



Food and Agriculture  
Organization of the  
United Nations



International Water  
Management Institute

## **Proceedings of the multi-actor and multi-disciplinary trainings and consultations on food waste prevention and reduction in Sri Lanka**

**Project: Innovative approaches to reduce, recycle and reuse  
urban food waste**

**(TCP SRL 3703; from June 2019 to August 2021)**



RESEARCH  
PROGRAM ON  
Water, Land and  
Ecosystems



# **Proceedings of the multi-actor and multi-disciplinary trainings and consultations on food waste prevention and reduction in Sri Lanka**

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Published by

**Food and Agriculture Organization of the United Nations  
and  
International Water Management Institute  
Colombo, 2023**

Required citation:

Aheeyar, M., Jayathilake, N., Drechsel, P. and Bucatariu, C. eds. 2023. *Proceedings of the multi-actor and multi-disciplinary trainings and consultations on food waste prevention and reduction in Sri Lanka– Project: Innovative approaches to reduce, recycle and reuse urban food waste (TCP SRL 3703; from June 2019 to August 2021)*. Colombo, FAO and IWMI. <https://doi.org/10.4060/cc4224en>

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ISBN 978-92-5-137606-5 [FAO]

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## Acknowledgements

This report synthesizes the major highlights of the stakeholder consultations, capacity development sessions, and bilateral meetings held under the project on “Innovative approaches to reduce, recycle and reuse food waste in urban Sri Lanka” that was implemented under the oversight of the Ministry of Urban Development, and Housing in collaboration with the Food and Agriculture Organization of the United Nations (FAO) and the International Water Management Institute (IWMI) from June 2019 to August 2021. The authors are thankful to FAO Sri Lanka and the Ministry of Urban Development and Housing for assisting to conduct the meetings. Special thanks are due to Ms Tina Jayaratnam and Rushanka Rathnayake of FAO Sri Lanka, Eng. Sarath Bandara, Project Director, solid waste management project, and Mr Anuradha Wijayawardhana, Senior Social Development Officer, the Ministry of Urban Development and Housing for the support given to reach the stakeholders and also facilitating the meetings. We are grateful to all the stakeholders who participated in the consultations and IWMI research interns Ms Kalpana Lakshmi, Ms Chathurya De Silva, Ms Ayomi Bandara, and Ms Imesha Waidyarathne for the rapporteur support provided. Thanks also go to CGIAR Research Programme on Water, Land and Ecosystems (WLE).



## Abbreviations and acronyms

CMC	Colombo municipal council
DoA	Department of Agriculture
EO&H	environmental and occupational health
FAO	Food and Agriculture Organization of the United Nations
FW	food waste
IWMI	International Water Management Institute
LA	local authority
MoA	Ministry of Agriculture
MoEd	Ministry of Education
MoEn	Ministry of Environment
MoH	Ministry of Health
NIPHM	National Institute of Post-Harvest Management
SDG	Sustainable Development Goal
SWM	solid waste management

## Executive summary

Food waste (FW) prevention and reduction play a major role in ensuring the sustainability of food systems as well as effective solid waste management (SWM). A coherent, coordinated, and complementary approach to quantification, causes identification, and scaling up feasible solutions for FW prevention and reduction is necessary worldwide.

The report on the multi-stakeholders training and consultations relevant to FW prevention and reduction from wholesale to households in Sri Lanka was produced for the project “Innovative approaches to reduce, recycle and reuse FW in urban Sri Lanka.” The project was implemented under the oversight of the Ministry of Urban Development and Housing, in collaboration with the Food and Agriculture Organization of the United Nations (FAO) and the International Water Management Institute (IWMI) from June 2019 to August 2021.

The proceedings’ report covers consultations and sensitization sessions (digital and face-to-face meetings) conducted during the project with participants from ten selected urban and peri-urban areas: Colombo, Sri Jayewardenepura-Kotte, Kaduwela, Moratuwa, Negombo, Kandy, Galle, Jaffna, Kurunegala, and Batticaloa. The knowledge from the report supported the drafting of the *National Roadmap on Urban Food Waste Prevention and Reduction for Households, Food services, Retailers, and Wholesalers* that was launched on 17 August 2021.

The identified stakeholders included government regulatory actors, private actors (e.g. food services, supermarkets, retail and wholesale markets, food manufacturers), service providing institutions (e.g. schools, hospitals, universities, other institutional caterers), non-governmental organizations engaged in FW prevention (e.g. charities, consumer organizations, trader organizations) and households. The project conducted eight face-to-face meetings and eight virtual meetings targeting a total number of 316 participants. Stakeholders agreed that FW is a relevant topic for Colombo and Sri Lanka. The meetings were conducted for sensitization and awareness creation, capacity building, consultations, collaboration and coordination of stakeholders and initiatives for data on FW and estimates of its impacts, sharing best practices of FW prevention and reduction and capacity development for solutions’ identification and implementation for food supply chain actors, the public sector, and consumers and validation of the project findings.

All stakeholders agreed that one of the major problems in addressing FW is linked to behaviour and attitudes that could be pushed through targeted awareness-raising actions for all food supply chain actors as well as for consumers. The need for a massive awareness campaign than the ad-hoc programmes was emphasized. Similarly, there was a consensus on the utmost importance of FW data that could be started to collect from waste management actors while making collaborations for direct quantifications that can generate actor-specific information and facilitate prevention and reduction actions.

The meeting proceedings discuss the challenges and hindrances associated with FW prevention and reduction, current reduction initiatives of different stakeholders, and potential solutions. The outputs of these meetings fed into the preparation of the National Roadmap on Urban Food Waste Prevention and Reduction for Households, Food services, Retailers, and Wholesalers launched on 17 August 2021.

## 1. Introduction

Sustainable Development Goal (SDG) 12.3 of the United Nations 2030 Agenda calls for halving per capita global food waste (FW) from retail to households. FW prevention and reduction play a major role in ensuring the sustainability of food systems as well as effective solid waste management (SWM). A coherent, coordinated, and complementary approach to quantification, causes identification, and scaling up feasible solutions is necessary. Awareness-raising and capacity development for food supply chain actors, the public sector, and civil society organizations is required for successful interventions.

The Project *Innovative approaches to reduce, recycle and reuse FW in urban Sri Lanka* was implemented under the oversight of the Ministry of Urban Development, and Housing in collaboration with the Food and Agriculture Organization of the United Nations (FAO) and the International Water Management Institute (IWMI) from June 2019 to August 2021. The project had six working areas and this report is the output of activity 1.6 (see **Figure 1**).

*Figure 1: Major components of the Innovative approaches to reduce, recycle and reuse FW in urban Sri Lanka project*



The project produced a series of reports and papers including Aheeyar *et al.* (2023a), Aheeyar *et al.* (2023b), Jayathilake *et al.* (2023a), and Jayathilake *et al.* (2023b) that were used in the awareness creation and capacity development programmes. The major output of the Project was to facilitate knowledge development for and drafting of the *Urban Roadmap on FW Prevention, Reduction, Management in Sri Lanka*, that includes a comprehensive Action Plan with monitoring and evaluation criteria. **Figure 1** illustrates the activities undertaken by the project:

1. Analyse the FW socioeconomic and environmental footprint in representative urban and peri-urban areas.
2. Conduct a gap analysis of policies, legislation, regulations, and strategies at the national and provincial levels that relate to FW prevention, reduction, and management.
3. Establish and engage the participation of relevant stakeholders through regular and structured consultative meetings.
4. Document and demonstrate a selected number of case studies that enable and facilitate FW prevention, reduction, and management.

5. Contribute with technical notes, from the consultations and workshops on FW, to the development of a national urban FW roadmap.
6. Sensitize key government and non-state actors on FW-related challenges and opportunities.

The objective of this report is to summarize the proceedings of the consultations and sensitization sessions conducted from June 2019 to June 2021.

Sensitization and capacity development sessions were conducted for identified stakeholders in 10 selected urban and peri-urban areas: Colombo, Sri Jayewardenepura-Kotte, Negombo, Kaduwela, Moratuwa, Kandy, Galle, Jaffna, Kurunegala and Batticaloa.

The identified stakeholders included government regulatory actors, private actors (e.g., food services, supermarkets, retail and wholesale markets, food manufacturers), service providing institutions (e.g., schools, hospitals, universities, other institutional caterers), non-governmental organizations engaged in FW prevention (e.g., charities, consumer organizations, trader's organizations) and households. Participants were encouraged to contribute knowledge and experience to the workshops and consultations.

The project implemented sensitization workshops, bilateral discussions, consultations, and capacity development seminars (see **Table 1**).

*Table 1: Type of meetings conducted by the project*

Type of meeting	Target group	Mode of the meeting	Date	No. of participants
Project inception workshop	Multi-actors	Face-to-face	27 June 2019	55
Capacity Development	Ministry of Megapolis; Western Province Waste Management Authority	Face-to-face	3 July 2019	15
	Training for food services (hotels, restaurants, caterers, food redistribution charities)	Virtual training Via Zoom	21 September 2020	30
	Training for supermarkets, retail markets and wholesale markets	Virtual training Via Zoom	28 September 2020	25
	Training for the education sector including schools	Virtual training Via Zoom	20 October 2020	32
	Training on food waste quantification for multiple actors	Digital training Via Zoom	3 February 2021	34
	Training on FAO educational guides for schools on food waste reduction	Digital training via Zoom	24 February 2021	14

Consultations and sensitizations with major stakeholders	Consultation with key government agencies	Virtual training Via Microsoft Teams	27 July 2020	12
	Consultation with university academia	Virtual training Via Zoom	14 September 2020	31
	Consultation with key government agencies on food waste reduction action plan	Virtual training Via Microsoft Teams	26 November 2020	15
	Consultation with multiple stakeholders on finalization of the road map and action plan	Face-to-face meeting	26 January 2021	28
Bilateral meeting with key government ministries	Meeting with Ministry of Agriculture (MoA)	Face-to-face meeting	12 August 2020	09
	Meeting with Ministry of Environment (MoEn)	meeting	12 August 2020	07
	Meeting with Western Province Ministry of Agriculture, Livestock, and Fisheries	Face-to-face meeting	26 August 2020	07
	Meeting with Ministry of Education (MoEd)	Face-to-face meeting	24 August 2020	12
	Meeting with Ministry of Health (MoH)	Face-to-face meeting	15 January 2021	05
Four types of activities: project launch, capacity development, awareness raising, state actors' bilateral consultations	Type of stakeholders: state and non-state	Number and type of meetings: 8 face-to-face meetings 8 digital meetings	From June 2019 to February 2021	Total number of participants: 316

## 2. Proceedings

### 2.1 Project inception workshop

The project inception workshop was held on 27 June 2019 at Yellow River Auditorium, International Water Management Institute (IWMI), Colombo. The workshop was attended by 55 participants representing all the stakeholder groups linked with the food value chain (i.e. households, catering services, food businesses, retail and wholesale).

#### Objectives of the workshop

The objectives of the inception workshop were to support and facilitate FW prevention and reduction through:

- awareness-raising;
- collaboration and coordination of stakeholders and initiatives for data on FW and estimates of its impacts; and
- capacity development for solutions' identification and implementation for food supply chain actors, the public sector, and consumers.

#### 2.1.1 Summaries of presentations

##### a) Food waste awareness raising, data, policies, and agreements

by Camelia Bucatariu (FAO International Consultant)

The presentation provided the definition and terminology related to FW: "FW results from the decision to discard or throw safe food while it still has value (social, economic, and nutritional), primarily at distribution, food services and at the household level of the food system." She emphasized the importance of working together as players in the food supply chain and consumers. It was mentioned that the starting point for FW prevention and reduction is to quantify and estimate the socioeconomic and environmental impacts. Through quantification and impact analysis, all food supply chain actors will access evidence that FW is an economic cost for their business, it is an environmental cost for the country, and it is a social cost for the food supply chain actors and the final consumer.

Several examples were presented: the 2018 Egypt awareness-raising campaign on FW prevention at the consumer level; the United Kingdom of Great Britain and Northern Ireland awareness-raising campaign on FW along the food supply chain, including messages for specific food items such as bread; the Türkiye Bread Waste Campaign; the Malaysia awareness-raising materials that highlight the link between FW and climate change.

Videos on the socioenvironmental and economic impact of FW were presented.

The presentation concluded by acknowledging that inputs from the workshops and project consultations and training will feed into the *National Urban Roadmap on FW Prevention, Reduction and Management for Sri Lanka*.

