# Contribution of food waste and loss reduction on Indonesia emission mitigation: Preliminary finding and Proposed Method

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## 1. INTRODUCTION

Food waste and loss is serious problem, as it may harm the nutrition and environmental sustainability. Many countries are not give a serious concern on this case including Indonesia. As a big country with high number of population, Indonesia needs to ensure the food availability for its people. Unfortunately, 30%-50% of foods in Indonesia are wasted without being consumed by people.

Furthermore, if we compare the total food wastages in the South-east Asia region, the total food wastage in Indonesia is the highest (Figure a).
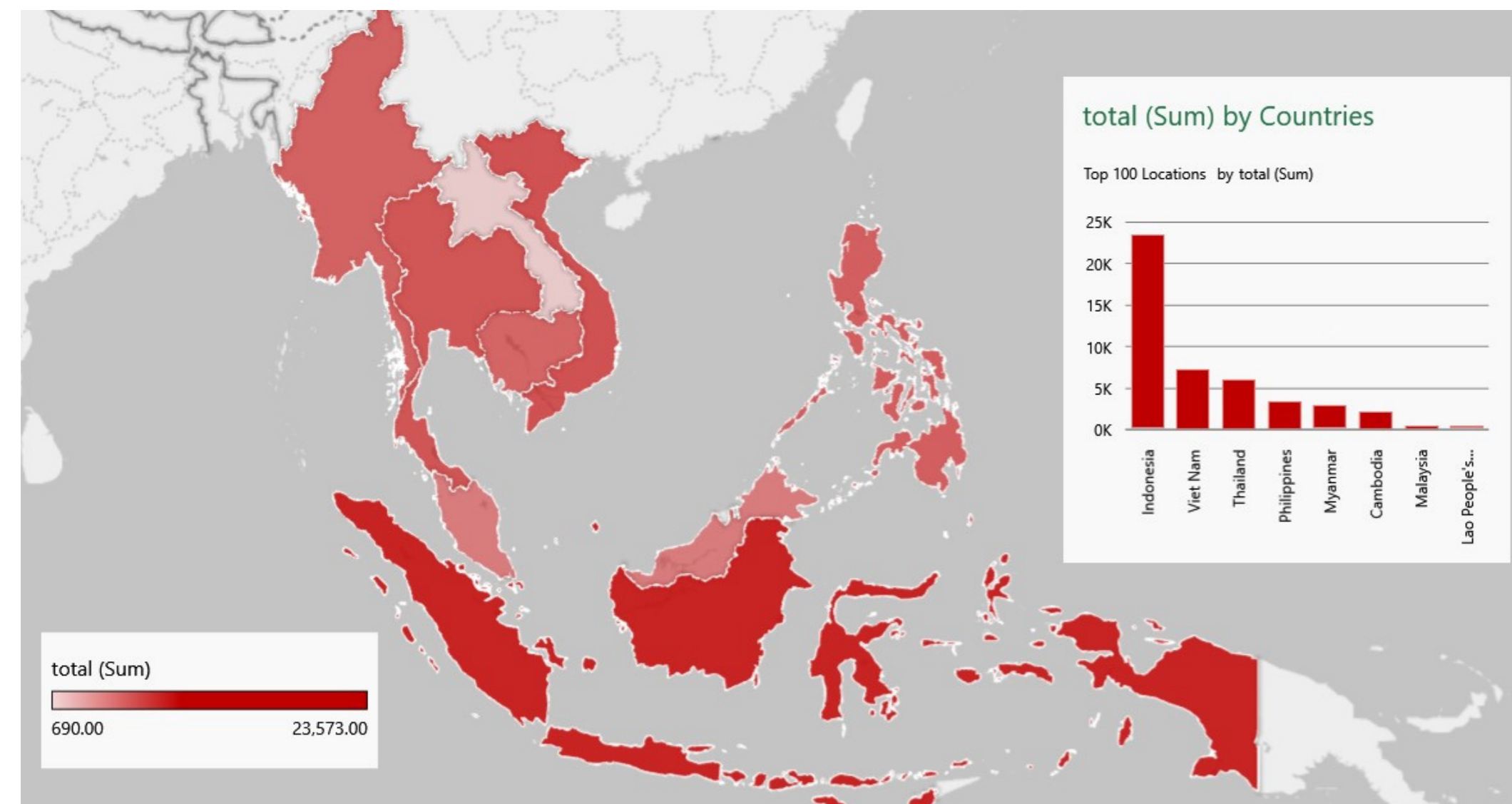


