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# The COVID-19 pandemic and climate change adaptation

Some perspectives from alumni of the WCDI Climate Change Adaptation course

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**List of abbreviations and acronyms**

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# Summary

In reaction to the COVID-19 pandemic we approached 300 alumni of the WCDI Climate Change Adaptation course. We asked them about (a) how they were restricted in their work, (b) how food systems and food security is affected by COVID-19, (c) whether there is something like COVID-smart agriculture, (d) how to combine COVID-19 smart and climate smart agriculture and finally (e) whether COVID-19 funds and activities are at the expense of climate smart and/or 'green activities. In the period 23 April-22 May 2020 we received 57 responses from 23 Low and Middle Income Countries (LMIC).

Respondents were all limited in their professional activities because of COVID-19. They work generally from home and normal activities in the field are on hold. Research in the field, monitoring visits to farmers, including advisory services, environmental control, all is severely affected. In some cases governments gave permits to persons working in agricultural extension in order to continue their activities, while applying the necessary health precautions. COVID-19 also delayed the educational system, for example universities have been closed.

The food system in many countries is seriously affected by COVID-19, most of all by the measures taken in order to control the pandemic. Many chains in the system are affected: labour and production inputs for the farm, national and international transport of food, and informal and peri-urban markets which often have been closed. Some value chains, especially of fresh products (fish, meat, vegetables, fruits), are more affected than others (because of lock-down and curfews). Health risks in the value chain increase and food industries send workers home or put them on reduced salaries. Agricultural value chains become shorter and home gardening is promoted and implemented more. The closing down of restaurants and public eateries leads to a shift in purchasing modalities. Sometimes there is also a change in behaviour of traders (they save food in order to increase the price) and consumers (hoarding). Last but not least COVID is a challenge additional to other threats in the food system, e.g. locusts invasions and extreme weather conditions such as floods or hurricanes.

The impact of COVID-19 on food security most of all seems at this moment on food access. There is still enough food but because of the above mentioned hindrances and because purchasing power of many vulnerable groups has decreased, people cannot access the food. People may be starving. Since fresh products are difficult to acquire, and because purchasing power of vulnerable groups has decreased, food utilisation (a balanced diet) is also at stake.

We introduced the term 'corona-smart agriculture' in our questions to the alumni with the other term 'climate smart' agriculture in our mind. We had not defined the term. Alumni mentioned several elements of a definition for 'corona-smart agriculture': (a) realization of the notion that different elements of the food system are more strongly interlinked than we felt before the corona crisis, (b) continuation of food production while minimizing the spread of corona, (c) more production of nutritious food to help the human immune system (d) avoidance of habitat destruction and fragmentation to diminish risks of transfer of pathogens from wild animals to humans, and (e) promotion of local supply chains and home gardening.

Current measures to deal with corona in the agricultural sector are among others: application of physical distance, promotion of self-sufficiency, temporary subsidies, loans, etc. to stimulate food production, food support programmes, construction of food storage facilities, monitoring of prices and import/export restrictions or stimulation. Measures that need priority according to many respondents are: local value chains, digitalization of farmers, improved hygiene and good governance which would take into consideration multiple time horizons and multiple level organization.

The respondents offer many suggestions how to combine COVID-19 smart and climate-smart agriculture, which partly coincide with suggestions about 'corona smart agriculture'. More emphasis

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should be on local and sub-national value chains, including circular agriculture. Local organisations, institutions and platforms should be strengthened. (Partial) self-sufficiency (home-gardening) should be promoted. Some respondents plea for a move towards agro-ecology and indigenous techniques. Approaches on health and climate-smart should be integrated, silos should be broken down e.g. when supporting farmers in the field. Such initiatives should be sustained by more research. Smallholder farmers should get more access to smart technology, including digitalisation (e.g. better internet connection and availability of necessary electric power). Promotion of healthy food (a balanced diet) could also help to enhance the body immune system. Environmental protection helps to stay food secure and healthy and reduces compounded negative effects. Governments should play an active role in all this, but should first of all remove transport barriers for food and provide social protection for vulnerable groups ((e.g looking for possibilities to open up informal and peri-urban markets). This pandemic shows that, although in almost all countries national perspectives have been dominant, COVID-19 is an international problem which needs international cooperation to strengthen sustainable and resilient food systems as well as climate change adaptation options.

Sometimes there is a competition between COVID-19 measures and climate-smart/green, like spraying of sanitizers in cities. Some organisations reduce the numbers of workers in e.g. agricultural extension, which leads to less climate-smart activities. In some countries new funds are allocated to COVID-19 measures, while disasters like floods, remain less attended or unattended. However, many respondents have not (yet) observed a negative effect of COVID-19 measures on climate-smart programmes and activities. It is too early for them to draw conclusions. In some countries a positive relation is reported, like less pollution because of reduced traffic. In some cases agricultural support programmes include activities that help to mitigate the effects of COVID-19.

Finally we conclude that a network of alumni of an international course can generate in a fairly short time information from many countries in a disturbed and disturbing situation, as we may characterise this corona crisis. Respondents encountered limitations to gather information, but still we believe we received valuable information, for which we acknowledge the respondents.

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# 1 Introduction

Wageningen Centre for Development Innovation (WCIDI) has been organizing the Climate Change Adaptation course for Food Security and Natural Resource Management for the last ten years. This course is annually organized in Uganda, in cooperation with Makerere University.<sup>1</sup>In reaction to the COVID-19 pandemic we approached 300 alumni of the course from the years 2011-2020. We asked them the following questions:

1. In what ways are you restricted in your work because of corona<sup>2</sup>?
2. How are food systems and food security in your country affected by the corona virus?
3. Is there something like corona-smart agriculture (or corona-smart food security), and if so what are, in your view or experience, its most important features?
4. How can we improve food systems (including the natural environment on which they depend) in such a way that these systems become more resilient against global pests like corona and climate change at the same time? In other words: how to combine corona-smart and climate-smart agriculture?
5. Do you see in your country that donors and/or governments are taking measures related to corona, which are at the expense of climate smart and/or 'green' activities ?

In the period 23 April-22 May 2020 we received responses on these questions from participants residing in the following countries (in brackets the number of responses): Afghanistan (1), Bangladesh (2), Burkina Faso (1), Colombia (2), Egypt (1), Ethiopia (3), Ghana (1), India (3), Indonesia (1), Kenya (10), Liberia (1), Myanmar (1), Nepal (3), Niger (1), Nigeria (8), Pakistan (1), Palestine (1), Philippines (2), Rwanda (1), Tanzania (2), Uganda (6), Vietnam (2) and Zimbabwe (3). These were in total 57 responses, of which one was from a Ugandan expert who presents a topic in the annual course. Participants of these courses are generally mid-career professionals with at least a B.Sc. degree and some years of professional experience. They work at universities, research institutes, NGOs and governmental institutions or agencies. They work in or focus most of all on the production aspects of the food system, including environmental aspects, and less on processing and marketing.

