

# Lost harvests – Food losses and food insecurity

Extent and causes, impacts and possible solutions

Uwe Hoering



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Uwe Hoering | FDCL | February 2012

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# 1 Introduction

Debates on the issue of food production are enjoying a boom. The documentary film “We feed the world” or bestsellers such as “Die Ernährungs-diktatur” (The food dictatorship) have attracted a lot of attention. The film “Taste the Waste” and campaigns by the German Federal Ministry of Food, Agriculture and Consumer Protection (BMELV) (“Too good for the bin”<sup>1</sup>) or the WWF (“Tons for the bin”<sup>2</sup>) address food destruction and waste, bringing a particular aspect of this system to the fore. Talk shows discuss best-before dates, food thrown away by supermarkets, restaurants and households, abundance, healthier diets with less meat and “skipping”.

The discussions reflect a profound unease with a food system where all aspects of growing global inequality are concentrated: abundance and luxury at one extreme, and shortage and poverty at the other; waste here and malnutrition and hunger there; highly efficient supply systems that waste valuable resources. Rising global prices for staple foods and the associated protests in numerous countries of the Global South are the trigger for this new interest in our food and our consumer society as a whole. Stock exchanges and investment funds have discovered food as a new source of return and make prices the plaything of their speculations—at the cost of consumers. The number of those starving is once again on the increase. According to some experts, enormous productivity increases are needed to prevent bottlenecks in the food supply.<sup>3</sup>

Reducing waste, destruction and losses would seem to contribute significantly to solving this problem, since, according to some studies, 50% of food that is harvested by farmers worldwide is lost “from field to fork”. A large proportion ends up in the rubbish bins of the North, but a lot is also lost on its long journey from the South. According to a study carried out by the Food and Agriculture Organization of the United Nations (FAO), “addressing the topic of food losses is extremely important in fighting hunger, increasing income and improving food security in the poorest countries of the world”<sup>4</sup>; “it impacts on the food security of the poor, on food quality and security, as well as economic development and the environment”<sup>5</sup>.

The criticism is strongly focused on the role of individual purchasing decisions and an allegedly widespread “throw-away mentality”,

factors that are also being indirectly held responsible for poverty and lack in the Global South. According to the first thorough analysis for Germany<sup>6</sup>, 61% of food waste, that is, 6.7 million tons, is produced in private households, and a further 17% is produced by large consumers such as restaurants, hotels, hospitals or schools. If we reduced waste in the North, the poor in the Global South would automatically have more to eat, so the argument goes. If customers bought only what they really needed and intended to use, demand would fall. This would also undermine rising prices and speculation. In addition, it could help to slow down the spiralling growth in use of resources such as land and water.

Private households, where food that has spoiled or is past its expiry date is thrown away, is at the end of a long chain of destruction and loss that occur once the food leaves the field, stable or water. Ethical and moral concerns and calls to consumers to change their behaviour are therefore understandable, but they address only part of the manifold causes of the problem.

Many development experts, politicians and international institutions focus their attention on the entire chain of losses, which begins already with the harvest.<sup>7</sup> The World Bank hopes that reducing losses during the various stages in the journey made by food could render superfluous some expensive production increases and thus the additional use of scarce resources such as land and water. This would therefore be “more cost-effective and environmentally sustainable than a corresponding increase in production”.<sup>8</sup>

This brochure aims to present a differentiated view of different forms of waste, destruction and losses in the local and global food value chains “from field to fork” and to analyse their causes. The focus is especially on food losses in the South, since they impact directly on food security and the income of farmers. Building on this, it aims to identify which solutions and proposals are useful and necessary in achieving sufficient, secure and healthy food for everyone, and discusses how a reduction in food losses, destruction and waste could contribute to achieving this goal.

## 2 Losses, waste, wastage, destruction

Most agricultural products travel a long way before they are finally eaten, and these journeys are becoming increasingly longer. Besides farmers, numerous actors are involved in this journey, and their number is growing continuously. Agricultural products are transported, cooled, processed, refined, traded, treated, and packed before they finally reach the shelves. By then, not only have they changed from their original form, but a large amount has also been lost. The reasons for that are becoming even more numerous and manifold.

The proportion of food produced that is lost on this journey is often estimated to be one third, but even half is within the realms of possibility. According to the FAO, this would be as much as 1.3 billion tons per year. The loss of rice, wheat and other cereals, the most important staple foods worldwide, is estimated at approximately 30%, with the same figures applying to fish. The loss of fruit and vegetables amounts to 40 or 50%, and for oilseeds, meat and dairy products the figure is only 20%.

These numbers mostly refer to losses that reduce the quantity of edible food during and after harvest until it reaches consumers. The considerable losses suffered before all of this due to pests or climatic conditions on the field are not even taken into account here.<sup>9</sup> It is usual to differentiate between losses resulting from storage, transportation and processing, and losses in the form of throwing away, destruction or “waste” suffered at the end of the food chain at the retail and consumption stage. However, qualitative

losses also occur, such as in the appearance or nutritional value, which can influence marketing and consequently also the price producers can obtain for their products.

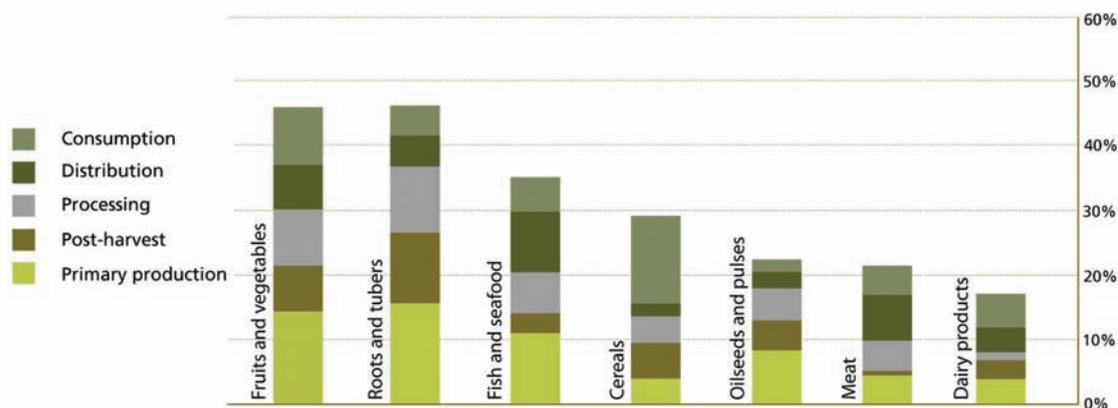
As highlighted by the WWF campaign “Tons for the bin”, some observers argue that the competing use of food such as maize, wheat or soy as animal food or agrofuel must also be considered lost, since it is no longer available for human consumption. It also drives up prices and can significantly jeopardize food security.