Figure 1. Food wastage comparison between each country in south-east Asia 2018 based on FAO food Balance Table (new method). Source: FAOSTAT (2021)

If we breakdown the food loss situation in Indonesia, we can see the loss is, although started to decrease, very high. The main problem comes from the cereals commodities that always dominate around half of the food loss of the country. Moreover, there is also a visible trend of wasted oils products along with the increase of oil crops and its demand (Figure 2).
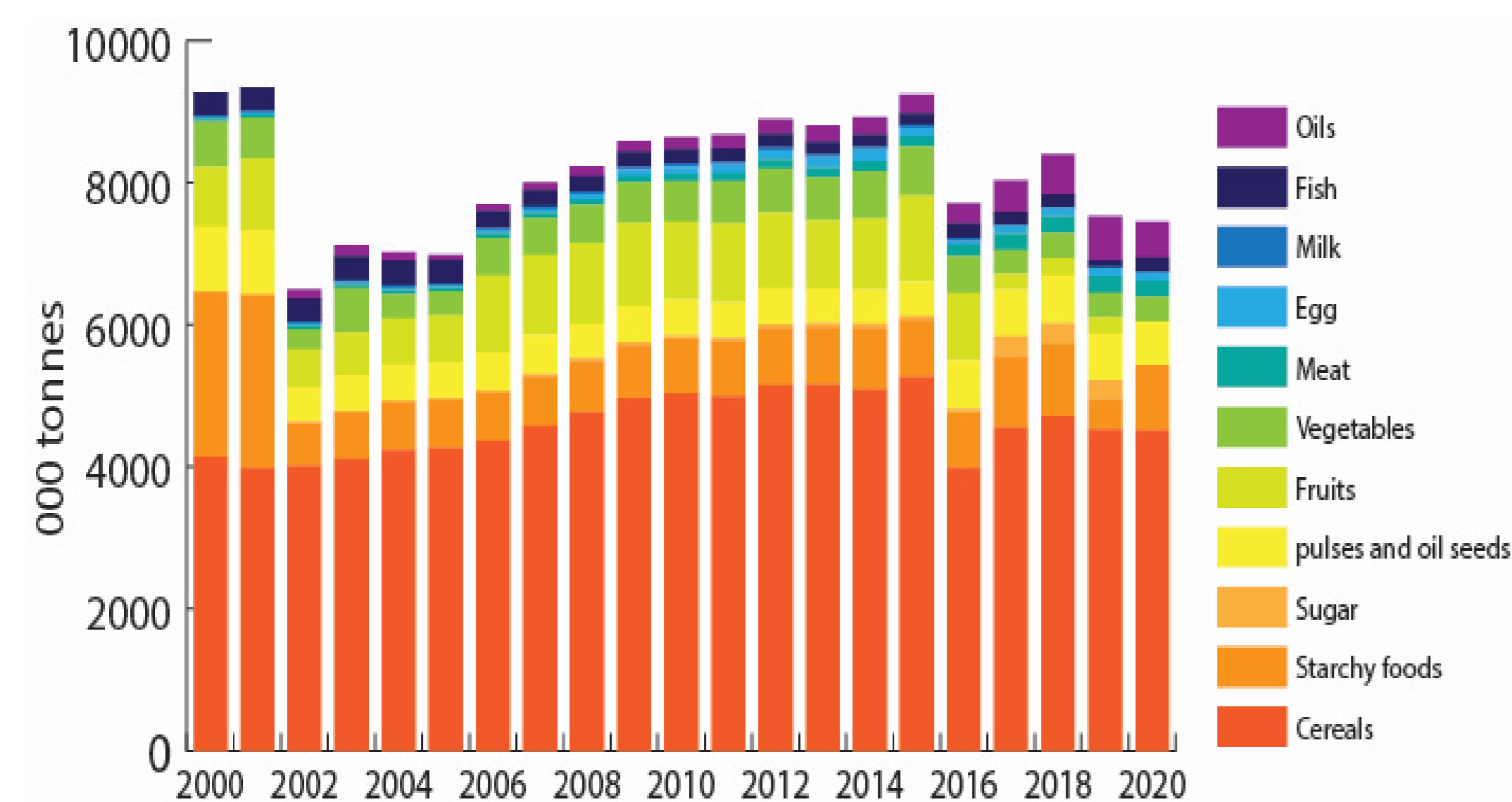


Figure 2. Food loss in Indonesia based on Indonesia Food Balance Table 2000-2020 for each food groups. Source: calculated from Indonesia food balance Table 2015-2021 Indonesia Ministry of Agriculture (2010-2021).

