



**sincerely,
food**

A global learning approach to food waste in non-formal education

Study

2018

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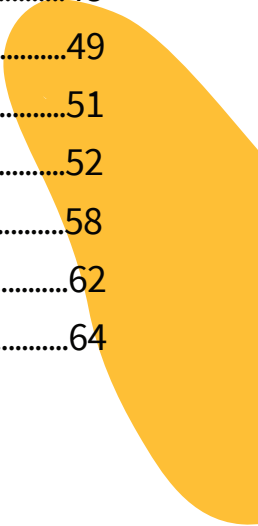


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1.

Introduction

Food waste has gained significant attention recently and is on political, scientific and civic agendas. It is acknowledged at the EU level, food waste ‘has high social, economic and environmental costs, as well as ethical consequences’ (EP, 2017, p. 3). In addition to the local food waste management problems, social inequality and deprived people, economic and environmental problems, global aspects of food wastage are of importance. Social burden and environmental impacts throughout whole food supply chains affect food producers and consumers all around the world. Especially socially vulnerable are people in developing countries in terms of hunger, food safety, inequality, low income, and human right impingements. Environmental impacts are felt both in developed and developing countries in terms of climate change, water stress or scarcity, and biodiversity loss.

Awareness-raising on those interlinkages is crucial in combating both social and environmental burdens locally and globally. Non-formal education and lifelong learning are essential factors to bring change in the interconnected and fast-changing world. A significant role here is played by non-governmental organisations—watchdogs, whistleblowers, agents of change, and the primary facilitators of sustainability on a community level.

The EuropeAid project ‘Global learning approach on food waste in non-formal education’ (No. CSO-LA/2017/388-342) focuses on the interdependencies between developing countries and the EU offering to the target groups the knowledge and understanding when food waste is generated in one country it causes social, economic, and environmental impacts in other countries and the world.

The project also contributes to the implementation of the UN sustainable development goals (SDGs), directly or indirectly addressing SDG 2 (zero hunger), SDG 12 (sustainable production and consumption), and SDG 3 (climate change) as well as EU policies in the field of waste reduction and management and development cooperation.

This study summarises the current food waste definitions, trends, challenges, and the global learning approach towards food waste. It overviews the current situation and initiatives in Bulgaria, Croatia, Estonia, Latvia, Lithuania, and Romania, as well as in some other European countries. The study also includes the summary of the experiences from developing countries’ perspectives regarding food waste and global interlinkages.

2.

Review of the principal terms and trends in food waste and global learning approach



2.1.

Global education approach

A global perspective is a natural condition of most humans, as we are globally interconnected by our daily needs, interests, and life patterns. The food waste issue is no exception. The project has a threefold objective (1) to fill the gap of low-level awareness and the poor educational base for global interlinkages of food waste, (2) to raise awareness on global interdependence and environmental and social development issues in society, and (3) to promote food waste avoidance skills and altered consumption patterns in households contributing to the reduced environmental and social burden globally, clearly highlighting the interconnectivity of local and global perspectives.

Both local and global perspectives are integrated into our everyday life. Localization of the global experience and globalization of the local experience (glocalization) happens in every aspect of human life. Glocalization highlights that globalization and localization have merged, are inclusive, and can be mutually enriching (Robertson, 2005). Glocalization methodology, created by the Latvian Platform for Development Cooperation (LAPAS), is the heart of global learning, enriching understanding of the interconnectedness of the local and the global and the capacity to think globally and act locally, connecting global issues with everyday life (LAPAS, 2015).

Regarding the topicality of the global dimension, there is a gap to be filled in this area in the project partner countries. Rather low public awareness of interdependence in a globalized world and development issues are characteristic of the partner countries and, on a certain level, throughout Europe. Already in 2012, the European Parliament (2012) called the member states to develop or strengthen national development education in the whole EU for a European strategy for development education, awareness-raising, and active global citizenship. However, just 18% of LT inhabitants have heard about SDGs and only 6% know their meaning, correspondingly in BG 21% and 6%, in RO 29% and 6%, in LV 34% and 6%, in EE 32% and 8%, and in HR 36% and 9% (Special Eurobarometer 441, 2016).

Poverty, hunger, terrorism, economic situation, and climate change are among the most severe problems facing the world according to Europeans. However, only 19% of respondents consider themselves to have a personal responsibility in preventing climate change and 49% of that group say they are taking actions to combat climate change. (Special Eurobarometer 435, 2015)

Households are affected by processes of globalization but are unaware of personal impact on global processes, such as climate change and food security (averages: EU-52%, HR-44%, RO-42%, LT-28%, EE-17%, BG-14%) (Special Eurobarometer 441, 2016).

In addition, civil society reports show a shrinking civic space in Europe (CIVICUS, 2016). Furthermore, the security of civil society space and its decision-making capacity and global influence significantly decreases. In 2014, the threat to civic space was recorded in 96 countries all over the world; in 2015, 101 countries were on the list including 31 on the African continent, 38 in Asia and 16 in Europe (CIVICUS, 2017). When the space for civil society diminishes, the public desire to be involved in global awareness-raising activities and to support global development also decreases. Therefore, it is crucial to strengthen civil society by raising awareness and global capacity building which is the primary goal of global education.

Global learning characterizes an education approach that facilitates changes in the areas of understanding, skills, and attitudes by exploring the global world and participating in it. Historically, global learning has started as global awareness about helping people in developing countries and has been supported by colonial studies that led to critical inquiry of traditional understanding of development and education. Afterwards, it shaped into development education, human rights education, education for peace and conflict prevention, intercultural education, education for sustainable development, and global citizenship education. There is a wide variety of overlapping global learning definitions and approaches (Fricke et al., 2015). Even within one of the approaches, the meanings and definitions vary considerably (Leduc, 2013). Analysis of the connections between these terms can be found in 'Global Citizenship Education in Europe: A Comparative Study on Education Policies across 10 EU Countries' (Global Schools, 2016).

This variety of approaches has shaped a scholarly debate and educational practices since the last decade of the previous century. Though different in some respects, these educational approaches consider global aspects and interlinkages and emphasize the shared responsibility for the global problems. They agree that global education enables people to

understand the links between their own lives and those of people throughout the world, increases understanding of the economic, cultural, political, and environmental influences, develops the skills, attitudes, and values which enable people to work together, make a change, and take control of their own lives, achieving a more just and sustainable world and sharing power and resources more equitably (Hicks, 2017).

Summing up different definitions, yet similar objectives, the Maastricht declaration (2002) states 'global education is understood to encompass development education, human rights education, education for sustainability, education for peace and conflict prevention, and intercultural education; being the global dimensions of education for citizenship' (North-South Centre of the Council of Europe, 2010).

The core elements of global education as presented by Hicks (2003) cover four dimensions: issue, spatial, temporal, and process. The issues dimension includes the main problem and solution areas, i.e., inequality (equality), conflict (peace), environmental damage (care), and alienation (participation). The spatial dimension encompasses local-global connections regarding problems and their dependency. The temporal dimension considers interlinkages between past, present, and future regarding specific problems and their solutions. The process dimension emphasizes the importance of participation, values representation, and guidance to the local-global citizenship.

The role of the global approach and global learning is emphasized in the UN SDGs which was adopted by world leaders and came into force in September 2015. Since then, countries have the primary responsibility for taking ownership and establishing national frameworks for the achievement of the 17 goals.

Sustainable development goals (UN, 2015) address education, specifically Target 4.7 of SDG 4 focuses on global citizenship education and education for sustainable development that shapes the core of the global education approach. By 2030, it intends to 'ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development' (UNESCO, 2017).

Both approaches—global citizenship education (GCE) and education for sustainable development (ESD)—indicate the current emphasis in global education is assigned to the competences of a global citizen. GCE intends to empower learners to engage and assume active roles, both locally and globally, to face and resolve global challenges and to become proactive contributors to a more just, peaceful, tolerant, inclusive, secure, and sustainable world (UNESCO, 2014).

Similarly, ESD intends to develop competencies that empower individuals to reflect on their own actions, considering current and future social, cultural, economic, and environmental impacts from a local and a global perspective. ESD requires a shift from teaching to learning and intends to develop a variety of competencies (Table 1) (UNESCO, 2017).

Table. 1. Key competencies to advance sustainable development (reproduced from: Education for Sustainable Development Goals. Learning Objectives, UNESCO, 2017)

1. Systems thinking competency:	to recognize and understand relationships; to analyse complex systems; to think of how systems are embedded within different domains and different scales; and to deal with uncertainty.
2. Anticipatory competency:	to understand and evaluate multiple futures—possible, probable, and desirable; to create one’s own visions for the future; to apply the precautionary principle; to assess the consequences of actions; and to deal with risks and changes.
3. Normative competency:	to understand and reflect on the norms and values underlying one’s actions; and to negotiate sustainability values, principles, goals, and targets in a context of conflicts of interest, trade-offs, uncertain knowledge, and contradictions.
4. Strategic competency:	to collectively develop and implement innovative actions that further sustainability at the local level and further afield.
5. Collaboration competency:	to learn from others; to understand and respect the needs, perspectives, and actions of others (empathy); to understand, relate to, and be sensitive to others (empathic leadership); to deal with conflicts in a group; and to facilitate collaborative and participatory problem-solving.
6. Critical thinking competency:	to question norms, practices, and opinions; to reflect on one’s own values, perceptions, and actions; and to take a position in the sustainability discourse.
7. Self-awareness competency:	to reflect on one’s own role in the local community and (global) society; to continually evaluate and further motivate one’s actions; and to deal with one’s feelings and desires.
8. Integrated problem-solving competency:	to apply different problem-solving frameworks to complex sustainability problems and develop viable, inclusive, and equitable solution options that promote sustainable development, integrating the above-mentioned competencies.

These key competencies that advance sustainable development highlight the interrelatedness of social, economic, and environmental sectors. As they imply a value-based approach, they can be successfully applied to address food waste issues. In addition, food waste throughout the whole life cycle of the product have significant economic, environmental, and social impacts on the local and global level, therefore, should be addressed taking both local and global perspectives into account.

Households are a crucial target group, as they produce nearly half of the food waste (Monier et al., 2011). Also, youths are of importance, as young people generate more food waste (Monier et al., 2011) and, at the same time, are going to shape local and global development in the near future. Thus, it is crucial for target groups not only to envision the world as one community but also to be able to find their role, responsibility, and involvement in coping with global issues. It is suggested that among the most successful principles of the application of global education especially for youths are: participatory and action-oriented learning, relating learning content to the real-life situations, balancing understanding of global issues, urging proactive and active engagement, learner-centred processes based on the needs, interests, expectations and engagement of people, linking individual and social learning, engagement in planning, and defining and evaluation of learning (Global Citizens' Academy, 2017).

- **Global learning, an educational approach started as global awareness about helping poor people, now is shaped by a variety of types of education, including development education, ESD, and GCE.**
- **The current emphasis in global education is assigned to the competences of a global citizen and shaped by the global agenda – UN SDGs.**
- **Due to its global and local (glocal) nature and interrelatedness of social, economic, and environmental sectors, the global learning approach is a proper tool to be applied to the issue of food waste.**
- **Global learning on food waste is to be ensured as the non-formal education of households, with specific attention to youths as current and future consumers and life shapers.**

2.2.

Food waste definition

Food waste is usually defined as the loss of food in the food supply chain (FSC), i.e., distribution, retail, and final consumption (Griffin et al., 2009; Parfitt et al., 2010; FAO, 2011). Food waste can be divided into: (1) avoidable and possibly avoidable waste referring to ‘edible’ food thrown away and (2) unavoidable food waste, which is waste deriving from food preparation that is not and was not edible (Parfitt et al., 2010 WRAP, 2017) such as bones, shells, and skins.