Losses, waste and destruction have manifold consequences. At the start of the food chain, they particularly impact on food availability and thus on access for poor population groups. Harvests lost or pest infestations directly reduce the quantity that farming families and other groups in rural areas are able to use for their own supply. They also affect sales possibilities, prices and farmers’ incomes, which, in the case of poor population groups with low purchasing power, can easily lead to more hunger.

Waste in urban markets and wholesale stores, in the processing industry and retail sector, drives up the costs associated with production, storage, transportation, marketing and distribution — and thus the price of the commodity that finally reaches the shops and consumers. Losses and waste throughout the whole chain can therefore result in higher prices for end consumers. The greater the proportion of income a household spends on food, the harder it is hit. This means

**Graph 1: Global food losses and waste**

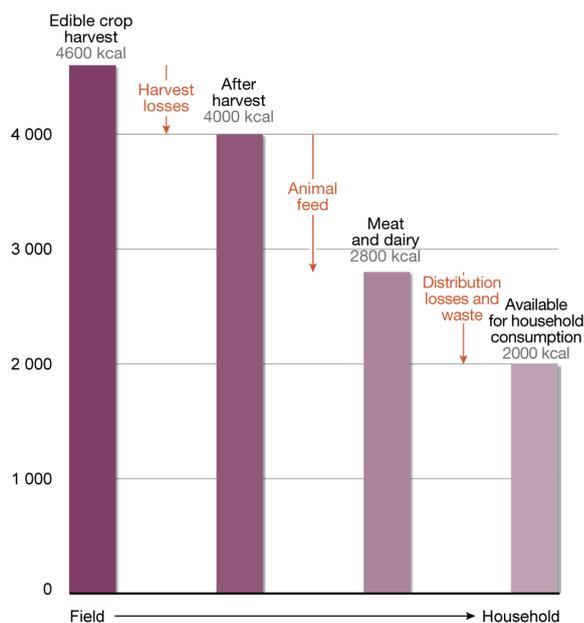
(In percentages; total: 1.3 billion tons/year)



Source: FAO 2012: Save Food: Global Initiative on Food Loss and Waste Reduction

## Graph 2: Global food losses on the journey from the field to households

(Measured in kilocalories per capita and day)



Source: UNEP 2009: *The Environmental Food Crisis. The Environment's Role in Averting Future Food Crises*

that losses, waste and destruction have a different impact on the well-off compared with poor population groups, or in industrial compared with developing countries.

### 2.1 "Too good for the bin"

*"Consumers in industrial countries waste almost as much food as the entire net amount of food produced in Sub-Saharan Africa".*  
Gustavsson, 5

Our consumer society defines the "good life" first of all as a wealth of material goods: as a wide variety of products. Full supermarket shelves and a well-stocked fridge are symbols of wealth and material security. A broad range is regarded as customer-friendly and demand-driven. Since sparsely stocked shelves speak to shortages and poor planning, supermarkets need to make sure that bread, meat and delicatessen counters remain full to bursting right up to closing time, even if the perishable goods then have to be discarded afterwards.

This model of prosperity produces a tremendous amount of waste. It is estimated that in the US, 43 million tons per year or 27% of all food products end up in the garbage bin, just from retail, restaurants, fast-food chains and private households<sup>10</sup>. In Germany, almost 11 million

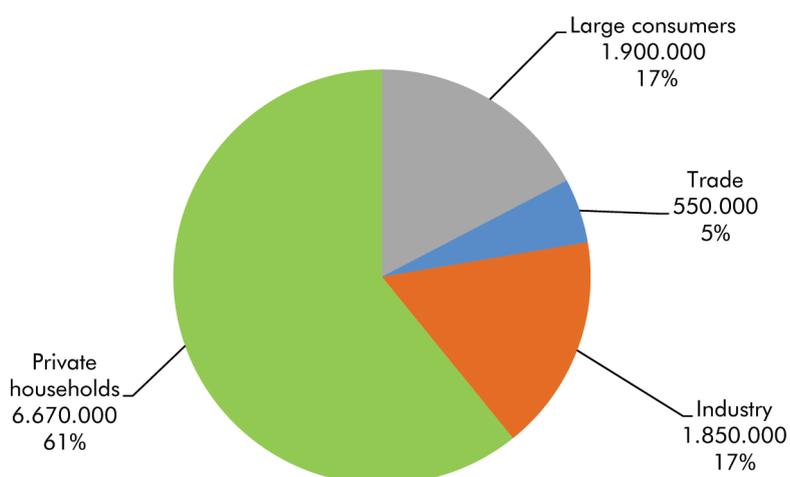
tons of food per year are "discarded". On average, every citizen throws away almost 82 kilograms of food. Two thirds of this waste could be completely, or at least partly, avoided.<sup>11</sup>

The Agricultural Policy Advisory Council of the Ministry of Agriculture posits that the widespread "throw-away mentality", which replaced the behaviour of former generations that was shaped by war and times of hardships, is one reason for these losses. The threshold for throwing away food is significantly lower today than it used to be. It has increased with rising wealth, as this brought with it different preferences and consumer habits.<sup>12</sup> However, this devaluation of food, which is also encouraged by the fact that staple foods have become ever cheaper relative to income, begins much earlier— that is, on the field.

The processing industry and trade sectors tell farmers how their products should look. Potatoes, tomatoes and cabbage are narrowly defined, which can be laid down in binding EU marketing standards and sales categories. "Outer values", such as appearance, colour, uniform size or cut-resistance are more important than nutritional value or taste; "trade quality" takes priority over nutritional quality. Everything that fails to meet these requirements, such as oversized potatoes or curvy cucumbers that do not fit into the pallets for transportation, are often labelled as "not for sale". They do not even leave the field, but are left there to rot.

### Graph 3: Food waste distribution in Germany

(In tons per year)



Source: University of Stuttgart (ISWA)/University for Soil Science Vienna (BOKU) 2012: Determination of the quantities of discarded food and proposals for reducing the disposal rate of food in Germany, March, Stuttgart

And so it goes on, throughout the entire processing and trade chain: Tight and meaningless expiry dates, increasing demands from suppliers, traders and consumers with respect to appearance, uniformity, size and variety are the reasons why many food products are rejected and end up in the waste bin prematurely—one quarter is accounted for by trade and industry, three quarters by private households and large consumers. A large proportion simply ends up on landfill sites, left to emit methane gas and contribute to climate change.

Food producers and supermarket chains cite consumer demands in justifying their supply overkill and standardization dictatorship, which they use as instruments to put pressure on the entire supply chain, from agricultural producers to supermarket tenants. This disregards the role of industrial production processes, marketing and product range strategies, competition and rivalry, sales increases and the fight for market share. An economy that is focused on growth, quantity and sales is not only constantly producing more commodities, but it is also constantly producing more losses, waste and a “throw-away mentality”.

The industry is rapidly globalizing this model. Since more and more food is imported from countries of the Global South, the requirements

of food and trade companies, supermarket giants, EU regulations and hygiene standards for food products increasingly dominate production in those countries. International trade adds just a further loss-making element to the production chain, the impacts of which on food losses have yet to be properly analysed<sup>13</sup>.