## b) Local actions to prevent food waste and feed those in need

by Erandi Narangoda (Soup Bowl Charity)

Soup Bowl was established in 2014 to respond to poverty while preventing edible food to be thrown away. The Soup Bowl is functioning with three objectives: (i) the Drop-in Centre; (ii) the Soup Kitchen; (iii) We Give Stuff Away (WGSA) programme.

The Charity collects unsellable food from Keells Supermarket branches in Colombo, Sri Lanka. The challenges faced are access to a refrigerated storage facility as the quantities that can be recovered and redistributed are significant. However, due to the lack of storage, the charity deals only with what can be redistributed on the same day, with the help of volunteer drivers that go door to door to assist families and individuals from their database. Other similar actions are implemented in Colombo and other parts of Sri Lanka.

### 2.1.2 Group discussions

The summary of the five group discussions is presented by segment in the food supply chain and by what challenges and opportunities were identified for each.

#### a) Identified cross-cutting areas of intervention

##### i) Awareness-raising

Awareness was recognized as an action that can be taken up by the public sector on a large scale. However, the private sector and civil society have a significant role to play, and they can reach food supply chain actors directly as well as consumers. FW could also be considered in the national education curriculum.

Participants agreed that prevention and reduction of FW should be a shared responsibility between the private sector, public sector and civil society.

##### ii) Data on FW

Participants agreed that better data on FW requires better waste management. It was acknowledged that quantifying segregated FW is a challenge. However, an estimate provided by the project would also be helpful. Some hotels are concerned about FW generation and are in the process of quantifying FW.

##### iii) Policy and legislation

Several stakeholders agreed that there are challenges in existing regulations and a lack of mechanisms for enforcement. Local authorities (LAs) need to be sensitized on FW prevention as well as the formulation and adoption of required by-laws. The necessity of removing barriers in the current enabling environment to prevent edible food from becoming waste and enhancing volunteer efforts on recovery and redistribution of safe and nutritious food for direct human consumption were emphasized.

#### iv) Technology

Implementation of solutions is a huge challenge. The knowledge transition for adequate technology use is difficult, for instance, in the fisheries sector. Moreover, the technology is not yet adequate. Finally, it is difficult to ensure education and know-how on the use of technologies for all those who need to implement concrete actions.

The Ministry of Fisheries has set a target to reduce post-harvest losses by 30 percent in 2025. The National Aquatic Resources Research and Development Agency (NARA) has initiated the quantification of fish waste. To achieve the target, availability of cold chain, adequate packaging and other infrastructure throughout the food value chain are vital.

Technological solutions for FW separation at source could engage actors in its implementation and potentially also in a pay-as-they-waste management measure. Such a solution would require an increase in efficiency along the supply chain and /or at the household level.

#### v) Waste management

Source segregation is an important way to help with FW better monitoring, quantification and reporting. Currently, waste segregation is done in most parts of the Colombo municipality area while in other LAs, the level of waste segregation is around 30 to 70 percent. Some areas have neither spaces nor do composting due to lack of adequate space and accurate data on FW.

The insufficient availability of vehicles for waste transportation for regular waste collection for the relevant authorities was pointed. Currently, the Waste Management Authority (WMA) segregates about 250 metric tonnes of organic waste (in three landfills) and, out of that, 80 percent is FW. Kalutara waste management landfill receives waste from roughly 2.5 million people. The use of coloured bins for food segregation with rigorous awareness at the household level could be among the solutions. It would be more effective to have the segregated waste quantified at collection points. The importance of better monitoring mechanisms and waste sorting was also highlighted. The possibility of upscaling biogas plants was discussed, but the major barriers are lack of the technology for quantification and storage facilities. These solutions would also further increase the demand for FW as a resource. Thus, this approach, if no adequate legal and technical boundaries are set and enforced, does not support the prevention of FW at the source.

Some industrial stakeholders indicated the effectiveness of installing CCTV camera systems to monitor the consumer FW in the dining area and the possible introduction of a penalty system for FW generators.

#### b) Actors in the food supply chain

##### i) Consumers

#### *Challenges*

There is a lack of consumer awareness on various FW prevention and reduction tools. Participants mentioned that, when eating out, Sri Lankan consumers generally prefer large portions even though they know that they are not able to eat the full portions. This attitude generates FW. Preparation of surplus food for the main meals is part of the culture and households have a tradition of preparing food for the entire family even if not all members are at home to eat that meal. Additionally, people



bring lunch from home at their workplace that is larger than needed or buy lunch packets from caterers and have no choice for preferred portion size.

### *Opportunities*

Offices could introduce a FW monitoring system that would build awareness among employees on the volumes of FW generated while creating opportunities to discuss solutions for prevention and reduction. Institutional caterers could be regulated to provide portion size options.

It was pointed out the importance of composting FW at the household level that would raise consumer awareness of the quantities wasted. Urban and peri-urban gardening may reduce the amount of food that is going to landfills.

The necessity of enhancing food literacy was suggested as a means to address FW. Consumers need to know how to evaluate the caloric and nutritional value of their meals to better manage the size of their portions.

#### ii) Hotels

### *Challenges*

From a business perspective, hotels have difficulties in asking customers to waste less because they already paid for the meal. An additional challenge is represented by difficulties in donating surplus food due to the time between the ending of the service, specific for each meal type, and the recovery schedule—while not having sufficient storage for the redistribution part of the chain.

### *Opportunities*

Working on portion control through awareness-raising is an opportunity to reduce FW. For instance: a message could be displayed on the restaurants' tables/walls informing them of available portion sizes and, if applicable, that customers could come back to the buffet for more, if needed.

Hotels/restaurants could also enable staff to reduce FW. For instance: a FW bin on a scale in the kitchen would allow tracking of FW. At the same time, a poster with practical solutions to FW would facilitate prevention and reduction. Some restaurants, in other parts of the world, are also charging an extra fee for leftover food. This could be considered for Sri Lanka as well.

#### iii) Restaurants/caterers/canteens

### *Challenges*

The government hospitals are providing free food to hospitalized patients (i.e. food prepared at the hospital kitchen by counting the number of patients in the morning). The challenge is that relatives bring home-cooked food, and this behaviour generates FW. Livestock farmers collect this FW from hospitals for animal feed. In some rural hospitals (e.g. Ampara), FW is composted.

The Ministry of Health distributed posters to display in hospitals to educate patients and relatives to minimize FW and also initiated a poster campaign to educate the general public. Kandy national hospital and Peradeniya teaching hospital have systems of segregation of edible and non-edible parts of FW that is sold to piggeries.

### *Opportunities*

Portion sizes and menus should be revised based on data from the direct weighing and identification of categories of the food items that are wasted. This would also allow evidence for targeted communication for both hospital patients and their families.

#### Restaurants

Some hotels and restaurants already have adopted a policy of zero FW from the kitchen. But consumer FW is generally not quantified. Educating waiters and kitchen staff about FW is necessary. Current Food recovery and redistribution mechanisms should be strengthened. Regulations should enable restaurants and hotels to donate their excess by, for instance, banning FW landfilling by local councils.

#### iv) Retail

### *Challenges*

One of the challenges for retail customers is the limitation of portion sizes available in the market. For example, customers may have to buy a whole fish even if need only a piece of it. IT applications could enable solutions and better stock management for retailers. About 25–30 percent of eggs are currently being wasted. A national platform on FW could enable change on a larger scale for FW prevention and reduction.

### *Opportunities*

There is a need to work on culturally sensitive awareness. Grades for fruits and vegetables could determine their price so that more people will buy, and waste will be reduced.

#### v) Institutions

The disposing of leftovers is a challenge in the bakery industry due to the short shelf life of bakery products and desserts. The quality of bread and buns starts to change three to four days before the specified expiry date. An option could be collaborating with food redistributing charities. It was also mentioned that storage is a challenge because expiry dates are not adequately understood by consumers and best before dates are misleading for products that are still in edible condition.

Many universities in the country have been engaged in quantifying FW occurring in the university canteens and hostels during the last several years and organized awareness programmes.

Some national research institutes are undertaking economic and food security studies and they are interested to know FW impacts agricultural production.

#### vii) Wholesale market

One of the reasons for the huge amount of waste at wholesale points is poor post-harvest operations. Colombo Manning market hosting more than 1200 shops, receives around 200 truckloads of fruits and vegetables in a day. During market operations, about 4–5 truckloads of FW are generated per day. Farmers are facing challenges in accessing and utilizing available storage facilities, transportation and packaging (e.g. boxes/crates for packing and transport).

Colombo municipal council (CMC) has outsourced FW collection at Manning market to a private company - Abans Ltd. A fee of LKR 3 000 is paid to dump a tonne of waste. The CMC wanted to reduce expenses on fees by reducing the volume of FW. The method currently practiced to reduce the quantity of FW is diverting the edible portion of the FW to piggeries.

#### Viii) Processors

Managing FW while maintaining sanitary standards at the source of FW, i.e. facility management is an issue for the processors. The challenge of engaging a large workforce in the factories towards FW reduction was a concern for some of the stakeholders.

### 2.1.3 Summary

Stakeholders agreed that FW is a relevant topic for Colombo and Sri Lanka. Participants identified that FW translates into economic losses, higher production and disposal costs and various challenges for the supply chain operations as well those who manage the generated FW.

Food supply chain actors expressed their concern about greenhouse gas (GHG) emissions due to FW management as well as due to production, processing and distribution of food that is, ultimately, not eaten by humans. There was a general agreement that solutions are available, and participants already use some methods towards mitigating FW. Nevertheless, all agreed that current actions are unorganized and scaling up is needed to make an impact.

Stakeholders agreed that a major problem is behaviour and attitudes that could be nudged through targeted awareness-raising actions for all food supply chain actors as well as for consumers. Target groups could include children and youth, through schools, while adults may be particularly sensitive to television messages.

FW data is of utmost importance. All participants agreed that data collection could start from waste management actors while collaborations for direct quantifications can generate actor specific information and facilitate prevention and reduction actions.

Solutions were identified. Among these:

- adequate infrastructure, packaging and human capacity development for wholesalers;
- identification of multi-actor feasible solutions and investments required, e.g. refrigeration to enable recovery and redistribution of safe and nutritious food for direct human consumption that can link producers, wholesalers, caterers and households in need;
- data collection through direct weighting to enable behavioural change;
- clarify policies and laws relevant to FW prevention and reduction; and
- awareness-raising for all actors along the supply chains and consumers.

## 2.2 Capacity development sessions

The project hosted several capacity development workshops, targeting various stakeholders (see **Table 1**, P. 2). Most of the programmes were conducted virtually given COVID-19 restrictions.

### 2.2.1 Training on Food waste prevention and reduction for government stakeholders

The programme targeted waste managers of the Western Province Waste Management Authority and the officials of the solid waste management project of the former Ministry of Megapolis and Western Development (now Ministry of Urban Development and Housing). The meeting was held at the Mekong meeting Room, IWMI, Colombo on 3 July 2019 and was attended by 15 participants.

The objective of the training was to impart knowledge to the participants on FW prevention, reduction, and management at wholesale, retailers, food business, catering and consumers' levels.

Camelia Bucatariu (FAO international consultant) was the resource person for the entire programme. The presentations focused on what is FW (i.e. definition); data available from multiple examples; and analysis of the implemented solutions for prevention and reduction. Linkages between current Sri Lankan status and the presented information were considered.

#### 2.2.1.1 Discussion

##### a) Main challenges related to food waste in Sri Lanka

- There is a lack of awareness on solutions among business entities in general. Only some actors have started to quantify FW and implement reduction measures.
- The lack of FW data at the household level should be addressed. Currently, no quantitative knowledge on the volume generated as well as causes are available.
- The absence of tax/incentives for (household) waste minimization is also a barrier towards reduction. Segregation of waste (i.e. FW from bio-waste) along the supply chain and at the household level is needed.
- Lack of proper storage and poor stock management lead to post-harvest losses along value chains before wholesalers and these challenges generate FW also after the wholesale level.
- Failure to introduce (plastic) crates for packing fruits and vegetables from the farm gate up to wholesalers leads to FW. Solutions addressing both FW and optimization of packaging simultaneously are also an opportunity to ensure food safety and quality.

##### b) Highlights and points of action

#### **FW data**

Participants suggested that data on total bio-waste for Colombo can be collected from waste managers of the Western Province Waste Management Authority. LAs have data on total bio-waste collected and the number of business entities (i.e. wholesale, retail and food services) and households in their jurisdiction. Using this available information, it would be possible to estimate the FW collected from different clusters.

