy Rs. 30 million
10. Rehabilitation of existing plantations TSH - Subsidy Rs 660 million

Total Subsidy – Rs 2950 million per annum

Impacts

- According to the official, rubber planting is environmentally beneficial, most new planting is done on private lands and not in forest lands.
- Application of fertilizers, chemicals and fungicides for pest and disease control can affect environment
- If tea and rubber new planting is done in forest areas, it can cause losses in bio diversity. However, permission is given for planting only on own lands (Must show deeds before getting subsidy)
- Proper soil conservation measures taken to reduce erosion in tea lands.

13. State Ministry of Tanks, Reservoirs, and Irrigation Development Related to Rural Paddy Fields

Subsidies

1. Tree planting on tank reserve areas – Subsidy Rs. 200 million
2. Providing fish fingerlings (Tilapia) in 500 small tanks – seasonal tanks- for inland fishing – Subsidy Rs 50 million

3. Small tanks seasonal ones – provision of fingerlings (other varieties) in Moneragala , Kurunegala and A'pura – Subsidy Rs 60 million.
4. Seed production in 25 districts (vegetable, rice etc.) – 50% Subsidy Rs 20 million
5. Crop diversification OFCs – 25 districts – Subsidy Rs 20 million
6. Production villages – 1-2 crops per village – subsidy Rs 90 million
7. Demonstration for commercial farming on uplands near tanks. Allocation Rs 400 million – Subsidy spent last year Rs. 50 million

Impacts

- Fish breeding in seasonal tanks not harmful to environment as the tank dries up and the fish is harvested prior to that.
- Tea planting on adjacent areas of tank improves water sources and improves environment.
- Bare or scrubland is used for commercial cultivation, impacts may be marginal.

14. **Water Board (NWSDB)**

Subsidies

- Subsidies for water supply for households and institutions - Rs 1.2 billion

Impacts

- Water Source – rivers, dry zone tanks, ground water (only when reliable source is not there)
- Water is extracted from 275 sources of water 73.5 % from rivers, 25.9% from tanks and reservoirs, 0.58% from ground water and 0.02 % from sea water.
- A total of 1.9 million M3 is extracted per day from major rivers, 0.7 million M3/day is extracted from major tanks and reservoirs and 0.15 million M3 / day from ground water for a total of 2.67 million M3 per day from all sources to supply potable water to the population.
- Taking river water does not have much impact on biodiversity. Water extraction from other sources may have some impact.
- Impounding tanks for water supply may have some impact on biodiversity.
- Formation of blue green algae in rivers and tanks due to high extraction.

15. **Ministry of Lands**

Commercial / 30- 50 year Lease agreements – Government land given for productive activity –mostly for agricultural purposes. Mostly poor quality lands leased out. Annual rental is charged for land. District Development Committee must give approval for land lease. Committee includes Dept. of Wild Life and Forestry Dept. , NBRO, representatives. Lands mostly given for agriculture but also given for commercial and industry activities. Area leased limited to 2 acres. Issues such as impact on wild life, forestry, marshes, etc. also looked at.

Should meet Land Commissioner for more details. LC is Mr. Bandara Jayasinghe – Tel. 011 2797400

1st. Floor Sethsiripaya

16. **Ministry of Plantations**

Responsible for development of following crops; Tea , Rubber, Coconut , Sugar Cane, Maize, Kitul, Arecanut, Oil Palm, etc. Provide planting material, seedlings at concessionary prices.

Mostly fertilizer subsidy given in the past – Includes, tea, rubber, coconut, minor export crops, other subsidies include subsidies for re-planting, new planting, soil conservation, seedlings, shade trees. Generally not much environmental impacts, mainly given for owned lands. Possibility of cultivating forest lands is there, but subsidy recipient must have proof of land ownership before subsidy is given.

Coconut , subsidy for seedlings cost Rs 225 subsidy Rs 125, maximum Rs 8000 per acre. GAP promoted by Ministry. Organic fertilizer subsidy . Inorganic fertilizer subsidy .

Impacts

Sugar cane – new planting , clearing of land can affect environment , fertilizer application can also affect environment . all of above given subsidies. Intercropping in sugar cane helps reduce env, damage. Tea should not be subsidized

Details of subsidies to be given – by Dir. Planning

17. Ministry of Forestry and Wild Life

Implementing Ecosystem Conservation and Management (ESCM) project funded by World Bank.

Village level – subsidies given for elephant fences constructed by villagers, maintenance by government, cost is lower as villagers' inputs are also provided in the construction and maintenance. (cost Rs 1 million / km)

Forest Department gives part subsidies for private sector tree planting in own lands. Varieties; Mahogany, Kos, Del, Mango, Durian, etc. . Green Sri Lanka programme, Subsidy planting material, other, (Rs 500 or above per tree) . Cost varies with type of tree. First year, ground established for planting. Also fence provided for each tree for protection. Subsidy given in instalments, starting at 40%, 40%, and 20% over planting period of 1 year. Program to grow 75 million trees on private lands Monitoring by DS headed Environmental Committee. Committee includes, Environmental Police Officer, Environmental Officer, GNs, & CBOs. Given smart phone to get pictures of tree growth. D.G . Wild Life – Mr. Suriyabandara DG Forestry Conservation - Mr. Bandara

18. Ministry of Environment

Responsible for environmental policies and guidelines. Agencies , CEA, GSMB Geological Survey and Mining Bureau,

No subsidies.

For mining activities, environmental clearance needed, to reduce environmental impacts.

5th. and 6th. National Reports on Biodiversity prepared – gives all details on biodiversity impacts in Sri Lanka. Targets to minimize subsidies affecting environment.