## 2.2 Lost in Transition

In purely arithmetical terms, Sub-Saharan Africa would not need to import grain if it could succeed in preventing postharvest losses in the country. The “African Postharvest Losses Information System” (APHLIS), which was initiated by the

### Box 1: Example of fish

The proportion of the catch that trawlers throw overboard totals up to 30 million tons, compared with the landing of 100 to 130 million tons per year. A considerable part of this would be fit for human consumption. Source: UNEP/GRID

European Commission in 2008, estimates that losses amount to approximately the equivalent of USD 4 billion per year. The harvest and processing stages alone, that is, through threshing storage and transportation, account for 10% to 20% of postharvest losses. This corresponds to more or less the expenditure for grain imports, which ranges from 3 to 7 billion USD per year (2000-2007). It is also more than the total amount of food aid that has been channelled into the region over the past decade.

While in industrial countries, postharvest losses caused by pests, inappropriate storage or long transport routes can be largely minimized by means of agrochemicals, cooling chains and logistics, the greatest losses occur in the predominantly agrarian countries of the Global South—with direct consequences for access to food, which is vital for food security and farmers' livelihoods.

In the same way as for the industrialized agriculture of the North, the first steps in preventing losses must start on the field, i.e. with farmers and their farming methods. For example, high-yield varieties of maize—both a food staple and source of income in Africa—are often more susceptible to pests or climate conditions than traditional grains, such as millet or locally adapted varieties. The main aim behind these high-yield varieties was to increase earnings rather than resistance or storability. Pests or fungal decay need to be controlled by pesticides and fungicides, which poor farmers often cannot afford. "Selecting the most suitable grain varieties is a decisive first step in preventing losses", the World Bank notes.<sup>14</sup>

Such risks, which predominantly result from production conditions and the situation of small-scale farmers, continue further into the supply chain:

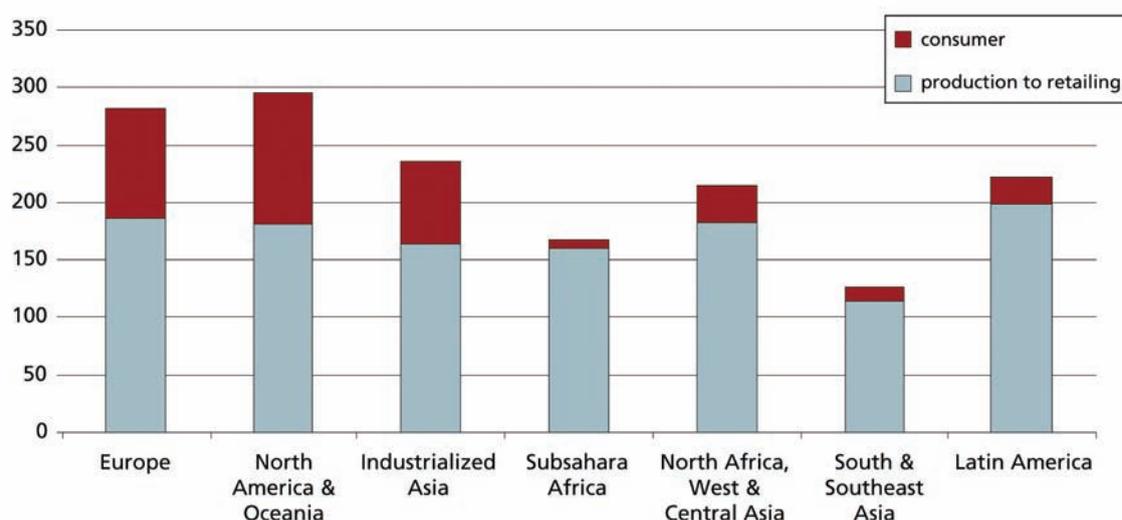
- An early harvest, which might be indispensable for dealing with excessive debts or climate conditions, leads to poorer quantities and quality, and thus to a lower level of self-sufficiency and income.
- During the drying, threshing and separation of chaff and grains, another part of the harvest is lost due to contamination.
- On-site storage is a central problem. Traditional methods using clay or wooden storage units are often insufficient to protect grains and other agricultural products. Poor families often either lack the financial means to buy chemicals to protect stored agricultural products, or their improper use leads to pollution, which affects quality and, in turn, marketing.
- Poor families in particular rarely have the opportunity to process fresh foods so as to increase their shelf life and market value.
- Besides storage, the second largest risk of loss is associated with transportation to the market. Many rural regions have only dirt roads and carts or pack animals available as a means of transportation. Small-scale farmers who lack their own transportation have to wait for the intermediaries and other private buyers to come to their villages.
- Further losses occur during grain milling, which can amount to between 5% and 30%.
- Finally, unhygienic conditions, and a lack of storage and cooling units on local markets take their toll.

## Box 2: The situation of small-scale farmers

The FAO estimates that, in spite of the worldwide industrialization of agriculture, there are still about 450 million farming families that cultivate fields of less than 2 hectares. Due to a lack of alternatives, their numbers are actually increasing, even as cultivated land is decreasing. For many of them, production for personal use takes priority, although it is often coffee, peanuts or other products that would bring in money. Forced by plantations and state farms into isolated regions with poor-quality soil, insecure and unpredictable rainfall, difficult topography and insufficient infrastructure, they often resort to traditional farming methods, such as mixed cropping, local varieties and traditional cultivation methods - the hoe instead of the plough. Most owe money to local lenders. Agriculture therefore bears a great risk, which is why security needs to take priority over high yields. Possible surpluses predominantly end up in local markets, often marketed by intermediaries.

#### Graph 4: Comparison of Food Losses at the Consumption and Previous Stages

(In kg per capita and year)



Source: FAO 2011: *Global Food Losses and Food Waste - Extent, Causes and Prevention*

Unlike industrial countries, where the majority of losses occur in industrial production, trade and private households, the decisive losses in the countries of the Global South occur on the journey from the field to processing, especially with staples such as grains, root vegetables and perishables such as fruit, vegetables or milk.

Many of these problems, which can often be prevented or at least minimized through relatively simple means, result from the long-term neglect of small-scale farming by governments and development organizations and the days of low-cost production of basic food. In the 1980s, so-called structural adjustment programs were implemented to surmount the debt crisis facing many countries in the Global South. Government advisory services were dispensed with, and guaranteed prices and subventions abolished. State or cooperative organizations, who provided loans, supplied agrochemicals and bought and marketed agricultural products, collapsed.

The World Bank, and development and economic advisors believed that private companies and the liberalized market would take over these tasks, but this proved to be wrong. Investments from the state, international creditors and the private economy were primarily channelled into export agriculture. Transportation facilities, warehouses and cooling chains were construct-

ed for flowers, fruit and vegetables destined for supermarkets and consumers in industrial and threshold countries. In contrast, many farmers who were largely left to their own devices, lacked the possibilities and financial means to take effective action to combat their harvest losses.

