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Environment and development in the aftermath of the coronavirus disease pandemic in the Asia-Pacific region

The role of sustainable mechanization in addressing the impact of the coronavirus disease on agriculture and in building resilience**

Summary

The impact of the coronavirus disease (COVID-19) pandemic on the agricultural sector has brought unprecedented challenges to the Asia-Pacific region. At this juncture, it is important to undertake a closer analysis of the effect of the pandemic on agriculture in the region, with particular attention to resource-poor smallholder farmers and low-wage migrant agricultural workers. In addition, it is vital to identify solutions that can help member States ‘build back better’ the agricultural sector.

The wide-ranging impacts of the pandemic on the region’s agricultural sector include decrease in production in some areas, disruption in marketing and sales of agricultural produce, shortages in supply of agricultural labour and other inputs, decrease in farmers’ and farm labourers’ income, and worsening of food security. At the same time, many examples of positive and timely government interventions have emerged which have helped to contain and alleviate adverse effects.

Sustainable agricultural mechanization is among the solutions that can strengthen the resilience of the farming community to crises. Application of agricultural machinery through an inclusive and sustainable approach can introduce greater speed of operations in the food production process, increase yield and output, reduce production costs, increase cropping intensity, reduce post-harvest losses, save manpower and reduce the drudgery of agricultural work. All of these can, in turn, contribute to recovery from crises and strengthen the resilience of farmers and the agricultural sector as a whole to future shocks.

In order to optimize the contribution of sustainable agricultural mechanization to recovery and resilience in the agricultural sector, it is recommended to address the needs of smallholder farmers, strengthen rural infrastructure, promote information and communications technology-enabled/digital technologies, encourage research and development, and leverage the potential of mechanization to generate employment opportunities for youth.

* ESCAP/CED/2020/L.1.

** The present document is being issued without formal editing.

I. Introduction

1. The impact of the coronavirus disease (COVID-19) pandemic on the agricultural sector has brought unprecedented challenges in the Asia-Pacific region. The pandemic threatens to not only stagnate progress towards the Sustainable Development Goals including Goal 1 (No poverty) and Goal 2 (Zero hunger), but indeed has the potential to reverse the gains made in recent years, thus jeopardizing the global community's shared promise to '*leave no one behind*'. The United Nations has recently estimated that between 83 and 132 million people may be added to the ranks of the undernourished globally in 2020 due to the pandemic. This is of serious concern for the region as Asia is home to 381 million undernourished people which still represents the majority of the world's undernourished.¹

2. At this juncture, it is important to undertake a closer analysis of the impact of the pandemic on agriculture in the region, with particular reference to resource-poor smallholder farmers and low-wage migrant agricultural workers who are amongst those furthest behind. In addition, it is vital to identify solutions that can help member States 'build back better' keeping in view the intricate linkages of the agricultural sector with food and nutrition security, livelihoods, and social and environmental sustainability. Sustainable agricultural mechanization is among the solutions that can strengthen the resilience of the farming community to crises. It can increase agricultural productivity and incomes – including for resource-poor smallholder farmers – while reducing food loss, alleviating manpower shortages, and enhancing capacities to cope with climate change. Sustainable agricultural mechanization is indeed an imperative for transitioning to a path of modern agriculture and higher rural incomes in the Asia-Pacific region, ensuring food security, and restoring more robust and resilient food systems.

II. Impact of the pandemic on agriculture in the Asia-Pacific region

3. The COVID-19 pandemic has had wide-ranging impacts on the agricultural sector including decrease in production, disruption in marketing and sales of agricultural produce, shortages in supply of agricultural labour and other inputs, decrease in farmers' and farm labourers' income and worsening of food security. At the same time, many examples of positive and timely government interventions have emerged which have helped to contain and alleviate these impacts.

4. *Decrease in production.* The pandemic caused delays in agricultural field operations including for cereals that represent the main staples in region, such as rice, wheat and maize. For instance, land preparation activities in paddy fields could not be undertaken in some areas, thus interrupting the rice cultivation cycle and causing postponement of planting. Conduct of operations such as manual rice transplanting and harvesting was also challenging in view of social distancing requirements.

