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REDUCTION OF FISH FOOD LOSS AND WASTE

Executive Summary

This paper provides a global overview of fish food loss and waste in fisheries and aquaculture, reviews the recent developments in this area and summarizes FAO's work for reduction of fish loss and waste along the value chain at national and global levels. Information on the policy guidance being developed, as requested by the twenty-second session of the Committee on Fisheries (COFI:32) is also presented in this paper.

Suggested action by the Sub-Committee

- Share information on relevant national, regional and inter-regional experience;
- Provide advice on how to proceed with the draft Guidance being developed by FAO following the request during the COFI:32;
- Provide recommendations on identifying areas for further work that address the needs of the broad range of stakeholders in the fishery and aquaculture value chains.

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INTRODUCTION

1. The potential contribution of the fisheries sector to sustainable development, especially in developing countries and countries in transition, is much higher than it is currently being achieved. This is mainly due to issues such as illegal, unreported and unregulated (IUU) fishing, over-fished fish stocks, degraded environments and ecosystems and, significantly, fish loss and waste.

2. Food losses in the fisheries sector are a significant issue in contemporary food systems, irrespective of the economic status of the country, the scale of fisheries, or the value chain complexity. It remains a serious problem, despite the FAO Code of Conduct for Responsible Fisheries (Article 11.1 - Responsible fish utilization) giving it prominence for over two decades. It is estimated that the percentage of fish and seafood produced for human consumption lost or wasted globally is almost twice that of meat, most likely linked to the highly perishable nature of this food commodity¹. Not only do losses constitute lost income to fishers, processors and traders but they also contribute to food and nutrition insecurity.

3. The global importance of food losses was recognised in 2012 at the United Nations Conference on Sustainable Development - Rio+20 - where food loss and waste were addressed under pillars 3 and 5 of the Zero Hunger Challenge, as well as in the 2015 Sustainable Development Goals (SDGs), mainly but not exclusively, under SDG12 (Ensure sustainable consumption and production patterns). FAO has prioritized food losses in the fisheries sector since the mid-1990s and taken the global leadership through different initiatives, both in assessing losses and in capacity development to address losses.

4. The importance of reducing fish losses throughout the whole supply chain was recognized at COFI:32 held in July 2016, which made a request for the development by FAO of guidance on the reduction of fish losses.

5. This paper describes the food and nutrition security relevance of fish loss and waste, the initiatives undertaken so far to tackle them, and the perspectives from the pilot project on the development of guidance on the reduction of food losses.

RELEVANCE OF FISH LOSS AND WASTE TO FOOD AND NUTRITION SECURITY

6. The demand for fish continues to increase and the sector is striving to be more productive and sustainable and to enable more inclusive and efficient systems while, at the same time, reducing rural poverty and enhancing the resilience of livelihoods to disasters, crises and climate change². This is where continued global food loss and waste becomes a paradox, in failing to ensure that food produced is fully utilised for human consumption.

7. The FAO definition of “food loss”, under the Global Initiative Food Loss and Waste Reduction (Save Food), is “the decrease in quantity or quality of food”³ and includes both food loss and food waste. However, the term “food loss and waste” (FLW) will continue to be used in this paper to emphasize the importance of both types of loss.

8. An important part of food loss is called food waste. The latter refers to the removal from the supply chain of food fit for consumption, either by choice, or that has been left to spoil or expire as a result of negligence by the actor – predominantly, but not exclusively, referring to the final consumer at household level. FLW occur throughout all stages of the value chain, from harvesting to the consumer, but the significance of the losses and the points where they occur vary by geographic region and

¹ www.fao.org/docrep/014/mb060e/mb060e00.pdf

² www.fao.org/3/a-i3720e/index.html

³ www.fao.org/fileadmin/user_upload/save-food/PDF/FLW_Definition_and_Scope_2014.pdf

according to the product or supply chain. However, the High Level Panel of Experts on Food Security and Nutrition and Save Food acknowledged that in middle- and high-income countries, most of the FLW occur at the distribution and consumption levels, while in low-income countries, FLW are concentrated at production and post-harvest levels.

9. In 2012, FAO estimated global loss and waste to be almost one-third of food produced for human consumption, equating to approximately 1.3 billion tonnes per year⁴. The loss and waste for the whole fisheries sector amounted to 35 percent of global landings, and 9–15 percent of these losses are linked to fish discarded at sea, mostly in trawl fisheries.