This condition is worrying because it can interfere with the food availability of the community. In addition, food waste also produces emissions directly and indirectly. This indirect emission from food waste comes from the process of land conversion for land clearing for food commodities. this can hinder Indonesia's mission in reducing emissions, including in the land use change (LUC) sector.

To assess this matter further, we are now developing and modify AIM/CGE [country] to assess the food wastages reduction and its impact to the economy and emission mitigation. In this presentation, we would like to present the idea and its model prototype.

## 2. PROPOSED DATA AND METHOD

Before modifying and developing AIM/CGE model, we need to gather several supporting information. In this case, we want to highlight the food wastages matter, thus we gather all the information about calculation of food wastages. For now, we are using the information gained from Food Balance Table (FBT), either from FAO or from national statistics.
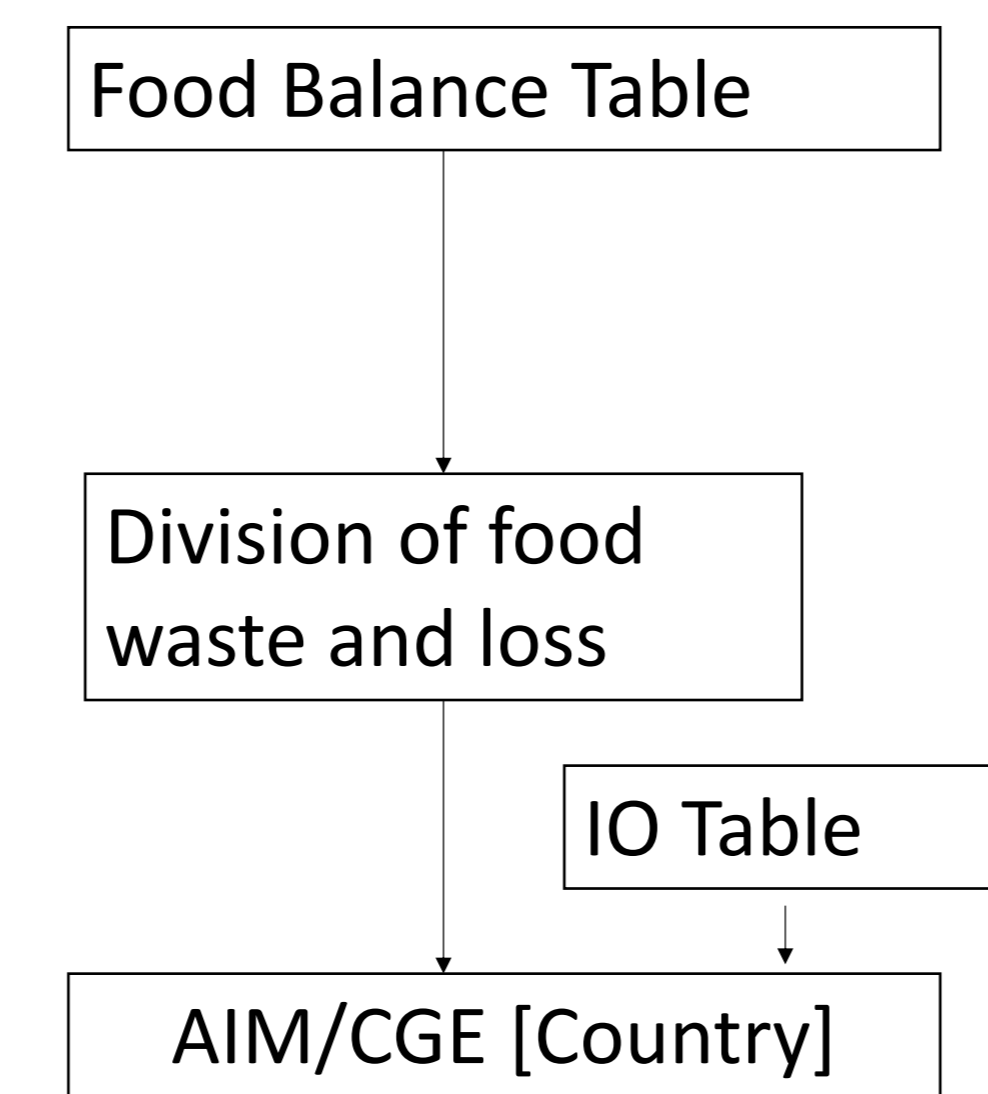


We start the model prototype from Indonesian case. In this case, we get the national statistic of Food Balance Table. However, the food wastages in the statistic only capture food loss and we still need to breakdown the FBT to make disaggregation between consumed food and food waste.