## **Capacity building**

The participants proposed that the training programmes should focus on awareness and solutions with the participation of representatives from the private sector, civil society and academia.

## **Policy**

LAs could enforce stock management measures as a prerequisite condition for the renewal of business licenses. Additionally, public health inspectors could be empowered to play a role in capacity development and awareness creation on FW prevention and reduction.

Public procurement: the government could consider introducing green procurement elements (i.e. FW minimization) for public procurement.

Food banks: LAs could explore the possibility of establishing centralized refrigeration facilities for the volunteering organization engaged in the recovery and redistribution of safe and nutritious food for direct human consumption.

Retail: retailers and food services could provide FW awareness messages through communication materials about the economic and environmental consequences of FW that would incentivize minimization.

## **FW at hospitals**

Awareness-raising is needed for hospital management and caterers on the value of food prepared for human consumption. Diverting surplus food to piggeries is not a long-term, sustainable, solution.

Hospital patients should provide an option, if their medical condition allows it, to choose the portion size (e.g. small, medium, or large). Bringing outside food to hospitals should be debarred. A procurement clause could be introduced to donate surplus meals that were maintained in adequate safety conditions. Training sessions on FW prevention and reduction are needed for hospital dietary officers and management staff.

## **Consumers**

Awareness raising from all markets/retail/food services as well as from LAs at the household level should be considered. Measures such as quantity selling on a weight basis would prevent surplus purchasing that creates FW (i.e. promoting to buy according to the need).

### **2.2.2 Virtual training conducted for food services, supermarkets, retail markets, wholesale markets, and schools**

The food services sector is considered as one of the FW generators. In Sri Lanka, urban markets are the second largest FW generators, next to the food services sector. The TCP/SRL/3703 project conducted three capacity development sessions for food services (21 September 2020); retail and wholesale markets including supermarkets (28 September 2020); and schools (20 October 2020).

## Objectives of the three training programmes

1. Capacity development on FW prevention and reduction.
2. Provide a platform to present and discuss FW prevention and reduction.
3. Participants identify local and international best practices that can be adopted.

### 2.2.2.1 Synthesis of presentations

#### a) Introduction and preliminary findings of the project

by Mohamed Aheeyar (IWMI), Nilanthi Jayathilake (IWMI), Shehani Gamage (University of Kelaniya) and Nalaka Wickramasinghe (University of Kelaniya)

FW accounts for the largest share of the total waste generated. The first step was to quantify the FW to understand the magnitude of the problem. According to preliminary findings, hotspots for FW are Colombo municipal Council limits and its suburbs. Also, according to the sectoral contribution of FW, the contribution of the food service sector is significant in municipalities in Colombo, followed by markets. One way to prevent FW is food redistribution for human consumption. Feed for piggeries is another practice that diverts FW from landfilling—nevertheless, boundaries and enforcement measures are necessary. Composting is practiced at a very low level due to space constraints.

Quantification of the FW is important to understand the magnitude of the FW problem and the consequent socioeconomic and environmental footprints. According to the case study in the hotel sector, 33 percent of total FW is inedible food and unavoidable waste such as egg shells, meat, and fish bones, and vegetables, and fruit peels. About 67 percent of total FW consisted of edible food such as rice, starch, vegetables and fruits. The average FW generated by a customer in the case study for hotels was a little over 500g. From the edible portion of the FW, 72 percent was from the buffet/surplus, 17 percent from the preparation stage, and 11 percent was from the customer plate. Also, 80 percent of the inedible portion comes from the customer plates while 20 percent comes from the preparation stage. It indicates that controlling or reducing FW is within the scope of the hotel, more than the customer.

The retail market's contribution to FW in the CMC area is 7 percent of the total FW collected. Total solid waste received in the dumping sites of Kerawalapitiya, Karadiyana and Kaduwela is 60 percent FW amounting to 670 tonnes of FW/ day. A similar pattern is observed across the country. FAO and IWMI are working with the Ministry of Urban Development to support efforts for SDG 12.3.

According to the case studies conducted, the wholesale market (i.e. Manning Market), retail market (Narahenpita dedicated economic center), supermarkets and retail shops are significant contributors in the Colombo city region. In the Manning market, 260.5 kg of vegetables, 159.5 kg of fruits and 320.52 kg of meat are wasted in a day. Compared to roots and tubers, a higher percentage of green and leafy vegetables are wasted and the reason for that is poor handling of perishables in the upper end of the value chain. According to the study, it has been identified that large quantities of vegetables, fruits and prepared food items are mainly wasted in supermarkets. About 2/3 of the total FW generated in supermarkets are edible. About 99 percent of supermarket waste is diverted to piggery farms to use as animal feed. However, feeding hungry people and source reduction and redistribution is considered as the most preferred option rather than animal feed, composting and landfilling.

Solid waste management is becoming a huge challenge in the country—socially, economically and environmentally. Enormous pressure is placed on policymakers and development planners. Schools are the greatest place to make changes in society. The education sector could play a bigger role in changing the behaviour and mindset of the larger society towards FW reduction.

In the school sector, the project research team was able to identify that providing free breakfast, free lunch and various other kinds of free meals could be linked also with FW prevention. The identified causes for FW at schools are limited time allocated to have the meal, not hungry, disliked food, portion size is too big and lack of taste. Furthermore, it has been identified that a higher percentage of FW is generated in primary grades, and quantity is reduced in moving towards the higher grades. Students prefer outside purchased food and a relatively high percentage of the freely given food is wasted. There is no formal FW prevention mechanism adopted in schools.

b) The urban dimension of food waste prevention and reduction – a perspective for food services, wholesale and retail markets and schools

by Camelia Bucatariu (FAO International Consultant)

We all are paying price for the FW which is happening along the food supply chain. FW is referring to the part of food that could be consumed and not to the parts that cannot be prevented from becoming waste such as bones, eggshells, etc. Among key causes of FW for restaurants and catering: overbuying, incorrect shelf and fridge/freezer storage, poor stock or inventory rotation, inadequate labeling, over-portioning, portion sizes, poor management of perishable items, poor planning and preparing too much.

FW can be further divided into five distinct types according to its origin:

- i. storage loss – food thrown away from storage;
- ii. preparation loss – food discarded during food preparation and cooking;
- iii. kitchen leftovers (surplus production);
- iv. buffet table leftovers (or serving loss); and
- v. plate leftovers – residues left on the consumer's plate.

FW reduction methods: staff can be advised to quantify and record FW for a week. All staff and management will know what is wasted and the cost of the FW from their kitchen. Decisions on how to change purchasing behaviour and menus can be taken based on this evidence.

For instance, restaurants in the United Kingdom of Great Britain and Northern Ireland produce 22 percent of the total FW across the hospitality and food service sectors. It has been identified that 45 percent FW happens during preparation and 21 percent during storage and 34 percent from consumer plates. Relevant to consider that 41 percent of the customers had said that the oversized portion was the reason behind FW.

Another example is from Malaysia. Consumer awareness campaigns and food donation programmes were conducted in partnership with ministries and civil societies. Generated data on FW helped to formulate awareness raising messages. One of the outcomes of the campaign was the creation of food banks. Many hotel and restaurant kitchens are linked with food banks to donate their excess food.

FW reduction is important for Singapore because they are under the pressure of diminishing landfilling space. FW is the largest part of landfilled bio-waste. A mobile phone application, called 11th Hour, shows users discounted items offered by some restaurants and food stalls before closing. Additionally, aesthetically challenged fresh produce marketing prevents FW and can transform them into healthy and delectable products.

Kyoto (Japan) works with businesses as well as clients on how to read the menu, how to adapt the menu, and how to decide portion sizes. The reduction plan also includes an educational component to promote the reduction of FW among the population through community college programmes.

Return to investment in FW prevention and reduction is a critical factor. According to a study conducted in 1200 foodservice sector business sites, 80 percent of them have gained a 1:1 cost – benefit ratio for the investments made for FW reduction and prevention within two years (WRI, 2019). Costs consisted of purchasing smart measuring scales or similar measurement technology and providing training to the relevant staff.

There are several global success stories in FW reduction from supermarkets. Tesco-Malaysia is the first retailer in Malaysia that has published FW data. Because they believe in transparency and think that quantification is essential for identifying FW causes and hotspots.

Safal is the largest organized retail network of fruits and vegetables in the capital of India, with over 400 outlets. Through quantification, Safal addressed the 7.5 tonnes of food discarded from their food outlets. Most were edible and could feed nearly 2 500 people. Thus, Safal started to redistribute the surplus food to people in need.

It has been identified that provincial health and nutritional coordinators, teachers, school managers, school catering staff, students from five to fourteen plus years of age are key stakeholders who can support preventing and reducing FW in schools. FAO has developed the “*DO GOOD! SAVE FOOD!*” teaching guide. This teaching guide (age group one: 5–7; age group two: 8–9; age group three: 10–13; age group four: 14+). The TCP/SRL/3703 project has translated to Sinhala and Tamil the four teaching guides.

For each age group, the educational tool consisted of two core lessons with a diverse range of activities including games, discussions, worksheets and projects. Core lesson one is information-based study and core lesson two is practice-based. This package provides step-by-step instructions for teachers on how to approach the content and how to develop activities with students.

Educating and empowering children is a win-win situation because they become part of the FW prevention and reduction in their homes and the community too. As an example, a child from India has launched a project to distribute surplus food for 300–400 hungry people with the collaboration of a supermarket.

The educational materials developed by the FAO were tested in some schools. For example, in Italy, France, Belgium, and United Kingdom, 18 schools and 15 canteens participated in a project that raised awareness among 5 000 children. As a result, a 15 percent average FW reduction was achieved that was equal to 7.7 tonnes of food that would provide more than 15 000 meals and financial savings of Euro 35 000.



To achieve the best results at the school level, the key factors are: students' age, measuring FW to target reduction in the canteen and kitchen. For instance, based on the research conducted in India, it was identified that children's preferences and choices of food are very important. About 70–80 percent of the FW generated in primary and secondary schools are avoidable. Japan offers a model for minimizing school lunch FW through five themes: reinforcement of social norms, menu planning, integrating food and nutrition subjects into the curricula, good lunchtime practices, and engaging children in FW reduction at school.

#### c) Food waste prevention and reduction in food services: opportunities and challenges

by Rohan Fernandopulle (CEO, Waters Edge Hotel, Colombo, Sri Lanka)

FW has a great impact on food security, the environment and the economy. This is a global challenge that requires urgent attention. FW is generated in various steps in the value chain. The hospitality and food service sectors have been identified as potential sectors to prevent FW.

We considered 1 kg of fresh food that leaves from a vegetable farm, fruit farm, ocean, or butchery, going through processing/handling and transporting; reaching the market 700 g are still available; sometimes less. It varies from 30–40 percent during these steps. Then from the market, it goes to the hotel's receiving department, and from there to the production area, with only around 525 g still available. Finally, only 370 g will go to the customers' plate preparation, from which another 30 percent goes to FW in different formats before reaching the customers' table. Through this process, only 40 percent is consumed, more than 60 percent goes into waste.

#### Reasons for FW

1. Restaurants or their kitchens
  - i. lack of appropriate planning—cooking right quantities, overproduction;
  - ii. lack of awareness on selecting appropriate ingredients, receiving, storing and waste management;
  - iii. errors in industrial processing and maintaining food safety standards. Practicing the standards would help to minimize waste;
  - iv. not following restaurant operations procedures and policies.
2. Consumer / customer
  - i. quality and taste of the food—if the food is tasty people seldom throw away anything;
  - ii. consumer attitudes and behaviour, we have to orient and train to make a change;
  - iii. social practices related to food consumption—we have various religious, social, ethnic groups with different cultures and traditional practices;
  - iv. lack of motivation and knowledge to prevent FW—gaps in knowledge and skills.

#### Good practices at Waters Edge

Waters Edge has implemented many best practices to curb FW, this was supplemented by some innovations very recently, through the FAO/IWMI project and its pilot case study at our premises:

- i. Material selection—we have a food committee chaired by the executive chef that decides on the material selection. The committee consists of representatives from other departments. We have recently decided to purchase pre-cut fish and filleted products to minimize FW. Advantages: buying only the fish cuts you need for the dishes saves energy, labor cost and time. Some people argue that we pay a higher

price for the pre-cut. But if you do a yield test, we can negotiate a better price for the cuts, because, for instance, the seller is selling the fish head separately if we buy it with the head off.