The responses varied very much in detail and length. Some respondents dedicated only some lines to each question and others provided much detail. Respondents gave their own opinion and, as most of them were restricted in travel because of various degrees of lock-downs, their sources of information could be limited. We did not study the relevant literature but only focused on the answers of the respondents. Below we will summarise the answers and come up with some conclusions.

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<sup>1</sup> See: <https://www.wur.nl/en/show/Climate-Change-Adaptation-in-Food-Security-and-Natural-Resource-Management.htm>

<sup>2</sup> When the term 'corona' (virus) is used we mean the COVID-19 (virus)

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## 2 How is the work of respondents affected by the COVID-19 crisis?

As the corona virus continues to spread around the globe it has affected different countries in different ways. It is hard for participants to indicate the severity and impact of outbreaks as it depends on many country-specific factors, such as when the pandemic hit, e.g. the country's healthcare system, general government response as well as more specific sector governance.

Most respondents reported that they are now mainly working from home. In general, for public government employees, most of the staff are required to work from home and only come to office in turns, which means managing teams remotely through calls, emails and virtual meetings. The key government strategies for COVID-19 control mentioned are 'Social distancing', 'Staying at home' and 'Lockdown'. Since the first Covid-19 case was announced by the government of Liberia "all educational institutions, social gatherings and meetings have been closed or forbidden by the government till date". Movements of people are restricted everywhere and many respondents face curfews (e.g. in Kenya there is a curfew from 7:00 p.m. to 5:00 a.m.).

Most respondents mentioned to be able to conduct desk-based research one way or another and use time to 'conceptualize' ideas, but to be restricted in their movement to the field for any surveys, meetings or consultations. Few respondents revealed that their workload actually increased, rather than decreased due to the virus outbreak. The fact that not all employees can work from home is emphasized by many respondents. "Rangers and site staff must simply be at the site location and therefore travelling to the site is a must, however accessing public transportation (e.g. ferry services but also bus services) becomes more and more challenging" (Indonesia). Being disconnected from beneficiary communities has led to a gap in technical support and advise and agricultural extension services in general in many of the respondent countries. "Free field movement and contact with communities was curtailed and led to a decline in [fish] production due to the lack of advice and support regarding fish feeding, harvest, postharvest handling and marketing" (Uganda).

In Liberia it was remarked that "most entities have reduced their staffs by 40(!)%". Many households depending on daily wages have lost their jobs. One respondent mentioned to have lost his/her job due to COVID-19.

Regarding food security, it was underlined (in Zimbabwe, though probably valid in many more of the respondents' countries) that "Due to the lock down we have failed to produce the weekly and monthly food security monitoring reports on time for informed decision making in our programming". Also: "It is currently not possible to enhance access to safe drinking water to vulnerable communities (e.g. through bore hole drilling/rehabilitation and repairing hand pumps)". "It is hard for the suppliers to travel from one province to another to deliver the inputs" (Philippines). In Vietnam, though, the heavy drought this year seems to be more severe and "is affecting food security more than the COVID-19 virus". At the same time, food safety risks might face an alarming increase: "Animal disease control activities are constrained because gatherings are banned therefore consultative forums are difficult to undertake, but also animal mass vaccinations are not practical now" (Kenya).

Many of the projects implemented in rural places are put on hold for the moment and planning schedules are -continuously- adapted. Some projects can continue with the support of local partners. Uganda mentioned that international fund transfers to some of the projects failed to happen, which may in fact occur in more countries. "Most [government] funds are now channeled towards COVID-19 therefore many other activities have been left pending".

"Initially, our movement was restricted due to the lock down announced by Government (India), but in coordination with the district administration the COVID-19 response programme got the necessary permission for mobility and helped us in performing our ongoing work related to sustainable

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agriculture and natural resource management as well as awareness raising on COVID-19 control by hand washing, social distancing and the distribution of masks and soaps. "Some health care workers are not turning up for work as they are afraid of being infected" (Nigeria). We increasingly start to realise "that body language is more unconsciously pronounced and has big impact in communication in our culture: The shaking of hands, eating together, talking closely, delivers messages strongly than mere words. The mentioned body arts themselves enhance the delivery of intended agenda, develops trust and hence acceptability of ideas in our society" (Kenya). On a more negative note: "Security agencies and task forces have taken laws into their [own] hands by killing citizens who are caught defaulting and gender-based violence is on the increase" (Nigeria).

COVID-19 delayed the whole education system. In most countries, we assume, universities and schools are closed, and some respondents mention to do lecturing online. "Despite of having only a limited number of students and lecturers, the online system does not work well" (Afghanistan). It is reported that many people in Nigeria do not believe that COVID-19 is a reality. They see it as a political virus and money-making venture for the government, so most people did and/or do not abide by the precautionary measures or laid down rule on preventing the spread of the virus.

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## 3 Impact of the COVID-19 pandemic on food systems

The reported impacts on food systems can be summarized as follows:

1. **Availability of labour on the farm is affected (positively and negatively).** In e.g. Burkina Faso farmers encounter restrictions of movements from farm to home. In the Philippines, at the start of lockdown, farmers had limited access to farms, but the government in a few days considered them critical frontliners and allowed them access to their farms. In Bangladesh a lack of labour force for the harvest is reported. It is the high time for rice (boro) harvesting which depends on migrant labourers. Due to the COVID-19 virus, agricultural labourers cannot work properly in the field, being afraid of contamination. The government promotes mechanised harvesting in some places of the country, and sometimes students and volunteers help, but this is not a solution that can be applied countrywide. In Niger, growing and harvesting may be affected especially for those using man power labour to grow and harvest their crops as there is a restriction for grouping. In India restriction on the movement of people may disrupt production as migrant seasonal workers constitute large section of agricultural labourers. A survey conducted during March-April 2020 in India pointed to lack of labour availability hampering harvesting operations and post-harvest activities in four states. In Uganda production is hampered by inaccessibility to farms especially those who live far from farms, and lack of skills/training due to lack of extension service. However, in Egypt, due to the lockdown (7 pm- 6 am) measures for most jobs, many people go back to their main job (farmer), so more labour force is available.
2. **Inaccessibility of production factors for the farm** (bank, inputs, chicks, fertilizers, seeds, fuel etc.). E.g. in Bangladesh paddy cultivation is influenced by diesel scarcity. In Burkina farmers encounter travel restrictions so they cannot buy the necessary inputs for their production. In e.g. Ethiopia and India farmers may not get agricultural inputs (such as seeds, fertilizers etc) even if they are normally provided by the government. In Uganda, agricultural production has been affected due to lack of inputs, lack of funds to invest in agriculture (as people now prioritise to survive instead of making investments). In Zimbabwe restrictions on movements means the farmers cannot bring their samples for diagnosis to the station neither can the station staff carryout farm visits to help the farmers with advisory services. This is negatively affecting production and quality of the produce.
3. **National transportation of food is limited by roadblocks, lockdown, travel restrictions and/or curfew.** In e.g. Bangladesh farmers face difficulty to transport potatoes to cold storages, while onion farmers and green fresh vegetable growers in other regions face financial losses as not many traders were approaching them. In Colombia farmers continue work to provide food, however in many places they could not distribute these because the transportation was limited. In Indonesia, some producers gave poultry products for free, while other products like shallots, chillies and other vegetables increased in price because of limited supply to the markets. The distribution among the different provinces is uneven. In Kenya, blockages on transport routes are particularly obstructive for fresh food supply chains and have resulted in increased levels of food loss and waste. Prices of food in closed counties have risen. In more productive counties, the producers are left with more products and for the perishable products, prices tended to get lower but beginning to increase as stocks reduce. Whereas the movement of essential good such as food is exempted from the cessation, the curfew in Kenya is affecting the capacity of traders to source and distribute produce from the rural areas. In Liberia food supply chains have been impaired because of the lockdown, and there is particularly a shortage of the staple food rice on the markets, and if found, the price is high. In Pakistan the federal and provincial governments announced a lockdown and all means of transportation were closed. Hence supply chain of different agricultural inputs and output (yield) were stopped at different locations for almost a month. Restrictions on food transportations resulted in price hike of different food items. In the Philippines the transportation of produce from the provinces to big markets like Metro Manilla was seriously affected because of the restrictions on domestic movements.



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4. **Closing of informal and peri-urban food markets.** In many countries the sale of food on informal and peri-urban food markets is restricted or forbidden. E.g. in Ethiopia farmers travel long distances by feet to sell their product but no one buys their goods, because consumers have to stay at home. Farmers return with nothing and stay home. In Kenya the impact is felt most in low-income urban households which rely on these informal food markets. The ministry of agriculture has now agreed to categorize transport of foodstuff as an essential service, to improve food supply in urban areas, but it is not clear if this will be sufficient. Market places are social grounds. The COVID-19 health measures like keeping distance when talking and bargaining, not touching of commodities, are henceforth affecting negatively immensely the sale of products and customer-relations. It is reported from Zimbabwe that the informal sector has been disturbed and totally brought to a halt. Before COVID-19 marketing structures and logistical frameworks were already below standards without formal systems or strategies.
  5. **Value chains of fresh products, like vegetables, fruits, eggs, meat and fish are affected most.** In the absence of storage capacity farmers are dumping perishable products (e.g. India). In Kenya the night curfew has reduced demand and supply of very easily perishable (tomatoes, fruits, and fish) products. They are out of the market and if any available are highly priced. Before COVID-19 many activities were performed during night time when the temperatures are cool and delivery for sale was completed in the early morning. Most fishing activities are done at night when temperature are drop but due to the curfew fishing at night is no longer possible. In Uganda, the internal consumption of fish is high. Fish export is the 2<sup>nd</sup> highest foreign exchange earner. The COVID-19 emergency measures negatively affect the sector. In Pakistan, although transport was restricted, fruit and vegetable markets and shops were not closed. Similarly, small shops with daily consumables were also not closed so as not to disturb food security of the masses. In Zimbabwe the Covid-19 has caused ministry of agriculture and strategic partners to rethink the whole fresh produce distribution and value chain system, with various bulking and distribution and governance initiatives being proposed to ease the food inaccessibility.
  6. **Health risks in the value chain:** Food and farmworkers have continued to work to keep food supply flowing in the face of major health risks because they are unable to maintain the proper social distancing and hygiene practices and are unable to obtain protective health equipment (e.g. in India). It is reported from Uganda that people are scared to even participate in food transportation or marketing due to fear of getting infected by COVID-19. In Zambia both private and social media have been reporting that community-level incidences of COVID-19virus are negatively affecting crop production of farm households which in turn is claimed to be worsening the problem of food insecurity in most parts of the country.
  7. **Food processing industries are affected.** In Nigeria agro-based industries have been shut down because of disruptions in the raw material value chains. This affects particularly the most vulnerable groups like daily laborers, women and children. Also in the Philippines manufacturing of processed foods decreased because of the shortage of raw materials. Workers in food production industries in Zambia are suffering from reduced incomes from their employing organizations. Some of these organizations have put their quarantined workers on half salaries because of the loss of man-hours that they claim workers normally put in.
  8. **Agricultural value chains become shorter and there are more home gardens.** Inward migration from urban to rural areas has increased stress on rural supply chains. There are more direct sales from farmer to consumer, bypassing intermediates (Colombia). The dynamics have changed in the supply chain and it could also be an opportunity to try more sustainable models. In e.g. Kenya new and more local value chains are being developed. In several countries people have reacted by producing more vegetables in their home garden, making the value chain the shortest possible. Planting food in the garden is also promoted by governments, e.g. in Palestine. In Uganda, rural communities with access to farm land are now very busy in their garden preparing it and planting. They do not receive food support from the government. So in the rural areas food production goes up. This may have long-term positive effects. It is reported from Vietnam that those who diversify in their farm by applying mixed and multi- crops, producing for subsistent instead of only for commercial purposes, have food for their family and for their neighbours as well. They become more resilience than others who hardly succeed to find a job to earn money to buy food.
  9. **The closing down of restaurants and other public eateries leads to a shift in purchasing modalities.** For example in Kenya the government, took this measure. This has an effect on the

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supply chain and has disorganized the previous supply and pick points of the food market systems. People visit less restaurants and prepare their food more at home. In e.g. Kenya also increased e-commerce deliveries is reported. However, small-scale farmers have not yet picked up online sales methods, so they lose at this moment. In Nepal, the elite or medium class workers who used to regularly eat at the hotels/restaurants are now obliged to prepare the food on their own as very limited restaurants are open and people are also scared to get out of the home for getting food. In Rwanda commercial streams of eggs was changed from restaurants to local markets and part of the eggs were destroyed. In Vietnam restaurants are also closed. Farmers have to destroy vegetables in the field, because the price is too low. However, the farmers who supply ecological products continue selling their products since most of their customers are direct consumers. Many young people who are working in city restaurants lost their jobs and returned to their village. However, those young people did not like to be farmers and they still do not like it.