Biodiversity Secretariat –

- Reducing harmful subsidies
- Global biodiversity impacts
- Actions for Sri Lanka
- Global biodiversity outlook
- Intergovernmental Biodiversity Policies on Subsidies

Biodiversity valuation done in 2016/2017

19. Ministry of Agriculture,

Fertilizer subsidy is a major subsidy for this sector – paddy and other crops. When cost of fertilizer was Rs 4000, the subsidized price was Rs 350 per 50 kg. bag.

When giving subsidies, which is based on area cultivated, the actual land area cannot be verified as deed may show more area while actual cultivated area may be less (data on this not accurate). Thus the actual amount of subsidy given is more.

Soil testing is now being done before providing fertilizer, the requirements of fertilizer differs for different crops, and different soil types and soil moisture content. This is the proper way.

With regard to organic fertilizer, currently available fertilizer is not of good quality. Liquid organic fertilizer not recommended for paddy as these fertilizers are absorbed through the leaves and leaf size is small in paddy and absorption is less, most of the fertilizers go waste.

Other subsidies given for promoting 13 crops: maize, green gram, chillies, potato, onions red, onions large, soya beans, groundnut, kurakkan, cow pea, tala, paddy and vegetables.

Following subsidies given for < 2 ha per person

Seeds and seedlings,

Machinery (pumps etc.), poly tunnels and plastic piping and other equipment for irrigation.

Current subsidy for above is 50%. Some foreign funded projects provide 100% subsidy for above.

Subsidy for weedicide to re-cultivate abandoned paddy lands, not operating now.

Eg. Agric. Sector Modernization Project (ASMP) 100% subsidy, Sustainable Agricultural Partnership Program (SAPP) -50% subsidy 50% loan, Climate Smart Irrigated Agriculture Project (CSIAP)

Indirect subsidies given for protected irrigated agriculture programme, equipment for micro irrigation and other projects are given a tax (Duty and Cess) waiver for imported equipment, polythene roof sheets, polythene mulch to reduce waste of water when cultivating chillies, vegetables and tomato.

Good Agricultural Practices (GAP) is practiced by farmers supplying Cargills and other Super markets. This has reduced fertilizer use by 80%.

Illegal application of banned agrochemicals, smuggled into the country from India is an issue with respect to pollution of environment.

20. Water Sector – Department of Irrigation

Main Sectors, Functions and Responsibilities of Organization

Sectors

- Head office branches
- 14 Regional Directors offices along with assigned Divisional Irrigation Engineer's offices.
- 4 Zonal Design offices
- Zonal mechanical workshops

Functions

- Preparation of Master Plan for development of the different river basins for the optimum utilization of land and water resources giving priority to the environmental factors.
- Collection, development and management of historical data base for water resources and flood management of the country.
- Project formulation and detailed designs of irrigation, hydro-power, flood control and reclamation Projects.
- Construction of irrigation and settlement projects for the conservation, diversion and distribution of water under gravity and lift Irrigation to new and existing land for cultivation by farmers for enhanced food crop production and to upgrade their living conditions.
- Construction of drainage, flood protection and salt water extrusion projects for the protection of cultivable land to enable the cultivation of such lands with rainfall for food crop production with minimized risk.
- Providing drainage and flood protection facilities to minimize or mitigate the damages caused by floods.
- Operation, maintenance, improvements, rehabilitation and water management of medium and major irrigation schemes. Drainage and flood protection scheme and salt water extrusion schemes for optimum productivity ensuring the participation of beneficiaries. Catering of water for inter sectorial use, domestic, industrial use and environmental requirements.
- Maintaining and upgrading the water infrastructure including dams and head works of the system
- Research in Hydraulics, Hydrology, Soil Mechanics, Engineering Geology, Geographic Information System (GIS), Engineering Materials and Land Use as applied to Water Resources Development Projects.
- Human resources development for optimum utilization of human resources in irrigation sector.
- Operation and maintenance of financial management system, accounting, reporting and auditing of systems of irrigation department in accordance with the financial regulation of the government of Sri Lanka.

- Providing consultancy Services to government department, statutory boards/corporation, public and private institutions and individuals; in the fields of Water Resources Development; Foundation Engineering; Quality Control of Earthwork and Concrete; Hydraulic Model Testing and Land Use Planning.
- Issuing Irrigation Department clearance, whenever necessary for the projects handled by the other government institutes and private sector such as highways, Mini hydro power, industrial and land filling, hotel resort and drinking water projects, etc.

Responsibilities of Organization

- Development of land and water resources for irrigated agriculture, hydro power, flood control, domestic usage, industrial usage and aquaculture development, while assuring environmental sustainability.
- Provision of lift irrigation, irrigation drainage and salinity extrusion facilities for cultivable lands in Irrigation and Drainage Projects.
- Facilitation for drinking water.
- Flood protection and drainage facilities to lands affected by floods.
- Alleviation of poverty of the rural farming community by increasing their farm income and raising their standard of living.
- Management of Water economically for sustainable agriculture and other uses.
- Productivity enhancement of land and water in major / medium / inter-provincial minor irrigation schemes.
- Integrated water resources management and participatory management in major / medium, inter provincial minor and micro irrigation systems.
- Integrated water resources management and participatory management in river basins assigned to ID

Are there any subsidies funded by the government only, provided to beneficiaries coming under your organization; (Subsidies can include cash or in-kind grants, subsidised or low interest loans, technical assistance, assistance for maintenance of assets, assistance in marketing products or output, provision of land or buildings)

Yes

If so, what are they?

1. Technical Assistant: Technical assistant in effective water management and distribution of the irrigation schemes.
2. Assistance for maintaining of assets: Operation and maintenance activities in irrigation schemes.
3. Provision of land or buildings: Irrigable areas, hamlets and infrastructure developed under irrigation projects.