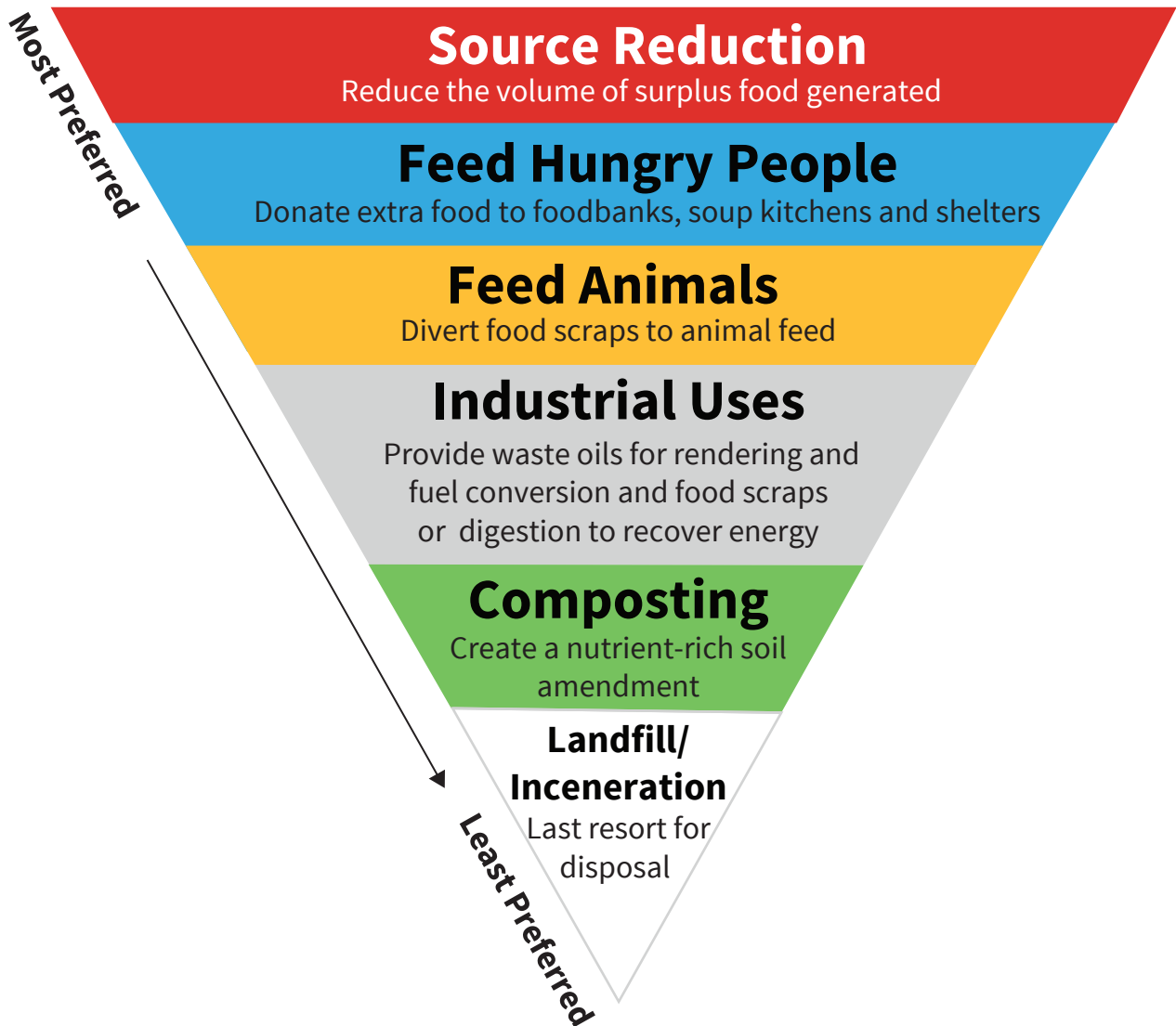
Different food waste definitions (e.g., food loss, food waste, food wastage) are usually employed in policy and scientific documents worldwide. Yet, the term ‘food wastage’ is broader and takes into consideration both food loss and food waste as presented by FAO (2013). However, this variety and different food accounting methodologies complicate the data comparability and reliability. As indicated by Gruber and Oberstainer (2016), ‘food waste’ and ‘food loss’ might happen in different stages of the supply chain for different products, so it is difficult to measure and report these parameters separately. Taking this into consideration, the project will apply a broad food waste definition, within its activities focusing mainly on food waste in the consumer sector, i.e., particularly avoidable food waste. Target groups and the objectives of the project also determine this approach. In addition, different food waste streams and their sources require different management tools. Despite that, the food waste management hierarchy (see Fig. 1) is usually applied to prioritize food waste reduction management.

“Food waste - food which was initially produced for human consumption but then was discarded or was not consumed by humans. Includes food that spoiled prior to disposal and food that was still edible when thrown away.”

(Thyberg and Tonjes, 2016)

Fig. 1. Food waste recovery hierarchy

(reproduced from <https://www.epa.gov/sustainable-management-food/food-recovery-hierarchy>)



- A broad definition of food waste is applied in the project context.
- The food waste issue includes the whole food supply chain that implies the whole life cycle of the product (production/farming, processing, storage, distribution, retail, marketing, preparation, and consumption).

2.3.

Food waste trends and determinants

Approximately 88 million t. of food is wasted annually in the EU; the global volume of food wastage is estimated at 1.6 billion t. per year (FAO, 2013). This wastage has not only an enormous negative impact on the global economy and food availability, but it also causes significant environmental impacts. Different parts of the supply chain contribute differently to the food waste in different regions. It is estimated that processing, distribution, and consumption in middle- and high-income regions account for 31-39% of food wastage but much lower in low-income regions – 4-16% (FAO, 2013). Hence, households generate the most significant amount of food waste in the food chain in European countries and other developed countries. Not considering the agricultural phase, 42% of all food produced in the food supply chain is wasted during the final consumption stage in the EU; catering services are responsible for an additional 14% (Monier et al., 2011). In accordance with more recent statistics on EU level, food waste amounts to up to 173 kg per year per person in the EU; more than half is generated by households (92 kg/yr/cap) (FUSIONS, 2016). Nearly two-thirds (60%) of this amount refers to avoidable and possibly avoidable food waste (WRAP, 2017). Another study suggests (Vanham et al., 2015) edible food amounts to 80% of food wasted.

Concerning the amount of food wasted (in terms of weight) in the EU 27 countries—the minimum value equal to 25 kg per capita was observed for the Czech Republic and Slovakia while the highest values were observed for households located in Luxembourg (113 kg per capita) and the United Kingdom (133 kg per capita) (Monier et al., 2011). However, data on food waste, especially in the household sector, for countries in the project is absent or unreliable, even based on the Eurostat database.

According to FAO (2011), about 25% of produced cereals are wasted at the consumption stage. For fruits and vegetables, this wastage accounts for 19%, roots and tubers-17%, meat and fish-11%, and milk-7%. Halloran et al. (2014) also highlights vegetables, cereals, dairy products, and meat to be significant types of wasted food at the consumption level. In addition, these authors indicate an economic loss at this stage is the highest, though other stages of production feature larger volumes of wastage.

A number of factors influencing food waste generation need to be addressed. One of these is household food-related routines which are associated with food purchasing, processing, and consumption choices (Stefan et al., 2013). Routines such as purchasing too much food during shopping trips (Evans, 2012) could contribute to increased food waste. In addition, planning routines (e.g., a shopping list, meal planning) (Bell, Corsten, & Knox, 2011; Stancu et al., 2016) could influence shopping routines and result in less food cooked (Stefan et al., 2013).

Another factor is customers' intense focus on freshness. This means goods with extended shelf life often result in discards quite some time before the expiration date. In addition, the import of food products is increasing in Europe (EEA, 2012). For example, in 2015, Europe imported over 35,000 tonnes of exotic tropical fruit almost exclusively from developing countries (CBI, 2017). The primary destination markets for exotic fruit such as lychees, passion fruit, pitahaya, and carambola are Germany and France, but consumption has also expanded into other countries.

Misinterpretation of different labelling approaches also might result in food waste generation. In a study by Beck et al. (2011, from Halloran et al., 2014) half of the consumers interviewed interpreted 'best before' label as 'inedible after'.

Different household characteristics are also associated with higher food waste levels. Larger households (Koivupuro et al., 2012) and households with higher incomes (Stancu et al., 2016) are found to waste more food in total. Discounts on food items as 'three for two' deals or 'economy size' promotions can become a source of food waste in single households due to too large quantities to be consumed before their expiry date (Halloran et al., 2014). However, Koivupuro et al. (2012) suggest 'buy one get one free' and discounted food products do not always lead to an increase in food waste. Hence, shopping planning routes might be an explanation here.

Age is negatively correlated with food waste amounts, as older people tend to waste less food (Stefan et al., 2013). Summarising Eurobarometer surveys, Secondi et al. (2015) also indicate food is more often wasted in the 15-24 age group. Gender aspects might be of importance. Koivupuro et al. (2012) show single-woman households generated the most avoidable food waste per person. Also, authors found Finnish households with a woman mainly responsible for grocery shopping generated more food waste in comparison to households where only a man or both spouses were responsible for shopping (27.196 kg on average to compare to 19.980 kg). However, Secondi et al. (2015) indicate some opposite results, suggesting women generate less food waste than men do.

Awareness about food waste-related impacts also is related to food waste generation. Stancu et al. (2016) indicate economic impacts are more important than social and environmental ones. Between reasons for food waste in the household sector, Priefer et al. (2016) also

indicate impulse purchasing, purchasing products that are disliked afterwards and not consumed, poor storage management, lack of skills of food preparation, and lack of skills to use leftovers.

- **The food waste issue is of importance both on the global and local level and both for developing and developed countries, though different situations and challenges exist.**
- **Different factors shape food waste generation and need to be taken into account: household size, age, gender, income, knowledge, attitudes, food-related skills, and routines.**
- **Reduction of food waste implies raising awareness about food waste locally and globally and changing attitudes and behaviour concerning food consumption: food purchasing, food planning, food processing, and food waste management.**

2.4.

Food waste impacts and challenges

Food waste can impose a variety of economic, social, and environmental impacts throughout the food supply chain. Some authors suggest environmental costs are much higher than economic ones (Reutter et al., 2017). Keeping in mind increased demand for food because of projected population growth and intake per capita, the need to provide food within the environmental boundaries of the planet is a challenge (Conjin et al., 2018).

Estimated economic costs, depending on different sectors included, could amount to 750 billion dollars globally (Thyberg and Tonjes, 2016). The costs associated with food waste for EU 28 in 2012 are estimated at approximately 143 billion EUR. Two-thirds of the cost is associated with food waste from households (around 98 billion EUR) (FUSIONS, 2016). This is the retail value of the food thrown away (the estimate covers only the edible food waste).

Cost for households was estimated as equal to £420 per year for an average UK household or approximately €454 in the case of an average Italian household according to Segrè and Falasconi (2011, from Cicatiello 2016). On average, Danish households waste €390 of edible food annually, with €125 of this total amount produced over the period of the Christmas holiday (Tænk Forbrugerrådet, 2012, from Halloran et al., 2014). Similar amounts of waste are also produced during the Easter holidays (Landbrug og Fødevarer, 2010, from Halloran et al., 2014). The annual economic value of food waste in Finnish households is about €70 per person (Katajajuuri et al., 2014).

The economic loss takes place throughout the whole supply chain. Reutter et al. (2017) estimated food waste is responsible for 1% of compensation (payments for work) to employees (AUS\$ 2.0 billion) and surplus (value added) (1.2 billion) in Australia.

Food security and social burden are other areas of food waste implications. One in nine people globally are undernourished, the majority of the world's hungry people live in developing countries. In 2016, the number of chronically undernourished people in the world

reached 815 million (11% globally) (FAO, IFAD, UNICEF, WFP and WHO, 2017). The situation has worsened in some parts of sub-Saharan Africa, South-Eastern Asia, and Western Asia.

The most negative trends are observed in situations of conflict and/or climate-change-affected areas (droughts or floods) (FAO, IFAD, UNICEF, WFP and WHO, 2017). Growing population and demand for food in the light of climate change and increasing competition for resources might only sharpen the situation.

It was observed that the average amount of food wasted in developed countries every year (220 million tons) is almost equal to the total net food production of sub-Saharan Africa (FAO, 2011). Hence, rethinking food consumption patterns and reducing food waste could contribute to food security and availability for others. As summarized by Tscharrntke et al. (2012), there is enough food produced, but it does not reach the hungry. In addition, more than half of Europeans are overweight (EEA, 2012); hence, health benefits might also occur upon changing some food consumption patterns. In addition, the European Federation of Foodbanks (FEBA) estimates 411,000 tonnes of food were redistributed in 2014 (<http://www.eurofoodbank.eu>) approaching the needy at the EU level.

Water is the primary constraint to food security, as food waste means wasting water, too. In addition, it is estimated 1.4 billion people already live in areas where there is not enough water available to meet all needs of society (Lundqvist et al., 2008). Gender aspects here are also important. In low-income countries, women and girls are primarily responsible for the management of household water supply and sanitation, and they are much more vulnerable, spending most of the time for this task (WWAP, 2016). They take on increased domestic and care work as available resources decrease, often being forced to neglect education and other opportunities (UN Woman, 2017). Food discrimination is also a common phenomenon in some societies, where women and girls eat the food that remains after the male family members eat (FAO, 2017c).

Conflicts, migration, people exploitation, and human rights impingements, due to the climate change and related outcomes such as water and food shortage, also arise and indirectly are influenced by food waste. In 2015, there were approximately 240 million international migrants, whereas, in 2013, around 760 million people migrated within their own country. Climate change and food security are drivers of this migration (FAO, 2017a). In general, families depending on agriculture are particularly vulnerable to climate change and have fewer capabilities to cope with arising risks (FAO, 2017b). However, intensification of agriculture increasing yields in the developed world does not necessarily contribute to global hunger reduction and quite often overlooks the environmental impacts (Tscharrntke et al., 2012). Growing crops for the export market usually is encouraged for higher incomes, but it often results in insufficient food to feed farmers' families (Farming first, 2010).

The environmental burden related to food waste generation takes place not only in consumption countries directly, but in production countries via agricultural activities and primary processing of food, particularly land use uptake, climate change, and water and soil pollution due to the use of pesticides and fertilizers, etc.

When analysing food waste-related environmental impacts, the whole life cycle of food products should be considered. Climate change, water consumption, natural landscapes, and ecosystem services are adversely affected not only by the produced but also by wasted food (Lipinski et al., 2013). Preventing one-third of food wasted globally (FAO, 2011) could contribute to avoiding approximately one-third of the impact, especially in the stage of agricultural production (mostly climate change, pollution, biodiversity loss, human health-related).

It is estimated, that in the EU annual food waste-related emissions will reach about 240 Mt of CO₂ eq. in 2020 (EC, 2010). Some other estimations indicate the input to the climate change of current food waste for the EU is at least 227 MT of CO₂ eq., in total related to food consumed – 1155 MT (FUSIONS, 2015). The British Waste and Resources Action Programme (WRAP, 2011) calculated the average carbon footprint of avoidable household food waste is approximately equal to 330 kg CO₂ eq. per person per year, corresponding to one-third of the CO₂ emissions associated with household electricity use per person in the UK.