10. These global figures are the most updated and quoted data on FLW across various commodities, although they are not based on systematic assessments. However, since the methodology to assess losses in small-scale fisheries was established in 2007⁵, many case studies have been undertaken to better understand the extent of FLW in this sector. Most of the commissioned studies have reported high levels of post-harvest losses, with an overriding level of fish quality loss, i.e. fish that incurs a reduction in quality/safety and/or nutritional attributes. These losses can account for up to 70 percent of total losses in a given value chain, giving rise to a loss in high quality protein (readily digestible, with essential amino acids), long-chain polyunsaturated fatty acids and micronutrients. Likewise, physical removal of fish from the food chain results in a (physical) loss and contributes to reducing availability. In both cases, food and nutrition security is significantly impacted as consumers have access to a smaller amount of fish or to fish of a lower quality, while the value chain actors have poorer economic returns.

11. By-products generated from processing of fish can represent a source of potential waste. With more fish being industrially processed, their amount wasted is expected to increase. If properly handled these by-products can represent an important source of raw material for food and feed purposes, including their use as fertilizers, rather than being wasted. The amount of catches reduced into fishmeal and fish oil is declining and a growing share of their production (25–30 percent) is already based on the utilization of fish by-products rather than whole fish. These by-products are usually not considered for food purposes, even if they represent a major component of fish micronutrients in terms of nutritional composition. Micronutrient deficiencies are affecting 2–3 billion people at global level. As a result, the limited utilization of these nutrient dense parts of the fish for food represents a lost opportunity from a nutritional point of view. By using innovative approaches and available technologies, many more of these valuable nutrients could be utilized for human consumption thus playing an important role in achieving nutrition and food security.

EXPERIENCE FROM VARIOUS INITIATIVES

12. Most significant targeted efforts to tackle FLW date back from the mid-1990s. This was when the collaborative undertaking with the Department for International Development of the United Kingdom of Great Britain and Northern Ireland and a project funded by the European Union (Member Organization) in West Africa, followed by an FAO partnership programme with a dozen of Sub-Saharan African countries developed and validated a post-harvest loss methodology in small-scale fisheries. This led to subsequent field assessments and the development of reduction strategies (FAO Technical paper 550⁶; Save Food Kenya case study⁷, FAO Circulars C1105⁸, C1121⁹ and C1129¹⁰, and others under regional programmes such as the Programme for the Implementation of a Regional Fisheries Strategy for the Eastern and Southern Africa-Indian Ocean Region (Indian Ocean Commission

⁴ www.fao.org/docrep/014/mb060e/mb060e00.pdf

⁵ www.fao.org/docrep/014/i2241e/i2241e.pdf

⁶ www.fao.org/docrep/013/i1798e/i1798e.pdf

⁷ www.fao.org/docrep/014/mb060e/mb060e00.pdf

⁸ www.fao.org/3/a-i5141e.pdf

⁹ www.fao.org/3/a-i5935e.pdf

¹⁰ Wibowo, S. *et al.*. 2017. Circular C1129 (in production).

(IOC)-SmartFish), and national FAO technical cooperation programmes). The rationale for these initiatives was that in order to efficiently tackle the problems of FLW and to prevent disjointed interventions, a systematic appraisal within any given context is required to focus on the efficiency of the entire post-harvest system, which can then provide reliable information to make cases for evidence-based policies, strategies and programmes.

13. These case studies demonstrated that FLW are caused by multiple factors stemming from technical, technological and/or infrastructure deficiencies and weaknesses in knowledge and skills, which together account for 65 percent of the causes undermining the availability of food. However, the remaining 35 percent of the causes of losses are shortcomings not commonly considered. These are linked to social and cultural dimensions of vulnerability, responsible governance, and regulations and their enforcement. Indeed, the institutional set-up, the information systems, the ability to anticipate and manage the supply or the purchase, the policy and regulatory enabling environment and the appropriate value chain development infrastructure can play a critical role in the occurrence of FLW. Likewise, addressing gender specific issues through managing the difficulties for women in the context of reducing chores (for example, providing child care facilities and developing gender sensitive technologies), providing capacity development, enforcing policy measures to address losses linked to “artificial glut” resulting from poor public safety (armed robberies on highways, trade corridors), have all shown significant impacts on reducing fish losses sustainably.