What are the costs of the subsidies funded by the government? (Annual, or for a short period only)

Hence Irrigation department is supplying a service without a revenue or profit, the total recurrent and capital cost incurred can be considered as subsidies.

Capital cost (2021)- Rs. Mn.8524

Recurrent cost (2021)- Rs.Mn. 2314

Are any subsidies given under any foreign funded projects?

Yes, foreign funds are given for implementation, rehabilitation and reconstruction of the irrigation projects.

If so please give details of subsidies of such projects? (period of operation, costs of subsidies, etc.

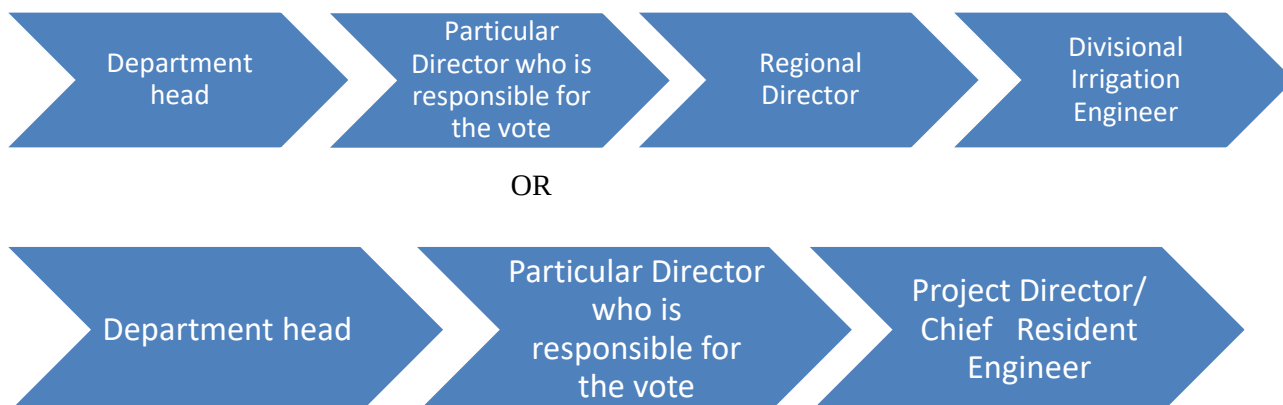
Please refer annex 01

Would the government continue the subsidies even after the project ends?

Yes, after the construction, an annual budget is allocated for the operation and maintenance activities of the relevant scheme.

How is the subsidy administered? (The process, agencies involved, conditions, given in instalments, etc.)

Treasury divides the annual budget according to the prevailing priorities. After that an allocation is reserved for each department. It distributes as follows.



Upon receiving the allocation to the Divisional Irrigation Engineer/Project Director/Chief Resident Engineer, the field work can be started. If there any stake holders the allocation is distributed among them as well.

Are there any shortcomings in the way that the subsidy is administered?

No

If so, please explain: -

What benefits do the beneficiaries receive from such subsidies?

- Water security for the irrigation.
- Water requirement for domestic purposes
- Flood protection and drainage facilities to lands affected by floods
- Improving the quality of rural population
- Food security

What are the positive and negative impacts of the subsidy?

Positive Impacts	Negative Impacts
Ensuring increased agriculture production Income generation Water security for irrigation Protection for the properties which are prone to floods Recreational facilities Improvement of ecology system and ground water table	Displacement of population from inundation area Deforestation Wastage of irrigation water as it was provided free of charge

What are impacts on the environment or biodiversity due to the subsidy? (Both positive & negative)

Positive Impacts	Negative Impacts
Increase of ground water table Full fill wild animal water requirement	Deforestation Effect to downstream ecological system

How can the negative impacts on biodiversity be reduced or avoided?

- Deforestation- Reforestation to compensate the destroyed forest area.
- Effect to downstream ecological system- Maintain a continuous discharge as environment flow to facilitate the downstream ecology system

Are there any alternative ways in which the subsidy can be administered to reduce the impacts on the environment?

- Reforestation to compensate the forest area
- Maintain the required environment flow

If so, please elaborate.

In your opinion should these subsidies be continued? If yes, please give reasons why?

Yes, To ensure the food security of the country Irrigation Department should continuously engage in the irrigation water supply activities. To mitigate the floods and ensure the safety of the residents, flood mitigation activities should be carried out.

In your opinion, should these subsidies be discontinued? If so, give reasons why?

No, By stopping the subsidy, it can effect negatively in economic and social circumstances of the beneficiary.

Any other issues or comments that you would like to make about these subsidies?

Cost of Subsidies

1. State Minister of Rattan, Brass, Pottery and Rural Industrial Promotion

- Machinery for enterprises – Rs. 100 M
- Grants for individual enterprises – Rs 65 M
- Concessionary Loans @ 4%-6% - 5000 Beneficiaries
- Assistance 1 enterprise / GN – total 14,016 enterprises – Rs 800 M
- Subsidised interest loans implemented through local revolving fund for cultivating raw materials, a total of 435 acres – Rs 100 M

Total for all subsidies- Rs 1.08 billion

2

2. Ministry of Power and Renewable Energy

- Kerosene subsidy - 50% - (Rs 90/ILt now sold at Rs 45) Cost of subsidy Rs 7.5 billion.
- Subsidies for biomass burners. 30%-50% Capital subsidies for water boilers and spice dryers.
- Energy efficient bulbs distributed to poor households 2-5 bulbs per households – Rs 250 M
- Energy efficient equipment – government subsidy support Rs. 200- Rs. 700 per unit
- Subsidies for power producers by purchasing power at Rs. 22 / Kwh. Average cost price Rs 16/Kwh
- Electricity - Lower consuming groups (mostly below 120 units of electricity) are subsidized. Subsidy Rs 52.5 billion
- Subsidy for roof top solar units (subsidized interest loan) but not for large scale solar plants.
- The SEA promotes the cultivation of forest patches in townships, green belts, planting of trees (Fruit, Jak and other varieties).