FAO (2013) highlights the carbon footprint of all food produced but not eaten is close to 3.3 G tonnes of CO₂ eq. (not including land use changes). Some other sources (Bakas, 2010, from Oelofse and Nahman, 2012) estimate food waste along the whole food chain has a potential to contribute up to 4.14 tonnes CO₂ eq. per tonne of food wasted at the consumption stage ranging between 0.3 and 0.6 tonnes of CO₂ eq. per tonne of food, and in final disposal, 0.45 tonnes of CO₂ eq. per tonne of food. Though farm emissions are the most significant, a study concerning Australia (Reutter et al., 2017) highlights GHGs emitted because of food waste at the consumption stage amounts to 2.8% of total GHGs emissions of Australia. In addition, most of the food waste ends up in landfills not only taking up the land but also contributing to the methane emissions (FAO, 2013).

Regarding energy use, 38% of energy consumption in the global food system is used to produce wasted food (FAO, 2017b).

Food waste also means wasted water (Lundqvist et al. 2008). The global agriculture sector consumes 70% of water withdrawal, and this is projected to increase (Foresight, 2011). Due to the expansion of irrigation systems and increased water demand, there is pressure on the aquatic system and even competition for water for food. Food waste is associated with 24% of all water used for agriculture (173 billion m³ of water per year) (Kummu et al., 2012). On the EU level, the food waste-associated blue water (only surface and groundwater) footprint averages 27 litres per capita per day which slightly exceeds the total EU municipal surface

and groundwater use (Vanham et al., 2015). In total, on the EU level, water associated with avoidable food waste from EU consumers amounts to 52 km³ per year (ibid).

Global average water footprint per ton of crop varies from 200 m³ /ton for sugar crops, 300 m³/ton for vegetables, 1000 m³ ton for fruits, to 1600 m³/ton for cereals (Mekonnen, Hoekstra, 2011). However, meat and dairy production are more water-intensive than crop production. 500–4,000 litres of water evaporate to produce one kilogram of wheat compared to 5,000–20,000 litres for meat production, mainly because of animal feed (Falkenmark and Rockström, 2004, from Lundquist et al., 2008). Reutter et al. (2017) present the water footprint of wasted meat dominates other products, amounting to 25% of the water footprint due to food waste in Australia.

28 million tonnes of fertilizer and 198 million hectares of cropland are used to grow wasted food annually (Kummu et al., 2012). The latter almost equals the extent of cropland in Africa (221 Mha) and is larger than the total expansion of global cropland over the last 60 years as estimated by FAO in 2011. Total fertiliser use, having adverse effects on biodiversity and water quality associated with food losses, amounts to 28 Mt of nutrients per year (Kummu et al., 2012).

Globally, about 9 million tonnes of nitrogen are unnecessarily lost due to food waste, of which, 17% comes from the EU 27 representing 7% of the world population (Grizzetti et al., 2013). On the EU level, 0.7 million tonnes of nitrogen are emitted into the water due to food which is not eaten and mainly contributing to eutrophication. In addition, 0.37 million tonnes of nitrogen are emitted annually because of wasted food, contributing to air pollution (ibid).

FAO (2013, 2014a) also indicates soil erosion (and related damages), land uptake, and the negative impacts of deforestation on biodiversity are related to agricultural activities. An example in Peru shows the pressure to produce for distant markets has led to a decline in the diversity of cultivated crops in the Andean region (Lennox, Gowdy, 2014). As summarised by Fischer et al. (2017), pressure for intensive, large-scale farming in some African countries contributed to the destruction of forest and associated biodiversity, which provided firewood, grazing, useful plants, water resources, and critical sociocultural services to the community. In turn, this expansion undermined farmers' food security. Small-scale farming is argued (Tscharntke et al., 2012) to be a key factor for food security for the poor and biodiversity which provides most of the ecosystem services.

One more aspect related to food and biodiversity is fish consumption. It is summarized that 88% of EU stocks are already overfished (EEA, 2012) resulting in increased fish imports and related impacts outside the EU. In addition to the overexploitation of fish stocks, pollinator loss due to agriculture is also an issue related to food production and food waste (FAO, 2013, 2014a). Drivers and impacts of food-related activities overlap and interchange; therefore,

a holistic approach to solving problems is necessary. For example, wasted food indirectly through land use and land cover changes contributes to the additional emissions of GHGs, as estimated by FAO (2017b) reaching 0.8 Gt of CO₂ eq. annually. In addition, environmental impacts also cause significant economic losses (FAO, 2014a) and sharpen food security in terms of quantity and quality (FAO, 2016).

Benefits of reduced food waste along supply chain:

- 1.** Reducing postharvest losses can increase the amount of food available to farmers for their own consumption or for sale to market
- 2.** Reducing postharvest losses can reduce the likelihood that small-holders become net food buyers
- 3.** Reducing losses in the value chain lowers expenditures of processors and retailers per unit of food grown or harvested
- 4.** Reducing food waste can lower household expenditures per unit of food consumed
- 5.** Reducing quality losses can better maintain nutritional value of food
- 6.** Reducing food losses increases the return on investment of time spent farming and could reduce the total time needed to work in fields
- 7.** Reducing food waste could reduce total household expenditures on food, freeing up resources for health, education, and other household benefits
- 8.** Better utilizing food already grown reduces the need to convert more ecosystems into food production or to harvest more wild food (e.g., fish)
- 9.** Better utilizing food already grown reduces the need to convert more land, apply more fertilizers, raise more livestock, and use energy for producing, processing, transporting, and storing food
- 10.** Diverting food loss and waste from landfills prevents methane emissions from rotting food
- 11.** Better utilizing food already grown reduces the need to withdraw more water from aquifers or add more agricultural chemicals that may pollute water bodies

(Lipinski et al., 2013)

Referring to the discussed food-related impacts, the food, and food waste management-related attitudes and behaviour play a crucial role. Choices made by stakeholders ultimately affect the choices made by other stakeholders up- or downstream in the food value chain. This is due to the high connectivity and interdependencies of all actors within the food system (Halloran et al. 2014).

However, the Flash Eurobarometer 425 (2015) showed the percentage of the belief that households can make an impact on the reduction of food waste in project partner countries is one of the lowest (EU average-76%, LT-44% (lowest in all EU), BG-52%, EE-62%, LV-61%, HR-65%, RO-67%).

- **The food waste issue causes local and global effects that are interrelated across social, economic, and environmental sectors: e.g., resource scarcity, environmental degradation, biodiversity loss, climate change, migration, food security, poverty, hunger, abuse of human rights, deterioration of health.**
- **In the reduction and management of food waste, attitudes and behaviour play a crucial role. Awareness of the global and local situation is also significant.**

3.

Situation, policies and initiatives regarding food waste and global approach in partner countries



3.1.

Bulgaria

National policies

Bulgarian waste management policy is expressed in various documents: Environmental Protection Act, Waste Management Act, ordinances, national planning and strategic documents—National Waste Management Plan 2014-2020, National Strategic Plan for Sludge Management of Urban Wastewater Treatment Plants 2014-2020, and the National Strategic Plan for the Staged Reduction of the Quantities of Biodegradable Waste for Destruction.

The state policy on waste management focuses on integrating environmentally and economically sustainable models whereby household waste is separated from all that can be utilized and recycled to become energy, in the raw material for the industry, in the fertilizer for the plants, and in the newly-built regional landfills to be disposed of minimum quantities of waste. In line with policies on the European level, the primary national interest is achieving 65% recycling of municipal waste by 2030, 75% recycling of packaging waste by 2030; and 10% maximum landing until 2030.

However, regarding food waste, the National Waste Management Plan 2014-2020 (2014) foresees only voluntary agreements for industries to prevent food waste and the implementation of 17 regional installations for the utilization of biodegradable municipal waste.

Food waste generation and consumers attitudes and behaviour

In total, over 670,000 tonnes of edible food are discarded for one year in Bulgaria, a quantity equal to nearly 2.2 billion portions of 300 g. Households dispose of 40% of this food. At the same time, over 1.5 million Bulgarians live below or at the poverty line, with at least 400,000 of them being children.¹

Some municipal-level studies² (2017) show 2% of the waste collected is food and garden waste. Some food waste is treated in municipal biodegradable waste treatment plants.

¹ Bulgarian Food Bank. URL: <http://www.bgfoodbank.org/en/>

² Ecology-Bulgaria.com. 2017. 207,000 tonnes of solid waste was processed at the Sofia plant [in Bulgarian]. Ecology-Bulgaria.com, URL: <http://ecology-bulgaria.com/article/2316-207-000-tona-tvardi-otpadaci-sa-preraboteni-v-zavoda-na-sofia> (accessed 29, December 2017)

For example, citizens of Sofia have the ability to sort biodegradable waste, as special (brown) containers were introduced recently. There were about 5550 t of food waste treated in biodegradable waste treatment plants (total capacity 20,000 t per year) in Sofia during the first half of the year in 2017. The biodegradable waste sorting approach is planned to reach 50% of households in 2018, 2019 – 75% of households, 2020 – 100% of households.

Regarding food waste from consumer perspectives, usage of ‘best before’ and ‘use before’ is considered a problem, as many consumers throw away edible food marked ‘best before’ because they think it is not good anymore. Less than a quarter of respondents in Bulgaria (21%) gave the correct answer to the question ‘What do you think “best before” on a food product actually means?’ (Flash Eurobarometer 425, 2015). Next to the precise information on labelling, for food waste reduction, Bulgarians indicated better shopping and meal planning (63%), and smaller portion size in the shops (39%). Only 52% of Bulgarians take personal responsibility for the food waste generation compared to 76% in the EU on average (Flash Eurobarometer 425, 2015).

Global approach and food waste-related initiatives

The Bulgarian Food Bank works to reduce food waste and use the good food that it saves to provide sources of nutritious meals for people in need. The Bulgarian Food Bank is a registered business operator, in line with food safety standards, and guarantees the provision of safe and good quality food to people in need. The major obstacle for the preservation of edible food is legislative. Paradoxically, it is costlier for a food retailer to donate its surplus food than to dispose of it, as a 20% VAT is imposed on food donations in Bulgaria.

Several initiatives have been created to share food by deploying refrigerators where people who have more food leave it for others who need it. One of them is under the name ‘Generous Refrigerator’, and by January 2016, 15 refrigerators were placed in 13 cities across the country.³ Another one-fridge initiative was piloted in Plovdiv with partial success.⁴

Golden Walnut is an online platform (<http://www.zlatenoreh.net/>) and network of non-formal ESD organizations in Bulgaria. The network offers educational services in the field of sustainable development through informal methods and has a Golden Walnut quality label. The network is open to non-profit organizations, businesses, teachers, parents, learners, local communities, media or state institutions (museums, national parks), and others.

Another initiative is the city tour on critical consumption. The method was developed in several EU countries: Germany (ConsUmdenken), Italy, Czech Republic, and Bulgaria

³ NOVA TV. 2016. The refrigerator with free meals in Varna is working again [in Bulgarian], URL: <https://goo.gl/M8joQU> (accessed 27, December 2017)

⁴ Plovdiv24.com. 2015. Refrigerator with food for the poor in the centre of Plovdiv [in Bulgarian], URL: <https://www.plovdiv24.bg/novini/plovdiv/Postaviha-hladilnik-s-hrana-za-bedni-v-centura-na-Plovdiv-595184> (accessed 27, December 2017)

(КонсУмувай! by Ecocentric Foundation). The method covers a short list of topics related to responsible and critical consumption. During the last several years, the method was implemented and redeveloped for the Bulgarian public, where over 500 pupils took part, giving ideas and feedback. Later, using all this input, a 200-page handbook was created by the volunteers, which contains different topics, covering food waste (e.g., globalisation, misleading marketing, coffee, cocoa, meat, shoes, clothes, sharing economy, DIY). Food waste is covered too—on 14 pages with 3 games. All topics are equipped with informational content, several games, several informal educational methods, a reflection template, feedback template, and tips and tricks to pack all this for a successful critical consumption city tour. Topics are structured looking through the economy and environment prisms in a global context. The method invites coverage of social justice, climate justice, values, empowerment, and gives an alternative to the status quo. The method has been adjusted (and later piloted) for use within classrooms in Bulgaria (<http://konsumuvai.org>).

One more example is the sustainable cooking class. The organization ‘For the Earth’ has carried out several cooking classes for sustainability. The 2017 winter cooking class was on sustainable fish. The method is analysing the life cycle of the products, overconsumption, waste, etc., making connections between climate and societal injustice, agriculture, and the chemical industry. The format includes a group of participants, several people from the team, and a professional chef.

There are also online resources for global education in Bulgaria. The platform for GCE (<http://devedu.eu/>) is for civic education for schools, teachers, and children, providing teaching methods, games, and handbooks on various topics, including sustainable development. The Makutano project site (<http://www.makutanojunction.org/>) presents a multi-media approach to effective development education. This is 2-year project financed by the EuropeAid Program focuses on raising students’ and teachers’ awareness of development issues through multimedia learning activities based around a highly popular, award-winning Kenyan television educational drama series—Makutano Junction. A virtual help centre (<http://priobshti.se/>) for inclusive education offers educational resources (e.g., research, books, good practices, online courses). UNICEF in Bulgaria (<https://www.unicef.bg>) provides information on campaigns and libraries in a wide range of topics, including sustainable development.

3.2.

Croatia

National policies

Croatia does not have a specific national plan or regulations for food waste so far. Food waste is addressed to some extent in the sustainable development strategy (2009) intended to encourage consumers in sustainable consumption and proper waste and food waste management. The National Waste Management Plan 2017-2022 (2017) addresses food waste in detail. The plan defines measures for reducing food waste (e.g., information and educational campaigns on prevention of food waste cumulating for all stakeholders; actions for improving the collecting and processing of food waste data; establishment of a food donation system). The plan also emphasizes the prevention of waste generation, reuse, recycling, and composting. The overall objective is to increase the recycling rate and to encourage citizens to compost waste in gardens and homes.