10. **Changing behaviour of consumers and traders.** While governments decided to going in quarantine, people rushed to markets and increased the demands of food supplies and suddenly the price increased. Not only that, traders and shopkeepers tried to save the food in order to increase the price. Due to uncertainty on the time of quarantine, people started hoarding (e.g. Colombia, India). This increased the price and there was no food in some supermarkets. However, afterwards in e.g. Colombia the market regulated itself again.
11. **The international food transportation system is seriously impacted.** Importing of food from neighbouring countries (e.g. in Afghanistan) was limited or banned because of closing of borders. Countries may be afraid to import products that are infected. In Niger, although food importation is allowed, first necessity food like millet, rice, maize, wheat based foods, milk etc. are becoming scares and very costly. This make access difficult especially for poor and middle economy class people. However, this is not everywhere the case. Although Egypt is a big importer of wheat, maize, oils, in general, food is available, and it's easy to obtain, while there may be a slight increase in the price of some commodities. In Kenya suspension of all international flights has posed a big problem for import in the country (e.g. import and export of fisheries inputs and products). Fishers along the Kenyan coast, who export seafood to Europe and China, are affected. Trade has come to a halt only 20% of their catch is being sold as they lack a market now. Because of the China lockdown, many producers in Vietnam could not sell their products. But there were many campaigns organized by groups of youth in cities to divert streams of water melon and dragon fruits. This phenomenon happens quite frequently in Vietnam, not just only in case of this COVID-19 virus. Export of coffee from Vietnam to China and Korea is difficult, while at the same time companies have to maintain the workers.
12. **The COVID-19 pandemic is a challenge additional to other threats for the food system.** The locust invasion in Kenya, while in some parts of the country massive floods have been reported, which destroyed farmlands, crops and livestock. Locusts also invaded the northern part of Tanzania. Uganda hosts more refugees than any other country in Africa, including people who have fled from South Sudan, the DRC and Burundi. WFP provides food insecure people with income support and skills training in exchange for the building of assets that enhance their livelihoods and reduce vulnerability to climate shocks. However due to the COVID 19 the World Food Programme announced a 30% reduction in food relief because of insufficient funds. This is because donors are more concerned about the internal pandemic than courtesy and humanitarian assistance. In Bangladesh the cyclone "Ampham" hit some parts of Bangladesh. The people of Bangladesh faced two problems: the super cyclone and the COVID-19 pandemic.

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## 4 Impact on food security

Impact on food security is caused by the measures to control COVID-19. Most of all the measures that have been taken by governments to control Covid-19 affect food security: lockdowns, social distancing, curfews, restrictions in travel and transport, nationally and internationally. There are hardly any reports of direct impact of COVID-19 on food security. We group the various observations on food security according to the four pillars of food security: availability, access, utilisation and stability.

### 4.1 Availability

The restriction of movement of people has affected farmers from going to farm and carry out farming activities. This may have great impact on food supply security for now and most of all in the future. With COVID-19, some households in e.g. Burkina Faso, are obliged to reduce the number daily meals in order to be able to use their remaining stock to overcome the Covid-19 situation. If farmers are hampered in accessing their fields, this will ultimately lead to a lower production. In Kenya and parts of Tanzania the virus accompanies a pest of locusts creating a compound effect. However, not everywhere there is a problem of availability of food. In Vietnam the price of vegetable and fruit in the market is quite low. The products still are available in the shelf. The good news in Afghanistan is that this year the precipitation is more than average and the agriculture production would be enough for the country.

### 4.2 Access

There is a decrease of purchasing power. Countries like Afghanistan, which about half of the population is living in food insecurity, COVID-19 virus led to disaster and decrease the power of purchasing of people. Because of travel restrictions e.g. in Ghana, farmers will not be able to undertake other alternative income generating activities to complement their food security needs. In the Philippines food security is also affected since almost all people have less or no income. People cannot access food because of interrupted supply chains, limited or no access to groceries (few people can enter at one time) public markets, informal and wet markets. Those who have income have difficulty in availing of supplies in groceries and markets because if not for shortage then it is for the very few persons who can enter at one time in groceries. Also public markets and wet markets have been closed down.

Who are the vulnerable groups? Resource-poor-people are unable to go to markets to trade and buy their daily food requirements because of movement restrictions imposed by government as a result of the corona virus (Zambia). In Nepal, the day to day earners are hardest hit by the pandemic. Food prices have gone up and there is a limited distribution throughout the country. At this time most of vulnerable groups are daily laborers, women and children (e.g. Ethiopia). In the rural areas farmers depend on non-farm and off-farm activities for their livelihoods, as they may be field labourers for other farmers, work in the processing industry or work in construction. Interrupted transportation and closures pose serious challenges to maintain safe business continuity throughout the rural economy. In Nepal the imposed restriction measures have caused the loss of jobs of thousands of persons. This has reduced their income and capacity to acquire food and food of good quality. Many peri-urban poor people are seriously affected by closing down of informal food markets. In Uganda they survive on daily income which is insufficient to meet their dietary requirements. They are coping with hunger which poses an immediate threat to their lives or livelihoods and renders them reliant on external assistance to survive the disruptions caused by COVID 19. In Zimbabwe the food security situation

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has been deteriorating mainly in the urban areas where there are no food security interventions. In rural areas, organisations such as the World Food Programme are providing food assistance to the needy thus minimising the food insecurity status. The food security in remote areas in the high hills and mountains of Nepal is threatened because people depend on transported food from the lower areas (Terai). Transport has been very limited though is said to be open for carrying goods. There are private interventions to help people that suffer from the crisis. For example, in both rural and semi-urban settings in Pakistan, the locals support each other by sharing meals to their relatives and neighbours. It is reported from Myanmar that the private sectors and donors are very generous and provide basic food items and safety equipment to vulnerable populations. There are many private donors or generous people.

There is also governmental interference to guarantee food security, e.g. in India. India has a national food security act. There is food distribution nationally and in states in India for vulnerable groups like migrant workers. It is not clear to what extent this system is effective for these migrant workers. It is reported from Rwanda that many people (casual workers) suffered because of lack of income and therefore lack of foods. But the government and donors tried to feed those people by bringing the free foods at their home. In Myanmar the government has provided basic food items (8 items such as rice, oil, peas and beans, etc.) to peasant populations. There does not seem a food security threat. In Uganda there is a mix of public and private support. The government centralised food for charity collection and distribution. While there has been remarkable food collection from well-wishers, the distribution of food to the needy people is still a challenge. People are reported to be starving. The government is distributing food to sustain the community from hunger as they do not practice backyard gardening and most rely on hand to mouth job, they do in the urban centres which has come to a standstill with the virus. In Nigeria the prices of goods are high. Palliative foods donated by government are marred by corruption, and so many households got little or nothing that could last for one day for a family of 5. But in some countries (e.g. Zambia) the government is not in a position to provide relief food for the affected masses.