Another problem is, AIM/CGE [Indonesia] constructed based on IO Table that has different sector classification with the FBT.

Figure 3. Proposed step to assess the food wastages using AIM/CGE [country].

To combine those two datasets, we need to reexamine the sector classification, and do some aggregation/disaggregation of those two datasets, and after that running the simulation and do some parameter adjustment needed.

After finish to assess the case of Indonesia, the method can be used to assess another country in Southeast Asia.

## 3. PRELIMINARY FINDING

By using some available data, we created a prototype of AIM/CGE [Indonesia] to assess the food loss reduction effect in Indonesia. This work is using the IO Table Indonesia 2010 and FBT Indonesia 2010. The analysis still only involve the food loss reduction as we still need further work to decide the food waste in consumer level. We involve two scenarios:

BAU : Business as Usual; no change
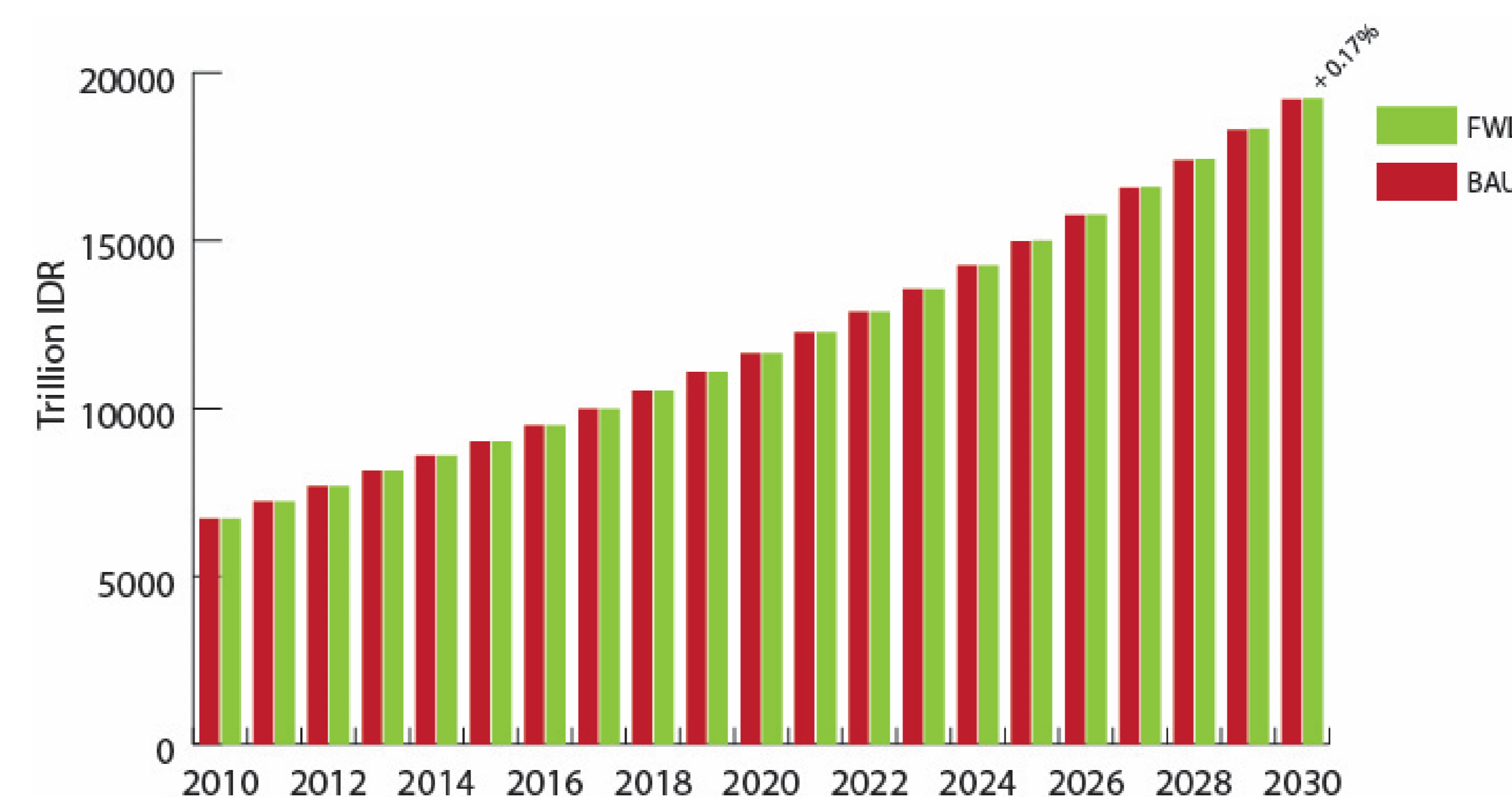FWL : Food loss reduction applied