14. Fish drying and smoking are predominant fish preservation techniques in developing countries, yet they are associated with large post-harvest losses. Outdated technologies and poor fish handling practices, the challenges faced by processors during the rainy season or cloudy periods and the exposure of fish to contamination from physical, microbial or chemical hazards are major causes identified that have been addressed in several initiatives. The introduction of improved solar driers and the dual fish smoking and drying system known as the FAO-Thiaroye Technique^{11,12}, the strengthening of the cold chain using solar energy and the use of improved storage and transportation equipment have all contributed to reduce FLW along the supply chain. The use of raised racks for fish drying in Lake Tanganyika riparian countries that halved post-harvest losses within two years and the upgrading of mud crab (*Scylla serrata*) handling facilities in the Indian Ocean region, with subsequent social, economic (for example, reduced losses from 25 percent to 9.4 percent with additional 120 000 Malagasy Ariary per trip through improving the crab transport crates on canoe)¹³ and environmental benefits are two illustrations of success stories in combatting FLW.

15. The Regional (Near-East) Conference on Food Security and Income Generation through Reduction of Loss and Waste in Fisheries held on 15 to 17 December 2013 in Nouakchott, Mauritania, underscored the important losses at smallholders’ level, acknowledging the significant waste at household and consumption levels, including catering and other food services. It concluded that notwithstanding the importance of food traditions and habits in the region, the existence of loss generating practices, especially in specific situations (festive, cultural, etc.), has an effect on the level of losses. As a follow up to the Nouakchott Declaration, FAO, through the FAO Multi-Partner Programme Support Mechanism - the Global Initiative on Food Loss and Waste Reduction - is currently providing analytical and strategic support to Egypt to consolidate efforts toward FLW reduction. Preliminary findings from gear selectivity experiments, presented at a stakeholder consultation workshop this year, show the potential for significant loss reduction by introducing improved fishing gear in shrimp trawling in the Gulf of Suez.

¹¹ www.fao.org/3/a-i4174e.pdf

¹² Ndiaye, O., Diei-Ouadi Y. 2011. Smoking healthy and eating healthy fish: Performance of the FAO-Thiaroye system, an improved design of kiln with particular focus on the control of polycyclic aromatic hydrocarbons (PAH). In www.fao.org/docrep/017/i3093b/i3093b.pdf

¹³ http://commissionoceanindien.org/fileadmin/projets/smartfish/FAO/Handling_of_Mud_Crab.pdf

16. In tropical and sub-tropical fisheries, gillnets and trammel nets are the principal fishing gears used in artisanal, small-scale, household-based fisheries and are reported to be associated with significant loss of fishery products. This can start to occur during the setting, soaking and retrieval of fishing gear, with cumulative effects in the subsequent stages of the supply chain. Work has been undertaken to better understand the dynamics of the losses from the net to the last sale point. This includes an Expert Workshop on Estimating Food Loss and Wasted Resources from Gillnet and Trammel Net Fishing, held on 8 to 10 April 2015 in Cochin, India and a Latin America Regional Workshop on Estimating Food Loss in Gillnet and Trammel Net Fishing, held on 22 to 25 November 2016 in Campeche, Mexico, with follow up activities in Indonesia, India, and Tanzania, while the Amazonia river basin is being considered for the next biennium, pending funding. One of the outcomes from the workshop in the Latin America region was that nutritional losses will be quantified and characterized for the first time. It was also found that other factors impacted on reducing losses, including shortening the soaking time and time taken to haul nets back on-board, improving the capacity and the quality of storage facilities, managing the availability of fish from storage in response to price and supply fluctuations. Also, warehouse receipt systems used in other sectors (for example, the “resi gudang” system in the agriculture sector in Indonesia) were discussed and are being considered for application in the fishery sector. This “market force loss” or price reduction due to gluts and irrespective of the quality of the fishery product is another type of loss with implications for incomes of fishers¹⁴.