### 4.3 Utilisation

Loss of purchasing power especially for the poor people, like daily wage labourers, families depending on small businesses, has caused changes in people's consumption patterns, resulting in poorer nutrition.

Children reliant on mid-day meals for their daily nutritional requirements have been deprived of food due to schools closing (India, Kenya). In Uganda communities survive on one meal a day. Nutritive diversity on the menu is no longer a priority and a threat to malnutrition and it increases the vulnerability to other diseases. In Kenya the result of the COVID-19 crisis is reported to be a higher dependency on GMOs. It is also difficult to get fresh farm products in some areas.

In many countries fresh vegetables are hard to get. In this period when people are supposed to be building their immunity (also against COVID-19) with good nutrition, they cannot afford to buy food because of scarcity of finance and for some that can afford to buy, cannot access the food or what they can purchase will be limited.

### 4.4 Stability

Not many respondents report on food stability. In Nigeria COVID-19 has much influence on the income of the state, because oil prices went down and Nigeria produces much oil. This may have consequences for governmental food security interventions on a longer term. Food storage is has been a daunting challenge in quite some countries. Thus, harvest stored inappropriately will not be helpful in counteracting the COVID-19 effects. India has a robust food stockpile - some 60 million tonnes of food grains - and the world's largest state-run food distribution programme. Food shortages are unlikely. But the challenges are in supporting farmers, sharecroppers and labourers until things return to normal; getting food to the poor and securing the harvest for the next season.

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## 5 What could be features of corona-smart agriculture?

This summary to question 3 provides respondents' ideas on what corona-smart agriculture could entail, what different actors do to mitigate the impact of COVID-19 or what adaptation measures have been taken and what should still be done or what respondents recommend.

### 5.1 What is corona-smart agriculture?

We introduced in our questions to the alumni the term 'corona-smart agriculture' with the other term 'climate smart agriculture (CSA)' in our mind (CSA is one of the subjects dealt with in the WCDI climate course). But we did not define it. The first observation is that the term 'corona smart' could be replaced by 'pandemic-smart' in order to include also future pandemics. Different perspectives exist among the respondents on what corona-smart agriculture actually means or what its most important features are; in this way shaping a full spectrum of complementary ideas. Perspectives vary from more planetary to more plant, animal or human health perspectives but mostly a combination of these.

Many respondents underlined that "the current Corona crisis made us really feel how the different elements of the food system are interlinked and improvements do require a (food) systems approach". "COVID-19 makes clear that our individual actions can 'ripple out' and have an impact on natural systems, on climate, on food security and food safety".

Corona smart agriculture may just mean: "using smart approaches to continue normal food production albeit while minimising the spread of corona". Other respondents complemented this by mentioning "Agriculture that is specifically meant to produce foods and other products that can help strengthen the health status (through nutrition provision) of individuals" and "Production approaches that will involve taking measures along the food and agriculture value chain to ensure a minimal spread of the virus (distancing) and sanitising production measures (equipment, storage facilities, transport means, labour force etc.)" and maybe even "minimising the number of people at the food distribution points and more use of machinery (robots) and equipment".

Other respondents stressed that "that habitat destruction and fragmentation increase the chance of human-animal interaction and therefore amplify the risks of transfer of pathogens from animal carriers to humans". Corona-smart agriculture therefore requires a more agro-ecological approach to build resilience, featuring sustainability and diversity: "It is climate smart, resource smart, habitat friendly, diverse".

Many respondents highlighted the need for non-industrial approaches and rebuilding local supply chains providing healthy and nutritious foods available to all including the poor by using more conventional practices of having a kitchen garden or home stead garden (Nepal) to ensure food and nutrition security and enhance more balanced diets. Also, in e.g. Bangladesh, Vietnam, Ethiopia, Kenya and Uganda, corona-smart agriculture entails self-sustenance ('home yard gardening' or 'kitchen farms'), in many countries at specific request of the government, and/or supporting small-holder farmers to reduce the basic food demands on specialized food chains. The governments of The Philippines and Uganda are also mentioned as promoters of urban gardening.

### 5.2 Current measures to mitigate the impact of corona on agriculture / food security

So what are the features of corona-smart agriculture? what does it mean in practice? Simple and more complex adaptation and mitigation measures have been mentioned:

- Food producers applying physical distance between workers to increasing production

- Promotion of in-country self-sufficiency.
- Many respondents mentioned (temporary) subsidies, soft loans or reduction of taxes to stimulate food production and avoiding farmers abandoning agricultural activities.
- In addition, most national or local governments are said to have embarked on measures improving food security e.g. Nakuru County's (Kenya) food support programme provides kits for families whose breadwinners have lost their employment due to adverse economic effects posed by the spread of the corona virus and in Sorsogon City, Philippines, the city government has distributed food packs to all households in the entire City.
- Construction of warehouses for food storage and strengthening of food distribution systems.
- Monitoring of prices of food on the market
- Stop of export of certain commodities. In other situations: stimulation of import of food.
- Private initiatives to help farmers selling their products.

A few examples from different countries have been listed in the table below and mainly reflect current measures or actions of governments.

#### Examples of measures taken by governments to mitigate the impact of the corona crisis on food security

- In Ghana: "Construction of warehouses for food storage and making funding available to the National Food Buffer Stock Company to mop up strategic food stocks to ensure food security, and also provide a regular update on the food situation in the country".
- In India: "COVID-19 has forced us to create food stocks and reserves and strengthen the Public Distribution systems".
- In Bangladesh: "The government requested the people to bring *every piece of land* (also the house yards) under cultivation to increase production. The Government has already decided to invest more money to the agricultural sector compared to other sectors".
- In Ethiopia, amongst other things, 'moveable markets' are set up to minimize movement of people. The government designed a 'one-to-one-family feeding program': one capable family feeds a family in need at least one meal per day.
- In Indonesia, the government has established a social security net by establishing the Rice ATM (providing 1,5 kg of rice per family in need per day).
- In Kenya, fighting Corona *and* Locust, the Agricultural Enterprises Support Programme will closely monitor prices and strengthen market supervision across the region. This will be done in collaboration with the private sector, farmer organizations and cooperatives to ensure that farm inputs are available to farmers at affordable prices (to ensure traders do not take advantage of the situation to hike prices of fertilizers, seeds and pesticides).
- In Myanmar, the government has enforced to stop exporting rice until the next production season
- In Nepal, relief packages have been provided by the government for needy people especially daily wage workers, temporary workers, and small shopkeepers etc. Other supplies like rice, vegetables, cooking gas are regularly available to buy.
- In Pakistan, the government provided cash grants of PKR. 12000 (approx. 75 USD) to 12 million deserving families (approx. 80 million people), mainly daily wagers and labourers, in Pakistan in a transparent manner.
- In the Philippines, the import of rice is being increased and the National Government has established the food lane project (accreditation of truckers and suppliers) for the movement of food and other agricultural commodities, including agricultural inputs and fishery commodities, to ensure the access to safe and affordable food.
- In Indonesia a Youth Organization took up the initiative to help farmers in selling their produced rice directly to the consumers (selling in residential areas using vans). In Nigeria, although poor people should in principle receive a small gift from

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## 5.3 Corona-smart agriculture: what is priority?