- ii. Ordering—this is the responsibility of the outlet chefs and managers to well inform the supplier.
- iii. Receiving—if you have the correct product specifications, for example, if you don't need the outer layer of the cabbage, the supplier can remove that before delivering it and use it for some other purpose.
- iv. Menu planning—once you complete the meal, ideally, the plate should be empty if the quantities are right and the food is prepared properly and is tasty.
- v. Preparation—portion-wise batch cooking/temperature control / reduce cross-contamination/ use technology and chemistry of different food items.
- vi. Serving—giving the customer what they want, not what we want. Proposed to incentivize customers to finish the whole plate.
- vii. Clearance and garbage sorting—the hotel is reducing garbage points, has no bin days, segregation, daily garbage weighing practice; everybody can see how much is going to the bin/reduce bin size.
- viii. Reuse and recycle—surplus food is directed to piggeries and inedible portions to composting.

#### d) Initiatives on food waste prevention and reduction: lessons learned

by Sashika Kaluwahewa (Assistant Manager–Sustainability, Jetwing Hotel, Colombo, Sri Lanka)

Jetwing group of hotels have introduced several measures for FW reduction.

##### *Waste reduction*

- i. Sourcing locally—the hotel is not using imported vegetables, fruits, seafood and meat. Buying fresh products locally shortens the value chain and therefore, less risk of being wasted.
- ii. Managing inventory—purchase only what is needed; using technology to monitor cold room temperature and door openings.
- iii. Foodservice—offer a set menu or à la carte option, which ensures that large quantities of food are not pre-prepared and wasted. One of the things introduced is live cooking stations in the hotels, where foods like pasta are cooked on demand, not precooked. Considering how to provide smaller servings and refilling points.
- iv. Leftovers—it must be ensured that the leftovers are stored properly so that they can be reused.
- v. Plate waste—difficult to control unless consumers change behaviour and mindset. However, this is manageable for staff dining. The staff cafeteria provides 3 meals a day and the staff can eat as much as they want. Nevertheless, plate scrapings are measured to discourage FW. Waste bins are kept on the scale; when somebody is throwing food, he/she can see how much they waste.

##### *Management of generated waste*

The hotel is monitoring and measuring the FW daily. Knowing the volume is important to take management measures. One of the basic measures taken is sending the segregated FW to piggeries

to reuse as animal feed. Some of the chain hotels have composting machines and biogas digesters. FW and some sludges are primarily used in the bio-gas digesters. The gas is used in staff kitchens.

#### Challenges

- i. Shifting mindset, especially the guest's mindset.
- ii. Training awareness—the hotel management believes that the change will come with training and awareness (proper awareness on menu development / portioning / managing inventory).
- iii. Initial capital investment is required for onsite waste management.

#### e) Our efforts in managing food waste at 'Keells'

by Dinuk Gunasekera and Minoshala Nissanka (Keells supermarket chain)

Keells, as a responsible business entity, has realized that FW is a massive issue. Keells being one of the largest supermarket chains in the country is playing an active role in adopting FW reduction strategies. The supermarket began the initiative of implementing the excess food donation model.

The company is also making efforts to educate customers to reduce FW. Regular quality checks at the collection centers, pack houses and in-store are in practice to ensure. Keells is always using plastic crates to deliver and store fresh produce and minimize FW.

FW is a problem, and a larger amount of waste comes from perishable food, which requires good storage facilities. The shelf life of perishable foods is limited. There are some established standards for Keells supermarket to display and sell fresh produces. There is a huge opportunity to redistribute fruits and vegetables.

During that COVID-19 period, Keells was implementing an excess food donation model at five stores, with two were not overly active due to access restrictions. Currently, over 30 outlets implement this solution to minimize FW through partnering with various charity organizations and institutions including the Voice Foundation, elders' homes and children's homes. The company was able to redistribute about 1 000 kg of fresh produce / week benefiting over 350 people in 2019/2020. To implement this food redistribution model, our long-term goal is to implement this option in all feasible points.

Apart from food donations, Keells is giving a 50 percent discount offer and quick sales for bakery items and fresh produce. By doing this practice, the company normally gets a saving of about 400 000 kg of food in a quarter. During COVID-19 restrictions awareness raising messages for customers on new recipes and tips for leftover food were disseminated. Finally, eight collection centers and pack houses and continuously do quality checks. Keells does a pre-check before it throws away the food, to ensure they do not take any non-quality food into the store or to the collection center.

From the analysis of foods and their shelf life, the management knows which areas contribute towards more FW. The analysis helps introduce new products or value additions based on waste records of the past few weeks and months. Keells is planning to achieve 75 percent of total sales volumes through 'ready to consume' products, introducing schemes to reuse and recycle, improve stock management and inventory systems, and expand surplus food donation.

f) Experiences in rescuing and redistributing surplus food

by Erandi Narangoda (WeGiveStuffAway, WGSA)

‘WeGiveStuffAway’ (WGSA) is a programme where rescued surplus food is distributed to reduce hunger and to prevent FW. The process is to collect surplus food from supermarkets (nearing shelf life and vegetables with small marks), sort, bag, weigh and redistribute. WGSA is maintaining a database of families in need, elders’ and children's homes, volunteering supermarkets, drivers and helpers as well as the redistributed food. The collected food is generally delivered after 9.30 p.m. The volunteer drivers are ready to drive at night to the required destinations. WGSA mainly works with supermarkets. However, some contacts with individuals who provide donations were also established. The process is entirely volunteer-based, and some people contribute to the mission by giving transportation or bearing the transportation costs. They collect vegetables and fruits, canned food and snacks. Insufficient storage leads also to WGSA discarding food due to timing and hygiene issues. Finally, the scarcity of commitment of individuals and lack of corporate involvement are the main challenges.

g) School children as the change agent to promote sustainable consumption and food waste reduction practices

By Madusha Jayakody (Consultant, Industrial Services Bureau, ISB)

ISB has taken a few initiatives for the SDG 12.3 target. For example, the ‘Save food, waste less’ was an initiative that aimed to promote responsible consumption through campaigning on FW reduction practices and a food saving culture at the consumer level.

One of the main projects conducted under the ‘Save food, waste less’ was a school project. This project hosted a series of inter-school quiz competitions, drawing competitions, drama competitions and knowledge sharing activities in collaboration with the provincial education department of the North Western province. Knowledge of the importance of FW reduction, causes, reduction practices, management, and the 3R concept were shared using banners, booklets, stickers, lectures, and some video clips.

From 2016 to 2020, it was observed that students became aware and prepared on a wide range of subjects related to FW reduction including factors affecting food spoilage, food preservation techniques, FW in the supply chain, FW management by local government, nutritional content; SDGs, sustainable consumption and production, waste management hierarchy, the 3R concept, cleaner production and resource efficiency. Students were also guided to think about pre-planning for shopping and consider traditional methods of food preservation, correct methods for food storage and new business concepts.

h) Sustainable development through eco-friendly schools

by Ms Pradeepa Samarasinghe (Principal, Devi Balika Vidyalaya, Colombo)

A school curriculum consists of a formal curriculum, an informal curriculum and a hidden curriculum. The zero-waste project was developed by paying attention to the hidden curriculum. It is not originally implemented to reduce FW, but to reuse FW. The main reason to start the zero-waste project was that the school is situated in a highly residential area, near the Borella general cemetery. Hence, trees

were planted on the school land, during the last 10 years, to create a natural barrier to the polluted urban air coming from the cemetery and the vehicular congestion around the school. Approximately 50–75 kg of tree leaves was collected per day from the school premises. After the collapse of the Meethotamulla dumping site in 2018, CMC refused to collect waste from the school creating a new challenge in treating organic waste.

The ‘Takakura’ composting and bio-gas system was identified as a solution to this mounting school garbage problem, and it took 5–6 months to implement the project. An audit was done before starting the project and revealed that approximately 50–70 kg of bio-waste is collected per day. In addition to leaf litter, there are three main places where FW occurs: the school hostel for 110 students, the school canteen and classrooms (3 000 students). FW generation is more than 30 kg / day. After implementing the composting and biogas project, the biogas generated is used for the school, and the compost is used for organic farming in the school garden. Selling the surplus compost provided an additional income of LKR 100 000 (around USD 420) per year to the school.

Another important initiative done by the school is reducing FW. Previously, there was a system in the hostel where every student got their meal served by the staff, which generated more FW. This was replaced by a buffet system. After this change, FW generated from the hostel was less than 1 kg / day. Additionally, the canteen menu was set up to match the food items which students were recommended to bring from home on a given day such as chickpeas, rice and curry, mung beans. This action discouraged students from purchasing canteen food while having also the food brought from home. The canteen was instructed to introduce two portion sizes for each meal to give students flexibility.

Finally, when organizing an event, students must forward their food menu and quantities to the school event committee and get prior approval. The process allowed reducing FW.

#### i) [Lessons from the lasses: zero waste school stories](#)

by Anuradha Wijayawardhana (Senior Social Development Officer, Ministry of Urban Development and Housing)

Garbage disposal is an issue faced by households, institutions and schools in the urban areas around Colombo. An appropriate solution was needed to manage the organic waste generated given the limited space in urban areas. The existing composting practices were not popular among the people in the congested urban environment. After reviewing the international experience to address this issue, the Indonesian experience called the ‘Takakura’ method of composting was selected as an appropriate method. To implement this project, a pilot area was selected in the Hangwella city area, with the assistance of Seethawaka pradeshiya sabha, and a model was created in ten houses. About 85 percent of FW was used for this pilot.

Takakura composting method is low cost and odor and leachate free. Organic waste is broken down by selected microorganisms that are cultured from local materials. The technique converts FW into compost within two or three weeks and can be used in households and schools/institutions, within their limited space. The method is implemented in several public places including the Presidential Official Residence, Bandaranaike Memorial International Conference Hall, Cancer Hospital, Oral Health Care Institute, Ayurveda Institute-Maharagama, 2000-Plaza apartment complex, Edinburgh food factory, and schools.

### 2.2.1.2 Discussion

Sri Lanka is a culturally unique country. We generate more FW than other cultures because we eat with our hands. We don't present 100 percent edible food to customers' plates leading to the generation of more inedible waste such as fish bones. So, FW quantities should be better disaggregated between edible and inedible parts. It was suggested that buffets are the main culprit of wasting food followed by garnishing. Due to poor packaging practices, lots of damaged products are coming to the kitchen, and refunding these damaged items is not possible. Selling by the unit is very important for food such as fish to make it easier to plan the menus at home as well as for food services.

Awareness programmes targeting hotels and restaurants were conducted out sides of Western Province as well in the past. For instance, A FW audits conducted in Kurunegala municipality area has found that the highest amount of FW is occurring from the consumers' plate due to portion size. The staff can reduce FW from food preparation. More research and pilots are needed to encourage the private sector to scale up FW reduction measures.

The importance of having an action plan to achieve the FW reduction targets was discussed. The major supermarkets have the potential opportunity to connect with charities to distribute the surplus perishables.

Supermarkets have concerns about possible health and hygiene-related liability issues that may arise due to redistributed food. However, participating charities mentioned that they are ready to take the challenge of liability issues ensuring the safety and hygiene of redistributing products.

During the COVID-19 period, several supermarkets have partnered with the government to support farmers. Several companies used all the field level collection centres to buy vegetables from farmers as much as possible under the locked-down condition.

Some supermarkets have offered fresh vegetables free to online customers. Special attention was paid by some supermarkets during the pandemic to the needy people including staff providing donations to hospitals and the wider community, in addition to offering employment on a daily wage basis, with three meals per day, to the people who lost their jobs due to COVID-19.

Supermarkets are educating both farmers and store staff on post-harvest management and stock management respectively. Aiming to reduce food waste and loss, supermarket outlet managers are given the authority to take decisions on the timely discounting of items and offer value-added products such as convenient packs and juices to prevent FW.

### 2.2.3 Virtual training on Food waste quantification, monitoring, and reporting

The virtual training on FW quantification, monitoring and reporting was organized for the stakeholders across the food value chain on 20 January 2021 with the participation of 34 representatives. The objective of the event was to share knowledge on methodologies and tools on FW monitoring and reporting, focusing on methodologies that can be applied to consumers, foodservice operators, retail, markets and wholesale.