### 2.3 Resource losses

In order to produce food, many different resources are needed—of course land and water, seeds and fertilizers, but also fuel, pesticides, herbicides and fungicides, manpower and time. Their use is wasted if the products are allowed to spoil, or are destroyed or wasted.<sup>15</sup> Fewer losses therefore mean that these resources could either be used in other ways or be protected. This is an urgent necessity in agriculture in the face of land and water becoming increasingly scarce and continuing deforestation. A reduction in the use of fuel and agrochemicals would also reduce the contribution of agriculture to climate change and other environmental damage, such as the over-fertilization of waters and the emission of toxic agents into the environment.

#### Virtual water

Agriculture is the largest water consumer and, because of the vast amounts of agrochemicals and fertilizers, one of the worst environmental

polluters. But water is becoming scarce: According to the International Water Management Institute (IWMI), 1.4 billion people are already living in regions where there is a lack of safe, clean water. A further 1.5 billion have only restricted access to water as a result of insufficient infrastructure.<sup>16</sup>

On average, 70% of water used—in highly agricultural countries up to 90%—is used in agricultural production. One reason for this is the boom of industrial agriculture. The expansion of irrigation, as part of the Green Revolution by means of extended dams and channels, deeper drills and the use of ever more powerful pumps, has driven up the use of seemingly inexhaustible water resources.

In irrigated agriculture, approximately 2,500 cubic meters of water are required to produce one ton of rice or soy, for wheat about 1,400 cubic meters, and for maize “only” 1,000 cubic meters.<sup>17</sup> Each kilogram of rice that is lost due to rats or fungal infestations therefore translates into 2.5 cubic meters of wasted water, which is often provided at high public costs. However, water waste due to leaking sewer systems, evaporation or inefficient use may be even higher.

Also, the trend towards producing lucrative, high-quality products such as meat, fruit, vegetables or flowers has led to higher water use per produced unit in industrial agriculture than in rain-fed agriculture, which make more frugal use of the often-scarce rainfall it has to rely on. To produce 1 kilogram of beef, up to 16,000 litres of water are needed. When in spring 2008, 65 million kilograms of unsafe beef were destroyed in the US in one fell swoop, this also meant that the millions of litres of water that had been used in its production—not least for feed cropping—went to waste. This would have been enough to supply the 600,000 inhabitants of Las Vegas or to irrigate 100,000 hectares of land for one year.<sup>18</sup>

This means that if half of the food produced worldwide is indeed lost from field to fork, then half of the water used in irrigated agriculture is lost as well—about 1,350 cubic kilometres, or half of the volume of Lake Victoria in East Africa.

### **Soil, forests, climate**

Similar calculations can be applied to land use: According to the FAO, around 1.5 billion hectares worldwide are used for agriculture, and additional immense areas as pasture. As in the case of water, opening up new agricultural areas is increasingly coming up against barriers—natural forests that need to be protected or

agro-climatic conditions or soil conditions that make agriculture either impossible or little economic sense.

More efficient food chains can also have positive impacts on climate change. According to calculations of the Intergovernmental Panel on Climate Change (IPCC), agriculture and livestock are currently responsible for up to one third of greenhouse gas emissions, a considerable part of which stems from cow’s stomachs, rice fields and fuel consumption.

However, such calculations and hopes often omit to consult the people involved, i.e. farmers and agricultural undertakings. Whether fewer losses would eventually lead to fields being closed, groundwater safeguarded, forests preserved and less agricultural products being transported to markets, is anyone’s guess.

## **2.4 Grey zones**

*“There is little consensus on the current global impact of food losses and waste”.*

Grethe et al, 35

Figures on the extent of food losses that are directly caused by pests, transportation damage, processing shrinkage or discarding are impressive. If we include the indirect impact, such as waste of resources such as land, water and production means as well as the contribution to climate change, the consequences are shocking. A solution therefore promises a considerable improvement in the living conditions of millions of people as well as the environment. However, research places a large question mark next to this issue.

### **Lack of reliable data**

As far as methodology is concerned, measuring losses is difficult, since they differ substantially in the different countries and at the different stages of the production chain.<sup>19</sup> Extent and causes also heavily vary depending on products, countries, agro-climatic zones and respective agricultural situations. In very few countries are there direct statistical records; they have to be determined, as in the study on Germany, by measuring waste quantities on landfill sites or by means of other indicators. The FAO admits that “not much research has been done in this area”<sup>20</sup>.

Data on losses in the countries of the Global South are mostly based on individual, often outdated, case studies from the 1970s and 1980s

and samples that used different measurement methods and reference values. The situation in industrial countries is similar. Here again, the information is largely based on extrapolations of individual case studies. In Germany, for example, the study commissioned by the Ministry of Agriculture was the first attempt to collect reliable data on a large scale. Decision-makers therefore often lack a scientifically validated basis for making decisions on efficient measures to minimize food waste.

The range of data on losses and waste is accordingly wide: With regard to Germany's food industry, it ranges from 210,000 to 4.6 million tons per year, for trade, from 460,000 to 4.8 million tons, and for private households it is between 5.8 and 7.5 million tons. Estimates on the overall postharvest losses range from 10% to 40%, with similar margins for individual products. In addition, technological developments, the growing involvement of small-scale farmers in contract farming and progresses in marketing and distribution, logistics and infrastructure have brought about changes over the last years, where it is not clear whether the impact on the loss ratio is positive or negative compared with previous studies.

The extent of the potential for saving is also unclear: The study carried out for the Ministry of Agriculture assumes that about half of food waste could be avoided. The costs involved in such a task and whether they are reasonable in relation to the results are even less clear. For companies, it is often simply cheaper to discard their waste than making efforts to reduce it.

### **Tank and trough**

At the same time, some developments remain hidden behind tight definitions of losses and waste, but can have a more direct, and probably also more severe, impact on food supply, prices and access opportunities for poor population groups. This includes industrial meat production and the use of agrofuels, which have been growing faster in the past years than agriculture as a whole. Increasing prosperity and growing global middle classes drive up consumption of pork and chicken, dairy products and fish. In light of the climate crisis and rising oil prices, the cultivation of energy crops is becoming increasingly attractive in political and economic terms.

Producing one kilogram of meat requires three kilograms of wheat as fodder. Fish in aquaculture are fed tons of fodder produced from

fish that would be well suited for human consumption. Europe meets a large part of its demand for fodder by importing soy from Latin America, where cultivation not only destroys forests, but also displaces small-scale farmers and their subsistence.

The FAO estimates that one third of cultivated land is currently used to produce meat. According to its calculations, 400 million tons of grain could be saved every year if per capita meat production could be limited over the next four decades to the level of the year 2000, i.e. 37.4 kg.<sup>21</sup> This would be sufficient to meet the demands for grain of 1.2 billion people for one year. However, this would be on the condition that meat consumption decreases in industrial countries and grows slower on a worldwide scale compared with today.