Figure 4. Simulation result on GDP by 2030. Source: Malahayati & Masui (2021, in press).

From the simulation, by reducing the food loss for around 1%/ year for cereals and 0.5%/ year for other food crops, the simulation indicate the GDP will increase for around 0.17% (Figure 4). This result indicate that resources savings may bring a positive impact to economy.

Moreover, we also expect reduction of cropland if the food loss can be reduced as more food products can be consumed without expanding the land to boost the production. Our simulation also shows the potential reduction of cropland demand will achieve 1.28% compared to the BAU level by 2030. This value is around 300 thousand ha of cropland (Figure 5).
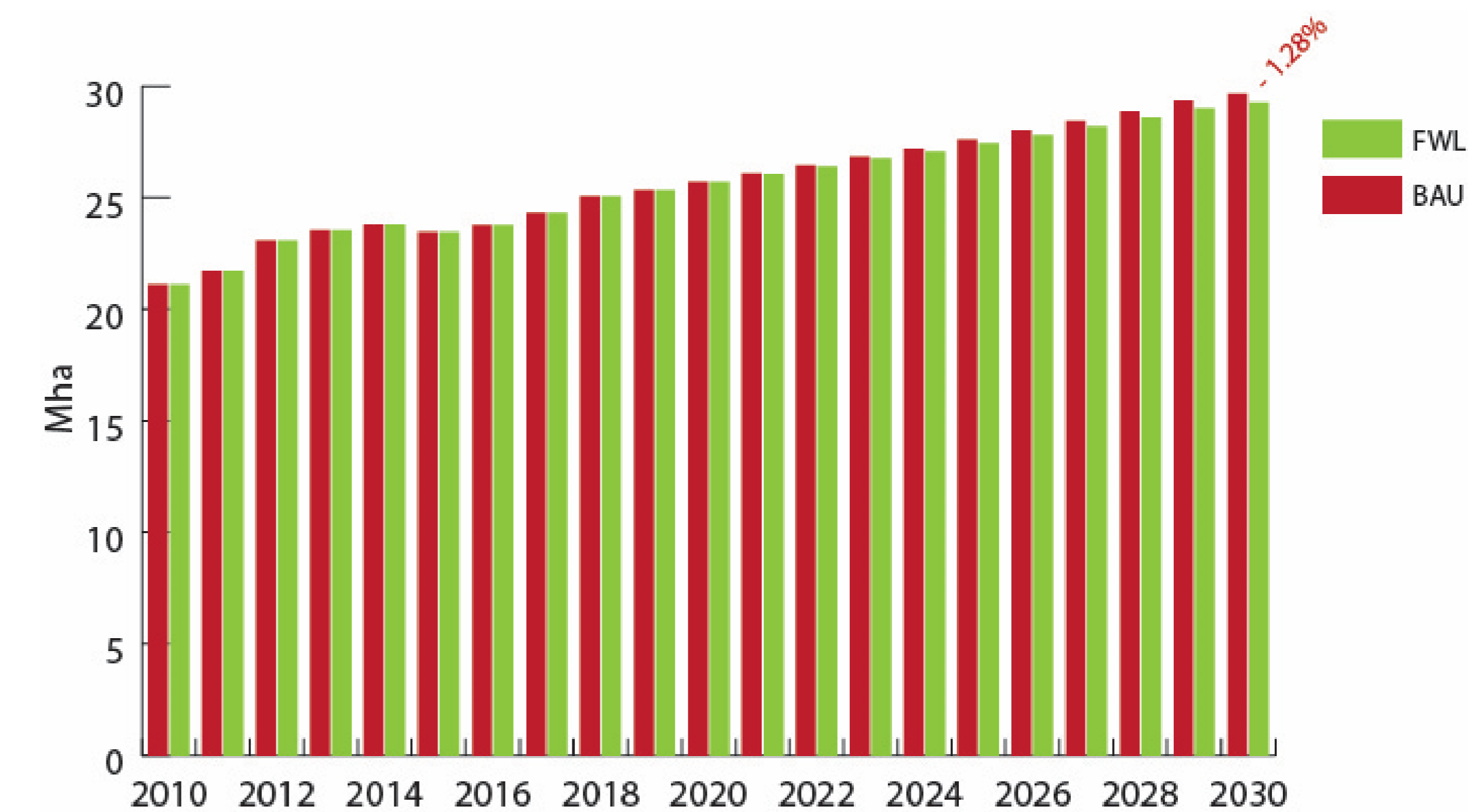