### 2.2.3.1 Summaries of presentations

#### a) Tools to monitor food waste from wholesale to households and successful examples for implementation

by Camelia Bucatariu (FAO International Consultant)

Data is very important for FW prevention and reduction. Knowing the FW quantities helps to understand the current drivers, potential future drivers and potential reduction solutions that can include institutional capacity development, policy and law revisions and socioeconomic actions. For example, waste reduction in a hotel can consist of five major steps: forming a working group, measuring FW, identify causes and feasible solutions, scale-up, and manage FW (e.g. recycle). As an example: Winnow is one of the IT tools used in many hotels and restaurants. This tool provides the quantity of waste generated and the associated costs.

Among the methods for FW quantification are direct weighing, accounting, composition analysis, archives, and diaries of FW. Interviews provide an idea about the volume of FW and can also guide the solution's implementation, after the quantification. Furthermore, mass balances, statistical models and proxy data are some other methods. Depending on the time and resources available, a method or a combination of approaches should be selected.

The lack of data on the cost – benefit of FW reduction investments is another reason for the FW generation. Findings of a study done in 1 200 business sites across 17 countries and more than 700 companies in food manufacturing, retail, hospital and foodservice sectors, show that every dollar invested in FW reduction provides a return of up to USD 14 (WRI, 2017).

Surveys done for households help change behaviour, adapting solutions to the analysed lifestyles and geographical backgrounds. In Malaysia, university students have participated in FW quantification research and highlighted the ways of FW generation. This research demonstrated that institutional-wise, quantification is most important to drive changes in FW generation.

The retail sector can include FW monitoring in its operations, and along its supply chains. Restaurants can implement straightforward weighting, using scales in their kitchens, to monitor FW generation and facilitate prevention through optimized sourcing, preparation and menus.

For example, in South Korea, municipal councils collect FW separately and households pay a fee based on the volume of FW they generate. Moreover, Kyoto (Japan) was able to reduce the FW by half from 2000 to 2016 through education for the private sector and consumers coupled with actions on quantification and prevention.

#### b) Food waste prevention – the experience of University of Colombo (success story 1)

by Dr Erandathie Lokupitiya (Professor, University of Colombo)

The FW prevention and reduction experience at the Center for Environmental Initiatives (CEI) started with awareness programmes on waste management at schools and for the university academic staff, non-academic staff and students.



Awareness creating slogans were developed and placed on signboards at key locations of the university. Annual waste surveys were conducted in 2017, 2018 and 2019 to develop a waste profile for the university. It was found that 40–76 percent of the waste generated by the university is organic. The findings were presented with different Faculties to discuss possible reduction measures. FW quantification allowed measures and reduction was achieved in the following years. For example, FW generation in the Arts Faculty canteen in 2017 was 1 200 tonnes and it was reduced to 700 tonnes in 2019.

#### c) Food waste prevention - the experience of Waters Edge hotel (success story 2)

by Rohan Fernandopulle (Waters Edge hotel, Colombo, Sri Lanka)

Waters Edge started FW data collection in August 2020. The motive behind the initiation is to achieve the FW reduction target of 50 percent reduction by 2030. According to the collected data, it was observed that the highest waste generation occurred on Friday, Saturday and Sunday. Total FW was about 2442 kg/week. One of the major findings was that the consumption of liquor makes people serve more food leading to more FW. FW at dinner is higher than FW at lunch.

The hotels used bins on a weighing scale to measure the FW. The management adopted several strategies to reduce FW including batch cooking and portion control, placing wet waste bins at key points, introducing no bin days at the staff cafeteria, encouraging chefs to be innovative to create new food from possible FW, and merging the staff cafeteria and banquet kitchen.

Conducting the FW audit to identify the sources, items, and patterns of FW was essential. Solutions were identified: for instance, using eggshells as a fertilizer and supplying segregated FW to piggeries.

After implementing prevention and reduction strategies, a 50 percent reduction in FW was achieved. The average per capita FW in August 2020 was 0.534 kg, but it has been reduced to 0.114 kg within three months after the introduction of the above strategies. Waters Edge has started a new initiative named 'We Care Sustainability initiative' that aimed to promote new sustainability initiatives.

#### d) Food waste quantification: application of tools and techniques

by Dr Nalaka Wickramasinghe (University of Kelaniya)

Stakeholders' lack of awareness of the magnitude of FW generated needs to be addressed. Most business entities believe that FW generation is part of the business model and FW is, by and large, an ignored matter. Lack of knowledge is a major barrier. A waste reduction strategy should address the questions of what is wasted, how much is wasted, when is wasted, where is wasted, why is wasted and how to avoid the FW.

To do a FW analysis, we prepare data collection sheets separately: for supply, storage, preparation, kitchen and restaurant tables. Though businesses are willing to invest in theft prevention, the interest in investing in FW reduction measures is not yet strong. When we are conducting a FW audit, we have to follow several simple steps: weighing the collection bag/bin, segregation of edible and non-edible FW, separate the edible FW by major commodities such as rice and starch, vegetables, fruits, fish and meat, filing them in separate containers for weighing and record the final destinations of the inedible waste (e.g. nutrient recovery for feed, recycling and disposing of).



Causes of FW can be transformed into FW reduction actions by education and training, changing business practices and diet habits, improving storage and transportation, and creating an enabling environment for recovery and redistribution.

FW quantification should be monitored regularly, and quantities displayed at the source for trend analysis and ownership of FW reduction actions to the relevant departments in the business entity.

#### 2.2.4 Virtual training for schools on *FAO DO GOOD! SAVE FOOD!* educational materials

The virtual training was held on 24 February 2021. The objective of the programme was to introduce the translated Sinhala and Tamil versions of the FAO educational package “*DO GOOD! SAVE FOOD!*” on FW prevention and reduction in schools. These packages are expected to build the knowledge and skills of primary and secondary school children to prevent and reduce FW. Ms Kamani Gunarathna, Director, Health and Nutrition Division, Ministry of Education delivered the opening remarks. She stated that food is wasted due to many reasons in schools, hotels, offices and hospitals, and various other institutions. Food consumption patterns in schools are identified as one of the causes of FW generation. According to research conducted at the University of Wayamba, one out of four students generate FW, from small to large quantities. Conducting awareness programmes among students and parents on FW and its consequences is essential. The Ministry of Education is interested to work with FAO and IWMI to implement some awareness programmes in schools and bring the FW prevention and reduction message to the wider Sri Lankan society.

##### 2.2.4.1 Summary of presentations

- a) Role of schools and educational curriculums in food literacy and FW prevention and reduction: global experiences for local actions – from children to school kitchens, and communities

by Camelia Bucatariu (FAO International Consultant)

Prevention and reduction of FW supports healthy and sustainable diets, and it is a part of the 2030 Agenda with SDG 12.3 on prevention and reduction of FW. The education sector is one of the major players that can easily provide the message of FW prevention and reduction to young people. Officials, teachers/professors, school managers, school catering staff, food suppliers, and students from five to 14+ years of age are identified as key stakeholders.

Education on FW can lead to optimized food use at the individual level and awareness raising on this topic for the wider community. Moreover, FW minimization can lead to stronger collaboration within the value chain, including for the procurement of food supply chains for schools. The ‘*DO GOOD! SAVE FOOD!*’ education material and FAO/IWMI reports prepared under this project are valuable resources.

To reduce FW at the school level, students can be empowered and motivated to measure and reduce FW by maintaining a FW diary that would reflect data on daily basis. Students could be empowered to analyze the collected data weekly. The results can be discussed with teachers and peers, to identify implementable solutions to minimize FW.

In 2016, for example, an Indian secondary school has done a project that foreseen daily FW weighting generated for four weeks. Staff and students in the school kitchen and canteen collaborated.

Participants identified that the majority of FW in both secondary (80 percent) and primary (70 percent) are avoidable.

The pilot test done by FAO in 18 schools and canteens in Italy, France, Belgium and United Kingdom (2015–2017) led to an average 15 percent FW reduction in participating entities. The project was able to save 7.7 tonnes of food and more than 35 000 euros financially during the implementation.

To prevent and reduce FW, children could also be motivated to launch initiatives themselves. In 2018, an ethnographic study conducted in Tokyo had interviews, observations, and documented FW views in five schools. After analyzing the results, Japan has proposed a model for minimizing school lunch waste through a holistic approach.

b) Introduction to the “DO GOOD! SAVE FOOD! “ FAO Educational package – published in Sinhala and Tamil translations

by Dr Nalaka Wickramasinghe (University of Kelaniya)

FAO learning materials have been developed to provide awareness and hands-on practice on FW reduction techniques which are aligned with DG 12.3. This package has been translated to Sinhala and Tamil languages. This can be added as a core curriculum course unit.

When considering the FAO educational package, there are four levels, years 5–7, 8–9, 10–13, and 14 years up. For each group, there are two parts of the course materials: two core lessons and a diverse range of activities including games, discussions, worksheets and projects. Teachers can design their own activities and get the active participation of students. The package includes the guidelines required for the teacher for each module.

#### 2.2.4.2 Discussion

It was pointed out that the videos presented in this programme were excellent. Showing these kinds of examples from other countries' experiences in our schools in Sri Lanka would bring very good results in FW reduction programmes. Visual tools are very good for changing behaviour and attitudes. Organizing school-level competitions focusing on FW reduction could be useful. Awareness programmes are needed, especially for primary students and parents. Posters would provide a better idea about FW to children.

There is an opportunity to use the school health promotion clubs to promote FW minimization activities at the school level. Most of the activities presented in the session are suitable and applicable to Sri Lankan schools. Topics on FW can be added to the curriculum, starting from the primary level.

#### 2.2.5 Virtual consultation on food waste with state stakeholders

The consultation was held digitally on 27 July 2020 with major government stakeholders. The objective of the session was to provide an update on the project “Innovative approaches to reduce, recycle and reuse FW”, to understand the institutional challenges, and discuss measures to support the adoption and implementation of the national urban roadmap, including a common platform.

An overview of the project's preliminary findings including the results of regulatory gap analysis, stakeholder analysis, results of FW quantifications and the methodology adopted in ongoing field case

studies were presented at the outset. This was followed by a presentation on “FW prevention and reduction: highlights from the 2030 agenda, regional perspectives and national action points” and “Towards an Urban Roadmap and Action Plan on FW prevention, reduction and management for Sri Lanka”.

#### 2.2.5.1 Highlights / points of action

In 2017, there were 341 LAs in Sri Lanka. Overall waste generation is 2 000 tonnes/day in the Western Province that consists of 40 percent (i.e. 700 tonnes) perishable and 20–30 percent cooked food. There are 23 composting centres in the Western Province. Lack of adequate space for landfilling is one of the major challenges. The second issue is the prevailing high demand for FW for feed-animal farms, especially from piggeries. However, there are no linkages between these farms and former foodstuffs generators, such as hotels, where most of the FW is generated. Existing policies and legislations have enough scope to manage solid waste properly. The missing part is regulatory enforcement mainly due to the lack of necessary infrastructure and resources.

The current waste dumping in the Aruwakkalu dumping site is experiencing a problem of leaching, while the site is designed for only 6 ½ years. Most of the waste dumping at Aruwakkalu is perishable. So, this 6 ½ years could be increased if there is a solution to reduce the perishable waste quantity sent to the landfill.

Most countries have a platform for FW reduction and reuse practices for all the major stakeholders, to facilitate the achievement of SDG 12.3.1.

CMC collects around 560 tonnes of waste / day. Among these, 65 percent (350 tonnes) is organic waste. Since treating this waste is very difficult, they need a way to reduce the organic waste quantity. Earlier, mixed waste was sent to Meethotamulla dumping site. However, currently, CMC is doing 100 percent segregation. Handling and treating/composting a huge amount of bio-waste is not easy. Currently, CMC is focusing on ways and means of reducing organic waste generation, from which FW is the largest part to minimize.

The 3R system is currently being piloted by the Urban Development Authority (UDA) at the school level. Tests resulted in a considerable reduction of FW. Policy actions are needed to upscale the piloted interventions. Infrastructure development gaps were highlighted to allow scaling up. It was agreed to use the following template to collect information for the preparation of the Sri Lanka urban FW roadmap.