“Fisheries activities have been devastated by the lockdown and curfew times and the normal supplementary aquaculture farming practices are neglected in maintenance”. Despite the pandemic’s huge negative impact on food production (including fisheries and aquaculture production) many opportunities have opened and will open up. Some priorities could be the following.

**Local value chains.** The fact that new marketing actors are taking up a role in (local) value chains and that local produce is increasing in value was regarded as a highlight. Families and households have realised that they should try to be self-sufficient as far as possible. The roof-top gardening or hanging gardens in urban areas, and kitchen gardening in rural areas is gaining momentum. Many respondents believe that this should be further promoted, to meet the small but essential produce like onions, tomatoes, carrots, eggs as well by using water recycling, water harvesting or domestic grey water. With small livestock organic manure is readily available for soil improvement. Household-to-household exchange and family-to-family learning is not only an output but should also be seen as an important driver to stimulate self-sufficiency.

**Digitalisation of farmers.** Another clear priority raised is linking smallholder farmers to markets and support online marketing: “fresh from the farm to consumers”. Different respondents mentioned the importance to leverage on technology to better serve farmers by giving them an online platform for ICT based marketing and distribution but also to engage with one another online, share views, learn, buy and sell online “all from the comfort and safety of their homes...”. “In Palestine, farmers start thinking about new technology focusing on using a remote control for irrigation as well as the process of irrigation”. Options for virtual platforms (e.g. using mobile phones) have to be explored for extension services and marketing strategies.

**Improved hygiene.** Without doubt, a lot can be improved regarding food (and feed) safety, hygiene and following Good Agricultural Practices at local level to guide in development of Standard Operating Procedures (SOPs) and other critical planning for improved hygienic and safety procedures in food production systems. ICT based training and demonstration activities have to be set up or enhanced. A lot of ideas and lessons learnt are already out there!

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## 6 How to make food systems both climate and corona smart?

Combining corona-smart and climate-smart agriculture is very important, for example in Uganda. In Uganda there are three incidences occurring: a) Locust invasion (first of that scale in Uganda), b) Extreme floods (first of that scale since 1963); c) and now COVID-19. All the three are happening at the same time a resource constrained country. Here climate change, environmental concerns and COVID-19 come together. This is only one example that shows the need to combine actions on COVID-19, climate change and the environment.

The suggestions to improve the food systems climate and COVID-19 smart can be categorised as follows. It has to be observed that some categories are the same as mentioned under 'corona smart.

1. **More emphasis on local and sub-national value chains:** Strengthening the capacity of small and medium enterprises linking farmers to urban markets could help ensure stability in future economic shocks. Governments and donor 'projects' looked too much at export and global value chains. There are opportunities to scale up local and regional input and output value chains that benefit local farmers and small and medium enterprises. Shortening of market chains helps to become more food independent. Farm for food first, the extra will be for sale. Use locally available materials, like local seeds. Create decentralized storage, cold chains etc. using renewable energy. Providing support to local food systems to enhance local access and control over productive resources such as water, land, seeds and livestock breeds including biodiversity rich landscape and ecosystem services. Promote shifting to food crops in the short term as there is large scale reverse migration from cities to villages and food requirement in villages will increase. Grow food and feed crops that are resilient to the effects of climate change and are suitable in the locality. Processing of these crops can also be done locally so that during periods of lockdown food systems will not be severely affected. Promotion of small scale agro-processing machines and storage to limit movement to communal milling machines. Congestion at milling machines in communities can easily facilitate the COVID 19 spread. Train farmers in sustainable farming practices through field experiments in farmer field schools in order to build skills and confidence for collective actions. Local food systems also need less transport and consequently result in less carbon dioxide emission.
2. **Strengthening local organizations and institutions.** Reduce costs of labour by practicing labour exchange programmes. Promote collective action for smallholder rural and peri-urban farmers to facilitate efficient access to inputs (also machinery), value addition, marketing, and decentralized storage spaces. This would, for, example, enable local farmers, through pooling of resources, access organized transport to the high value urban markets thereby increasing their resilience. Organized food transporters are able to transport their produce even during the down to dusk curfews since they are rated as essential service providers. Promote capacity strengthening through farmers organisations.
3. **Promote self-sufficiency by home-gardening.** In India (but not only there), families have realized that they should try to be self-sufficient as far as possible. The roof-top gardening in urban areas and kitchen garden in rural areas is gaining momentum. Maintain a well-planned home garden (both in urban and rural areas) which provides the vegetable and fruit requirement of the year round. Promote demonstration and innovation of technologies for growing of vegetables in the courtyards. This also limits the frequency to visits to congested markets.
4. **Agricultural diversification, agro-ecology and indigenous technologies.** Participatory plant breeding should be encouraged. Intellectual property arrangements governing agricultural genetic resources, such as crop and livestock, must not inhibit the full and free use and exchange of agricultural varieties and breeds among peasants, their communities, or public breeders. Traditional practices such as seed saving and exchange should be preserved and promoted. Promote native crops, organic products and no-use of chemicals and



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pesticides. Integrate indigenous traditional knowledge systems and cultures with scientific approaches in order to develop appropriate, niche specific yet adaptable home-grown practical solutions.

