



Food Waste Footprint (Phase 2)

Economic valuation of social and environmental costs of food waste

Concept note

Justification

About 30% of global food production is lost or wasted in one way or the other. Food waste does cause significant financial costs due to income forgone for the different agents (farmers, traders, processors, retailers, consumers). However, not all costs of food waste have direct impacts on the economic agents along the supply chain. The real costs of food waste include societal costs which are currently borne by nature and people. These costs include, for instance, the cost of land degraded or deforested unduly, the cost of water polluted or overused, the cost of biodiversity put at risk, the cost of greenhouse gas emitted and the social cost of wasted human efforts and food insecurity. Both social and environmental costs are largely not internalized in food prices and their magnitude is unknown. Especially for the social impacts of food waste, no framework for analysis exists for its evaluation. A quantification of these costs can draw attention to the real societal costs of food waste and convince important stakeholders to introduce measures for food waste reduction. For instance, while the mere economic cost of food loss may not warrant investment efforts, a full internalization of external costs of food waste, and thus accounting for the cumulative effects that decreased production resources represent for food availability and livelihoods, may convince decision-makers on taking prompt action to reduce food losses and waste.

Aims of FWF - Phase 2

- Design an analytical framework for evaluating environmental and social costs of food waste.
- Quantify the external costs of food waste at regional and global level, differentiated by product.
- Quantify the potential investment cost for reducing food waste at different stages of the supply chain.
- Compare food waste reduction scenarios/costs to the full cost of food waste, including environmental and social costs, with a view to inform decision-makers on costs and benefits to the economy, nature and society.

Methodological approach

In order to quantify the external costs of food waste, Phase 2 of the FWF project will build upon results and tools from two previous projects of the Natural Resources Management and Environment Department:

- **Food Wastage Footprint (FWF):** estimation of physical impacts on carbon, land, water and biodiversity of food wastage at regional and global level for different products (see FWF Summary Report).
- **Sustainability and Organic Livestock model (SOL-m):** a global model which allows analyzing food supply and food demand development scenarios to 2050, focusing on livestock production, land use and several other environmental impacts.

The approach taken to the economic valuation of social and environmental costs of food wastage consists of the following steps:

1. **Integration of physical FWF data into the extended SOL-m**

The data generated in the FWF project will be integrated into SOL-m. A module for a calculation of product-specific environmental and social impacts will be programmed. This will allow analyzing impacts of food wastage in an integrated way, including important environmental, social and economic parameters and questions.

2. **Theoretical framework and a typology of societal costs of agriculture and food wastage**

A theoretical framework and a typology of societal costs of food and agriculture systems, and food wastage in particular, will be developed based on existing literature and conceptual considerations. Food wastage occurs at all stages of the supply chain, but societal impacts have not yet been addressed comprehensively by research. While impacts on food availability can be estimated using a quantitative model as described below, other social impacts (e.g. reduced access to natural resources as means of production, labor implications, livelihoods vulnerability, changes in ethical values, impacts on rural development) need to be specified.

It has to be emphasized that food wastage may have both positive and negative impacts for specific stakeholder groups (e.g. consumers, farmers, processors, traders, retailers). To this end, there is a need to develop an encompassing framework to specifically capture both cumulative and unexpected effects. For example, while undue losses of natural resources undermine food security, food wastage may contribute to food price and supply stability. In particular, trade-offs exist between decreasing food wastage footprints and increasing food availability. For instance, investments in food waste reduction infrastructure may increase food availability for local populations but generate additional greenhouse gas emissions.

3 **Definition of costs for different environmental impacts at global scale (or regional differentiation if data allows)**

Many studies have been conducted to examine the costs of either specific impacts of agriculture, such as on biodiversity, on environmental degradation or of its total environmental impacts. Based on Pretty at al. and the Environmental Valuation Reference inventory (EVRI-Database¹, a framework will be developed for environmental costs. Results of Step 2 will be used as an analytic framework for estimating social costs.

¹ www.environment.nsw.gov.au/publications/evri.htm

4 Selection of economic methods for monetarisation of the different impacts

Economic methods for estimating the environmental and social costs of agricultural production will be selected. Benefit transfer methodology will be used for transferring existing valuation results to food waste. It is necessary to consider different methods for different environmental impacts. The TEEB study (The Economics of Ecosystems and Biodiversity) will be used for further analysis of biodiversity impacts. For the valuation of greenhouse gas emissions, Watkiss and the carbon valuation approach from the UK Department of Energy and Climate Change DECC will be used. The further choice of methods will be based upon state-of-the-art literature and discussions within FAO (e.g. land and water division). Alternative methods for impacts which may not be quantifiable in monetary terms will be suggested. A preferred option for illustrating the correlation of food wastage with social impacts is overlaying maps of food wastage quantities and food insecurity for different countries. With this, hotspots can be determined and decisions with respect to investment priorities in food wastage mitigation measures can be supported.

5 Compilation of food wastage mitigation measures

Based on existing literature and expert consultations, a list of food wastage mitigation measures will be compiled and classified according to their feasibility and implementation costs in different settings.

6 Public consultation and discussions via a facilitated electronic-forum

The results of the preceding steps will be discussed in an e-forum on Full-Cost Accounting of Food Wastage in September 2013, including: the preliminary economic quantification of social and environmental costs of food wastage; discussion and selection of additional valuation methods for analysis; and food wastage mitigation measures. This will ensure global participation of stakeholders, getting feedback on the preliminary results and for getting regional information of food wastage impacts, data, values and mitigation typologies and costs.

7 Calculation of societal costs and specification of impacts

Societal costs will be calculated using the selected methods and figures differentiated by product and region, as far as data is available. For impacts that are not quantifiable due to methodological constraints or lack of data, alternative ways of illustration will be used. Such illustration can be achieved via overlaying maps of natural resources scarcity (SOLAW), food insecurity (GIEWS), poverty and food wastage and allow indicating the linkages and implications to the poor and vulnerable.

8 Calculation of investment costs for reducing food wastage

In a first step, appropriate measures for mitigating food wastage at different stages of the supply chain will be specified. Monetary efforts for implementing these measures will be estimated, based on available literature and the FAO InPho database and network on post-harvest losses, as well as on the outcomes of the e-forum.

9 Calculation of food wastage scenarios

Based on the values specified for the different products and regions, global scenarios towards 2050 will be calculated using the extended version of SOL-m. These scenarios will analyse food wastage

reduction options, covering interactions of food waste impacts with social, environmental and economic variables at global scale.

10 Final reporting

The final reporting is due in early 2014, consisting of: a paper targetting decision-makers; and a scientific paper in order to give the results the necessary credibility. This is particularly necessary as existing monetary valuation techniques lack a broad acceptance among many scientists and stakeholders.

Figure: Graphical overview of FWF - Phase 2 activities