Institution	Policy and stakeholder analysis: gaps and strengths	Agenda 2030 and SDG 12.3: what is the current institutional setting for Sri Lanka?	FW data and quantification; gaps and strengths	Coordinate better current and potential partnerships on FW prevention and reduction	Current institutional action plans on FW prevention and reduction

### 2.2.6 Virtual consultation on food waste with universities

The virtual consultation on FW prevention and reduction with the universities/academia working in the related field was held on 14 September 2020. The major objectives of the event were to share knowledge on environmental, economic, and social impacts associated with FW at the national as well as at the global level; and to identify modalities to work with a multidisciplinary team towards achieving the TCP/SRL/3703 project goals: provide technical knowledge for policy and regulatory development as well as strengthen stakeholders' capacity to identify and adopt opportunities for FW prevention.

In the introductory remarks, it was stated that Sri Lanka has to half FW by 2030 according to the commitment made for SDG 12.3. This is a challenging goal that needs to be supported by a plan. She warmly welcomed all university stakeholders and hoped that the participants will provide their valuable contributions to the project. Evidence collected by universities, IWMI, FAO and other development partners is important to drive the country to achieve FW reduction targets.

At the moment, composting is done for a low percentage of FW. The main barriers to large-scale composting are financial requirements, and lack of space in the urban environment. Therefore, FW prevention is the best solution. In the meantime, we should pay more attention to food security as well. We are aiming to reduce FW as a means to support food security as well. There are many negative implications of FW for the environment and climate change.

Many countries and universities globally are actively trying to reduce FW. If we wasted 1 kg of rice, we are also wasting the 3 000 liters of water used to produce it, along with the land resources that were extracted. Organic waste contributes to climate change as well.

After the introductory remarks, two presentations were done on the following topics;

1. Introduction and preliminary findings of the Project on "Innovative approaches to reduce, recycle and reuse FW" that covered policy and regulatory gap analysis and stakeholder analysis by Mohamed Aheeyar and Nilanthi Jayathilake (IWMI).
2. The urban dimension of FW prevention and reduction – a perspective for universities by Camelia Bucatariu (FAO).

#### 2.2.6.1 Discussion

**Question 1:** Why do hotels and supermarkets generate a higher quantity of FW despite these two clusters are well-organized supply chains purchasing very good quality products? What about the seasonality of waste, such as tourist season and festival season, etc.?

**Response:** Supermarkets and hotels are well-organized and customer oriented. Their focus is to maintain high quality and standards. That is one of the reasons for FW. The LAs in Sri Lanka have many hotels, restaurants, supermarkets and small vegetable and fruit shops that generate FW. The data presented covers food services (i.e. hotels, restaurants, and caterers). Star grade hotels have to follow international standards and have quality compliances. For example, once they serve food for the buffet, any leftovers will be thrown away. These hotels are not allowed to redistribute or even to provide their employees with the leftovers from the buffet, under the existing arrangements. The amount of waste generation is higher in the festival and tourist seasons. There is a research gap we must address because if we have a better-organized supply chain the waste should be reduced. Other

elements, generally, influence FW reduction and generation. Encouraged to do additional studies for Sri Lanka.

**Question 2:** Do we have any concerns about biomass energy generation (biogas and bioethanol) as a source of renewable energy concerning FW?

**Response:** Some countries generate energy through bio-waste, including, in this category, FW. However, the current project is focusing on FW prevention and reduction, as the approach that yields the best returns on investment for all supply chain actors as well as consumers.

**Question 3:** Are there any initiatives towards behaviour change/nudging towards the prevention of FW in Sri Lanka?

**Response:** The Ministry of Environment and Ministry of Urban Development have taken some initiatives leading to behavioural changes. However, this cannot be achieved by conducting some awareness programmes alone. A long-term campaign is needed, through mass media including print, electronic and social media. Under this ongoing project, there is a small component to develop some communication resources.

**Question 4:** Food sharing is an integral part of Sri Lankan culture. Solutions should consider the cultural dimension of FW when preparing the school curricula or syllabus. Is there any mechanism to support university engagement in this project?

**Response:** One of the purposes of this meeting is to establish links between universities and the project. We need contributions from academia to achieve the target of reducing FW. The project has formed a working committee that has a lot of opportunities for collaboration, especially for inputs in preparing and finalizing the action plan and road map for urban FW prevention and reduction.

**Comment:** We need to look at both food loss and waste together. Because our products are seasonal. High supply leads to low prices and low demand. We have a problem with storage and carrying capacities in the system. We need to think of making changes from seasonal to non-seasonal.

**Comment:** The recommendation is to follow sustainable consumption and production practices.

#### 2.2.6.2 Summary of presentations

##### a) Research and knowledge gaps in food waste prevention and reduction

by Dr Anurudda Karunaratna (Faculty of Agriculture, University of Peradeniya)

In Sri Lanka, we are having different regions, perspectives and cultures that contribute to waste generation differently, depending on economic and social growth. The lifecycle approach can be useful to consider:

Life cycle Approach–5Rs:

Reduce –source reduction

Reuse–reduction by reuse

Recycle–materials removed by separation

Recovery–energy recovery by the thermal process

## Residues

There are many policies and regulations in Sri Lanka for waste management. Nevertheless, these do not provide proper attention to FW. Current policies provide more attention to issues such as controlling plastic pollution. However, FW should be better understood and prioritized.

FAO/IWMI project is a good opportunity to connect all researchers engaged in this field for information sharing. Recently we did a study in Kandy to measure FW quantitatively because the available secondary data is not very reliable. A primary level data collection, using kitchen diaries for a seven-day measurement, interviews for capturing people's perspectives, and understanding the gaps in food literacy at the household level, hotels and restaurants, and commercial sector.

## Findings

The hospitality sector is not much concerned with FW, because all the costs are transferred to customers.

Secondary data, records and statistics at the LA level are mostly inaccurate/mismatching.

There is an unavoidable portion of FW (that is difficult to prevent). This part needs to be reused and recycled.

## Gaps and way forward

- i. Life cycle thinking is proposed considering an economic and environmental perspective.
- ii. Collective and collaborative efforts are needed to establish a FW database and develop innovative strategies.
- iii. Policies and regulatory amendments are needed to directly address FW prevention.

## b) Role of academia in food waste prevention at the national level

by Ms Chintha Rupasinghe (Faculty of Agriculture, University of Ruhuna)

The main clusters involved in FW generation are wholesalers, retailers, and households. Ethical, environmental (nature), commercial, behavioural, and cultural factors influence FW. Some examples of FW are plate waste and food that spoils due to poor storage at the home or restaurant. Restaurants prepare food but is discarded due to a lack of demand.

The notion of an academic as a change agent emerges from the intellectual and personal transformation associated with teaching and research in the advancement of knowledge.

In the waste hierarchy:

- waste charging could provide a significant influence on changing behaviour, for example enforcing the “polluter-pays” principle;
- landfill disposal bans can divert municipal solid waste (MSW) away from landfill space;
- legislation is necessary to ensure compliance and penalize those who engage in environmentally harmful behaviour and practices;
- public education and partnerships are soft measures to raise awareness, increase understanding, and foster partnerships with the community and business.

Food security is a global priority (see Zero Hunger Challenge, SDG 2, SDG 12.3). The growth of the world population induces increasing pressure on existing food production systems due to the limited availability of resources (land, water, energy, nutrients) that demand efficiency for sustainable consumption and production. Therefore, FW prevention takes top priority. A food system is sustainable when the economic, social, and environmental bases to generate food security and nutrition of current and future generations are not compromised.

In FW prevention, the following objectives could be considered:

- i. Conduct a review of existing research and practices related to FW prevention.
- ii. Carry out an audit of FW to record what is wasted, how much, where and at what times of the day.
- iii. Develop a system to record FW and connect unused food with recipients locally.
- iv. Promote attitude and behaviour change relating to FW and assess the implications of evidence from research.
- v. Contribute to the development of a sustainable food policy.

In 2018/19, Ruhuna University researched FW in a government office, university student canteen, small-scale restaurant, medium-scale restaurant and a hotel wedding. The research had taken the headcount as well as the amount of FW during breakfast, lunch and dinner by gender. Serving too much food, offering liquor before lunch, providing same size portions for kids, quality of food lower than expected, the attitude of the guests, and greediness for the attractive appearance of foods are some of the identified reasons why food is wasted. A social media platform can be a tool for behavioural change due to its ability to produce a wide-reaching influence.

Recommendations:

- Develop a greater understanding of FW streams, management practices, internal and external factors.
- Increase cooperation and communication across operational boundaries.
- Introduce a means of collecting and distributing leftover food that complies with food and safety standards.
- Introduce accountability into catering contracts concerning the amount of FW generated to add an economic imperative to catering suppliers to the reduction of FW.
- Consumer FW can be minimized. This could be achieved with messages disseminated through flyers, posters and online advertisements.
- Promote innovations/techniques/skills to prepare food using leftovers.
- Launch and capacity development for food banks.

#### 2.2.6.3 Discussion

Several participants mentioned that they are currently not doing any research on FW but are interested in this topic; have worked only on SWM. There is also the opportunity to support the mission by identifying economic and social factors driving FW.

Some universities are running different degree programmes such as food business management and eco-business management. There are huge opportunities to revise the curriculum to incorporate FW as a subject and looking forward to getting students as well as researchers on board.

### 2.2.7 Bilateral sensitization meetings with key government ministries

The project conducted a series of bilateral meetings with officials from key stakeholder ministries to explain the scope of the project, discuss preliminary findings, obtain stakeholder feedback, understand the planned activities of the given ministries related to FW management, and establish linkages with the line ministry and the project. In these meetings, the scope of the ongoing FW project was introduced in detail including project objectives, main components, preliminary findings, and expected outputs. Discussions were done on policy and regulatory gaps regarding FW management in Sri Lanka. The draft actions proposed in the Urban FW Roadmap were presented and discussed. The vital requirement of interactive engagement of stakeholders to achieve the project objectives and develop and finalize the draft urban FW action plan was highlighted. Bilateral meetings were conducted with the following Ministries:

1. Ministry of Agriculture
2. Ministry of Environment
3. Western Province Ministry of Agriculture, Livestock, Fisheries and Environment
4. Ministry of Education
5. Ministry of Health

#### 2.2.7.1 Bilateral meeting with the Ministry of Agriculture

The setting of the Ministry of Agriculture (MoA) for SDG 12.3 (Agenda 2030): the ministry has well-established institutions to take considerable actions related to post-harvest losses. The National Institute of Post-Harvest Management (NIPHM) is a dedicated institution functioning under the MoA to conduct research and develop technologies to reduce post-harvest losses.

FW is not directly addressed by the ministry, because the mandate of the ministry is to focus on farmers, not consumers. However, it is well known that a large amount of FW occurring in the back end of the value chain is linked with the practices done in the upper end.

The ministry has developed guidelines and introduced good practices to minimize post-harvest losses. Nevertheless, implementing the guidance and good practices is a challenge due to the lack of mechanisms to enforce or monitor the adoption.

MoA introduced plastic crates as a solution to reduce post-harvest losses in the past, but it was not successful due to the increase in transport costs. The subject of food transport is beyond the control or authority of the ministry. Transport is fully handled by the private sector while retail markets and public fairs are under the Ministry of Trade and Commerce and LAs respectively.

In 2017 NIPHM undertook a survey to assess food losses along supply chains (especially during transportation) and estimated the commodity-wise losses as a percentage up to the retail level (survey data is not yet published). The food technology unit of MoA has developed a food loss calculation method for value addition, especially for fruits and vegetables. It was suggested to introduce innovative measures to reduce the transport cost through an improved packaging system. One of the proposed solutions is to consider the feasibility of introducing a folding rack system for lorries that would provide space in the lorries to transport goods on the return journey after unloading perishables to the wholesale market.



The Department of Agriculture (under the MoA) has a separate food research division that has introduced value-added products, dehydration technologies and food processing methods. Also, the NIPHM has introduced food preservation methods such as dehydration especially for pumpkin, jack fruits, tomato, and banana to manage the food losses occurring during the peak seasons. Fruit and vegetables dehydration technology is currently adopted by some large producers, in partnership with private and semi-government organizations that are well connected with an established export market.