5. **Create and maintain platforms of stakeholders, including youth.** National and provincial disaster management authorities are required to devise strategies with the relevant provincial departments and stakeholders to chalk out plans in case of emergencies like COVID-19. Farmers cooperatives should be encouraged. Participation of young farmers should be encouraged in different farming operations, as aged people are more vulnerable to COVID-19. Attract the young people to participate in agriculture, to do marketing with added values and to cut down the intermediate to get higher price.
6. **Strengthen agricultural value chains:** strengthening the physical infrastructure in the country particularly improving efficiency of the transportation systems to connect production areas to markets; improving efficiency of value-chains to become truly functional, organized and well-developed inclusive of strategically addressing needs and establishing linkages among actors along each node of a value-chain and also connecting to auxiliary service providers. Collect data on processors etc., to co-synthesize new knowledge with climatic change impacts and adaptations in order to create synergy and harmonise measures that are both COVID-19 and climate smart. In each value chain specific measures need to be taken. Involve all stakeholders in the food system in order to formulate policies on COVID-19. "The current lock down was imposed by the government and based on information provided by health practitioners and no consultation of farmers or religious leaders took place." A measure could be to ensure that informal markets in (peri-) urban areas markets remain open all day, although at reduced capacities.
7. **Integrate approaches, break down silos.** The COVID-19 pandemic presents an opportunity to break silos and show closely climate change cuts across sectors and how health and agriculture are closely related. Rural agricultural extension networks could be used to disseminate information on health awareness as well as climate change education and collect data of local impacts of both COVID-19 and climate change. Agriculture networks go deep into the rural areas e.g. by training farmers on agri-business. These networks can be used to disseminate health messages, products and services to help address COVID-19 and climate change. Information packages to farmers could be integrated. Ensure that climate-smart agriculture produces 'super-foods' that can strengthen the health status of individuals and ensure that (health) safety measures are put in place in the climate-smart agriculture approaches. While practicing climate smart agriculture, ensure that you follow the government and WHO guidelines like washing hands with soap, not touching mouth, eyes and nose, cover your nose with your elbow while sneezing and coughing and maintaining social distances. While integrating different sectors, there should always be some funds for contingencies like the COVID-19 crisis. In the Philippines there is a constant need to plan for disaster risk management. The pandemic hampers Philippines typhoon evacuation so here is also a clear need for integration of sectors. A comparable report originates from Bangladesh where recently a cyclone hit parts of the country: "We need to relocate our peoples from the coastal areas maintaining safe distancing. Therefore combining corona-smart and climate smart agriculture is very crucial. I think we need to work on it to find a way out".
8. **Research.** There is a need to do research on several important themes. Undertake action research and policy advocacy to support the development of more resilient, sustainable and locally controlled farming systems which can endure economic and climatic shocks. Investing in research in the dimensions of health, agriculture, climate change and environment through multidisciplinary research. There is a clear lesson for us about how supply chains that cross multiple borders are vulnerable to climate change and a host of other intersecting risks associated with our global systems. Understanding climate change as a compounding risk factor is now an urgent priority, with implications for how we perceive the need for climate change mitigation and adaptation in both developed and developing countries. Climate change impacts and vulnerability add extra pressure, threatening food systems, livelihoods, and health. Research is urgently needed to better understand how producers, consumers, and all the businesses in between will be affected by changes in supply and demand, as COVID forces shifts in farm labor, planting schedules, farm operations, markets, imports and prices.

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9. **Introduce and/or expand smart technology to smallholder farmers.** The COVID-19 pandemic presents an opportunity to accelerate the scaling of innovations that address climate change adaptation. This includes mechanization of agriculture at scale given the predominate long-term trend of migration of the youth from rural to urban areas and the impact it has on access to labor. This equipment may include using mini-tillers, planters, harvesters and other time- and labor-saving equipment. Smart agriculture by using sensors can control the water and fertilizer agriculture and in the same time allowed the small farmers expand their efforts to another sectors and achieve diversity. Employ efficient technologies such as circular agriculture, water harvesting and irrigation in production. Improve storage systems by introducing simple technologies and services to smallholder farmers to improve safe storage.
  10. **Promote digitalisation of farmers.** The current COVID-19 crisis has forced us to use digital communication systems, replace human work with digital tools where possible and use technology to help target interventions. Both the public and private sector could build on this opportunity to invest in increased access to internet, electricity and other digital resources, including in impoverished areas. All these technological innovations can help farmers to better cope with the constraints of COVID-19 and any emerging crises like climate change or stresses to the food system, while also making agriculture more productive and more attractive to the young. Learn from the social media such as YouTube, Facebook etc or straight telephonic conversation rather than calling technicians and waiting hours for his/her arrival for small and petty things. We should think how distance learning/e-learning can help in climate smart techniques and technologies transfer to farmers. In this way physical contacts can also be reduced.
  11. **Healthy food consumption.** For example in India: change food habit with the inclusion of bread (roti) of wheat, aato of maize, dhindo of finger millet etc. ensuring the balanced diet i.e. nutrition of the family to enhance the body immune system. Promote better sanitation while cooking, processing and eating. promote nutrition at the household level especially for children. As a consumer, we have to eat healthy food, choose green options. Special attention is needed for vulnerable groups, like children, pregnant women, elderly, malnourished persons and people whose immunity is compromised. Take measures so that they get adequate, safe and balanced diets.
  12. **Environmental measures help to stay food secure and healthy.** Many diseases are related to environmental conditions. When our environment is polluted we will be sick or ill because we are part of the global ecosystem. So we should e.g. practice mixed farming or agroforestry so that farming activities does not negatively affect the ecosystem through tree cutting, use of chemicals for spraying etc. Encourage farmers to use low pesticides and insecticides and practice integrated pest management. Smallholder agricultural producers should be encouraged to adopt sustainable land, water, fisheries, and forestry management practices. However, in order to encourage adoption of these management practices, improvements in infrastructure, extension, climate information, access to credit, and social insurance-conditions, all at the heart of rural development, are necessary. The black soot and waters and rivers polluted by oil explorations continue to be a serious threat to health and a hindrance to growth of agriculture in the Niger Delta Region. In a climate and COVID-19 samrt approach such issues also need attention. Ban wildlife trade and thus reduce transport and transmission of virusses. Enforce implementation of guidelines on the handling of any kind of wild animals and livestock. Sustainable land use management is also important: no barren land for any family, use available resources. Cultivate perennial fruits in terraced lands. Apply water harvesting methods and soil conservation. Promote advocacy and sensitisation on non-sustainable techniques like bush burning.
  13. **Governments should remove transport barriers for food and provide more social protection to the poor.** We should ensure all food which are being produced reach to market and government reduce all barriers which hinder food transportation e.g. having good rural roads; removing export bans, etc. Countries must boost their social protection programmes, keep global food trade going, keep the domestic supply chain gears moving, and support smallholder farmers' ability to increase food production.
  14. **Strengthen global governance and cooperation on food security climate and health.** Finally, COVID-19 will will have an impact on our global governance system. Agriculture,

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climate change, research and development sectors have a role to play in the needed transformation. A system change must focus on dietary diversity and food safety and security, paying attention to the rural poor in low- and middle-income countries and strengthening climate change resilience. We can work together to scale cross-sector platforms to build solid networks and scale-up innovations to strengthen sustainable and resilient food systems as well as climate change adaptation options.

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# 7 Do COVID-19 measures compete with climate-smart and green?

## 7.1 Competition between climate smart/green and COVID-19

In many countries implementation of programmes (including green and climate smart programmes) is delayed due to COVID-19. In Nigeria and Zimbabwe pollution is mentioned as a problem. "Rampant use of different sanitizers and soap everywhere around the country even in areas with no disposal facilities for the different sanitizers has negative impacts on the environment and health of different organisms including people" (Zimbabwe). "Fumigation of the federal capital territory is harmful to the environment"(Nigeria).