17. Other good practices addressing upstream FLW can assist in planning interventions and strategies to reduce losses. The amount of fish discarded as a result of by-catch is a significant loss of fish that could be used for food or feed purposes¹⁵. An ongoing REBYC-II project (funded by the Global Environmental Facility) is aiming to reduce by-catch, but at the same time promote no discards. Fish already caught should be utilized, and could provide low cost fish to local consumers. In separate work, by-products from tuna and Nile perch processing activities have been transformed into powders and successfully tested as ingredients in local diets.

18. Addressing policy, whether to set regulations, standards and guidelines or to provide incentives for behavioural change, is necessary to achieve competitive and efficient (i.e. low or zero loss) value chains. Aside from the interventions targeting the supply chain, it is important to inform consumers about their role in reducing losses, through raising awareness of food waste issues.

19. Fish waste at the retail level and by consumers, stemming from the poor purchasing decisions, are yet to be meaningful analysed. Likewise, the connection between the regulations on date marking of fish and fishery products and fish waste needs to be researched. Studies in other foodstuffs acknowledge that variations in date labelling terms and uses contribute to substantial misunderstanding by industry and consumers alike and leads to significant and unnecessary food loss and waste potential food safety risks, especially in perishable foods such as fish¹⁶. This is especially true when their interpretation may create more confusion among consumers. Food loss in the retailing sector and food services have been clearly established as significant sources of losses in many food commodities¹⁷.

20. Partnership, collaboration and advocacy have been prominent in the recent initiatives in food loss reduction at various levels, including under the FAO corporate Save Food. The experience so far shows that reducing FLW will most likely rely on a combination of improvement in awareness, knowledge and skills, as well as technical, financial, infrastructural and policy support. The experience to date emphasizes the fundamental fact that “one size does not fit all” in addressing FLW challenges. These loss reduction interventions have impact on three levels: a) increased sources of protein and of

¹⁴ Wibowo, S. *et al.* 2017. Circular C1129 (in production).

¹⁵ [www.europarl.europa.eu/RegData/etudes/STUD/2015/540360/IPOL_STU\(2015\)540360_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2015/540360/IPOL_STU(2015)540360_EN.pdf)

¹⁶ <http://onlinelibrary.wiley.com/doi/10.1111/1541-4337.12086/abstract>

¹⁷ www.nrdc.org/resources/dating-game-how-confusing-food-date-labels-lead-food-waste-america

other valuable macro- and micro-nutrients; b) improved incomes of the actors along the value chain; and c) positive impacts on the environment, including the sustainability of natural resources.

PERSPECTIVES WITH THE GLOBAL PROGRAMME ON PRACTICAL GUIDANCE TO INFORM POLICY ON ADDRESSING COMMON LOSS SCENARIOS

21. COFI:32 acknowledged the importance of reducing fish losses throughout the whole supply chain and made a request for the development by FAO of guidelines or guidance on the reduction of fish losses. As an initial step forward, Norway funded a seed project “Practical guidance to inform policy on addressing common loss scenarios from pre-harvest to consumption stages in fisheries and aquaculture”.

22. The rationale for this project stems from the acknowledgement that there has been a lot of work undertaken on methods to assess losses and to address losses at the policy level. There has also been a lot of work done, on a case by case basis, to address and prevent losses in the fisheries value chains around the world. However, there is no single repository of loss scenarios and loss reduction options. The project aims to address this, facilitating the development of solutions to food loss scenarios on the ground at the targeted points of the supply chain in fisheries and aquaculture. It will demonstrate the utility of a repository focusing first on guidance to policy makers on a set of the most common loss scenarios.

23. The document/repository, once fully developed, will provide options (technical, policy, managerial, educational) for reducing or eliminating food losses for common loss scenarios. The aim is that the repository will be a living document and further options will be provided as and when they are developed. Issues to be addressed in the repository will follow a food system approach, covering all aspects from pre-harvest in capture fisheries and aquaculture all the way to the consumer.

24. Such a loss reduction document/repository will provide guidance to policy makers (the focus of this seed project), development practitioners, non-governmental organizations and value chain actors to facilitate the development of solutions to food loss scenarios on the ground at the targeted points of the supply chain, as well as at policy level.

25. It is expected that further funding would allow the expansion of the project to cover all target beneficiaries, widen the coverage of loss scenarios and deepen the reduction options and information, utilizing lessons learned from the seed funding phase. If funds are available, more country case studies may also be incorporated in the next phase.