The same applies to energy from the field, i.e. ethanol or diesel. Often, sugar cane, oil-seed rape or *Jatropha* for the tank displace staple foods from the field. Maize and wheat, the processing of which as fuel is more lucrative than using it as food, are lacking on the markets.

The cultivation of fodder and agrofuels is also the main cause of land grabbing: Investors secure large estates in Sub-Saharan Africa, Eastern Europe and Central Asia that are allegedly not, or not sufficiently, being exploited economically. But also in regions with intensive, dense small farms, such as Southeast Asia, Indonesia or the Philippines, energy crops and fodder are increasingly being cultivated on the scarce land. Speculators and investment funds provide billions to shore up these investments, since they expect solid and increasing returns.

Ever more land that could be used to cultivate staple foods is being put to different uses, ever more wheat is disappearing in tanks or turning into steaks, and the livelihoods of farming families are being destroyed. Food prices are linked to energy prices and expected profits on the stock exchanges, which are well known to rise. For industrial countries, where prices for wheat or rice account for only a small part of living costs, this can be absorbed by the majority of consumers. In the countries of the South, however, where the struggle for daily bread means a struggle for survival for millions of people, this situation translates into malnutrition and hunger.

# 3 Waste, losses and hunger: solutions must begin in the South

*“The food thrown away in Europe and North America would be sufficient to feed all the hungry people in the world three times over.”*

Taste the Waste

Most of the starving people are not at the end of the food chain, but at its beginning. A growing proportion of the starving population lives in the expanding cities of the Global South, which are home to over a million inhabitants. However, it is predominantly the households led by women who cannot afford the goods on offer, due to a lack of purchasing power. The great majority, i.e. about two thirds, lives in the countryside, in rural areas. In the event of disaster, when their harvest and cattle is lost, their only hope is food aid, just as refugees in conflict areas, who are another group of the starving.

The normal life of many farming families already constitutes an ongoing disaster situation. They do not have enough land to live from and not enough money to buy additional food if their own harvest is consumed after a few months. Families with better basic material conditions also live in a situation that is permanently marked by food insecurity. Climate change, pests, drought, rising costs for materials, lacking information on better farming methods or market prices, debts and fluctuating food prices, the profit of which is not collected by them but by traders, lead to a precarious economic situation and therefore a precarious existence for millions of farmers.

It will take some time for the effects of less waste and waste production at the “prosperity end” of the supply chain, for example by consumers in the North, to reach the agricultural producers or

## Box 3: Avoiding food losses in the North

The range of recommendations aimed primarily at consumption behaviour, dietary habits and “throw-away mentality” is broad and multi-faceted:

- One way is to rely on information campaigns targeting households and teaching food appreciation, as in the campaigns by the WWF and the Ministry of Agriculture.
- A whole range of activities and publications advocate a healthier diet with less meat or other products so as to leave a lower “footprint” with regard to food and resource consumption.
- Trade should become aware of its responsibility and, for example, offer smaller packages and better inform about expiry dates on food labels.
- At the EU level, the Ministry of Agriculture proposed abolishing all marketing standards that contribute to waste; it also aims to strengthen regional and direct marketing so as to reduce losses.
- Additionally, the Agricultural Policy Advisory Council of the German Federal Ministry of Agriculture gives a useful input with regard to tax policies by suggesting raising VAT on food to the regular rate.

Many of these solutions, such as rising food prices, which would particularly affect low wage earners, are complex and politically sensitive. The Agricultural Policy Advisory admits: “They will not reverse behaviour patterns that change with rising wealth.”<sup>22</sup> If we do not succeed in significantly reducing the amount of waste, it concludes, it should at least be utilized more efficiently, for example in biogas plants, so as to save resources.

the starving people in the South. If more was left of what they finally harvest after their hard work, they would be better able to feed themselves. In the best-case scenario, they could even sell any surpluses. This would help to improve both supply on local markets as well as their income, thus contributing to a better life as well as to investments in agriculture. Numerous reports and studies have pointed to the fact that small-scale farming has the potential to produce higher yields, and to achieve more productivity and efficiency.<sup>23</sup>

### 3.1 Lost decades

The first debate on losses and waste dates back to the 1970s. It focused above all on the countries of the Global South, where the supply crisis and thus the need for action were acute. The direct cause of the crisis was similar to the current situation: The “oil price shock” in 1973, the subsequent stock market crash, price increases and hunger crises, such as in Ethiopia in 1973, which contributed to the overthrow of Emperor Haile Selassie, alarmed the world and brought the agricultural situation to the fore.

The first World Food Conference of the FAO in 1974 declared that “each person has the inalienable right to a life without hunger and malnutrition so as to develop his or her physical and mental capabilities”, and set the target of eradicating hunger, food insecurity and malnutrition within one decade. Reducing postharvest losses was thereby regarded as a central strategy. The then US Secretary of State, Henry Kissinger, declared that possible savings might even reach the level of food aid. Investments in this area were to quickly and significantly improve the worldwide food supply.

#### Technological approach

At the international level, the conference resulted in the Action Programme for the Prevention of Food Losses, organized by the FAO in 1977. On a worldwide scale, more than 250 projects and programs were carried out to help governments identify and reduce causes of losses. Further initiatives, fora and networks gathered information, organized exchanges of experiences and advised governments and agricultural experts on how to reduce postharvest losses.

The issue of grain was a central topic, for rice, wheat, maize or millet are the basis of food security for the majority of the population and a vital component in the livelihoods of small-scale farmers.

The outcome of these efforts, which only rarely went beyond individual measures and pilot projects, is sobering. The World Bank sums up that they had particularly little success in Africa<sup>24</sup>, with the narrow technological approach being the main reason for this. Loss reduction measures were seen as isolated interventions aimed at improving food security at the household level. The proposed techniques and marketing approaches often ignored the needs and possibilities of small-scale farmers. They led to an increased workload, with the costs involved exceeding savings and either failing to provide an economic incentive or failing because of practices and traditions. A paper published by the German Society for International Cooperation (Deutsche Gesellschaft für internationale Zusammenarbeit—GIZ) reads: “towards the end of the 1980s, it became increasingly evident that postharvest issues can only be solved in a sustainable manner, if greater account is taken of existent socio-cultural and socio-economic conditions”.<sup>25</sup>

#### Green Revolution

This insight was, however, never put into practice, since the Green Revolution - which, from the 1970s onwards, resulted in a significant increase in production, an improved supply, and less hunger - led to a waning interest on the part of governments and development organizations in postharvest losses. New high-yield varieties of wheat, rice and maize, the increased use of synthetic fertilizers and pesticides, increasing irrigation and government subsidies to introduce guaranteed prices continually led to record harvests across Latin America and South and South-east Asia. In the core agro-industrial countries of Europe and North America, food production also increased considerably.