The Ministry of Agriculture of the Republic of Croatia is preparing a Plan for Prevention and Reduction of Food Waste in the Republic of Croatia for the period 2018-2022. The plan intends to identify the key measures to prevent the development of food waste along the entire food chain, contributing to the achievement of the EU and UN Sustainable Development Agenda 2030. Specifically, for the responsible production and consumption target (12.3) plan aims to halve food waste at retail and consumer levels and reduce food loss along the entire chain of production and supply.

Better food management and food donation in Croatia are being incentivised by tax exclusion. Food donations are exempt from any value-added tax; meaning neither the companies donating food nor the recipients of these donations have to pay a VAT.

Status of waste management and amounts of food waste

Approximately 3.7 million tonnes of waste are generated annually in Croatia. Just in terms of municipal waste alone, each person in Croatia currently produces an average of 402 kg of waste; i.e., 31% of total waste is generated in households. If analysing the content of an average Croatian citizen's waste bin, one would find 30.9% of kitchen waste, 23.2% of paper and cardboard, 22.9% of plastic, 3.7% of textiles, and the same amount of glass (HAOP, 2016).

The biggest problem is the kitchen or organic waste, sorting of which is not yet ensured in most cities (except in Knin, Križevci, Virovitica, Čakovec, Đakovo, and Zadar).

By joining the European Union, the Republic of Croatia has taken certain restrictions on waste disposal. By 2030, at least 70% of municipal waste should be recycled or prepared for reuse. However, the reuse rate of municipal waste in Croatia was only 21% in 2016. 77% of the municipal waste generated was disposed in landfills. Within this waste, 831,977 tonnes of biodegradable waste were also disposed of in landfills. Hence, the goal for biodegradable waste disposal in landfills (378,088 t) according to the Law on Sustainable Waste Management (OG 94/13, 73/17) has not been achieved (HAOP, 2016).

Approximately 380,000 tonnes of safe food are being thrown annually in Croatia (HAOP, 2014). More than 53% of the dumped food comes from households. So far, there is a lack of research related to the issue of food waste in Croatia. In accordance with the only analysis in the Republic of Croatia (HAOP, 2014), only two types of waste are specified as food waste: biodegradable kitchen waste and edible oils and fats. At the production stage, the amount of biowaste that could contain food waste in 2014 amounted to 147,847 tonnes, of which approximately 75% was recovered (HAOP, 2014). Another source⁵ reports (Borzan, 2017) about 400,000 tonnes of food per year are wasted in Croatia, including 135 tonnes of bread per day.



Consumers attitudes and education

The Action Plan for ESD (MZOIP, 2011) was adopted for the promotion of sustainable development in formal and non-formal education. The plan derives from a participatory multi-stakeholder process involving representatives of civil society organizations. The action plan shows a lack of non-formal programs in environmental and health protection, sustainable development, as well as in sustainable production and consumption sections. According to the action plan, the issue of sustainable development is insufficiently represented in the media, although there are specialized television shows on national television (HRT) such as Consumer Code, E as Earth, Eco Zone, and on a local television station (JABUKA TV) such as Censorship, Human and Health Culture, etc., intended to inform consumers and address current issues of consumer rights, environmental protection, waste generation, and food waste problems in HR.

According to the survey of Flash Eurobarometer (2015), only 49% of Croatians (in comparison to Greece 71% or Denmark 68%) always check date marking on food labels, and only 36% of the polled understand the meaning of 'best before' labelling on food products.

⁵ See more URL : <http://www.biljanaborzan.eu/hr/novosti-detajli/borzan-i-mreza-hrane-predstavili-inicijativu-najdonator-dodjelu-priznanja-istaknutim-donatorima-hrane-380>

As an indicative result, 6% of polled Croatians never check the labels. This indicates a very low awareness level (one of the lowest among all countries) (Flash Eurobarometer 425, 2015). According to Croatians, responsibility for food waste lies with the consumers (65%) and shops and retailers (56%). Better shopping and meal planning (60%) and use of leftovers (51%) are most often indicated means for food waste reduction (Flash Eurobarometer, 2015). Some more recent data is expected in 2018, as the first research on food waste generation and consumer awareness was launched by the University of Zagreb.

Global approach and food waste-related initiatives

The problem of food waste in Croatia is present but insufficiently addressed in public. There are some individual projects and initiatives carried out mainly by non-profit organizations (mostly related to environmental protection) and some individual initiatives (small entrepreneurs), but their activities are mainly at the local level. There is a lack of initiatives and campaigns at the national level.

‘Zero Waste Adriatic Network for Events and Festivals’ is an Adriatic IPA project to create a ‘zero waste’ online network of events and festivals with a reduced impact on the environment (<http://www.zerowasteevents.eu/>). The primary goal of the project is to have no waste produced at festivals and events.

‘EAThink2015—eat local, think global’ is a project for primary and secondary schools of 12 European and 2 African countries funded by the European Union with the objective of enhancing European students’ and teachers’ critical understanding and active engagement in global development challenges, with a specific focus on food security and sustainable food systems and smallholder farming (<http://eathink2015.org/en/>). Croatia (Association Žmergo) is one of the countries involved in the implementation of the project.

‘Žabac’ food outlet is another initiative in food waste reduction (<http://zabacfoodoutlet.hr/>). Prompted by the fact that approximately 400,000 tonnes of food did not reach the final buyer in Croatia, two Zagreb entrepreneurs launched the first Croatian ‘outlet’ food store in which products can be purchased at favourable prices in case they are factory surplus or are defective in packaging or reach their expiration date soon but follow all health claims. ‘Žabac’ started their work in early August 2017.

3.3.

Estonia

National policies

Estonia's sustainability principles have been determined by the sustainable development strategy 'Sustainable Estonia 21 (SE21)' (2005). Currently, those principles are defined by the renewed Sustainable Development Act (1995, 2017). The act includes provisions on environmental norms regarding waste and substituting non-renewable natural resources with waste but does not focus on food waste as such.

The organisation of waste management and requirements for preventing waste generation are provided by an updated Waste Act (2004, 2018) which only notes food waste in the context of biowaste. The Estonian waste management plan (2014) states Estonia's goal in the area of waste is to recycle as much as possible the materials left over from consumption, i.e., waste. The plan sets that by the year 2020 the share of recycled biowaste should reach to 13% of the domestic waste (baseline in 2014 5%) and the share of the biowaste disposed to landfills should decrease to 20% (baseline in 2014 57%). According to the Ministry of Environment of Estonia,⁶ the amounts of waste being landfilled are decreasing thanks to the obligation to collect waste separately and the limits to landfilling biowaste; the gradual increase of the pollution tax. Implementation of recovery methods such as mechanical-biological treatment, waste fuel production, mass incineration, and biofuel production have also had a positive effect on the amounts of waste being landfilled. The waste management plan also declares awareness-raising measures have not been sufficient till now in Estonia and new information campaigns are necessary for awareness-raising and supporting sustainable behaviour.

Hence, in the last few years, the subject of food waste has received more attention. The state has commissioned studies to estimate the amount of food waste in different sectors. A food waste roundtable is comprised of representatives of different ministries to find solutions geared to the prevention of food waste. In the non-governmental sector, the European Aid Fund and the Estonian Food Bank organizing food aid distribution in Estonia and the local authorities cooperate to reduce hunger and prevent food waste.

⁶ Ministry of Environment of Estonia. URL: <http://www.envir.ee/en/waste>

ESD is incorporated in the Estonian National Curriculum for Basic Schools and Upper-Secondary Schools.⁷ The Ministry of Foreign Affairs⁸ also supports activities of global education and relies on the definition by the European Global Education Forum. Activities such as annual World Day in Tallinn, presentations of fair trade goods, seminars, and training on global education and development cooperation issues have been supported by the ministry throughout the years.

Food waste generation and consumers attitudes and behaviour

The first detailed study (Moora et al., 2015) examining the problem of food waste in Estonia estimated, every year, households throw away €63 million worth of food; (around €120 per household per year, per household with children up to €200 per year). Waste from ready-to-eat foodstuffs gets thrown away most often, mainly because it has become spoilt. More food waste is produced in households with 1-2 children and households of young people living alone. An average household generated 2.5 kg of food waste per week (ca 1 kg per person), which makes 130.4 kg per year (54.1 kg per person). Avoidable food waste constitutes 36% of the total food waste generation. Therefore, the amount of avoidable food waste generated by an average household was 0.9 kg per week and 46.9 kg per year (0.4 kg and 16.8 kg per person respectively). Collectively, Estonian households generate approximately 71,000 and 25,000 tonnes of food waste and food loss (avoidable waste) per year respectively (Moora et al., 2015).

Hence, in the case of Estonia, the challenge is to increase awareness on a larger scale regarding the SDGs. According to Flash Eurobarometer (2015), Estonians estimate of the consumer's role and food service sector's role in food waste is lower than EU citizens on average (respectively 62% and 41% of Estonians and 76% and 62% of the EU citizens interviewed). The answers also show the low awareness on measures for preventing food waste. For example, only 30% of Estonians interviewed indicated using up leftover would help to waste less food at home and only 18% that better and more precise information on food labels would help to waste less food.

Global approach and food waste-related initiatives

There are several initiatives and campaigns on food waste in Estonia as well as networks of global education. The Sustainable Development Forum took place in Estonia in autumn 2016 introducing the global SDGs and more specifically focused on matters related to food waste. Topics included food and climate change, food production and consumption, the carbon footprint of food waste, activities of Estonian food businesses, and organizations contributing to climate protection and climate change adaptation.

⁷ Ministry of Education and Research of Estonia. URL: <https://www.hm.ee/en/news/ten-years-education-sustainable-development-estonia>

⁸ Ministry of Foreign Affairs URL: <http://vm.ee/et/teavitamine-ja-maailmaharidus>

The campaign ‘Consume Food Wisely’ [in Estonian ‘Tarbi toitu targalt’] started in 2016 (<http://tarbitoitutargalt.ee/>). The campaign seeks to raise awareness of the food waste problem while offering tips to help consumers make smarter choices. There is a webpage and a handbook⁹ for preventing food waste for households, for grocery stores and for catering institutions.

The Roundtable of Development Cooperation¹⁰ was formed in Estonia with informing the public about development topics and global education as one of its primary activities. The roundtable is an independent, not-for-profit coalition of non-governmental organizations that work in the field of development cooperation or have expressed interest towards that topic.

The NGO Mondo Global Education Centre in Estonia specialized in global and development education programs. Outside of Estonia, NGO Mondo mainly operates on projects of development cooperation and humanitarian aid. In Estonia, the main areas of work include global education, responsible consumerism, and promotion. This NGO has had projects such as ‘Raising global citizens—developing the basic values and competencies of the national curriculum through global education’ (2012) and ‘Global Dimension in Social Sciences Subjects in Formal Education’ (2015). In 2016, the centre issued global education learning materials for schools and kindergartens and organized global education training courses for teachers. All learning materials prepared by Mondo are available at <http://www.maailmakool.ee/>.



⁹ Handbook on preventing food waste in households [in Estonian] Toidujäätmete ja toidukao vältimine ja vähendamine kodumajapidamises. URL: https://www.envir.ee/sites/default/files/1_juhendmaterjal_kodumajapidamiste.pdf

¹⁰ Roundtable of Development Cooperation. URL: <http://www.terveilm.ee/leht/english/>

3.4.

Latvia

National policies

The sustainable development strategy of Latvia 'Latvia 2030' (2010) is a long-term planning document setting national priorities. The priority of Sustainable Management of Natural Values and Services includes a specific target (No. 249) to increase sustainable lifestyles and sustainable consumption for the inhabitants of Latvia. Another target (No. 262) intends to support environmental education programmes facilitating the change of 'everyday practices, as well as to promote participation in activities of sustainable lifestyle'. The ecological footprint of households is foreseen as a measure for that (target No. 263).

The National Waste Management Plan for 2013-2020 (2013) includes a reduction in the amount of biodegradable waste that goes to landfills. The EC Directive 1999/31/EC requires Latvia to reduce the amount of total waste landfilled to 35% from the 1995 level. The plan also foresees reducing the amount of waste generated, then increasing reuse and recycling. The tools proposed to reduce amounts of biowaste (food waste) include raising the natural resources tax, improving food waste separation and composting availability of the households. One of the main challenges indicated by the strategy includes a general lack of understanding about proper waste management among the members of society.

Amounts of food waste and consumer perceptions and behaviour

Currently, waste management in Latvia is in a rather poor situation, with approximately 73% of municipal waste still going to landfill (LEGMC, 2016). According to the EC directive 1991/31/EC, the recycled amount of waste must reach at least 50% by 2020.

In addition, there is no clear set of data showing the precise amount of food wasted throughout supply chains or by households and the existing monitoring initiatives are inefficient and unreliable (Waste Management Association of Latvia, 2016). Research carried out in 2011 summarized the contents of four Latvian solid-part waste landfills and concluded approximately 50% of the waste brought to those landfills was biologically degradable, of which 30-35% was food waste (Virisma, 2011).

More recent research, in 2016, revealed 39% of the total waste in cities on average was categorized as biologically degradable, namely of an organic origin (Geo Consultants, 2016). Aside from food waste, the latter also includes fallen autumn leaves, garden waste, and other types of organic waste. It was also revealed that farmsteads have considerably less proportion of organic waste going into public waste management than apartment houses with multiple residents or even private houses in cities (Geo Consultants, 2016). According to the National Waste Management Plan (2013) in 2020 461,228 tonnes of biodegradable waste will be generated in Latvia.