Total all subsidies – Rs. 87 billion

3. Ministry of Tourism - Sri Lanka Tourism Development Authority (SLTDA)

- EU funded assistance for 60 tourist SMEs at Rs 1million per enterprise – total Rs 60 million for 60 SMEs.
 - Material grants for women headed SMEs in tourist sector (guest houses, catering enterprises etc.) Grants of Rs 60,000 per enterprise.- Rs 120 million
- Total subsidy – Rs 180 million

4. State Ministry of Livestock Farm Promotion and Dairy and Egg Related Industries

- Animal improvement - mostly for dairy and goat farming, through AI.
- Animal Breeding - Stud bull purchased by Government from private farmers 50% subsidy.

- c. Subsidies given for goat farming - value Rs 41 million in 2020
- d. Enterprise Sri Lanka and other loan schemes to promote agriculture and livestock - full interest subsidised
- e. Agro-Livestock Development Loan Scheme - Dairy farming - Contribute 25% to equity - for low interest loan
- f. Agro-Livestock Development Loan Scheme - Dairy farming - Contribute 25% to equity - for low interest loan.

Total subsidy – Rs. Rs.2 billion

5. State Ministry of Samurdhi, Microfinance, Home Economy, Self-Employment and Business Development

- a. Samurdhi Beneficiaries – 1.76 million HH – Amount of subsidy (grant) - Rs. 53 billion.
- b. Samurdhi banks provide subsidised loans (4%-7%) to members, for self-employment, business, consumption- Loans Rs 43 billion
- c. Treasury provides funds for livelihood dev., infrastructure dev. , agriculture, industry – Subsidy Rs 2 billion in 2017
- d. Saubaghya Development Programme - Rs 5 billion 2021 – Rs 700 million in 2022.
- e. Grama Sakthi Programme – Given for a village (50-100 HH) Rs 670 per HH or average of Rs 50,000 for common activities.
- f. Disability Payments - Rs 5000 per month for disabled persons - About 72,000 people receiving this payment – Cost Rs 4.3 Billion
- g. Payment for CKD patients – Rs 5000 / Month for 39,000 individuals – total cost Rs 2.3 billion

Total subsidy – Rs 72 billion

- h. COVID Loans – Loans for COVID affected enterprises Rs 119 billion, @ low interest rate.

6. Ministry of Gem & Jewellery and Related Industries

- a. Although the G&J Authority is not giving any direct subsidies, there are indirect subsidies such as ; No VAT levied on gem exports; Other taxes are also low at 2.5% to 5%; Assistance given for education of miners' children . Pension scheme

7. State Ministry of Export Agriculture and Minor Crop Development

- a. TJC Mango and other crops cinnamon, pepper – promotion subsidy Rs. 7.2 billion.
 - b. Sugar cane – Planting material and fertilizer subsidised - loan at subsidised rate for cultivation
 - c. Cashew - Planting material – improved seedlings provided at a subsidy – technical support for 3 years. Maize no subsidy.
- Total subsidy - Rs. 9 billion

8. Ministry of Highways

- a. Road construction expenditure – 2019 – Rs 155 billion, 2020 Rs 226 billion, 2021 Rs200 billion- Recovery of expenditure is only 5-10%, mostly from highway use charges.

9. State Ministry of Coastal Aquatic Resources Development

- a. Subsidies given under Agric. Modernization Project –under livelihood development subsidies for cage materials, infrastructure development, backup generators, electricity connections – Rs 50 million

- b. Tax relief for import of shrimp feed, aerators for shrimp farms, equipment, High Density Polythene – 40% tax relief
- c. Boats (canoes) given free to fishermen – value Rs 75,000 per boat.
- d. Subsidies for pond culture – Rs 12.9 million
- e. Subsidies for ornamental fish – Rs 132 million
- f. Subsidies for shrimp farming existing – Rs 38 million
- g. New shrimp farmers – Rs 132 million
- h. Aquarium improvement – Rs 4 million
- i. Cage culture – Rs 2.3 million
- j. Small scale fish feed production – Rs 2.2 million
- k. Large scale fish feed production – Rs 3.7 million
- l. Sea Bass Culture – Rs 22 million
- m. Sea weed culture – Rs 7.2 million
- n. Dry fish/Smoked fish production – Rs 1.7 million
- o. Boats 50 per annum Rs 75,000 – Rs 100,000 – Rs 4-5 million

Total Subsidy – Rs 450 million

10. Ministry of Fisheries and Aquatic Resources

- a. No subsidies for production activities in marine fisheries – except for diesel and kerosene use in fishing boats. – About 32,000 motorized boats are operating in the fisheries sector. Every year about 1000 new boats are registered.
 - b. Subsidised fuel – cost Rs 4.7 billion - subsidised fuel.
- Total subsidy – Rs 4.7 billion

11. State Ministry of Urban Development , Coast Conservation, Waste Disposal a

- a. No subsidies

12. State Ministry of State Company Estate Reforms, Tea and Rubber Estate Related Crops Cultivation, Factory Modernization and Tea and Rubber Export Promotion