## Recommendations

- i) Coordinate with supermarkets to reduce agricultural losses through awareness and value addition.
- ii) Proposed solutions/strategies for FW reduction-strengthen the current food redistribution mechanisms, and regulations to reduce plate waste by introducing an extra fee from customers and introducing buffet systems instead of lunch packets or set menu.
- iii) The Food act of Sri Lanka mainly addresses the safety and hygiene that have a direct link to FW generation, and it has provisions to monitor expiry dates, quality control, packing, etc. However, there are no provisions to control the quality of agricultural produce.
- iv) Post-harvest losses could be reduced significantly by introducing plastic crates for transportation. This measure would require an affordable transport system. It was recommended to introduce profitable and economically feasible transportation systems like vehicles with folding racks. Farmers have adopted good packaging for high-value products (e.g. mangoes, tomatoes). About 30–40 percent of post-harvest losses in fruits and vegetables occur in transportation.
- v) The type of storage facility also determines the magnitude of food losses. Cold storage and ozone treatment are better than refrigeration. The ideal situation is a cold chain instead of only cold storage facilities.
- vi) Current unacceptable artificial ripening practices create enormous FW in the backend of the value chain. In the current institutional arrangement, no one is responsible for regulating the ripening process. Although guidelines are in place for artificial ripening practices, these are not properly implemented. There are observations that chemicals used for ripening are up to eight times higher than the recommended dosage. It was recommended to provide fruit ripening chambers as a measure to control artificial ripening.
- vii) There is no responsible body or authority or manpower under the ministry to implement and enforce the rules and guidelines at the grassroots level to minimize food losses of agricultural products (i.e. no responsible authority to control violations). MoA has proposed to strengthen the law enforcement mechanism by aligning with the existing institutional arrangement and manpower. For example, the possibility of empowering the field staff in the agriculture and/or health sectors.
- viii) HACCP is developed by the Health Department, but no such regulations are developed by MoA. Instead, MoA has developed Good agricultural practices (GAP) as a voluntary guideline.
- ix) Continue the food loss quantification and assessment survey, as conducted in 2017 by the NIPHM.
- x) Proposed to utilize digital innovations (e.g. mobile app to link farmers and consumers).

- xi) The lack of coordination among different stakeholders is the main barrier. The establishment of a common FW platform would be beneficial for prevention and reduction.

#### 2.2.7.2 Bilateral meeting with the Ministry of Environment

The setting of the Ministry of Environment (MoEn) for SDG 12.3 (Agenda 2030): It was highlighted that there are several policies, guidelines and plans for FW management, but the main problem is the lack of resources or mechanisms to implement the available plans and regulatory provisions.

The MoEn is the focal point of implementing SDG goals and it has created a separate unit to handle the subject. Different institutions have taken initiatives to minimize FW and some progress has been made. Activities are largely unorganized. A national programme for minimizing FW in an organized manner is imperative.

The ministry has built collaborations with bakery owners' associations and restaurant owners' associations to take practical actions to reduce FW. Posters to create awareness on FW reduction have been developed and released. In a separate initiative, a pilot project has been prepared to implement the idea of a green school, green hospital and green office with the participation of organizations where FW reduction and prevention are integrated.

The ministry has prepared an action plan for FW minimization for the period of 2019–2023 providing attention to the life cycle approach. The major objectives of the plan are:

- i. Launch a steering committee, stakeholder consultations, and gap analyses of government policies, strategies and regulations.
- ii. Carry out sector profiles on FW to identify waste minimization strategies.
- iii. Implement lifecycle assessments of main crops/food and propose business opportunities in waste minimization.
- iv. Develop a communication strategy to create awareness among the stakeholders and the public, and
- v. Research and development on FW Minimization technologies.

#### Recommendations

- i. Behavioural changes to reduce FW are very important and should be commenced from pre-school and primary schools' levels through awareness programmes and curriculum changes.
- ii. Ad hoc awareness programmes will not make tangible behavioural changes. A massive media campaign through print, electronic and social media is needed to make an impact.
- iii. Attention should be given to implement/enforce available rules, regulations and guidelines related to FW prevention and reduction.
- iv. Adopt a lifecycle approach for FW reduction.
- v. Provide time-bound targets for LAs.
- vi. Impose a fine for FW generators by introducing load base waste management concept for FW and incorporate/alter FW concept to the already available policy clause "extend producers' responsibility".
- vii. The overall agenda and activities targeted for FW reduction should be provided to appropriate leadership by the most relevant and mandated agency.

### 2.2.7.3 Bilateral meeting with the Western Province Ministry of Agriculture, Livestock, Fisheries, and Irrigation

The setting of the Western Province Ministry of Agriculture, Livestock, Fisheries and Irrigation (WP-MoA) for SDG 12.3 (Agenda 2030): the ministry has not prepared a plan for FW management, but the ongoing activities and projects can contribute to the reduction of FW footprint by adopting measures to reduce post-harvest losses. One of the important programmes implemented by the provincial ministry is promoting home gardening that would reduce FLW by shortening the food value chain. At present, there are three projects implemented by the ministry - potentially support the mission of reducing FLW.

- i. Building capacities of farmers and farmer leaders on dehydration technologies of perishables and production of value-added products (e.g. dehydrated jackfruit and banana, canned rambutan and durian, and powdered pumpkin). The ministry has proposed to establish a factory for canning and vacuum packing of fish. Plans are underway to provide machinery for value-added product manufacturing and the relevant training to interested community-based organizations.
- ii. Establishment of aquaculture.
- iii. Manufacturing organic fertilizers from fish waste.

The ministry is promoting organic farming at the homegarden level. The current activities are aimed to empower the farmer organizations to produce safe products and encourage them to adopt value-addition. The activities are linked to waste reduction, providing healthy foods through organic farming and improving food and nutritional security.

Department of Agriculture (DoA) of the central government is focused on the reduction of post-harvest losses. There are no interventions from Western Province MoA on FW. Agricultural production within the province is limited to medium and small-scale farmers. There is no mandate or mechanism within the ministry to interact or coordinate with LAs to reduce the FW occurring at the retail and wholesale level. It is noteworthy to mention that the relevant authorities are investing in infrastructure development to improve the facilities available in the retail markets/open markets and developing facilities for reuse and recycle that are expected to reduce the FW generation.

FW generation at the wholesale and retailer level relates to practices taking place throughout the value chain, starting from harvesting, packaging, transporting and storage practices. Reduction of food losses during transport is a challenge due to the high transport cost (sellers tend to pack more items within very low space).

#### Recommendations

- i. FW is also caused by the attitudes of people; therefore, it is recommended to promote the 'empty plate' concept. People are cooking a lot more than they are consuming owing to the prevailing cultural norms. The traditional conduct/generosity of Sri Lankans in treating visitors is also leading to FW. To correct this issue, we need to go for a massive campaign to drive behavioural change; ad-hoc awareness may not be sufficient.
- ii. Awareness of FW issues should start from schools or kindergarten, with necessary changes to the curriculum. Collaboration with the Ministry of Education is vital.
- iii. Several laws and regulations are relevant to FW prevention and reduction. The relevant agencies are not empowered enough for law enforcement.

- iv. Since most of the agricultural products are seasonal, appropriate technologies should be introduced to keep the harvest for a longer period (e.g. making value-added products).
- v. Investment to increase storage and cold storage facilities in the agricultural value chain is essential.
- vi. The taste of the food has a role in FW generation. Developing cooking skills for the staff working in food services and households would contribute to FW reduction.
- vii. The knowledge and skills of traditional food preparations and preservation should be transferred to the new generations, e.g. reuse leftover foods for delicious dishes.

#### 2.2.7.4 Bilateral meeting with the Ministry of Education

The setting of the Ministry of Education (MoEd) for SDG 12.3 (Agenda 2030): the ministry has a separate division to look after the health and nutrition of school children. It has not prepared a plan focused on SDG 12.3.

Each provincial department of education has appointed a provincial health and nutrition coordinator to link with the Ministry of Education. FW is a problem for many schools. FW is generated at schools' canteens also due to food brought from home at schools where there is a free mid-day meal programme. However, the attention on FW prevention and reduction is largely untouched. Composting of organic waste is practiced in some schools.

#### Recommendations

- i. The current focus at schools is largely on waste management (if any), not FW prevention and reduction. This can be changed through awareness raising.
- ii. The FW issue is not yet prioritized. Therefore, quantification activities should be introduced through new projects that would help to understand the issue and drive changes.
- iii. FW issues should be sensitized by incorporating necessary changes to the curriculum.
- iv. Capacity on FW prevention and reduction should be built at the schools' level from management to kitchen staff.

#### 2.2.7.5 Bilateral meeting with the Ministry of Health

The setting of the Ministry of Health (MOH) for SDG 12.3 (Agenda 2030): the ministry has a separate unit "environmental and occupational health (EO&H)" that is responsible for food safety and hygiene-related issues. The implementation of the Food act is under the purview of the MoH.

Though the ministry has not prepared an action plan focusing on SDG 12.3, activities are being undertaken to reduce the FW generation in the health sector, especially in hospitals. The EO&H has conducted 22 awareness programmes in hospitals on climate change, FW reduction and hazardous waste management in 2020. The programmes conducted aimed to sensitize the hospital staff to formulate a plan for FW reduction measures. The ministry is also promoting the provincial health authorities to prepare provincial-level plans for FW prevention and reduction.

Hospitals have been requested to reduce FW and quantify the FW generation to set a baseline. The idea was given to the hospitals last year and the EO&H has arranged to get updates from hospitals through WhatsApp. In the next step, hospitals will be provided achievable FW reduction targets.

The Health Promotion Bureau under the MOH is conducting educational programmes and developing educational materials to support nutrition. The ministry believes that cooked food should be fully used for human needs, not for animal feed. Therefore, the focus is the reduction of FW. Awareness and good practices should be started from the pre-school level.

#### Recommendations

- i. Reduction of FW at hospitals needs cooperation from the public who are visiting the hospitals. It has been observed that the patients warded in the hospitals receive many food packets from the visitors while also receiving the hospital food. Visitors fail to understand that sick person has food restrictions and eats less than a healthy person. Therefore, most of the food provided to the patients goes to the waste bin.
- ii. Actions towards behavioural change are much needed to address the FW issues.
- iii. Providing food to patients in hospitals should consider the taste and cleanliness of the food provided. Considering these concerns, the MoH has taken initiatives to address the taste issues and setup some standards for the system of food distribution. The food delivery person should wear a clean dress (i.e. aprons and hats) and food should be delivered in individual silver trays instead of plastic plates.

#### 2.2.8 Consultation with state stakeholders on the draft roadmap

The meeting was conducted virtually with the participation of representatives from key government Ministries and Agencies. The main objective of the consultation was to capture participants' inputs for the proposed draft Roadmap and Action Plans on Urban FW Prevention, Reduction and Management in Sri Lanka.

##### 2.2.8.1 Summary of presentations

- a) Dynamics of government, public and private sector stakeholder engagement and conclusions of policy/regulatory/statutory gaps and potential areas for future action

by Mohamed Aheeyar and Nilanthi Jayathilaka (IWMI)

Sri Lanka generates 5 000 tonnes of FW and spends LKR 1.2 to 2 billion / day for waste collection and disposal. Prevention of FW can reduce waste management costs by over 50 percent. The saved resources could be diverted to the welfare of the taxpayers while FW reduction would increase food availability. The environmental cost would also be reduced. As a country, waste prevention should be prioritized:

- Food production and climate change policies are not directly addressing the question of FW, but the national cleaner production policies and national policy on sustainable consumption and production included FW issues.
- Existing waste management policies are mainly focused on the reduction of waste going to landfill sites, except the latest national waste management policy of 2019 and policies dealing with food safety and hygiene.
- The Food act does not provide due attention to safety and hygiene issues of agricultural produce: provisions are limited to processing/industrial food products and handling, not on agricultural produce.
- Safety and hygiene of surplus food redistribution: there is a lack of guidelines/regulations.

- Missing link between the two-layer administration system: food safety aspects are nationally regulated and monitored by the Food act that is not linked with the provincial administration set up.

Stakeholders identified: government, private actors such as supermarkets, retail and wholesale markets, food services, food manufacturers, service providing institutions (public and private) for schools, universities, hospitals, other canteens, traders' organizations, civil society: charities, NGOs, consumer organizations, households.

The stakeholder consultations findings were grouped into the following topics:

- i. Actions towards better enabling environment and infrastructure.
- ii. Awareness creation: tools and materials.
- iii. Strengthened capacity of key players.
- iv. Strengthened the food-management skills of the actors, and
- v. Food recovery and redistribution mechanisms.