Increasing surpluses led to significantly lower prices, and the food crisis of the early 1970s seemed to have been overcome. As a result, the policy shifted to emphasizing food security through economic liberalization and international trade. “The world seems to have forgotten the importance of postharvest food losses in the African grain sector,” the World Bank deplored<sup>26</sup>, and initiatives like the FAO Action Programme to prevent food losses or the Global Post-harvest Forum („PhAction“) were practically abandoned.

Instead of strengthening food security by means of local agriculture, preference was given to food imports that were available cheaply on the

world market. Import competition and the phasing out of public subsidies as part of structural adjustment programs further marginalized local food production in many countries. Many farmers limited themselves to meeting their own demand or looked for other income opportunities. The growing dependence on imports of many countries, Africa in particular, is now taking its revenge with the new crisis and its rising prices.

### 3.2 New initiatives in development cooperation

*"If long-lasting changes are to be achieved, the central role of the private sector must be recognised."*  
Missing Food, 40

Similarly to the situation at the beginning of the 1970s, the current food crisis again understands loss reduction as "being an important element in meeting the world's growing food and energy demand".<sup>27</sup> To achieve this goal, the different organisations of bilateral and multilateral development cooperation, such as the FAO, the World Bank and the GIZ, cooperate closely, for example on the "Global Donor Platform for Rural Development"<sup>28</sup>.

Again, the focus is on the countries of the South and on small-scale farming, which is still producing more than half of the world's food, but is also regarded as one of the main sources

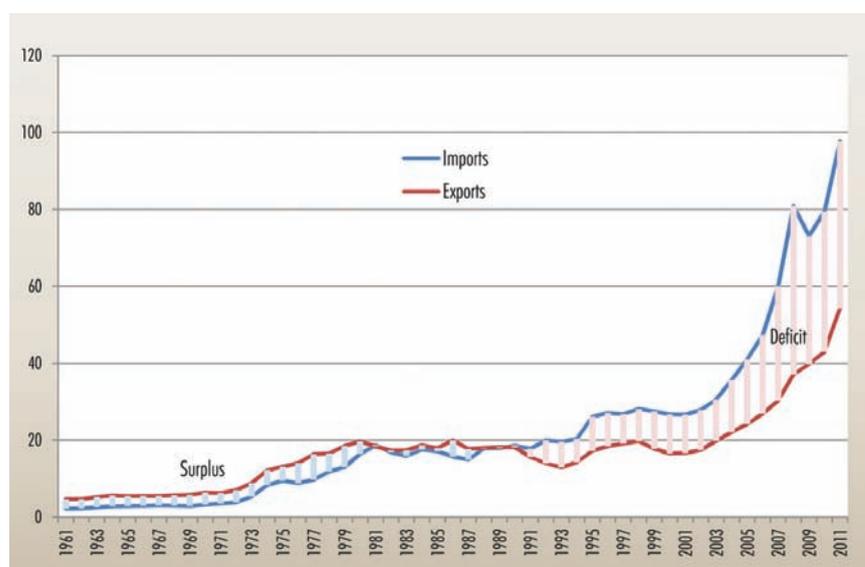
of losses. However, this approach is more broadly and comprehensively embedded in numerous agricultural action programmes of governments, international financial institutions and UN organizations, as well as in far-reaching changes in global agriculture.

#### Systems approach

Within the framework of its Programme for Rural Development and Food Security, the Federal Ministry for Economic Co-operation and Development (BMZ) has again incorporated the topic of postharvest protection. At a conference in June 2012, participants discussed previous experiences in development cooperation and options for action.<sup>29</sup> The GIZ, one of the implementing organisations of the BMZ, together with the World Cocoa Foundation, a cacao industry foundation that supports small-scale farmers, are currently preparing a study on food losses associated with cassava and maize in Nigeria. The first phase involves evaluating available studies and experiences drawn from development projects and setting out recommendations for German development cooperation. It draws conclusions from the little success of earlier isolated and primarily technical approaches:

- Since causes of the losses depend on the system, it is necessary to adopt a systems approach.
- In order to identify the most important problem areas, the entire supply chain must be taken into account.

**Graph 5: Agri-Trade: Net Food Importing Developing Countries**  
(1961-2011, Billion US-Dollars).



Source: FAOSTAT

- Cooperating with the private sector can help to add value to activities implemented within the framework of development projects.

Many initiatives and activities that are currently being discussed or implemented are targeted at agriculture in Africa.

- The FAO cooperates with the African Development Bank (AfDB) within the framework of a programme to reduce postharvest losses, providing USD 1.7 billion.
- Together with the World Bank, the FAO has carried out various workshops to reduce postharvest losses in grain supply.<sup>30</sup>
- Information networks, such as the INPho (Information Network on Postharvest Operations) and APHLIS (The African Postharvest Losses Information System<sup>31</sup>), which were founded on the initiative of the European Commission, will gather information and make it accessible.

Besides the systems approach, a close partnership with the private sector is of prime importance. Within its global initiative to reduce food losses and waste (Food Loss Reduction Strategy<sup>32</sup>), the FAO relies on cooperation with the packaging industry. Under the heading SAVE FOOD, it recently carried out numerous events at the packaging trade fair Interpack in Düsseldorf, in the hope that the industry will provide solutions to the problems.

At the same time, the objectives have shifted: The main focus of the rediscovered interest in food losses is now on securing a supply of high-quality agricultural products so as to satisfy the needs of the industry and urban consumers: “The system’s primary goal is to provide consumers with high-quality and safe food”.<sup>33</sup>

### Market integration

In contrast to former approaches that included providing farmers directly with suggestions and services to enable them to protect themselves against losses, the new systems approach is to “link them to the market” and encourage them to adopt corresponding measures through economic incentives. “The market”, i.e. the development of prosperous urban middle classes and changed consumer needs, would now “reward” reduced losses and improved quality”.<sup>34</sup>

To fund appropriate measures and to be able to supply the products demanded on the market in sufficient quantity and quality, family farms

need access to loans, power supply, means of production and transportation facilities. A fundamental role in supplying them is allocated to private companies. Contract farming, i.e. the cooperation of family farms and buyers such as processors and supermarkets, therefore appears to be the most promising way to reduce losses. At the same time it should also boost the production, productivity and “efficiency” of the entire production and processing chain, leading to increased food production. According to the World Bank, this could also benefit small-scale farmers who to date have been constantly living on the edge of existence.

Preconditions for this private sector involvement in the agricultural sector include public investments and state measures. Infrastructural improvements can help to reduce transportation costs and improve production conditions. Reliable pricing policies and reforms of land use rights aim to create favourable investment conditions.