Rubber Crop - Subsidies

- a. Rubber development - machinery and equipment for rubber tapping and latex protection – Rs 5 million.
- b. Livelihood Development for Rubber Smallholders - Cost Rs 125 million / year
- c. Disease control in rubber – Subsidy Rs 25 million
- d. Rubber nursery development – equipment and materials – Subsidy Rs 260 million.
- e. Rubber sheet improvement – Subsidy Rs 50 million
- f. Irrigation facilities for rubber cultivation in dry areas - Subsidy Rs 50 million - subsidy for motor Rs 100,000 (50% subsidy), poly tubes for irrigation Rs 200,000 subsidy 500 persons.
- g. Research - Development of Rubber – Subsidy Rs 40 million
- h. Home garden development Rs 80,000 per person Total Rs 625 million
- i. Under planting with maize, pineapple, groundnut
- j. New Planting of Rubber – Subsidy Rs 100 million – soil conservation measures
- k. Replanting of Rubber - - Subsidy Rs 360 million
- l. Rubber productivity improvement –Rain guards – Subsidy Rs 60 million
- m. Smoke houses for small holders Rs 1.5 million subsidy
- n. Training and Empowerment of farmers and other – Subsidy Rs 30 Million

Total Subsidy – Rs 1.6 billion

Tea Crop - Subsidies

- a. Tea new method planting (Rs 75,000 ¼ acre) – Subsidy Rs 500 million
- b. Compost development – Subsidy Rs 175 million
- c. Tea Small Holder (TSH) Tea new and replanting – Subsidy Rs 750 million

- d. Irrigation facilities for Tea cultivation (50% subsidy) – Subsidy Rs 200 million
- e. Livelihood development of Tea small holders –Subsidy Rs 1000 million
- f. Tea nurseries – Jumbo Plants 425,000 plants - Subsidy Rs 50 million
- g. Shade tree – cultivation – provision of seedlings – Subsidy Rs 30 million
- h. Equipment – augers, pruning equipment, plucking machines – part subsidy – Subsidy Rs 55 million
- i. Soil rehabilitation, new planting and maintenance, allowance for lost income, infilling, training, awareness, pest and disease control – Subsidy Rs. 30 million
- j. Rehabilitation of existing plantations TSH - Subsidy Rs 660 million

Total Subsidy – Rs 2.95 billion per annum

13. State Ministry of Tanks, Reservoirs, and Irrigation Development Related to Rural Paddy Fields

- a. Tree planting on tank reserve areas – Subsidy Rs. 200 million
- b. Providing fish fingerlings (Tilapia) in 500 small tanks – seasonal tanks- for inland fishing – Subsidy Rs 50 million
- c. Small tanks seasonal ones – provision of fingerlings (other varieties) in Moneragala , Kurunegala and A'pura – Subsidy Rs 60 million.
- d. Seed production in 25 districts (vegetable, rice etc.) – 50% Subsidy Rs 20 million
- e. Crop diversification OFCs – 25 districts – Subsidy Rs 20 million
- f. Production villages – 1-2 crops per village – subsidy Rs 90 million
- g. Demonstration for commercial farming on uplands near tanks. Allocation Rs 400 million – Subsidy spent last year Rs. 50 million

Total Subsidy – Rs 890 million

14. Ministry of Agriculture

- a. Fertilizer subsidy is a major subsidy for this sector – Rs 37 billion
- b. Other subsidies given for promoting 13 crops: maize, green gram, chillies, potato, onions red, onions large, soya beans, groundnut, kurakkan, cow pea, tala, paddy and vegetables - Rs 20 million
- c. Following subsidies given for < 2 ha per person , Seeds and seedlings – Rs 20 million
- d. Production villages – Rs. 90 million
- e. Seed production 25 districts – Rs 20 million
- f. Demonstration for commercial farming - Rs. 400 million
- g. Machinery (pumps etc.), poly tunnels and plastic piping and other equipment for irrigation. Current subsidy for above is 50%. Some foreign funded projects provide 100% subsidy for above.
- h. Subsidy for weedicide to re-cultivate abandoned paddy lands, not operating now. Agriculture Sector Modernization Project (ASMP) - 100% subsidy.
- i. Cashew - Planting material – improved seedlings – Rs. 70 million for 3 year
- j. Subsidy for crop insurance – Rs 1.5 billion
- k. Cultivation subsidies – Rs 1.6 billion
- l. Sustainable Agricultural Partnership Program (SAPP) -50% subsidy 50% loan.
- m. Climate Smart Irrigated Agriculture Project (CSIAP)
- n. Indirect subsidies given for protected irrigated agriculture programme, equipment for micro irrigation and other projects are given a tax (Duty and Cess) waiver for imported equipment, polythene roof sheets, polythene mulch to reduce waste of water when cultivating chillies, vegetables and tomato.
- o. Other subsidies – Rs 10 billion.

Total Subsidy - Rs. 50.7 billion

15. Water Sector – National Water Supply and Drainage Board

- a. Subsidy for low consumers – Rs 1.2 billion

16. Water Sector – Department of Irrigation

- a. Subsidy – Rs 2.3 billion

17. Transport Sector

- Subsidy for public transport (CTB) Rs 12 billion.
- Other subsidy – Socially obligated bus service 5.6 billion
- Subsidy for School, Higher Education Students and Armed Forces - Railway season tickets and bus passes at subsidized rates. Cost Rs 24 billion.
- Subsidy for serving under-served bus routes Cost Rs 6 billion.
- Railway subsidy – Rs 13.0 billion
- Other subsidies – Rs 26.3 billion