In 2013, on average, households in Latvia wasted 9.4% of the edible food, which is estimated to be worth 475.56 EUR per year (Tokareva, 2017). Another 13% of the purchased/grown food was usually considered as the inedible food fraction and therefore, was discarded, the estimated value of which is 674.28 EUR per year. Households in rural areas wasted considerably less food than households in urban environments. In addition, households with higher average income generated more food waste. Moreover, households with minors wasted more food than households with adults only since children have less predictable eating habits. Research also suggests the usage of shopping lists reduced food waste by up to 5%. Also, meal planning has a significant role. Households which planned their meal more than a week ahead wasted only 6% of food in comparison to the households that did not plan their meal at all and wasted 13% of their food (Tokareva, 2017).

According to a Flash Eurobarometer survey (2015), 61% of Latvians recognize households and consumers have the most significant impact on food waste amounts. 63% of respondents say better shopping and meal planning could reduce their food waste. Also, 51% indicate using leftovers instead of throwing them out would reduce their food waste amounts. 45% of respondents point out better and clearer information on the meaning of 'best before' and 'use by' dates indicated on food labels would help. Only 51% know the true meaning of the 'best by' date, but 60% are ready to use the product after its 'best by' date if the packaging is not damaged and the food looks all right.

Global education and food waste-related projects

Global education in Latvia has not yet been fully integrated into formal education. However, global education ideas and solutions can be found in both the Latvian education policy documents and in schools in practice. Global education as thematic units are implemented in the basic education subject standards, and education programmes and Latvian teachers implement global education content in their professional work (Global schools, 2016). Significant global education work has been done by local NGOs, schools, and municipalities.

Project 'Global Dimension in Social Sciences Subjects in Formal Education' in which 21 schools

participated, increased the capacity of global education integration by educational seminars, methodologies for teachers and other activities (<http://www.globalaizglitiba.lv/global-dimension/>). Projects such as ‘Global Schools’ (<http://www.globalschools.education/>) which took place in Latvia and 9 other EU countries, also the Global Education Week organised by the Latvian Platform for Development Cooperation (LAPAS)¹¹, and several other global education projects have contributed to the integration of the global education approach.

The NGO Foundation for Environmental Education (FEE) and their eco-school programme is recognized as a strong driver for global education and topics such as sustainable consumption, climate change, waste reduction, sustainable energy and other environmental issues. The FEE project ‘Eat Responsibly’ (<https://www.eatresponsibly.eu/lv/>), incorporating 96 primary, secondary schools, as well as high schools and nursery schools, focuses on food waste. Every eco-school has its ‘Eco Council’ consisting of active students, teachers, and other staff members. Every school evaluated their food consumption. Different categories of food waste in school canteens were weighed and analysed by the Eco Council of the school. Action plans to reduce waste were developed. Some schools reduced their food waste by up to 50%. They also asked parents to fill in questionnaires on food consumption and food waste in households.

Another activity by FEE Latvia is Action Days, where educational institutions organize different events and campaigns on global and environmental topics not only for school children and the staff but also for the local communities. These include workshops, flash mobs, informative events, and meetings with politicians and others. From 2014 to the end of 2017, more than 620 local events and activities have been organized. For example, in 2016 a kindergarten in Rezekne measured their food waste for a week, analysed the reasons, and found ways to reduce it. In 2017, the main topics were climate change, the loss of biodiversity, the increasing amounts of waste and the excess consumption with an emphasis on food waste; approximately 162 events were organized.

Project ‘Reduce Food Waste in Your School’ by the Centre for Eco-design Competency compiled the eco-school experience, relevant solutions in other countries, and developed guidelines for educational institutions on how to reduce their food waste and food packaging waste, starting with reduction and recycling. The project also developed guidelines for schools and municipalities on reducing food waste through green procurement.¹²

Homo ecos: – a Latvian environmental organization – has implemented a few food waste campaigns addressing both local actions and impact as well as global interlinkages. In 2013, homo ecos: organized a national campaign¹³ for the public targeted at the reduction of food

¹¹ Latvian Platform for Development Cooperation (LAPAS). URL: <https://lapas.lv/en>

¹² Project “Reduce Food Waste in Your school”. URL: <http://ekodizains.org/projekti/samazini-partikas-atkritumus-sava-skola/>

¹³ See homo ecos projects. URL: <http://www.homoecos.lv/eng/>

waste as well as to information and education of consumers on the impacts of their everyday choices. To inspire the discussions on food waste, several celebrities accepted the challenge to both track and reduce their food waste during the period of four weeks, meanwhile documenting in social networks their experience and challenges encountered. In 2015, homo ecos: started another campaign¹³ linking the food waste with topics of globalization, fair trade, and social justice. The campaign included a travelling documentary 'The Economics of Happiness' the viewing of which was accompanied by discussion and debate, as well as a travelling photo exhibition displaying images of the impact of the food supply chain globalization on farmers in developing countries. The campaign was targeted at educational institutions as well as farmers, rural communities, and urban residents.

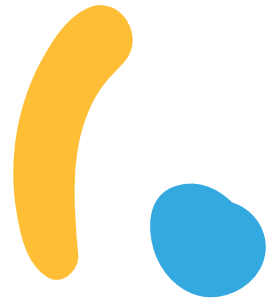
Another campaign called 'Dalīsim brālīgi' ('Let's share equally') is homo ecos: initiative to educate the graduates of the culinary education school and their teachers on the importance of reducing food waste, as well as inspire them and equip them with the necessary skills to cook healthy, tasty, local, seasonal, and mostly organic meals. During the project, students were both, informed on the global interdependency of food production with a lecture and a quiz as well as asked to track their food waste at home. At a later stage, they were encouraged to take local action and to develop new recipes, especially considering their regional authentic tastes and preferences.

'Mazāk ir vairāk' ('Less is more') is an educational campaign sponsored by the Foundation for Environmental Protection of Latvia that includes a film festival, cooking classes in the largest cities of Latvia, as well as cooking masterclasses, which introduce zero waste menus to the participating restaurants. The campaign is also planning to broadcast zero waste ideas and events on television and can be followed in social networks.

¹³ See homo ecos projects. URL: <http://www.homoecos.lv/eng/>

3.5.

Lithuania



National policies

Sustainable consumption policy is still in the development stage in Lithuania. Most of the existing political instruments usually address only business and governmental institutions; final users and consumers mainly have an indirect role. The national sustainable development strategy (NSSD, 2009) is limited to the promotion of eco-procurements on the national and individual level, exploring the attitudes of the consumers, consumption habits, and behaviour.

Despite that, the strategy covers the waste and awareness-raising issues rather well, though specifically food waste is not mentioned. Also, within specific tasks there is an objective by 2020 to reach that ‘the municipal biodegradable waste disposed of at landfills does not exceed 35% of the amount of municipal biodegradable waste in 2000’ as well as ‘to provide the public with information on waste management and to develop environmental education’ promoting ‘waste management culture of the residents and to raise public eco-consciousness’ (NSSD, 2009, p. 41). The renewed strategy also includes a priority on ‘global poverty and sustainable development challenges’ reflecting Lithuania’s obligations for global peace as well as for reduction of disparities between developed and developing states. However, this is limited mostly to the financial aid measures.

Both NSSD (2009) and national environmental protection strategy (NEPS, 2015) highlight public education about the sorting, recycling of waste – focusing on promoting the composting of biodegradable waste at the place of generation; public education, provision of knowledge about the importance of biodegradable waste sorting and composting is highlighted in the latter. The law on waste management (2002) also sees public information as a tool for municipal waste management. However, global interlinkages are somewhat weakly addressed. Some similar conclusions are drawn by reviewing existing formal and informal education in Lithuania (Augutienė, Baltrėnienė, 2014). Authors indicate global education is an integral part of national development cooperation policy. However, the focus is only on information of the public on development cooperation objectives and directions, as well as promoting support for the policy rather than on a systematic approach.

In general, waste management policy in Lithuania follows EU legislation and is based on waste management hierarchy (Law on waste management, 2002). However, the focus is on industry and avoiding landfilling rather than on avoidances of such waste, especially in the households. The national environmental protection strategy (NEPS, 2015) objectives are to reduce the amount of biodegradable waste destined for landfill from 505 thousand tonnes in 2011 to 268.1 thousand tonnes in 2020, and by 2030, the disposal of biodegradable waste in landfills would be discontinued. In the National Waste Management Plan (2014) food (or kitchen) waste is already identified as a part of the biological waste, but the focus is mostly on generated waste management, not avoidance.



Food waste generation and consumer attitudes

In total, municipal waste accounts for about 1.4 million tonnes each year in Lithuania, about 50% being biodegradable waste (NEPS, 2015). 36% of such waste is landfilled, and some 9.4% is recycled (EEA, 2016). There is no detailed data on food waste so far in the statistical databases of the EU for Lithuania. According to the Ministry of Environment of Lithuania,¹⁴ over a year, more than 100 thousand tonnes of food waste is generated. In 2014, the number amounted to 102.7 thousand tonnes, much of it (82.8 thousand tonnes) ending in landfills. According to those numbers per capita, food waste generation reaches some 35 kg. Some earlier estimations place this number higher—more than 50 kg, dominated by grain, milk products, and potatoes (Dagiliūtė, 2011). Recent research on the Klaipėda regional waste management centre shows 14% of municipal waste collected is food waste (KRAC, 2017). Applied to the national level, this number amounts to approximately 62.7 kg /cap of food waste in the household sector compared to the amount of supplied (consumed) food - 983 kg (Statistics Lithuania, 2017).

In 2016, the Lithuanian Science Council initiated a study ‘Analysis of the possibilities of reducing waste and redistributing it to deprived people’. In addition, in 2017, on the initiative of the Minister of the Environment, the Coordinating Working Group on Measures for the Prevention and Management of Food Waste started working. This group analyses the current situation in the field of food waste prevention and management and reviews the legal regulation in the area. Possibly, more reliable data and policy measures regarding food waste will be available.

69% of Lithuanians declare separating the majority of their waste (Special Eurobarometer, 2017). At least occasionally kitchen waste is being separated by 50% of Lithuanians (Flash Eurobarometer, 2014). Despite that, most of Lithuanians’ responsibility for food waste reduction is on other supply chain actors, not consumers (Flash Eurobarometer, 2015). Better

¹⁴ Ministry of Environment of the Republic of Lithuania. Citizens are to sort food waste [in Lithuanian]
URL: http://www.am.lt/VI/article.php3?article_id=17772 (accessed 15, November 2017)

shopping and meal planning are indicated most often as a measure to prevent food waste (42%, still much lower than the EU 28). Some 14% do not know what could help to reduce food waste at home. Only 24% know what the labelling ‘best before’ means, but knowledge of ‘use by’ is much better compared to EU 28 (Flash Eurobarometer, 2015). A study by Musteikyte (2016) shows respondents throw away some food up to 2-3 times per week. The most common cause of food wastage at home is passed expiry date for the food (44%).

The proportion of respondents who state helping people in developing countries is essential has increased by 13% since 2015 (currently 87%), but just over one-third of respondents in Lithuania think as individuals they can play a role in tackling poverty in developing countries (36%) (Special Eurobarometer, 2017a). The proportion of respondents in Lithuania who say they have heard of the SDGs (27%) is much lower than the EU average of 41% (Special Eurobarometer, 2017a). Hence, there is room for awareness-raising on both topics.

Global education and food waste-related projects in Lithuania

Most of the initiatives regarding raising awareness are projects based and focused mainly on awareness rising either on food waste reduction or development cooperation and sustainability. Only some initiatives or separate events hold both aspects. Some initiatives are very short-term and based on single events, such as discussions or conferences.

The Lithuanian Food Bank, in cooperation with the ‘Schweizer Tafel’, implemented projects regarding food waste reduction such as ‘Stop Food Waste in Lithuania!’ and continues this work mainly with the retail sector.

The Active Youth Association also had some food waste-related initiatives for youth such as ‘Appetite for Waste’¹⁵: visit to the food bank, making a video.

The Lithuanian National Non-Governmental Development Cooperation Organisations’ Platform runs activities regarding sustainability, development cooperation, volunteering, for e.g. ‘Youth awareness-raising about United Nations Sustainable Development Goals till 2030: The Youth of SDG 30’. Activities involve 1) theoretical (lectures/discussions about SDGs, DC), 2) practical activities (essay-contest, impersonating and performing selected SDGs issues at Forum theatre, development of cooperation strategies/plans), and 3) a one-day event in October for World Development Information Day and awareness-raising on SDGs.

The Lithuanian Development Education and Cooperation Network of Non-Governmental Institutions (LITDEA) runs or has run small-scale projects such as 2017 ‘Raising awareness on

¹⁵ See more on the initiative URL: <http://activeyouth.lt/2016/01/10/lets-prevent-food-waste-together/?lang=en>

global development issues in Lithuania' (2017) or EuropeAid projects such as TEACH MDGs (2010-2013).

The Lithuanian Children and Youth Centre each year organizes Global Education Week and runs projects on global education and sustainable development such as 'Jump into Sustainable Lifestyle', 'Sustainable School' and 'Youth Education on SDGs'.¹⁶

The NGO, Lithuanian Consumer Institute (<http://www.vartotojai.lt/>), carried out a national project on sustainable food consumption, also covering food consumption and related environmental impacts through all life cycle stages of the products, i.e., also food waste. The project ran a variety of activities starting from drawing competition for the school children and exhibitions, to the discussions, articles in the mass media, radio broadcasts, and an interactive map of eco-farms.

¹⁶ See more on the projects URL: https://lvjc.lt/about-lithuanian-youth-center/#LYC_main_projects

3.6.

Romania

National policies

The National Strategy for Sustainable Development of Romania ‘Horizons 2013-2020-2030’ focuses on sustainable development in Romania in general. Regarding waste, the first national waste management strategy (NWMS, 2004) followed the European legislation in the field of waste management. In 2004, the National Waste Management Plan was also developed to take the necessary actions to reach the objectives of the strategy (NWMP, 2004). In addition, regional waste management plans for the eight Romanian regions were issued in 2006.