### Opportunities and risks

The growing interest among private companies in the agricultural sector offers opportunities for this kind of strategy. The global agricultural industry is increasingly growing together, both horizontally and vertically. Old stakeholders, such as global agricultural corporations and trading groups that already dominate the world market, and new buyers, such as supermarket chains that are expanding globally, are trying to control the entire production and supply chain, from the supply of seeds, fertilizers and other means of production to production and consumers. As has become apparent in the case of land grabbing, i.e. the dramatically increased involvement of investors of all kinds, land, agriculture and food production, but also other agricultural products such as energy crops, fodder and industrial raw materials are becoming increasingly important for the economy and for economic growth.

At the same time, this development also means that industrial food production methods, which have been implemented in almost every farm in industrial countries, will now also dominate small-scale farming in the countries of the Global South, which to date have been predominantly producing for their own consumption, local markets and to guarantee regional food security.

Therefore, we cannot be sure whether this market integration will indeed help to reduce losses altogether, or whether it will merely change its form—from postharvest losses to the

destruction and waste of food caused by industrial agricultural production that is guided by the dictates of supermarkets and the manufacturing industry. This would merely shift the problem, without actually contributing to reducing losses.

For farmers and the supply of the populations of the countries of the South, this strategy is only of limited advantage. Farms that have the necessary prerequisites, such as sufficient land and water and a location near the new urban markets, or access to export opportunities, could increase their production and income this way. This would promote the development of a new class of medium-sized farmers who supply the food industry. However, millions of families do not produce enough to be able to benefit from better sales opportunities, but rather are forced to buy additional food once their own harvest has been consumed. "Many grain producers in Sub-Saharan Africa that live in extreme poverty will presumably remain outside the markets," the World Bank admits, thereby clearly outlining the limits of this strategy. Instead of economic integration into supply chains or marketing initiatives, it proposes subsidised social "security networks" as appropriate instruments and "exit strategies" for millions of farming families, which means a withdrawal from agriculture.<sup>35</sup>

### 3.3 Alternative non-industrial agriculture: Local is beautiful

*"That rescuing food leads to better access to food for those who need it most, has not been clearly established".*  
Earth Trends

Since hunger and food insecurity are particularly widespread in regions of small-scale farming that have too little land, water and capital to benefit from a market-oriented approach, loss reduction measures and measures to improve production must begin here. During the past decades, a whole set of practical measures, technologies and concepts have been developed and tested, many of which might indeed be sensible and helpful (see box 4: Measures to reduce postharvest losses). The same applies to individual elements of a market-oriented approach or cooperation with private buyers or service providers. They must, however, be tailored and adapted to the conditions and possibilities of small-scale farming, and not be imposed by technology-fixated experts or powerful buyers.

#### Box 4: Measures to reduce postharvest losses

Since the 1980s, numerous approaches, technologies, practices, and training and advisory programmes have been developed and proven to reduce postharvest losses of small-scale farmers. They are based on harvest practices and immediate processing, since high losses can occur already at this stage:

- The International Rice Research Institute (IRRI) developed a two-wheeled tractor especially for small-scale farmers that can be used for ploughing, maize cob shelling, harvesting wheat or threshing.
- A great variety of tools were developed to improve the important drying process, including, in Vietnam, dryers that run on rice husks
- Small power-driven hammer mills that facilitate the work for women and offer them income opportunities were a large success in Sub-Saharan Africa's grain sector.
- "ASI-Thresher-Cleaners" for threshing and cleaning rice, which can be manufactured by local businesses, are just another success story. At a price of USD 5,000, they are too expensive for small farms, but have come to be used for half of the entire rice harvest in Senegal.

Local storage systems are the second important area in which measures have been implemented, since a significant volume of the harvest is lost due to pests:

- A whole collection of different storage devices were developed. Some are based on traditional models made of clay, others are made of metal, which is widespread in Central America. Also, "triple bagging", where the harvest is packed in triple plastic bags, protects against storage losses.
- To take account of environmental and health concerns, it was attempted to replace synthetic pesticides, for example, by heat treatment, which is, however, often little practicable under African conditions.

### **Box 5: “Warehouse Receipt Systems” – Storage and access to loans**

Storage facilities managed by private or public institutions or cooperatives allow farmers to store their harvest until they can sell it. For this purpose, they receive a warehouse receipt, which can be used as a security to obtain loans for making investments. Private operators are, however, often too expensive for small-scale farmers and are focused on export products such as coffee or cacao. In addition, banks have shown little interest in this form of lending, and as a result, public or cooperative systems are not widely used.

Such measures have to be not too expensive or labour-intensive and they must not entail high costs. Poor farmers lack access to the metal silos that were successful in Latin America, rice threshing machines for USD 5,000, or measures to fight rats, the costs of which correspond to one third of the harvest. Such disadvantages reverse any possible advantages; their use poses an economical risk and can increase the debt burden.

If small-scale farming is to be improved, a systems approach must be adopted, which is different in many ways from the market integration pursued by most approaches of bilateral and multilateral development cooperation. Measures to protect against postharvest losses need to be included in a new comprehensive approach to promoting small-scale farming so as to make full use of its potential to reduce losses, increase production and income and thus reduce hunger and poverty. These include:

- Cheap, locally adapted land varieties that are stored, conserved and exchanged in local seed banks, instead of high-yield crops that can be expensive and susceptible to disease and pests;
- Biological fertilisation and pest control that help to reduce costs;
- Simple processing methods that extend the shelf life of food and, at the same time, allow for income opportunities, in particular for women;
- Local grain silos instead of large, commercial central silos that are predominantly intended for export or speculation on rising prices;

- Possibilities for independently obtaining financial resources for investments (loans from state banks, sale of agricultural products etc.) to minimise dependency on money lenders or commercial investors;
- Market access based on short ways, such as farmers’ markets in rural regions and cities, or unions of consumers and producers, which can circumvent rising prices for imported foods;
- Corporative or state organisations acting to counterbalance private buyers by providing an alternative solution to purchasing agricultural products, in particular basic foods, lending and provision of means of production.

To develop and implement these measures it is necessary to consult producers and include them in the decision-making processes. In addition, agricultural research and consulting, which is currently strongly focused on market-oriented farmers, must be increasingly adapted to the difficult and complex conditions under which small-scale farmers live. This can only be done by enabling the central actors, i.e. the small-scale farmers themselves, to participate.

In addition, small-scale farmers must jointly organise marketing so as to be able to take a united stand towards buyers. The joint purchasing of supplies also allows them to benefit from low prices for means of production. Besides these economic advantages, small-scale farmers must also unite to make themselves heard politically and to pronounce their concerns, demands and interests. Not only are they suffering as a result of the fact that they do not come close to fully exploiting their economic potential; they are also in a weak position vis-à-vis industrial agriculture at the social and political level. The result is that they do not receive the necessary attention and support of governments or international development organisations.

In response to these disadvantages, marginalization and external control of agricultural and rural development by the global agricultural industry and politics, the concept of food sovereignty has been developed during the past years<sup>36</sup>. This concept entails a demand for a democratic, self-determined agricultural development involving localised production and marketing and focusing on small-scale farming as its central pillar. Not only could it contribute to reducing losses and waste, but it could also be more effective than a market-oriented approach when it comes to tackling hunger, poverty and environmental problems in the agricultural and food sector.