Total subsidy – Rs 86.9 billion

Appendix 2: Outcomes of the Workshop – 16/06/2022

Subsidy	On budget	Off budget	unintended	Impact on BD	Recommendation for Repurposing
1. Fertilizer subsidy	yes	(Donation, eg :FAO)		Overuse of application result in: Land, water ,Air pollution	Soil testing before application (Recommendation based on nutritional requirement)
				Biodiversity reduction within cultivated area	IPNS (integrated plant nutrient management system)
				Cultivated area expansion	Precision agriculture (Eg: nano fertilizer)
				Increase of food contamination	Advance generation fertilizer
					Awareness and extension programmes for farmers (certification system)
					Allocating a percentage of the subsidy for testing and lab facilities
					Production of organic fertilizer being made a prerequisite for obtaining a subsidy on chemical fertilizer.
2. Seed subsidy	yes		Intended	❖ Subsidy given to seeds like green grams – production of nitrogen reduces need for urea ❖ Extra income provided for framers ❖ Positive impact on BD ❖ Food safety and security due to import substitution ❖ Certain seeds like big onion and potatoes require	❖ Encourage IPNS ❖ Subsidy given to input rather than input

				more chemicals which affects the BD	
3.Machinery subsidy	yes		Intended	❖ Fuel used for machinery causes environmental pollution ❖ Low use of agro chemicals ❖ Increased productivity and safety ❖ Improves quality of production ❖ Decreased risk to animal life ❖ Mismanaged plastic waste ❖ Can be generated (green house net)	❖ Giving a subsidy to local manufactures so we can reduce imports ❖ Giving a raw material subsidy for local manufactures
Wild animal damage subsidy	yes (For some) (Insurance for crops)		Intended	Reduce human harm to animal life	❖ Percentage of subsidy allocated to the upkeep of protected areas. ❖ Improve the enforcement of environmental laws.

Appendix 3: Recommendations on Fisheries and Aquaculture

Sector	On Budget	Off Budge	Unintended	Impact on Biodiversity	Recommendation for repurposing
			Open access for finfish and mollusks	overexploitation	Stock assessment-based fisheries management strategies i.e. closed systems for area and Species based Quantities
			No quota system for fish harvesting	Overexploitation	Reintroduce the licensing system for fishing
	Fuel subsidy			Increasing fishing pressure /overexploitation	Stock assessment-based fisheries management strategies
		Subsidies implemented by provincial councils		Increasing fishing pressure	Fleet management system
			Not adhering to rules and regulations		Awareness and enforcement
Aquaculture					
	Land allocation/sea area allocation for aquaculture				Select suitable area for aquaculture development based on national aquaculture zoning plan
	Introduction of species		Colonizing lagoons by some introduced species	Creating imbalance in the natural environment I.e. competition for resources	Strict precautions to avoid, escape and implement fine etc.
	Shrimp farming			Effluent discharge, use of antibiotics, chemicals	Adhere to good management practices, and enforcement, treatment of discharge water, crop calendar etc.
	Lagoon dredging			Changing natural environment/ impact on biodiversity and water circulation	Preliminary study on biodiversity EIA/ community based restoration management

	Tax relief on equipment/ high density polythene etc.				Polluter pay tax system based on the quantity used by aquaculture farmers
	Other recommendations				Establish baseline information on biodiversity in aquaculture areas
					Recirculation aquaculture, effluent treatment
					Introduce solar power in to aquaculture operations
					Scientific studies before introduction of new species
					Introducing environmental tax/ introduce replantation programme or restoration base on the contribution of aquaculture farmers
					Improve monitoring & regulation of aquaculture practices/ capacity building in aquaculture extension
					Control unnecessary political influences

Appendix 4: Workshop Recommendations on Transport Sector

Workshop

Recommendations of the Team on Transport

The Team only consisted two members from Private bus operators association.

- Transport sector does not require Grant Subsidies
- Road construction must be planned for 25 to 30 years and made it sustainable by not allowing breaking the road during that time. One year ahead all relevant parties such as water board, telecom and residence etc. must be informed to take advance action to take all amenities as road once constructed would not be allowed to break after construction.
- Bus stand, Parking slots etc. should be planned properly in consultation with RDA, Traffic Police etc. and not based on political & personal needs of people to eliminate traffic blocks.
- Low interest Bank loans should be arranged for buying transport vehicle at depreciating interest so that bus fares would not need to increase.
- Administration and Management of CTB need to be Non-Political but professional and Technical
- In order to minimize waste of resources such as vehicles, fuel and human resources, CTB and Private buses must be placed in a Joint or Combined time table to eliminate competition among the two. It is successfully implemented in the Southern Province and must be implemented all over the country for both short and long distance routes.
- Reservations of Highways should be used to plant trees such as Jak, Coconut and Fruit trees to make those areas productive. At places where perennial crops are not possible annual crops could be cultivated instead of maintain Grass. This can be implemented by RDA or given to private sector of communities.
- The space under over- head bridges could be made to use for purposes such as warehouses, parking lots etc. instead of keeping as waste lands in city. This is done in foreign countries.
- Reconsider economic value of constructing Highways instead of developing existing trunk roads. If decide to construct Highways they must be designed locally considering the needs under local conditions.
- Preference should be given to local contractors against foreign contractors and where ever possible using members of the Tri Forces with an additional allowance if required in construction work should be promoted to minimize the cost.
- Villages in the underserved bus routes should be developed by introducing Industrial, Agricultural, Agri-business and residential operations to make them no more under serving but profit making.
- Authorities and decision makers such as Project Directors, Chief Engineers etc. must be made not only officially but also legally responsible for negligence and carelessness in duty and using public funds. Resignation from position is useless.
- Importation of Private vehicles to the country must be limited to 2000 cc for diesel and 1500 cc for Petrol vehicles for a specific period when vehicle importation is allowed.

- Arrangement should be made to monitor each bus route by an authorized committee of young people consisting of operators and commuters.
- In order to eliminate or minimize the need of school buses transport to Colombo from Provincial Urban Centers, National level schools such as Royal, Visaka etc. should be developed in Urban centers such as Rathnapura, Kalutara, Gampaha and Kegalle.