Presently, there are two documents regarding waste management in Romania: The National Waste Management Strategy 2014-2020 (NWMS, 2013) and the National Waste Management Plan (NWMP, 2014). These are the primary documents for the implementation of the EU waste management policy and foresee a national communication campaign to encourage a behaviour that prevents food waste, providing information on specific food waste prevention techniques, labelling schemes, etc. The interinstitutional and inter-organizational working group is also established with the reduction of food waste at the national level with four thematic groups as a target. Specifically, a group on education and awareness prepared a thematic plan for research on food waste for the period 2015-2018. 2014 has been declared the year of food waste reduction.

In 2016, specific legislation on food waste reduction was adopted by the Romanian Parliament (Law 271, 17 November 2016). However, the implementation of this law was suspended by Emergency Ordinance 45, on 30 June 2017. The measures to be taken according to the proposed legislation are in line with the hierarchy of prevention of the generation of food waste, referring to the responsibility of the agro-food chain, measures for the low-priced sale of products near the expiry date, measures for the transfer of food through donation or sponsorship, etc. To foster discussion on measures provided by the Ministry of Agriculture and Rural Development in partnership with the NGO InfoCons Association also organize a working group meeting every month to discuss and make proposals for a national action plan. This includes suggestions for food waste reduction, funding programs, setting up interinstitutional and organizational cooperation and

partnerships, elaboration of a national strategy for reduction and management of food waste, new national legislation for reducing food waste and management of alimentary waste, education and information of consumers on these issues, establishment of an online communication platform, and connection with other initiatives and actions.

Food waste generation, consumer attitudes, and behaviour

Municipal waste generation per capita amounts to some 249 kg in Romania (Eurostat data). From the 5 kilos of waste generated per week, half (2.5 kg / week) is a biodegradable waste (Panagoreţ, 2016). However, most often only paper/cardboard/beverage cartons (50%) and plastic bottles or others plastic materials (60%) are sorted. 22% of Romanian consumers do not sort any waste (Flash Eurobarometer, 2014).

A survey (InfoCons, 2013) on food waste indicated 39% of Romanians spend between 500- 900 Ron (approximately 120-200 EUR) every month on food. A survey of Ciobanu et al. (2016) indicated 33% of respondents spend between 30-40% of monthly income for food, 29% between 20-30%, 14% spending 50% of income, 8% spending over 60% of income. About half of the Romanian consumers said most of the purchased food is used (76-100%). However, 53% of people throw away food and the amount wasted reaches approximately 10% of the food bought in a month (InfoCons, 2013). Most often wasted in 2013 was cooked food (25%), vegetables (19%), and fruits (16%) (InfoCons, 2013). Some similar groups were identified in 2016, too: cooked food (27%), fruits (22%), vegetables (21%), bread/bakery products, and milk and dairy products (14% for both categories). Meat products appear to be the least sourced in the waste (1%) (Ciobanu et al. (2016). The most important cause for which food is thrown out is a poor estimation of the amount of food that can be consumed. As a possible way to prevent food waste, 19% of Romanians indicated an appropriate assessment of food needs; 14% - making purchases according to a food list; 11% - reuse leftovers from meal preparation. 92% of consumers are interested in reducing food waste from their household (InfoCons, 2013).

According the Romanians, the main actors that have a role in preventing food waste are consumers (67%); shops and retailers (45%), the food services sector (37%), food manufacturers (37%), public authorities (29%), and farmers (26%) (Flash Eurobarometer, 2015). The ways to prevent food waste in households included better shopping and meal planning by household (66%); using up leftovers instead of throwing them away (36%); using a freezer to preserve food longer (46%); availability of smaller portion sizes in shops (44%); and better and clearer information on the meaning of 'best before' (53%).

Projects and initiatives on global educations and food waste

To increase public awareness on the topic, several projects and initiatives have been carried out. In 2013, in partnership with the Ministry of Agriculture and Rural Development, the InfoCons Association launched the ‘Stop Food Waste!’¹⁷ campaign. In this campaign, flyers and posters with the campaign message were created and disseminated.

In 2014, NGO Junior Chamber International (JCI) Romania (<http://jcicluj.ro/>) started a national project about food waste called ‘Food Waste Combat’. The project was implemented only in Cluj city with the motto ‘Food in plates, not in garbage’.

There are also some European projects related to the topic. Green Association, The Public Resources Centre, and Food Waste Switzerland run the project ‘Food Waste Romania’ to contribute to raising awareness, transparency, visibility, collaboration, and public participation concerning reducing food waste in Romania (<http://foodwaste.ro/>). The main activities of the project include: identifying sources and causes of food waste as well as the methods of reduction through a nationwide study on the distribution chain. The project reached over 1000,000 people by informing the general public about the problem of food waste in an educational caravan in seven cities in the country (Bucharest, Constanta, Iasi, Brasov, Cluj, Timisoara, and Craiova) by attending agro-food fairs, information campaigns in supermarkets, and a documentary on food waste in Romania and animated clips showing tips for reducing waste.

The European Project—We Eat Responsibly (<https://www.eatresponsibly.eu/en>) covering organizations from Bulgaria, Czech Republic, Croatia, Latvia, Malta, Poland, Romania, Slovakia, and Slovenia is intending to raise children and young people’s awareness of food consumption and related impacts. The target groups include teachers and pupils in kindergartens, middle schools, high schools, parents, and members of the local community. Each year, the project involves 50 schools from Romania¹⁸. The project was implemented in the form of a story in kindergartens and middle schools and in the form of movies in the high schools. Correspondingly, this resulted in posters with illustrations or a card that include the drawings and the story created by the children; in middle schools – a journal of the eco committee; in high schools—a movie. Publications (Menus for Change and Stories for Students) also included 7 steps towards responsible food consumption (teacher’s guide), banners, posters and a Facebook page were launched.

In line with the project-based activities, there are some single-case initiatives regarding food waste in Romania. An online petition was launched in Romania: ‘Stop food waste in Europe!’ #StopFoodWaste—Good for Taste. Good for health. Good for the planet. A very famous chef

¹⁷ See more on the initiative. URL: <http://www.infocons.ro/ro/i-stop-risipei-de-alimente-alege-sanatos-traieste-sanatos-MTUwMDUtMw.html>

¹⁸ See more URL: <http://www.ccdg.ro/programe/mananca-responsabil/despre-proiect-er>

(Mr. Adi Hadean) of Romania shares some information about food waste and some advice on his website¹⁹. Also, there is an initiative by the Romanian Foodbank regarding food waste and poverty reduction. The Romanian association SOMARO promotes the idea of social supermarkets, including a donation of food.

- **Policies regarding the food waste in partner countries are being shaped in line with the EU circular economy and waste management policy.**
- **Accuracy and availability of data on food waste are quite different; lack of trusted comparable data sources and research is a common feature.**
- **Countries' experiences are rather different in the global education approach, ranging from only on some specific topics on food waste to a fully employed global perspective in international projects.**
- **The gap in knowledge, attitudes, and poor food management must be addressed.**

¹⁹ See more URL: <https://www.adihadean.ro/2016/01/food-waste-romania/>

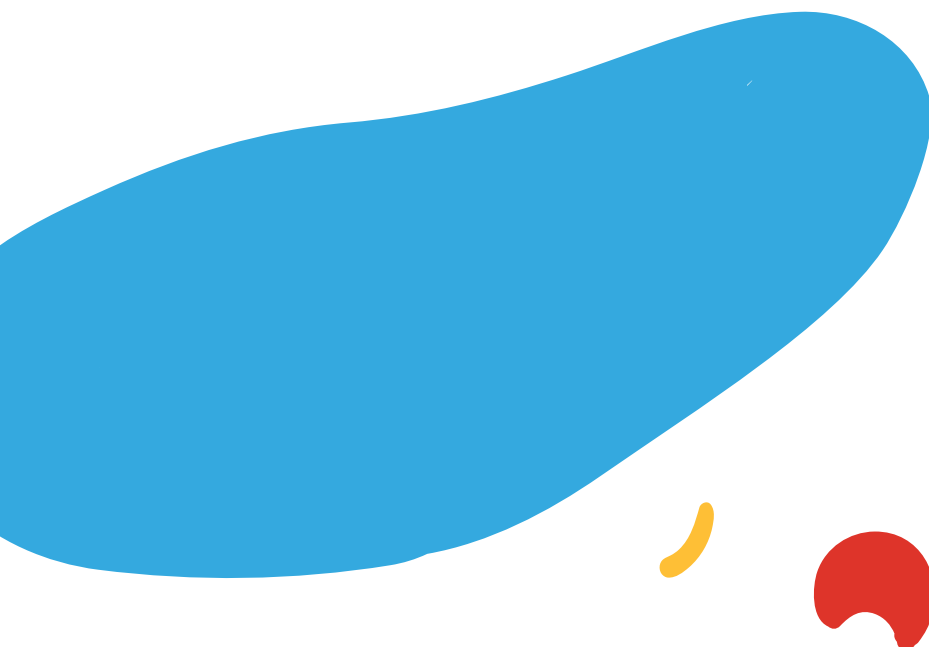
4.

Awareness-raising and food waste reduction initiatives in non-partner European countries



This chapter presents a review of the extant, mostly non-formal experiences in non-partner countries. The review includes Austria, Belgium, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, Netherlands, Portugal, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom. Experiences on awareness-raising on food waste reduction integrating a global approach vary significantly in the countries reviewed. Some countries share the same projects (e.g., REFRESH, We Eat Responsibly, STREFOWA), some have valuable national initiatives regarding food waste reduction (e.g., STOP WASTING FOOD, Love Food Hate Waste). There are some activities under global initiatives such as ‘Think.Eat.Save’. Some projects and initiatives take into account the global approach (We Eat Responsibly), some tools focus only on food waste as such (e.g., apps, tips). Activities carried out vary from websites, tips, and videos to actions in food sharing, different apps, cooking labs, videos, tips, and competition. Target groups approached include the whole society: children, school children, students, the general public, in some cases catering services, charity organizations, also local governments, city councils, and policymakers.

Some initiatives of different countries are presented in more detail in the next sections.



4.1.

Denmark

National policies

Denmark has achieved a national reduction in food waste of 25% within the last five years. There is now a national movement against food waste, a food waste restaurant, a food waste supermarket, a government Partnership against Food Waste and significant focus on food waste in the media. The country has more initiatives against food waste in Europe than any other state—from awareness campaigns and partnerships to government subsidies for food waste projects. Most of the action started with the activities of the ‘Stop Wasting Food’ movement.

The ‘Stop Wasting food’ movement carries different campaigns for different players in the food supply-consumption chain. Most of the Danish retail chains (e.g., REMA 1000, Coop Denmark, KIWI, LIDL) have collaborations with Stop Wasting Food in food waste prevention and reduction initiatives. The movement inspired Danish supermarket Rema 1000 to replace buy one get one free and other quantity-based discounts with general discounts in all its stores. More than 500 volunteers in more than 200 projects, activities, and campaigns were involved. Also, Stop Wasting Food has generated over 7,000 Danish and international media coverage spots bringing food waste massively into the media agenda. The movement acts as a partner to multiple international networks and organisations: international Food Loss & Waste Protocol, European Joint Declaration Against Food Waste, United Nations SAVE FOOD initiative, FAO/UNEP Think.Eat.Save campaign, Partner of the EU FUSIONS project, a member of the European Commission’s EU Platform on Food Losses and Food Waste, and others (<http://stopwastingfoodmovement.org/>).

STOP MADspil is a platform (<http://www.stopspildafmad.dk/madspildital.html>) by the Stop Wasting Food campaign that provides both informative materials about food waste as well as concrete activities for teachers in high schools. Their activities are linked with school subjects—Danish language, social studies, mathematics, geography, biology, and health education. Students are asked to work as journalists, thus investigate, research, calculate, and find ways of reducing their food waste.

The organisation also pays attention to food waste in events. In 2014, Stop Wasting Food

partners and volunteers saved and distributed 27.5 tonnes of free good surplus food from the Roskilde Festival to the Danish charities. The initiative won an internationally-acknowledged festival award, the Green Operations Award.

The organisation also organises United Against Food Waste, which is an annual event focusing on food waste as a social problem. At the events, it is food manufacturers, retailers, restaurants, educational institutions, and organizations who come together to raise awareness of the problem. The entire value chain of food products was represented at the first event in 2013. 6000 visitors were fed with surplus food which would have otherwise been discarded. The remaining surplus food was collected for the homeless, and organic waste was collected for conversion into biogas (<http://www.unitedagainstfoodwaste.com/>).

WE FOOD is a supermarket which sells food that regular supermarkets can no longer sell due to overdue best before dates or damaged packaging. All its profit goes to charity which is fighting famine and food insecurity worldwide, especially famine in impoverished countries such as South Sudan, Ethiopia, and Bangladesh. WE FOOD, managed by DanChurchAid, promote active citizenship in developing countries through workshops, educational seminars and other development-related activities. Both We Food and restaurants that are preparing dinners from surplus food are educating their visitors on the DanChurchAid activities, so their consumers not only get to buy food that otherwise would go to waste but see the interconnections between their choices and global consequences (<https://www.danchurchaid.org/join-us/wefood>).

The YourLocal app is another approach that helps stores get rid of products that are close to their expiration date and provides consumers with the possibility of buying food at a fraction of the original price—food that would otherwise go to waste. The app has proven successful, as Danish supermarkets such as Føtex, Irma, and Brugsen, as well as greengrocers, restaurants, and the like, have joined the project in Copenhagen, Aarhus, and Aalborg (<https://yourlocal.org/en/>).



4.2.