Figure 5. Simulation result on land demand by 2030. Source: Malahayati & Masui (2021, in press).

## 4. FUTURE WORKS

There are still many room for improvements for this study and model development. As we still need to complete some data and information to make the simulation can be more complete and comprehensive.

The most significant improvement will come from the separation of food loss and food waste.
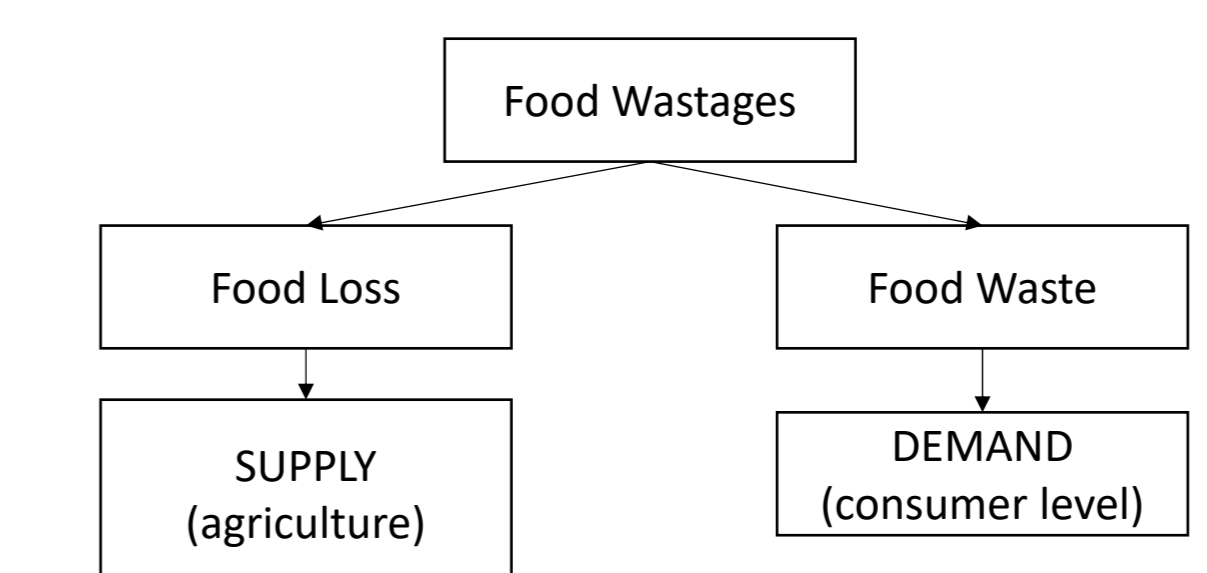


The assessment of food loss are mostly involve the setting in the supply side, especially for agricultural sectors. While the food waste will involve more analysis in the demand side as it is highly relate with the consumer demand (Figure 6).

Figure 6. Further analysis on Food Loss and Food Waste

Moreover, emission mitigation also an important topic to be assessed for Indonesia. Especially because Indonesia has a target to achieve net-zero emission by 2060. Thus, we would like to expand the analysis by looking the relation of food wastage reduction to the emission, and how much this food wastage reduction may help Indonesia to achieve the emission reduction target.

While this matter also involve life cycle assessment, we received some suggestions to consider further the utilization of food waste as bioenergy and as organic compost. As those kind of utilization may also affect the calculation emission and in the end the effect to the economy.

Also, as food also highly related to the public nutrition and health, a further exploration to this topic can also be assessed in the future study.

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