Appendix 5: Meetings with Stakeholders – Photos



Appendix 6: Photos of the Workshop – 16/06/2022





Appendix 07 : Summary Table

No.	Sub Sector	Total Subsidy Cost - Rs Billion (US\$ Billion)	Environmental Cost - Rs Billion (US\$ Billion)	Economic Benefits - Rs Billion (US\$ Billion)	Environmental Impacts	Recommendations for Repurposing
1	Marine Fisheries	1.85 (0.01)	81.5 (0.454)	41.2 (0.229)	Pollution of marine water from leakage of fuel and other chemical wastes, destruction of corals through illegal fisheries activities such as blast fishing, use of illegal fisheries equipment, bottom trawling and methods that cause the destruction of habitats and loss of corals, increased coastal erosion, the reduced sustainability of fisheries. Ghost nets or nets abandoned in the ocean are made of plastic and nylon and do not decompose, wreaking extreme havoc on the wildlife and ecosystems that they interrupt	Diesel fuel subsidy for fishing boats used by mainly large boat owners (Multiday boats) should be removed. Subsidy for kerosine, used mainly by small boat owners should continue. It should be implemented in such a way that the richer households, businesses, commercial organizations do not have access to this subsidy. This can be achieved by providing a cash grant equivalent to the subsidy amount only to the persons targeted by the subsidy. The subsidy should be given only to deserving (poorer) fishermen and the amount of subsidy can be varied according to the economic status of the fishermen. There should be an annual review done by the Department of Fisheries and deserving fishermen should receive the subsidy. The amount of subsidy can be adjusted to such that it reflects the current world market prices of Kerosine. Furthermore, the Fisheries Inspector should inspect the boat and provide a certificate that it is sea worthy and that it is actually used for fishing activities. The subsidy grant should only be given on production of such certification. A quota system can be introduced to reduce overfishing. The license, registration and permit fees can be increased as these fees are low at present and do not reflect cost of issue in such certificates.
2	Energy	67.6 (0.376)	73.8 (0.41)	509.3 (2.829)	GHG emissions, fly ash, sulfur and nitrogen oxides are emitted to the atmosphere from thermal power plants. This can cause acidification or eutrophication of habitats and greenhouse gases contribute to global warming. Construction of major as well as mini hydro power plants lead to environmental degradation and negatively impact on biodiversity of downstream as well as on site. Failing to release minimum water flow from mini hydro power plants negatively impact on downstream habitat and biodiversity. Energy production from wind and biomass can also damage biodiversity.	The subsidies for fossil fuel used in electricity production should be removed such that the cost of production of electricity can reflect actual market values. With respect to subsidies provided for low consuming electricity consumers, it is suggested that these subsidies should also be removed progressively over a period of time. In the meantime the quantum of subsidy should be also reduced for all categories of consumers who are receiving the subsidy. The subsidy however, could be reduced in a progressive manner and over time to reduce any temporary hardship that may be faced by the low consuming consumer. Furthermore, license/registration/permit fees/health certification and administrative fees levied by the Department of Fisheries and Aquatic Resources should all be increased. These fees are rather low and have not been increased in the recent past and with high inflation levels, the real value has declined even further. This recommendation would lead to a soft increase in non-tax revenues of the Sri Lankan authorities corresponding to the aim of increasing this type of revenues.
3	Agriculture	51 (0.281)	83.6 (0.464)	134.3 (0.746)	Pollution of soil and ground water due the use or overuse of fertilizers and agrochemicals. Eutrophication of water and soils . Algae formation due to dissolved nitrogen in excess nutrition flowing into water bodies causing harm to inland water life and to humans drinking such water.	With a view to promote integrated fertilizer application which is found to be the best solution scientifically, the subsidy for inorganic fertilizer should be continued but must be given only to persons who are using the integrated system including both organic and inorganic fertilizers. This action need to be supported by the following; * Requiring certification from the dealers of fertilizer. * Subsidize the organic fertilizer and make sure they are of standard

						quality * Increasing the awareness of the farmer on the use of organic fertilizer. * Subsidize the organic fertilizer and make sure they are of standard quality * Conduct soil testing in the agricultural areas and zone them accordingly with the optimum requirement of the fertilizer (both organic and inorganic). the farmer will be encouraged to resort to the optimum fertilizer usage thus the overuse will be restricted. The above recommendations are for all crops including paddy.
4	Coastal Aquaculture	0.25 (0.0014)	22.6 (0.126)	6.3 (0.035)	Pollution of natural water bodies, ghost fishing and algae formation due to nutrition and feed waste into water bodies and increase in potassium levels harmful to inland water life.	Shrimp farming provides a relatively higher income compared to other aquaculture activities. Thus one suggestion is to remove these subsidies progressively over a period time (say three years) so that it has the least impact on the livelihoods of the fishermen. The subsidies for shrimp culture should be completely removed at the end of this period. Subsidies for activities such as pond and cage culture, fish feed production, Sea Bass and Sea Weed and Dry Fish should be continued to promote these activities. Tax relief for other aquaculture promotion activities should be continued for the next five years, with the proviso that these promotional will be discontinued thereafter, in order to provide an initial support for new investors. Those wishing to enter this field should take this opportunity during this promotional period. Tax relief should be granted only for activities that promote new investments in this field and not for continuing activities
5	Transport	210.15 (1.168)	410.1 (2.278)	772.8 (4.293)	The construction of roads causes dust emission, noise pollution, air and water pollution, ground water level decline, dirt accumulation, flooding etc. Pollutants in the transport sector include greenhouse gas emissions, sulphur dioxide, oxides of nitrogen, carbon monoxide or particulates and CO ₂ . These affect human health, lead to acidification and eutrophication of water and soils, and cause damage to nature and buildings as well as cultural assets.	Give priority to services that will increase the public transport mode share from users shifting from private vehicles. Subsidies for the transport of school children and for running underserved routes should be continued as the socio economic benefits are high. Subsidies for railway and public transport should be withdrawn over a period of time so as to remove the inefficiencies in these two services and promote a more efficient and cost effective service similar to the private sector. All other subsidies that are currently in force should be removed as they will promote inefficiencies if continued. An environmental tax was introduced by the government and later withdrawn due to protests by the citizens. It is recommended to re-introduce this tax based on the level of pollution of the vehicles. Allowing passenger transport vehicles to transport a limited amount of goods such as vegetables and fruits from rural areas to the markets will provide a quick means of transporting perishables to the market at a reduced cost, while reducing environmental pollution by replacing truck transport with this dual mode of transport using passenger busses.