The United Kingdom

Love Food Hate Waste 10 cities campaign intends to raise awareness of the need to reduce food waste and offers various educational ways to do so. They partnered with retailers, local authorities, and community groups to deliver various workshops on food saving tips for households, employees in the workplace, cooks, local communities, and others. On their website, they also offer recipes, portioning, and planning tips and many more materials (<https://www.lovefoodhatewaste.com/>).

The Midlothian Council has developed a toolkit for reducing general waste, as well as encouraged local scholars to practice zero waste lunch. On a regular basis, a team from Waste Aware visits local schools. They arrive with their Waste Aware trailer carrying many games and activities. During their visits, all the waste after the lunch period is collected in separate categories and weighed by the pupils. Children bringing a packed lunch to school are encouraged to consider how they can bring a waste-free lunch in the future. The waste team regularly returns to repeat the activity to see if increased awareness has reduced the overall food waste and packaging composition. They also organize seminars for adults and offer individual consultations to households (<https://www.midlothian.gov.uk/waste-aware>).

NGO Carymoor Environmental Trust has created a toolbox²⁰ for teachers to help them carry out lessons for pupils on food waste, also investigating the food supply chain of fruits and vegetables.

NGO Feedback is an organization actively campaigning for fairer laws protecting farmers in the developing world as well as actively researching supply chains of some of the largest retailers in Europe. They also engage the public in further discussion on waste that happens when retailers regulate the size and look of the harvest. The most notable event organised by Feedback is Feeding the 5000, where thousands of people are fed from the food that would otherwise go to a landfill. They bring together a coalition of organisations that offer solutions to food waste, try to raise the question in the political agenda, and inspire new initiatives. They also have started the 'Feeding the 5000' pledge where they invite companies to affirm they will follow the food waste pyramid principles in their activities. The organisation has a clear vision on food waste reduction in which they emphasize the global context, providing examples and case studies from developing countries (<https://feedbackglobal.org>).

²⁰ Educational pack URL: http://www.carymoor.org.uk/foodwaste/food_waste_education_pack.pdf.

4.3.

Germany

Germany has launched many communication campaigns which can be divided into governmental and private campaigns (launched by universities, NGOs, activists).

The German Food Bank (Deutsche Tafel) has a voluntary agreement with the wholesale and retail sector regarding foodstuffs donations close to the best-before date. They collect qualitative food that would otherwise land in the garbage and distribute it free or for a symbolic amount to socially and economically disadvantaged people. There are currently more than 900 Tafel in Germany. All of them are non-profit organizations. According to their website, the Tafel support more than 1.5 million people in need of food throughout the country—nearly one-third of them are children and youths.

Food sharing is an Internet platform that facilitates food sharing instead of wasting it. Shared food includes surplus food from households as well as food recovered from supermarkets or directly from farmers. Households can submit their no longer needed food on a map for everyone to see and take an interest in. The platform <https://foodsharing.de/> has spread not only across Germany, but other German-speaking countries such as Austria and Switzerland.

A private initiative called the Dinner Exchange Program intercepts unused produce and unsold food from stores and markets to serve meals to the community in exchange for donations. The funds collected are donated to local food education courses (<https://dinnerexchangeberlin.wordpress.com/about/>).

Former Agriculture Minister Ilse Aigner announced the ‘Too Good for The Bin’ campaign (‘Zu gut für die tonne’) in May of 2012. The initiative seeks to reduce food waste by educating the public through an interactive online platform, a series of events or ‘days of actions’; and an online app that contains leftover recipes with more than 400 cooking ideas including some from top celebrity chefs. The platform includes a sharing option of simple tips, recipes, interactive tests, and other activities. During the annual ‘Days of Action,’ different campaigns take place. For example, food with flaws is collected from supermarkets and producers and then processed into meals which are served on a long table in a central square of each city. In 2013, free vegetables and soup were served to more than 2,000 guests in Dresden. The fresh ingredients, which could not be sold in markets due to imperfect appearance, were gathered from local farms (<https://www.zugutfuerdietonne.de/>).

Plate instead of a dustbin (Teller statt Tonne) is a campaign launched in 2011 by Slow Food Germany. Activities take place during 'days of action' against food waste, including 'waste' cooking demonstrations and general information for consumers about food waste and about the reduction of food waste in households (<http://www.teller-statt-tonne.de/>).



4.4.

Austria



'Food is precious' serves as an umbrella campaign on food waste launched by the Federal Ministry of Agriculture, Forestry, Environment, and Water Management to coordinate the increasing number of initiatives on food waste and to offer the different stakeholders the opportunity to use a unique, recognizable logo. On a national level, it has been used as a price sticker for products which mark the products near the 'best before' date to be sold at reduced prices and in a national best leftover receipt contest. Different 'Food is precious' activities have been carried out in different parts of Austria. For example, in Salzburg, activities organised consisted of a one-week campaign targeting householders with a mixture of discussions and plenary presentations, flash mobs, organic food events, movies, exhibitions, and cooking workshops (FUSIONS, 2015b).

The Department of Environment of the City of Vienna launched a neighbourhood project towards surplus food transfer which focuses on food waste prevention in the Viennese district Donaustadt in 2013. The goal of the project is to establish partnerships creating a local network for surplus food transfer. The primary target groups are schools, youth centres, small farmers, and companies (FUSIONS, 2015b).

TafelBox (<http://tafelbox.at/>) is a box for securing leftovers from catering buffets. In 2014, Wiener Tafel, a food bank in Austria, launched a measure to secure leftovers from catering buffets and in restaurants. The so-called 'TafelBox' is a takeaway box which consumers can purchase. With every purchase, 20% goes as a donation to Wiener Tafel to help to further prevent food waste by at the same time, helping the poor. The TafelBox is made from organic material and can store up to 700 g of saved food per box. In addition, it is a very useful tool to create awareness against food waste, not only at catering buffets but also when taking the box home for lunch or dinner the next evening.

A restaurant called Biomat²¹ was set up in Vienna where one can exchange waste for fresh food, primarily to get people's attention. They had a garbage scale which estimates the collected waste's energy value. That amount can then be eaten and drunk for free. Waste was weighed outside, where they had a big bin for collecting the waste. At the end of the project, it was put into a composter and rolled in the urban garden for a day. The garden had a small biogas plant, converting waste to useable methane (which can be burned to make more food).

²¹ See more URL: <https://www.fastcompany.com/3022038/at-this-austrian-pop-up-restaurant-you-can-exchange-garbage-for-food>

4.5.

Examples from other countries



Slovenia

The Jožef Stefan Institute (Slovenia), with partners, run Horizon 2020 funded 'Resource Efficient Food and drink for the Entire Supply chain' (REFRESH). 26 partners from 12 European countries and China work towards the objectives of reducing food waste across Europe by 30% by 2025, reducing waste management costs and maximizing the value from unavoidable food waste and packaging materials. Backed by research to better understand the drivers of food waste, the project supports better decision-making by industry and individual consumers (<http://eu-refresh.org/>).

Czech Republic

Project 'We Eat Responsibly' (2015-2018) in the Czech Republic is implemented by Glopolis, P.S.C., an independent think-tank analytical centre focused on global challenges and responses to them in the Czech Republic and the European Union. Primary goals of the project are to support teachers in embedding responsible food consumption topics into their lessons, developing critical thinking of pupils and students, supporting their activities towards responsible changes at schools and in their neighbourhood, increasing awareness of parents and larger society on global impacts of everyday choices. 45 schools got involved in the second year of the project. During the school year, they explore six topics of responsible food consumption and go through 7 steps of eco-school methodology using a handbook called 7 Steps to Responsible Food Consumption. Based on the analysis in school cafeterias and households, Eco-teams consisting of students and teachers choose the most burning issue they want to tackle during the school year. They create plans for activities and organize action days for parents and the broader public where they present and explain the chosen topic (https://glopolis.org/en/_project/we-eat-responsibly).

Hungary

SavingFood is a project funded by H2020. Coordinated by ViLabs, SavingFood offers an approach to tackle food waste through the redistribution of surplus food to welfare organisations that support people in need. The project provides a platform where all participants—food donors, beneficiaries, policymakers and society at large—can engage, discuss, and deliver within a pro-social environment in which everyone’s needs are met, information is shared, and the food is effectively distributed (<https://savingfood.eu/>).

Italy

The International Food Waste Coalition AISBL (IFWC) (<http://internationalfoodwastecoalition.org/>) in partnership with FAO runs an action-driven programme called SKOOL (School Kitchen Optimisation, Organisation, and Learning) to help schools adopt a comprehensive approach to reducing food waste and to enable children to play a part in this. The objective is to deliver targeted packages to those involved along the value chain – to educational teams, to the cafeteria, and to kitchen staff – on implementing methods to reduce waste along the whole food chain.

During ‘lo non spreco: Adotta un nonno a pranzo’ (‘I do not waste: adopt a grandfather at lunch’) (<http://www.milanoristorazione.it/>) events, schools invite for lunch older people who eat alone at home or the elderly who face economic hardship. By eating along with children, they contribute to reducing food waste, and the action indirectly fills the gap between generations. In addition, initiative lo non spreco: snack-saver bag (I do not waste: snack-saver bag) is run focusing on primary school students. Fruit, bread, puddings, and snacks, if not eaten at school, can be saved for later consumption at home: each child in the classes participating in the ‘lo non spreco’ initiative is provided with a snack-saver bag made from washable, reusable, recyclable material. To date, the following have signed up to the project: 77 primary schools; 22,050 bags distributed.

STREFOWA (Strategies to reduce and manage food waste)—an international project (<http://www.reducefoodwaste.eu/>) financed by Intereg programme and intending to raise awareness in schools and amongst consumers (Austria, Czech Republic, Italy); prevent food waste through donations and reuse (Czech Republic, Poland, Hungary, Italy, Austria); and optimize separate collection of food waste (Poland, Austria). At the STREFOWA Food Waste Hackathons are organized 2- to 3-day events open for everyone interested in learning about food waste and contributing to developing ideas. So far, 5 events have taken place in Vienna, Prague, Miskolc, Wroclaw, and Asti (IT). One of the pilot projects was implemented in schools.

The goal of this pilot action is to do research, define recommendations, and provide tools to prevent and reduce food waste at schools and ultimately lower the connected GHGs emissions. Other activities of the project include different apps, website quiz games, and so on.

Greece

Boroume, which means ‘we can’ in Greek, is a non-profit organisation that fights food waste by organizing the distribution of surplus food for charities throughout Greece. Boroume is a communication hub between food donors and recipient organizations (welfare institutions, soup-kitchens, municipal social services) that creates ‘bridges’ between those who have food to give and those who need food. Since 2011, Boroume has created thousands of such ‘bridges’, often of a permanent nature, and on average, offers more than 2500 portions of food per day through its network (<https://www.boroume.gr/en/>).

Food Recovery and Waste Reduction (FORWARD) (<http://foodrecoveryproject.eu/>) – is a two-years transnational project in collaboration with a consortium of 8 EU partners co-funded by the EU under the Lifelong Learning Programme. It intended to reduce food waste and to promote unsold food recollection in favour of charities through training and other resources: a free online training course for food supplier and charities on the reduction of food waste and methods to recovery and redistribute it; an educational game simulating the process of recollection of food waste; and a user-friendly brokering platform to allow the natural matching of demand and supply of food waste.

Spain

Aprovecha la comida. No tiene desperdicio! (Take advantage of the food. It has no waste!)— is a project of the HISPACOOOP confederacy of cooperatives of consumers in Spain (<http://www.hispacoop.org/desperdicios/>) with the objective of raising awareness and educating consumers about good habits and responsible behaviours to reduce food waste. Activities include a conference to debate this problem and a leaflet with practical recommendations about how to plan, prepare, and preserve food and how to reuse leftovers. It provides information about ‘best before’ and ‘use by’ date labels.

Portugal

Flaw4Life (<http://www.flaw4life.com/>) is a project co-financed by EU’s LIFE Programme. Primary goals of the project are to replicate the methodology of Fruta Feia (ugly fruit), already tested in Lisbon, throughout the national territory, launching new delivery points and raising the number of tonnes of waste saved annually. Fruta Feia’s methodology is to buy weekly

from local producers the misshaped products, to set boxes and to sell them to its associated consumers, who pick them up at the end of the day; and to disseminate the Fruta Feia's approach on a national and international level to respond to the current issue of food waste due to appearance, to be applied elsewhere in similar circumstances.

Finland

The ResQ Club online service, launched in 2016, allows people to buy restaurants' surplus meals for a discounted price (typically 40-60%) (<https://www.resq-club.com/en/>). The service enables restaurants and hotels to advertise their leftover food portions that are still in excellent condition, but which need to be consumed that day. This food can be listed as 'to be rescued' on the mobile app or web service. Users can use the app to check what meals are available that day, make an order, pay, and pick up the food. It is also possible to receive offer notification from restaurants or for certain types of foods, such as vegetarian meals. ResQ has expanded its service to several cities in Finland and is already expanded to Sweden. At the beginning of 2017, they already had over 70,000 registered users and 130,000 food portions rescued. In addition to the active food rescuing and sharing the idea of stopping food waste, ResQ Club also adds their input to global education via social media: Facebook (@resqclubglobal) and Instagram.

Sweden

The Swedish Food Waste Reduction Project is a national campaign to reduce food waste. They include analysis of opportunities and possible obstacles, information campaigns targeted at consumers (<http://www.stoppamatsvinnet.nu>), increased collaboration between different stakeholders, spread of information about good practices through the websites, webinar, conferences, and meetings (basic facts and examples of different food waste-reducing measures, and recommendations on how to avoid food waste in various professions, website was launched with a number of practical guides, videos, and advice on how to reduce food waste), promotion of the increased use of unavoidable food waste for the production of biogas and utilisation of digestate (online material about better utilization of unavoidable food waste has been produced and distributed). The project made available for stakeholders practical and readily available tools such as educational material, videos, easy to follow guidebooks, advice, and tips for different target groups.