5. *Disruption of marketing and sales of produce.* Restrictions on movements increased the cost of logistics and transportation and made it difficult for producers to sell their produce. Given the lack of access to adequate storage and processing facilities in many countries, particularly for smallholder farmers, perishable produce such as seasonal fruits and vegetables as well as meat was

¹ FAO, IFAD, UNICEF, WFP, WHO (2020). The State of Food and Nutrition Security in the World 2020. Transforming Food Systems for Affordable Healthy Diets.

severely affected, resulting in financial loss to the farmers. This was compounded by the drop in demand and/or a fall in prices. For instance, although farmers engaged in contract farming continued to produce, closure of restaurants, hotels and schools resulted in such output remaining unutilized.

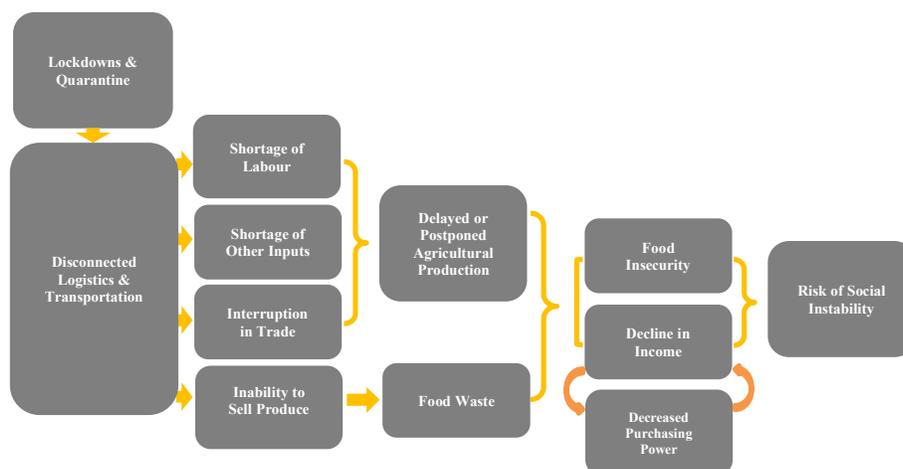
6. *Shortage of labour.* Restrictions on movement and transportation prevented migrant workers from reaching labour-deficit areas in time while other workers abstained from work due to the threat of infection. This led to shortage of labour for various agricultural activities like field preparation, plant protection and harvesting. Countries which rely heavily on overseas agricultural workers also suffered due to the curtailment of international travel.

7. *Shortage of other inputs including agricultural machinery.* The pandemic disrupted the supply chain for material agricultural inputs such as seeds, fertilizer, pesticides, chicks and fish seeds which adversely affected crop, livestock and poultry, and fisheries production. It also led to delays in the sales, spare parts supply, and repair and maintenance of agricultural machinery in case of prolonged lockdowns. In areas where agricultural machinery is accessed through the provision of service providers, the work of agricultural machinery operators and related training activities was affected. Moreover, the activities of custom hiring centres, which are particularly important for smallholder farmers who are unable to purchase machinery, were slowed down.

8. *Decrease in farm income.* The pandemic adversely impacted the income of the farming community. Farmers in many areas had to sell their produce at low price due to inability to access markets located far away as a result of transportation restrictions and the lack of storage and processing facilities. This made it difficult for them to recover input costs leading to financial stress, increased debt and insolvency. Among those hardest hit were the most vulnerable segments of the farming community such as smallholder farmers and migrant agricultural workers who have very limited access to resources or alternative sources of income. The overall impact included reduced purchasing power in rural areas and scaling down of farm investment including in agricultural machinery, which is likely to have repercussions on productivity in the coming years.

9. *Worsening of food and nutrition security.* The decrease in production and constraints on international trade in food commodities induced by the pandemic, together with other challenges in access to and utilization of food, has undermined food security in the region. Of particular concern have been the bottlenecks in supply and sale of perishable produce like fruits, vegetables, meat, fish, eggs and milk which have also jeopardize nutrition security of consumers. If left unaddressed, the cumulative effects of worsening of food and nutrition security, and decreased farm income and rural purchasing power, can potentially pose a risk to social stability in vulnerable areas and communities in the region, as depicted in the figure below.

Figure I
Correlations and impact of the coronavirus disease pandemic on food systems



10. There have, however, been notable examples of positive interventions undertaken by Governments in the region to address the challenges posed by the pandemic in the agricultural sector. Timely action was taken in many countries to exempt farmers and stockbreeders from the restrictions imposed on movement. Transportation of agricultural produce was facilitated and the importance of creating ‘green channels’ for smoother delivery of raw materials and produce as well as enabling of food imports was recognized. Dedicated aid programmes for several industries including agriculture were also announced.