Response to UNDP Comments

Hi Ramitha

Here are some comments for consideration –

1. Presentation format – they could do summary tables on all the subsidies + the costs. It would be visually more impactful rather than finding bits and pieces in the narrative. Also please ask them to prepare a table where all the subsidies listed are marked against the CBD type subsidy (see in the attached).
2. What is the total amount of subsidies and compare with macro indicators like GDP, tax revenues, export revenues – then we could see how significant this is.
3. The process for shortlisting the 5 sectors is a bit dodgy. The screening criteria was applied but the conclusions are a bit haphazard – like I would expect more analysis on livestock (due to expansion of grazing area vs forest cover) and tea / rubber --- but it's not there
4. Attribution of impacts of subsidy on biodiversity versus other important drivers. Would be nice to see how they can resolve this – a bit difficult.
5. Did you share the valuation database ? I think there is a good deal of literature available for Sri Lanka – so we can avoid doing the benefit transfer approach from dated (and challenged) materials from Costanza et al :) How about Emerton perhaps ?
6. Sectoral clustering – this was done for agriculture and coastal aquaculture – in later phase, maybe in validation, we can zero out on specific subsidies?

Overall, the report is of high quality. I like the discussions on repurposing and impacts.

Hi Ramitha

Here are some comments for consideration –

1. Presentation format – they could do summary tables on all the subsidies + the costs. It would be visually more impactful rather than finding bits and pieces in the narrative. Also please ask them to prepare a table where all the subsidies listed are marked against the CBD type subsidy (see in the attached).
2. What is the total amount of subsidies and compare with macro indicators like GDP, tax revenues, export revenues – then we could see how significant this is.
3. The process for shortlisting the 5 sectors is a bit dodgy. The screening criteria was applied but the conclusions are a bit haphazard – like I would expect more analysis on livestock (due to expansion of grazing area vs forest cover) and tea / rubber --- but it's not there
4. Attribution of impacts of subsidy on biodiversity versus other important drivers. Would be nice to see how they can resolve this – a bit difficult.
5. Did you share the valuation database? I think there is a good deal of literature available for Sri Lanka – so we can avoid doing the benefit transfer approach from dated (and challenged) materials from Costanza et al :) How about Emerton perhaps ?
6. Sectoral clustering – this was done for agriculture and coastal aquaculture – in later phase, maybe in validation, we can zero out on specific subsidies?

Overall, the report is of high quality. I like the discussions on repurposing and impacts.

In the case of the transport and energy sectors pollution was estimated using the costs of carbon emissions. In agriculture, excepting the values of agricultural activities, which was obtained from a local

study, other costs such as impacts of fertilizer was obtained from study done in Europe in 2006 and updated to 2019 values. Marine fisheries

- **Marine Fisheries** :In valuing marine ecosystems (marine fisheries), data for valuing the impacts was taken from a study entitled “ Valuing Marine Ecosystems - Taking into account the value of ecosystem benefits in the Blue Economy” published in 2019. The issue here is that we used data pertaining to valuation in a location in Europe and therefore may not be appropriate for Sri Lanka. For valuing marine fisheries, the data may not be fully applicable to Sri Lanka. However, the CO2 emissions may not differ too much between European and Sri Lankan fisheries. In the case of fisheries the resources available in European waters may differ somewhat from resources available in Sri Lankan waters. Fish species are different and type of fishing methods also may be different. Thus there is a likelihood that the values may be different and thus the cost benefit calculations may differ or may be incorrect. The study is not too dated as it was completed in 2019. See table below

Value of Marine Eco System Services

Marine Services	System	Value at 2019 Euro Million	Value in 2019 SL Rs Billion (1 Euro = Rs. 200)	Losses at 15% of value of the Marine Resources (Rs Billion)
Recreation		1600	320.0	48.0
Marine Fisheries		464	92.8	13.92
Aquaculture		200	40.0	6.0
Carbon absorption		819	163.8	24.57
Waste assimilation		317	63.4	9.51
Other		27	5.4	0.81
Total		3427	685.4	102.81

A study done in Sri Lanka “ Greening the National Accounts”, by U. A. D. Prasanthi Gunawardena, estimated the value of fisheries and agriculture. See table below.

Table 9: Summary account of the Agriculture and Fishery

Sector	Damage cost (Rs million)
Agriculture	54,147
Fishery	113,307
Total deductions	167,454

The value estimated was Rs 113 billion for both coastal, inland and aquaculture fisheries in 2010. These figures need to be updated to 2019 values. The figures estimated using the European study is Rs 40 billion, only for marine fisheries. It is possible that our valuation is under-estimated.

- **Agriculture** - In the case of agriculture, the costs of pollution, emission of green house gases and soil erosion were obtained from a local study “ Greening the National Accounts”, by U. A.

D. Prasanthi Gunawardena, in 2010, the cost of pollution from fertilizer use from a study done in 2006 in Europe “: H. Von Blottnitz, A. Rabl, D. Boiadjev, T. Taylor & S. Arnold - “Damage costs of nitrogen fertilizer in Europe and their internalization”

Both studies are dated, however, the impacts of agriculture do not change very much as the production methods have not changed much.