## 4 Summary

The success of the film “Taste the Waste” shows that criticism of waste and food destruction has clearly hit a nerve in the consumer society. The accompanying debate reflects a profound unease with a situation in which abundance and waste prevail at one extreme, and hunger and poverty at the other. This has become a focal point of all of the problem areas of a food system that makes far less efficient use of scarce resources such as food, land and water than claimed by its protagonists.

At the same time, basic food price jumps, bread riots and the assumption that further expensive increases in agricultural production are necessary have led to “food security” becoming a global issue with high conflict potential with regard to the access to land, water and energy. Governments, international development organisations and financial institutions are initiating measures to combat food losses in order to reduce hunger and poverty and to avoid price increases.

The reasons for about a third of harvested food being lost “from field and fork” are manifold. In simple terms, they can be attributed to two different production and food systems: They occur as part of a supply chain where industrial agribusiness, processing industry, trade and marketing conditions systematically lead to food being devaluated and destroyed. At the end of the supply chain, this is reflected in wastage, waste production and a “throw-away mentality” of the consumer society.

In contrast, in many agriculturally oriented countries of the Global South, the majority of losses occur during food production, which is based on small-scale farming, i.e. immediately after harvesting, during storage, local processing and transportation. This is due to the fact that small-scale farming and rural areas have been neglected in favour of an export-oriented industrialised agribusiness, which has only been possible because of the successful increase of wheat production during the Green Revolution in the 1970s and 1980s.

However, this debate is rife with contradictions: In spite of broad public attention and commotion, research on the extent and causes of losses and waste in the different phases of

the supply chain in different countries and agricultural systems, is, from a methodical perspective, still in its very early stages. Therefore, the potential for savings and the costs also remain unclear, as does the question as to whether they are in a reasonable relation to each other and where measures should primarily begin if they are to have maximum impact. At the same time, other important causes of food shortage, such as the expanding cultivation of fodder, energy crops and agro-industrial raw materials fade into the background.

The public debate on losses and waste, as well as the answers and initiatives on the part of development policy, develop at different levels, pursue different approaches and are in some ways inherently contradictory.

Thus, for obvious reasons, the debate in Europe focuses above all on consumer behaviour, industry and trade policies or on bureaucratic regulations and procedures and their contribution to waste production. Measures at the “prosperity end” of supply chains and individual consumer behaviour, including moderate meat consumption are indeed vital, but have no immediate impact on the starving or small-scale farming in the countries of the Global South. Most importantly, they have little influence on structural causes of the displacement of subsistence through export production, expanding fodder cultivation or the use of agrofuels. What we really need are political initiatives.

In contrast, bilateral and multilateral development cooperation initiatives focus on the situation in the countries of the Global South by improving efficiency in supply chains and protecting against losses so as to reduce hunger and poverty. The emphasis of their market-oriented systems approach is on integrating small-scale farming into the value chains of the processing industry and trade. Cooperation between farming families and private buyers, such as processors and supermarkets, seems to be the most promising way of reducing losses.

If small-scale farming in the countries of the Global South is now to be dominated by industrial methods of food production, there is the risk that, instead of reducing the overall loss ratio, we merely shift the causes – from postharvest losses to waste.

This approach also satisfies the growing interests of private companies in the agricultural sector, which manifests itself for example in land grabbing. Global agricultural corporations and trading groups and expanding supermarket chains are currently trying to control the entire production and supply chain, from the supply of seeds, fertilizers and resources to production and consumers. However, this approach excludes a considerable proportion of farmers and the rural population, above all the most hungry and poor, who should be the first to benefit from the measures.

Hence, if we take the goal of tackling hunger, poverty and scarce resources seriously, it is neither sufficient to change consumer behaviour in the North nor to foster market integration in the Global South. Rather, we must shift the focus: hence, the systems approach.

Since hunger and food insecurity are particularly widespread in small-scale farming regions that do not have enough land, water and capital to benefit from a market-oriented approach, all measures must begin here. They should not be dominated by the interests of buyers, but must build on the conditions of small-scale farming so as to make full use of its potential to reduce losses, increase production and income and thus to reduce hunger and poverty. This way, the presumably much higher

losses that occur “on the field” during production, would be taken into account.

For this purpose, we need to expand approaches of incorporating small agricultural producers in political decisions and development with regard to agriculture. In addition, farmers’ organisations need to be strengthened in order to place greater emphasis on their interests, concerns and demands. For, not only are small-scale farmers suffering as a result of the fact that they do not fully exploit their economic potential. They are also in a weak position vis-à-vis industrial agriculture at the social and political level. The result is that they do not receive the necessary attention and support of governments and international development organizations.

With the problems of the current dual food system on the agenda thanks to discussions about losses and waste, the much more complex question comes to the fore as to what a global food security strategy should look like. It is obvious that reducing losses and waste alone will not be sufficient to secure access to sufficient food for all and create an agriculture that is socially, economically and environmentally sustainable. The quest for solutions to these problems leads directly into a systems debate on what type of agriculture and food system can secure food and livelihoods for the millions of families who live off small-scale farming, while at the same time protecting the environment and resources.

## 5 Conclusions

We should make use of the attention currently being paid to the issue of food losses and waste to discuss and promote possibilities and the need for action to improve food security in the countries of the Global South.

Such measures should aim to increase the overall supply of staple foods, but also specifically improve availability and access for those population groups that, due to poverty or economical precarity, are currently not in a position to feed themselves. This means that measures should:

- First, focus on those regions that are characterised by food insecurity, since it is only there that reduction in postharvest losses can directly improve the supply of and the access to food,

- Second, specifically target small-scale farming, since reductions in postharvest losses in other areas of agriculture, for example in larger companies, will have little positive impact on food security.

Measures must also be oriented to the needs, demands and economic possibilities of the target groups. The idea that postharvest losses in farming families or marginalised regions can be primarily reduced by means of economic incentives and market integration is unrealistic, since most farming families lack the conditions to make use of these “incentives”.

Measures must also be participatory and linked to knowledge, experiences and possibil-

ities of the target groups, rather than derived from the needs of value chains, such as the demand for high-quality products.

All experience shows that purely technological or isolated approaches bring little success. Measures to reduce postharvest losses must instead be embedded in an “alternative systems approach”, which promotes small-scale farming as a whole rather than hoping that private

economic or profit interests will somehow “pull along” small-scale farming.

Therefore, it is necessary to shift the focus of development cooperation. It is currently a long way from a targeted support of small-scale farming and food security, as it is increasingly oriented to the integration of small-scale farming in production processes of the agricultural industry.

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## **Lost harvests - Food losses and food insecurity**

Extent and causes, impacts and possible solutions

Uwe Hoering | FDCL | February 2014