Data from the project: per capita FW generation / year in the CMC area ranges from 100-200Kg. Case studies were conducted in hotels and restaurants, markets, retailers, caterers, hospitals and households to understand the FW scenarios and draw guidance in developing recommendations for FW reduction and prevention. The case study approach was aimed to identify the volume of FW generated, where, why and how this FW arises, and then to identify opportunities to reduce FW and propose strategies. A few identified strategies to prevent and reduce FW were implemented in the case study sites, monitored, and evaluated the impact of these practices. During these case studies, different quantification tools were used such as kitchen diaries, records on FW volumes and locations and waste audits.

Some interviews were conducted to understand current practices. Conducting awareness programmes, measuring and displaying the waste amounts, and educating the staff were some of the tools implemented. Monitoring the progress of FW reduction is important.

The main causes of FW are generally linked to awareness and capacity building. In the supermarket and hotel sectors, some FW reduction strategies have been already implemented as a voluntary commitment. Most of the FW generated by these entities is edible. Case studies helped to identify the major causes behind FW generation and possible strategies to reduce FW.

## b) Development of Sri Lanka's urban Food waste prevention and reduction roadmap

by Camelia Bucatariu (FAO International Consultant)

When discussing the methodology of innovative approaches to reduce, recycle and reuse FW, an action plan has been drafted through consultation, literature research, and primary data collection. It involved both qualitative and quantitative analysis. Through consultations with the private sector and civil society, challenges and potential feasible actions were identified. The flexibility of these actions is very important. Prevention is the key.

Governance, research, technology and innovation, communication, and sensitization are the main intervention areas. The proposed six objectives of the draft action plan were drawn from consultations and meetings and linked to stakeholders' achievable targets.

## 2.2.8.2 Discussion

### a) Enabling environment or incentives to reduce Food waste generation

The subject of FW has been included in the latest national policy on waste management of 2019 and the sustainable consumption and production policy of 2019. However, regulations must be developed while establishing mechanisms for law enforcement. Some suggestions related to enabling the environment:

- Creation of an incentive mechanism to reduce FW generation by introducing a load-based FW fee/load-based licensing scheme.
- Some food services are considering charging a small fee from the clients for plate leftovers.
- The introduction of different standards and different sizes of portions (lunch/dinner) would provide a choice for the customers.
- Announce a green award system for the private sector considering FW activities implemented.
- Arrange a mechanism to display FW quantities on the business entity premises that would incentivize reduction.

### b) Awareness building

- It was suggested that awareness is very important to change the behaviour and attitudes of FW.
- Awareness programmes should be focused on different groups: school children, youth, food services, hospitals, canteens, retail markets, etc.
- Organize annual symposiums on FW issues for different clusters of private sector organizations with the participation of champions who could share success stories and best practices.
- DoA is also conducting awareness programmes from the farm to consumer level on various aspects of production, Good agricultural practices GAP), Good management practices (GMP), food and nutrition, storage and consumption.
- Educate the wholesale market on food redistribution practices for direct human consumption to explore the options for providing former foodstuffs for livestock (MoEn) feed – legal and technical guidelines are necessary.
- All these measures should be well supported with a vigorous media campaign. Donor support should be solicited for a social media/mass media behavioural change campaign (MoEn).

### c) Lifecycle approach

- FW cannot be seen in isolation from food loss (DoA/MoEn).
- DoA has implemented a crop forecasting system to address the issues of food scarcity and gluts. A coordination mechanism between farmers and traders for their vegetable production and marketing has been established that is expected to reduce FLW.

#### d) Infrastructure

- Develop necessary infrastructure at Dedicated Economic Centers to produce biogas from wasted perishables, but this would not help to reduce the FW generation.
- The provision of cold storage may not be sufficient. The focus should be on cold chain management, paying attention to the entire food value chain.
- Food packing systems, handling and transport are some of the identified issues linked to FLW that should be addressed through the development of suitable infrastructure.

#### e) Redistribution of surplus food for direct human consumption

- Guidelines for recovery and redistribution for human consumption are required. The government should formulate legal and food safety guidelines in coordination with the Consumer Affairs Authority (CAA). The private sector could play a dominant role in the redistribution of surplus food to needy people as a part of CSR or voluntary actions.

#### f) Former foodstuffs to feed

- Guidelines for former foodstuffs to feed are required. Should discuss with the regional veterinary authorities on measures that should be taken to ensure the safety of the feed that would be considered by the government to issue necessary guidelines.

#### g) General discussion

- The stakeholders agreed to work towards achieving the SDG 12.3 targets of cutting FW by half in 2030. It was mentioned that some actions would need a short term of five years, while some other actions required ten years.
- Challenge: lack of a common platform/coordinating mechanism to work with a multiplicity of agencies in a common agenda.
- It was suggested to include the Ministry of Environment, Ministry of Urban Development and Housing, Ministry of Agriculture, Ministry of Health, Ministry of Education, Central Environmental Authority, Colombo municipal council to the proposed national steering committee.

### 2.3 Consultation with state and non-state stakeholders on the finalization of the roadmap

The workshop was held on 26 February 2021, from 9.30 a.m. to 2.00 p.m., at the Waters Edge Hotel, Colombo. It was attended by 20 invited champion/key stakeholder representatives from key government regulators, universities, academia, schools, private sector representatives from food services, supermarkets, retail markets and wholesale markets and charity organizations.

The objective of the workshop was to review the shortlisted actions in the Draft Roadmap and Action Plan prepared based on research and arising from consultations, primary data collections, and contributions from the government and the wider stakeholder groups. These actions were fine-tuned based on the current context (enabling environment), possible mechanisms/modalities, viability, and available resources.



The workshop facilitated dialogue, engagement and knowledge sharing among stakeholders, specifically engaging champions and institutional focal points linked to the roadmap. The workshop had two main sessions. The first session was aimed at presenting the key findings of the project and the draft action plan. The second session was a group discussion to fine-tune the action plan followed by group presentations to reach a consensus on the actions.

Dr Ajantha De Silva—Additional secretary, the Ministry of Agriculture highlighted the need of FW prevention as the key ministry in-charge of food production in his opening remarks. He also stressed that FW reduction is critically important in the path of achieving national food and nutritional security.

### 2.3.1 Technical session 1

In this session, two key presentations were done to provide a background and major findings of the project. It was highlighted that municipal solid waste collected consisted of over 50 percent of FW. The amount goes up to 75 percent in some of the LA areas. If the FW can be prevented, then half of the solid waste problem is over while contributing to food and nutrition security. An action plan is needed to achieve the SDG target of reducing current levels of FW by half by 2030. The ongoing project conducted FW quantification and analysis, policy and regulatory gap analysis, stakeholder analysis and field case studies. The activities of the project helped to identify the magnitude of the FW, causes and best practices.

The topic of FW prevention and reduction has great relevance to the country, where food and nutritional insecurity and issues related to climate change are growing challenges. The urban action plan includes many actions that can be launched immediately. Some must be further considered. Throughout the action plan, it has been indicated how the actors in the food supply chain can be enabled for FW prevention. The action plan highlights solutions identified through the consultations and research work. The action plan could facilitate the reversal of the current FW hierarchy in Sri Lanka which is focused on landfilling though it is the least preferred method. The project conducted many consultations, bilateral meetings, capacity development sessions, and workshops with various stakeholders connected with the food value chain during the last two years. The findings of the project activities were incorporated into the draft action plan that will be fine-tuned in today's workshop.

### 2.3.2 Technical session 2

The participants were grouped into four small working groups based on the objectives/activities of the draft action plan. Each group was assigned one to two objectives to discuss in detail and fine-tune. In addition to fine-tuning the actions, the following questions were provided to the groups to discuss.

- i. Who will be the lead agency responsible for each objective/ activity?
- ii. Who will be the key collaborating partners/ contributors for each activity?
- iii. Performance indicator that describes your view of an implementation mechanism/ how and where can work start for each activity?
- iv. Timeline for each activity.
- v. The estimated budget that could be associated with each activity.

After the discussion, representatives from each working group presented their feedback.

a) Group 1

Objective 1: Raise awareness that results in a national level drive on Food waste prevention and reduction

- Activity 1.1 - Agreed on the proposed lead agency and the listed contributors. It was recommended to provide an equally important role for the private sector and explore ways and means to use social media to achieve the target. A steering committee should be formed to function as a platform to coordinate the activities.
- Activity 1.2 - A logo with a tagline should be developed to start the FW reduction national campaign. Depending on government resources alone may restrict the performance and achieving the targets and therefore fundraising works should be started by developing relevant concept notes. The Ministry of Environment agreed to lead the initiation in this regard. The existing platforms such as the Health Promotion Bureau and Antenatal Clinics should be utilized for the promotional campaigns.
- Activity 1.3 - Proposed to organize annual symposiums to share the best practices and lessons of FW reduction initiatives.
- Activity 1.4 - In addition to schools, it was proposed to include universities as well. Provincial councils also could play a role considering the potential role that could be played by preschools that are under the purview of provincial councils.

b) Group 2

Objective 2: Strengthened Food waste measurement, monitoring and reporting capacity of wholesalers, retailers, food services providers, households, and waste management players

The leading platform is the future national steering committee. Identified sectors are hotels, restaurants and canteens; schools and universities; government institutions; healthcare (both government and private); supermarkets, dedicated economic centres and retail markets; households and industries.

Identified issues within sectors are planning, storage, consumption, purchasing, preparation, and disposal. The suggested awareness and training should be based on good practices and FW prevention, reduction and management, the introduction of 3R concept, cleaner production practices and preparation of FW reduction guidelines. The work should be supported by the development of a mobile application that would be used to feed the FW data at individual business levels, sectoral, and national levels. Each association can report. Sector-wise reduction guidelines should be developed. The reporting frequency could be biannual.

The awareness building and stakeholder engagement should be conducted with the collaboration of hotel associations, trade associations, school associations and supermarket associations. Each cluster should take the responsibility for training since the government cannot do it alone.

c) Group 3

Objective 3: Enhanced food literacy skills on Food waste prevention and reduction for consumers and actors from food services, retail, and wholesale

Activity 3.1: Academic institutions and hospitals should be included in the target group.

Activity 3.2: Target groups should include academic institutions and universities, hospitals, camps of security forces and garment factories.

Activity 3.4: Introduce innovative ideas and technologies, value addition techniques and funding support to share existing research knowledge.

d) Group 4

Objective 4 Safe and nutritious food recovery and redistribution for direct human consumption is implemented and monitored

Objective 5: Increased adoption of segregation, separation of waste collection and conversion of former foodstuff into animal feed

Storage and operational models were the biggest concerns in implementing food redistribution. It was proposed to have resource centers and food banks with public-private partnerships in key locations. The initial step could be some pilots. Manning market is one of the strategic locations for a pilot with the support of the government and CMC. The food bank in Manning market could be operated daily, for example from 02.00 p.m. to 08.00 p.m. The participating business entities should be rewarded or recognized through media (print, electronic, social media).

Ministry of Urban Development and Housing should consider allocating a space for the proposed food bank in Manning Market, while the overall initiative should be led by the Ministry of Environment. Anil Indrajith from Manning Market, Erandi Narangoda (formerly Soup Bowl charity) and Akash (from Voice for Voiceless charity) volunteered to support the project.

The development of a mobile application to provide a common platform for the stakeholders engaged in food redistribution is another activity suggested. The mobile application would provide hands-on information on registered potential beneficiaries and the availability of food. The centralized database should be accessible to anyone to donate or receive excess food.

Food for human consumption requires infrastructure such as cold storage, mobile storage facilities and storage trucks. The government should develop legal and operational guidelines for food redistribution and assist food donors to overcome liability issues.

National level awareness is required, but this should be done by sector experts. Training of trainers is proposed at the initial stage. However, the development of training modules requires support from sector experts. Training on food safety and hygiene, food quality, nutritional values and consumer protection are some of the suggested training needs. Training should be conducted in three languages (Sinhala, Tamil and English) but language use must be simple with straightforward instructions. The use of visual tools and illustrations for teaching as much as possible is most recommended.

e) Group 5

Objective 6.1 and 6.2: Strengthened segregation and separation of Food waste collection and conversion into compost and explore energy recovery from food-derived waste (without competing with the prevention or safe and nutritious food recovery and redistribution for direct human consumption)

The group proposed to consider the use of Food waste to produce recyclable materials such as fabrics and packaging. This would require support from academia to conduct feasibilities and set standards for the Sri Lankan context.

**Final Note:** Consensus was reached that the Ministry of Environment will be the custodian organization of the finalized Roadmap and Action Plan.

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ISBN 978-92-5-137606-5



CC4224EN/1/07.23