Systemic food wastage analysis, diets and food systems transformation

1. Introduction

Food wastage is an emerging problem with enormous environmental, economic and social implications. The issue is very large because this term is not only about domestic waste, but also what happens during the whole food chain, from production to final consumption and different aspects have so far been neglected. It has to be considered relatively new in the international scientific and political discourses and FAO has only recently developed a line of analysis and activities on the issue.

2. Methods

It's evident that the definition of food waste and its perimeter have effects on the way is quantified and on the policies. Existing studies are not yet adapted to fully address the issue. The approach focused primarily on food address the issue in a more structural way than the waste-focused approach does. Analyzing phenomenon through a more comprehensive approach and giving priority to surpluses prevention imply to consider all technological, cultural, social and economic drivers, as well as internal relations into entire production-distribution-consumption patterns, subtending different food systems types. To achieve a complete definition the main aim is the resilience of coupled socio-ecological systems within the ecological and social limits, not just the efficient use of resources or the food security.

Based on the existing literature and data, also with a survey on the main success stories, we provide an overview of the nexus between environmental issues and other aspects, such as food security and sovereignty, territorial development, bioeconomy.

The report comes to a proposal of systemic definition and highlights critical extent and effects of food wastage by providing extensive data and information at national, European and global scale. Data reported in this study are the only ones currently available and further analysis are needed.

3. Results

In a food system wastage is the part of production that exceeds dietary requirements and ecological capacities. Thus in addition to conventional wastage that produce waste, food wastage should include: "non-yields" and pre-harvest losses of edible products; industrial, energy and livestock uses of edible products; human overeating; nutritional quality losses; wastage of drinking water.

Including overeating and livestock supply, wastage is globally almost 50% of production in energy/mass; as proteins wastage exceeds 66%; another 10-15% of food goes to non-food uses. European and Italian systemic wastage could be at least 63% in food energy. Global requirement

increases are followed by excessive withdrawals, supplies, consumptions and wastage exponential increase (32 times the average requirement); where production and supply come down wastage falls. Agro-industrial structures and overproduction amplify strong geographical and within populations imbalances: globally 66% of people suffer serious nutritional problems. Environmental effects are mainly related to production stages rather than to the disposal ones. Food systems are main driver of exceeding biophysical limits of processes regulating Earth's resilience: first cause of exceeding alteration of biodiversity and nitrogen-phosphorus cycles as for soil consumption; among first for climate change, first cause of approaching the limit in water consumption. Ecological footprint of food wastage takes in biocapacity deficit for about: 58% globally, 30% in the Mediterranean, 18% in Italy where it takes half of the biocapacity.

Accounting only food waste, not considering other components, alternative systems produce less wastage. With the same resources employed small-scale ecological agriculture produces waste from 2 to 4 times lower than agroindustrial systems, it has a total consumption of resources much lower, it's more durable and provides more nutrients. On a global level small-scale agriculture produces 70% of total food production using 25% of the land. The available data show: local short-biological supply chains reduce pre-consumption food waste to 5% against 30-50% of industrial systems; consumers that only supply themselves in alternative food networks waste one-tenth compared to those who use only conventional channels; community supported agriculture (CSA) systems waste 7%, against 55% of the large-scale retail systems.

4. Discussion and Conclusions

Basically wastage level is feature of the structure in each food system model. Today the main tackling approach is the prevention of garbage (technical efficiency, food recovery, recycle) which yet can preserves the rise of surpluses, systemic wastages and negative effects. For effective reduction, efforts must go to the structural prevention of surpluses grounding on cooperating local self-sustaining communities. It should be promoted: sustainable food model planning and green public procurements; systemic/participatory local policies; food education; local, small-scale, ecological and solidarity networks; peasant agriculture and access to land; agroecology and protection of agrobiodiversity; social, urban-periurban, inland areas agriculture; struggle *vs* illicit; more research; institutional initiatives; transformation of industrial chains; citizens active role.

To come back into ecological capacities, systemic wastage should be likely reduced at least: to 1/3 of the current globally, to 1/4 in Italy. It's needed to make food a right and a common, with more social and economic value, fair production and access, avoiding commodification and glamorizing. Total requirements and surpluses must be reduced, production must be ecological and self-sufficient, reversing agricultural/natural land take, supporting alternative networks, aggregating resilient communities, reducing animal products, ultra elaborated, unhealthy fats, salts, sugars and addiction to international finance and trade, with a type of *quasi*-circular bioeconomy avoiding the Jevons paradox (simultaneous increases of efficiency and of total resources consumption) using just minimum physiological surpluses.

5. References

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