III. Role of sustainable agricultural mechanization in supporting recovery and building resilience

11. Application of agricultural machinery through a sustainable approach can bring a wide range of benefits in the current context. Agricultural machinery can introduce greater speed of operations in the food production process, increase yield and output, reduce production costs, increase cropping intensity, reduce post-harvest losses, save manpower and reduce the drudgery of agricultural work. All of these can, in turn, contribute to recovery from crises and strengthen the resilience of farmers and the agricultural sector as a whole to future shocks.

12. During the crop production stage, for instance, there is often shortage of manpower in many areas, particularly during the planting or harvesting seasons. These shortages became critical during the COVID-19 pandemic due to some of the countermeasures and restrictions imposed. In general, agricultural machinery such as rice transplanters and combine harvesters can serve to address such shortage of manpower while supporting social distancing measures, and thus allow critical operations to proceed in a timely manner. Seed cleaners and graders, and efficient sprayers are other examples of equipment which can help under these constraints.

13. The importance of agricultural machinery for post-harvest operations has also been highlighted during the pandemic. Mechanization solutions support and improve the efficiency of storage and processing including for perishable products like fruits and vegetables. This can lead to reduction in food loss, and

can enhance incomes of farmers by empowering them to better decide the time of sale and obtain remunerative prices.

14. Information and communications technology (ICT)-enabled mechanization solutions such as autonomous equipment and precision agriculture can further build resilience in the agricultural sector. For instance, when used as part of a precision agriculture approach, Unmanned Aerial Vehicles (or drones) can assist to carry out operations like pesticide application in an automated way to cope with labour shortages. Such services can potentially be made accessible to smallholder farmers through the provision of service providers. Overall, ICT-based mechanization solutions when used in an inclusive way hold significant promise for positive and ‘green’ transformation across the value chain.

15. Conservation Agriculture is an approach to sustainable agriculture based on the principles of permanent soil cover, minimum soil disturbance, and diversification. It can strengthen the resilience of smallholder farmers by improving soil health and productivity, and also by reducing their dependence on chemical inputs the supply of which can often be disrupted during a crisis or shock. Sustainable agricultural mechanization has an important role to play in implementing the principles of conservation agriculture through machinery such as no-till seeders.

16. Since the outbreak of the COVID-19 pandemic, increased attention has been devoted to zoonotic diseases and measures for their prevention and control. Due to various factors, the Asia-Pacific region has historically been a region with a high incidence of zoonotic diseases, causing sizeable losses to the livestock and poultry sub-sector and threatening human health, livelihood and food security. Mechanization solutions for livestock and poultry can play an important role in the prevention and control of zoonoses. They offer advantages in terms of more reliable elimination of pathogens, blocking of transmission routes and enhancement of biosafety. They can also increase labor productivity, increase breeding efficiency, improve the quality of livestock products, and reduce the undesirable environmental fallout.²

17. Finally, the pandemic has seen a return of large numbers of migrant agricultural workers from urban centres as well as from abroad to their hometowns in rural areas. Many of them are young workers who are now seeking productive employment. As machinery reduces the drudgery of agricultural work and also provides opportunities for innovation and entrepreneurship, sustainable agricultural mechanization can play a useful role in retaining youth in agriculture while increasing farm productivity and incomes.

IV. Recommendations and the work of the Economic and Social Commission for Asia and the Pacific

18. In order to optimize the contribution of sustainable agricultural mechanization to recovery and resilience in the agricultural sector in the aftermath of the COVID-19 pandemic, it is necessary to address the needs of smallholder farmers, strengthen rural infrastructure, promote ICT-enabled and digital technologies, encourage research and development, and leverage the potential of mechanization to generate employment opportunities for youth. The following recommendations are proposed for relevant policymakers, research

² ESCAP (2020). Mechanization Solutions for Improved Livestock Management and Prevention and Control of Zoonotic Diseases.

and training institutions, civil society organizations and private sector entities in the region.