Luxembourg

The awareness and information campaign 'Together against waste' was launched by the government of Luxembourg in 2016. The campaign includes several different components

intending to combat bad waste habits, such as pamphlet 'Together Against Waste', a conference for industry professionals, 'antigasp' (anti-waste) week in school canteens, a webpage (<http://www.antigaspi.lu>) offering news, tips, tricks, and recipes for reducing food waste, and the 'anti-waste' expo (traveling exhibition addressed to all consumers to raise awareness on global themes: food shortages and need of action, playful information, and daily tips for handling food (e.g., menus, the shopping, the storage of food, the interpretation of the expiry date)).

France

Disco soup is a movement born in Paris in March 2012 that intends to raise public awareness of the problem of food waste. The movement has spread all over France and to other continents, bringing together consumers and activists to face the challenges related to the food waste problem (<http://www.discosoupe.org>). The idea of a disco soup is to come together with the community members for cooking together using discarded or unsold food and supporting happy and positive activism. Since 2012, 'disco soup' events have regularly been organized to raise awareness of waste. The soups, salads, or smoothies made are then redistributed free of charge or at a minimal price. The disco soup events are open to everyone, and everyone is free to organize his or her own disco soup on the condition that it follows the disco soup event's rules. In the first half of the year alone, 180 disco soup events were organized in 86 cities and 10 different countries. 25,000 kilograms of fruits and vegetables were spared. The movement has proliferated to other continents, and disco soups are organized all over the world, for example in Chile, United States, Great Britain, Israel, Lebanon, Mexico, Italy, and Switzerland. The movement shares information about food waste, tips, and tricks, disco soup events' agendas, etc.

Netherlands

Kromkommer in the Netherlands (<https://www.kromkommer.com/>) was founded with the mission to save all the fruits and veggies that otherwise would have been wasted because of their looks or overproduction.

NoFoodWasted (Netherlands) is an app intending to reduce food waste by 50% within five years. The app alerts users about food that has been discounted in around 150 supermarkets in the Netherlands, so they can prevent it from going to waste and pick up a bargain in the process. It has been downloaded 77,000 times and has so far achieved 13% of its goal (<http://www.nofoodwasted.com/en/>).

Cyprus

The EAThink Kit (<http://eathink2015.org/en/>) is a working tool including the best global learning units for primary and secondary school teachers, global education trainers, and volunteers engaged in educational activities on global learning and sustainable agriculture. Different kits developed by the EAThink partners in the Greek, Croatian, Slovenian, Romanian, Polish, Hungarian and Italian languages can be downloaded.

Ireland

Stop Food Waste (<http://stopfoodwaste.ie>) is a programme funded under the environmental protection Agency National Waste Prevention Programme. In between other measures, they provide tips for food waste reduction: planning, storing, cooking.

In 2014, Tesco and FoodCloud launched a partnership which redistributes surplus food from Tesco's stores to charities and community groups using FoodCloud's app. The partnership follows a successful FoodCloud pilot programme in 18 Tesco stores, which ran from October 2013 to February 2014 and donated almost 60,000 meals or 27 tonnes of food to 38 charities. Since partnering with FoodCloud, charities such as Drogheda Homeless Aid have been able to reduce weekly food costs by an average of 30% (<https://food.cloud/>).

- **There is a wide variety of non-formal sector experiences on food waste awareness-raising and food waste reduction. Also, there are examples of NGO and governmental business cooperation.**
- **Experiences regarding food waste reduction vary from social food sharing initiatives, apps, and platforms to competitions, videos, tips, and recipes.**

5.

Food waste situation and initiatives in developing countries



Food waste and loss is a global issue which is related to all participants of food chains. Depending on the region, food loss and waste occurs in different stages. Overall, on a per-capita basis, much more food is wasted by consumers in the industrialized world than in developing countries. It is estimated the per capita food waste by consumers in Europe and North-America is 95-115 kg/year while in sub-Saharan Africa and South/Southeast Asia this figure is much less – 6-11 kg/year (FAO, 2011).

Postharvest food losses occurring in the early and middle stages of the food supply chains are considered to be the proportionally most important source of food losses and waste in developing countries (FAO, 2011). Postharvest food losses are particularly high in sub-Saharan Africa, where a third food produced is lost before it reaches the marketplace (FAO, 2011). Also, in the South and Southeast Asian region about 90% of the loss originates from postharvest and processing levels. For example, in India, more than 40% of food, valued at over \$8 billion, is lost due to inefficient postharvest management and lack of sufficient storage and processing infrastructure (Diofasi, 2013).

In Latin America and the Caribbean, most of the food is lost or wasted in the production and consumer segments of the food supply chain. About 28% of food losses occur in the consumer sector, about 28% in the production, 17% during marketing and distribution, 22% during handling and storage, and the remaining 6% during processing (FAO, 2014b).

Given that many smallholder farmers in developing countries live on the margins of food insecurity, a reduction in food losses could have an immediate and significant impact on their livelihoods (FAO, 2011). In addition, in 2016, the number of chronically undernourished people in the world reached 815 million (11% globally), mainly due to worsening of the situation in some parts of sub-Saharan Africa, South-Eastern Asia, and Western Asia in the areas of conflict and/or climate change impacts (droughts or floods) (FAO, IFAD, UNICEF, WFP and WHO, 2017). Discrimination, migration is also highly related to food security. There is enough food produced, but it does not reach the hungry (Tscharnatke et al. 2012). Hence, food waste reduction is one of the solutions.

Also, it should be acknowledged that many developing countries are the leading producers and exporters of certain products, for example, Latin America—meat production, coffee, bananas, cane sugar; Africa—cacao and sugar; Asia—rice, tea, fish, etc. Only, in 2015, Europe imported over 35 thousand tonnes of exotic tropical fruit almost exclusively from developing countries (CBI, 2017).

Hence, in low-income countries, measures should foremost have a producer perspective,

e.g., by improving harvest techniques, farmer education, storage facilities, and cooling chains (FAO, 2011). Multiple projects have been carried out in developing countries to tackle postharvest losses that occur in the early and middle stages of food supply chains and to improve the capacity of the farmers, their access to food markets, and the capacity of the regional policymakers. Examples include the YieldWise Initiative (<https://www.rti.org/impact/yieldwise-initiative>), which is monitoring and evaluating efforts to reduce postharvest waste in sub-Saharan Africa, targeting cassava and tomato production in Nigeria and mangos in Kenya. The project linked farmers to an ecosystem of buyers, linked value chain actors to finance, and trained them in postharvest loss reduction techniques and technologies. The SAVE FOOD initiative by Messe Dusseldorf, Food and Agriculture Organization of United Nations, UNEP and Interpack which organises multiple projects to increase the capacity of the smallholder farmers in developing countries, such as the project Mainstreaming food loss reduction initiatives for smallholders in food deficit areas or Support to African Union in the development of policies and strategies for country-specific plans to reduce postharvest food losses, Food loss reduction strategy development in favour of smallholder producers in Africa (<https://www.save-food.org/>), and the SAVE FOOD activities in Brazil (<https://www.savefoodbrasil.com/>).

Many projects emphasize the connection between food security and food waste/loss in developing countries. Focus for them is on timely redistribution of products close to expiration dates in shops or products that have been discarded earlier in the supply chain. 'Food for All Africa' is a food bank programme and a social enterprise which originates in an organisation called Food for All Ghana. The organisation has a group of stakeholder-businesses (manufacturers, importers, farmers, and hotels) that take part in the activities and donate excess food to the organisation's food supply chain (<http://foodforallafrica.org/>). 'Chowberry' is an app developed by a Nigerian innovator which enables charities and householders to shop for products that are about to expire at a very discounted price. The app allows access to products ranging from cereals, cooking oil, and powdered milk to snacks among other groceries. Retailers such as Classic Supermarket, Health Trust Pharmacy and Store and Your Essential Stores supermarket in Nigeria participate in their products (<http://chowberry.com/hb>). Another example is the 'Zero Hunger' project in Brazil. It is a series of programmes implemented by the municipality of Belo Horizonte and the federal government. Its objective is to guarantee the human right to adequate food and freedom from hunger. Their strategies encourage more responsible consumption and waste reduction through recycling and using discarded food through food banks, promoting urban farming through school, and community kitchen gardens (FAO, 2015).

Disco soup is an international grassroots movement to raise awareness of food waste. The first ever African event took place in Nairobi in 2014. The volunteer-led event focused on food

waste, what is rejected due to the cosmetic standards of European supermarkets. The event was organised by Marah Koeberle, a resident with a background in the food industry and it was visited by a couple of hundred people. Similar actions take place in Mexico, Chile, and other parts of the world (<http://discosoupe.org/>).

Some projects are related to food waste and losses indirectly but intend primarily to reduce food insecurity. For example, the Hunger project seeks to end hunger and poverty in Africa, South Asia, and Latin America by different actions mostly involved with capacity building of inhabitants of local villages such as teaching new crafts and skills and promoting self-reliance, also fostering effective partnerships with local governments and empowering women as critical agents of change. For example, in eight countries in Africa, The Hunger Project's Epicenter Strategy mobilizes clusters of rural villages into epicentres, which band together 5,000-15,000 people to carry out community-led integrated strategies to meet basic needs. Women and men in 121 epicentres create and run their own development programs, reaching 1.6 million people in their communities (<http://www.thp.org>).

- **Regarding food waste generation and reduction, developing countries need to address farming, harvesting, storage, and processing related food waste, which in turn, should reduce the impacts of poverty, food insecurity, climate change, water stress, etc.**
- **Via food supply chains, developed and developing countries are interlinked, each group facing both local and global food-related problems.**

Concluding remarks

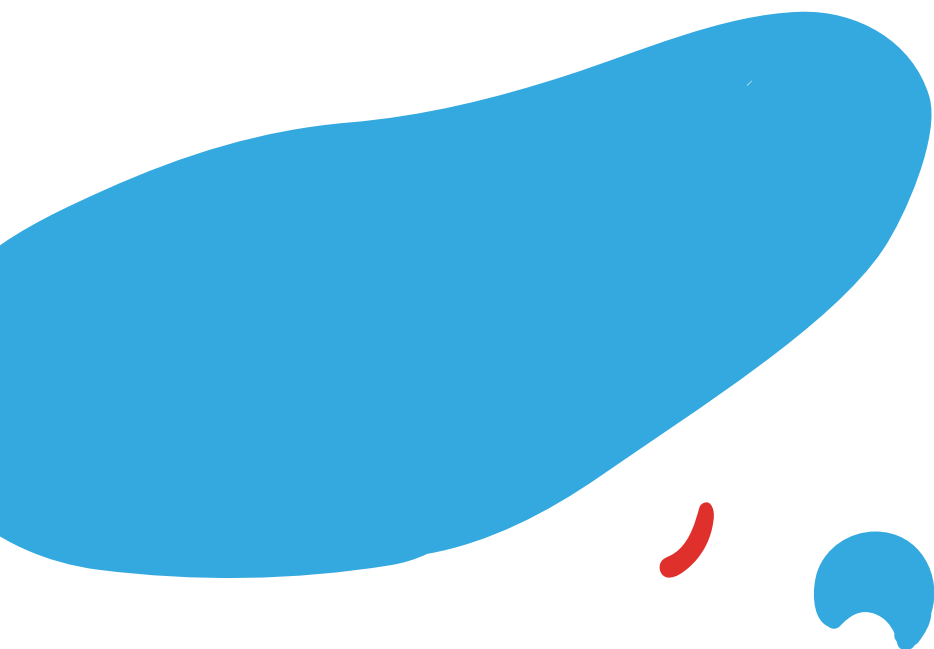
The food waste issue is on local and global political, scholar, professional, civic, and private agendas. UN sustainable development goals, particularly with SDG 2 on zero hunger, SDG 12 on sustainable production and consumption, SDG 3 on climate change, and SDG 4 on quality education, contribute to the issue from a broad perspective. Considering global goals, the topic gains more and more attention regionally and locally. Ongoing and planned activities in partner countries for reduction of food wastage also are in line with the EU policies in the field of waste reduction and management as well as development cooperation policy.

Still, the lack of uniform food waste-related definitions and data are challenges. Therefore, food waste should encompass a broad understanding and include the whole food supply chain that implies the whole life cycle of the product (production/farming, processing, and storage, distribution, retail and marketing, preparation and consumption).

Existing data indicates high food wastage both in developing and developed countries to be addressed, though at different food supply chain stages. In addition, the food waste issue causes local and global effects that are interrelated across social, economic, and environmental sectors: resource scarcity, environmental degradation, biodiversity loss, climate change, migration, food security, social vulnerability, poverty, hunger, abuse of human rights, deterioration of health, economic inequality, etc.

Hence, due to its global and local (glocal) nature and interrelatedness of levels and sectors, a global learning approach is a proper means to be applied to the issue of food waste. For reduction and management of food waste attitudes and behaviour play a crucial role. This implies awareness-raising about food waste locally and globally and changing attitudes and behaviour about food waste in private consumption: food purchasing, food processing, and handling. Awareness of the global and local situation is also significant. Global learning on food waste is to be ensured as the non-formal education of consumers (households) because they tend to waste most within the food supply chain in developed countries (i.e., partner countries also).

However, a somewhat different situation regarding food waste and a global approach applied in practice in partner countries should be taken into account. Some countries have some good examples of continuous projects, some have only occasional initiatives on the issue. Also, the somewhat different situation regarding food waste generation, as well as attitudes and knowledge regarding the topic, should be considered while implementing project activities.



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