19. *Address needs of smallholder farmers.* Smallholder farmers, migrant workers, women and elderly farmers, farming communities in hilly and remote areas and other vulnerable groups are among those most severely impacted by the pandemic. Priority must be accorded to their needs when formulating policy and programme interventions for sustainable agricultural mechanization. Given the resource constraints they face, due attention is required for providing adequate financial and material support through mechanisms such as fiscal incentives, service providers and/or custom hiring of agricultural machinery.

20. *Strengthen rural infrastructure.* Facilities for storage, preserving and processing of agricultural produce should be promoted in rural areas. Among other things, these can include establishment of cold storages for perishable produce within easy access of production sites for saving the produce till it is marketed. Efficient transportation and secondary processing facilities should also be made available.

21. *Promote ICT-enabled mechanization technologies.* Efforts should be targeted towards accelerating the integration of agricultural mechanization and informatization, and using big data and artificial intelligence while giving due attention to 'green' technologies and enabling smallholders to benefit from such solutions.

22. *Promote research and development.* Some of the areas recommended to be prioritized for research and development of agricultural machinery are (a) developing machinery for harvesting of 'soft crops' like fruits and vegetables, especially for areas that suffer from seasonal labour shortages; (b) growing off-season crops under controlled environments which can concurrently reduce the import bill for such crops; and (c) promoting safety of machinery and use of harmonized regional testing standards that can also facilitate trade.

23. *Encourage youth engagement.* Capacity-building programmes and incentives to encourage youth in rural areas to adopt sustainable agricultural mechanization technologies (including for livestock, poultry and fisheries sub-sectors) should be supported, so that machinery can help increase farm productivity as well as provide new income generation opportunities.

24. The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) is promoting sustainable agricultural mechanization in the Asia-Pacific region through its regional institution, the Centre for Sustainable Agricultural Mechanization. The Centre has been working to enhance technical cooperation among the members and associate members of ESCAP, through extensive exchange of information and sharing of knowledge, promotion of research and development, and agro-enterprise advancement in the areas of sustainable agricultural mechanization and technology for the attainment of the Sustainable Development Goals. In the recent past, the Centre has:

(a) Facilitated cooperation for development of national agricultural mechanization strategies in order to promote an enabling policy environment;

(b) Promoted knowledge exchange and networking amongst national agricultural machinery associations, agricultural machinery testing stations, and research and academic institutions;

(c) Strengthened capacities for testing of safe, efficient and environmentally sound agricultural machinery as well as capacities of private sector industry associations;

(d) Facilitated the development and in-principle adoption by participating member States of harmonized regional standards for testing of three types of agricultural machinery;

(e) Identified good practices for integrated straw management in order to address the problem of burning of straw residue;

(f) Contributed to engaging youth in sustainable agricultural mechanization by strengthening capacities of university students and encouraging innovation; and

(g) Supported South-South cooperation efforts to build smallholder's resilience to climate change, with two the Centre's initiatives already featured by the United Nations Office for South-South Cooperation as "Good Practices in South-South and Triangular Cooperation for Sustainable Development".

25. In addition to the above, following the outbreak of the COVID-19 pandemic, the Centre for Sustainable Agricultural Mechanization has responded to the needs of member States through targeted analytical work and knowledge sharing initiatives. The Centre has developed a research paper titled 'Mechanization Solutions for Improved Livestock Management and Prevention and Control of Zoonotic Diseases' which outlines how mechanization can contribute to addressing the threat of zoonotic diseases on livestock farms. The Centre also organized a 'Webinar on Impact of COVID-19 on Agriculture in the Asia-Pacific Region and Role of Mechanization'³ in June 2018, and an 'Online Training Workshop on Climate Smart Mechanization for Dryland Agriculture in Central Asian Countries'⁴ in September 2020. Both the events enabled sharing of national experiences and potential solutions for supporting recovery and resilience in the agricultural sector, and have informed the recommendations outlined above in this document.

V. Issues for consideration by the Committee

26. The Committee may wish to review the present report and provide guidance on the issues highlighted therein for promoting the role of sustainable agricultural mechanization in recovery from the impacts of the COVID-19 pandemic and restoring more robust and resilient food systems in the Asia-Pacific region. The Committee is also invited to share experiences and provide guidance to the work of the Centre for Sustainable Agricultural Mechanization.

³ http://www.un-csam.org/news_detail.asp?id=554.

⁴ http://www.un-csam.org/news_detail.asp?id=563.