In Liberia the COVID-19 crisis has negative impact on climate-smart activities. The government has reduced the number of government workers to only the essential staff. Likewise, NGOs are also reducing their workers to only essential staff. These reduction of workers has considerably and negatively impacted activities on climate smart agriculture in the extension service delivery systems in the country.

In Kenya there are shifts in budgets focusing more on COVID-19 measures, " the daily big agenda is corona, corona and corona". Agriculture and green activities are secondary to matters of health but not totally shelved. Enormous funds are geared into improving the testing for corona, safety measures, infrastructure to meet the social distance requirements from other sectors. Although, the government is supporting food insufficiency for vulnerable persons less is put into the nutrient value of the supplies. There has been so much focus on COVID-19 that the recent floods in Kenya caused so much disaster since there was not much attention paid to it. The victims were left homeless and in some cases they could not evacuate to schools. These schools had been preserved as COVID-19 quarantine centres. Most rivers and lakes recorded highest historic levels that wreaked havoc with floods. This is related to climate change. However this does not mean that climate related projects have come to a standstill. "From the projects that I know are working on climate change, the implementing partners and donors have been able to work out new plans to cater for delays. In this case the funds earmarked for climate change still remain. But at the same time, new funds that are available now are focused on Covid-19 which might have an implication in the future".

In Vietnam the persons which normally would have moved to villages were caught up in urban centres. This has increased the demand for charcoal and its trade is going on un-controlled.

In Uganda because of the measures to contain COVID-19, 'green' activities are at standstill. Actually, environmentalists are not part of 'essential workers' during COVID-19 lockdown. So they cannot go into the field and execute environmental control. Ugandan President Yoweri Museveni has called on the population to first forgo other activities and focus all the energy on the fight against COVID-19. Some donors provide emergency help related to COVID-19. In Ethiopia, Alibaba donates some preventive kits face mask, glove, sanitizers and thermometer but no one donates resources for sustainable measures related to COVID-19. The many masks (PPE) being used are a potential threat to the environment in many countries, because sufficient measures have not been put in place to handle the extra waste.

## 7.2 Neutral or uncertain relation between climate smart/green and COVID-19

Many respondents have not (yet) observed any negative effect of the COVID-19 measures on measures to promote climate change adaptation and a green, sustainable development. But they are suspicious that this will happen in the near future. A shift in attention is noted in e.g. Afghanistan.

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Many donors allocated much funds for combating COVID-19 virus and its impacts. Also all NGOs shift their attention to combat the COVID-19 virus impacts. Given the uncertainties, financial or otherwise, some donors in India have withdrawn their support, stalling crucial projects in the future. Also in India, measures have been announced by the government for the agriculture sector, for example direct benefit transfer and opening up of agriculture sector. At present it is difficult to say if these are at the expense of climate smart or green activities but stress on the natural resources in rural India is bound to go up as reverse migration takes place.

A reporter in Nepal states that it is too early to claim that foreign aid for climate change and a green economy will be diverted to COVID-19 measures "as everything is technically shut down. However, I suspect that most of the foreign budgeted will be diverted to public health issues at least for coming couple of years potentially compromising budget for other global issues including climate change." "However, I suspect that most of the foreign budgeted will be diverted to public health issues at least for coming couple of years potentially compromising budget for other global issues including climate change." The situation is not clear. According to media reports, the government is planning to promote environment friendly infrastructure developments and climate-& technology-smart self-reliant agriculture production.

### 7.3 Positive relation between climate smart/green and COVID-19.

Several respondents observe positive relations between COVID-19 and green measures. There is less pollution and carbon dioxide emissions because of reduced traffic caused by restricted movements, avoidance of mass gatherings and lockdowns. It has to be observed that this is probably a temporary effect.

In Bangladesh the government has announced a new loan scheme for farmers to boost agricultural production in the backdrop of COVID-19 fall-out. The government has been giving special attention to the agricultural sector. It is reported that even special arrangement have been taken to ensure the transport of labor, agricultural product, all necessary materials like seeds, fertilizer, fuel etc.

In Niger COVID-19 and green measures seem to go hand in hand. Land reclamation activities to ensure food security in the country are important. Both donors and government are financing such activities. Reclaimed lands are used for agriculture or pasture production. To avoid migration in the COVID-19 context, local people are paid through a food for work or cash for work approach to build anti erosion structures. Capacity building is also dedicated to farmer to build resilience to climate and COVID-19 issues.

It is reported from Pakistan that the government has implemented several green programmes, which are internationally lauded. These programmes continue. Also in Uganda donors have not stopped their support for climate smart agriculture for refugees and host communities. In Vietnam no negative impacts on projects have been noted so far.

We finish this section with one optimistic view. "Governments will shift towards believing in science, because now they practically understand the cost of not believing in science. So climate change deniers may shrink more and instead science based policies be on the front line which may benefit 'green' activities."

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## 8 Conclusions

Respondents were all limited in their professional activities because of COVID-19. They work generally from home and normal activities in the field are on hold. Research in the field, monitoring visits to farmers, including advisory services, environmental control, all is severely affected. In some cases governments gave permits to persons working in agricultural extension in order to continue their activities, while applying the necessary health precautions. COVID-19 also delayed the educational system, for example universities have been closed.

The food system in many countries is seriously affected by COVID-19, most of all by the measures taken in order to control the pandemic. Many chains in the system are affected: labour and production inputs for the farm, national and international transport of food, and informal and peri-urban markets which often have been closed. Some value chains, especially of fresh products (fish, meat, vegetables, fruits), are more affected than others (because of lock-down and curfews). Health risks in the value chain increase and food industries send workers home or put them on reduced salaries. Agricultural value chains become shorter and home gardening is promoted and implemented more. The closing down of restaurants and public eateries leads to a shift in purchasing modalities. Sometimes there is also a change in behaviour of traders (they save food in order to increase the price) and consumers (hoarding). Last but not least COVID is a challenge additional to other threats in the food system, e.g. locusts invasions and extreme weather conditions such as floods or hurricanes.

The impact of COVID-19 on food security most of all seems at this moment on food access and utilisation. There is still enough food but because of the above mentioned hindrances and because purchasing power of many vulnerable groups has decreased, people cannot access the food. In some situations people may be (or are) starving. Because of decrease of purchasing power and since fresh products are difficult to acquire, food utilisation (a balanced diet) is also at stake.

We introduced the term 'corona-smart agriculture' in our questions to the alumni with the other term 'climate smart' agriculture as a reference in our mind. We had not defined the term. Alumni mentioned several elements of a definition for 'corona smart agriculture': (a) realization of the notion that different elements of the food system are more strongly interlinked than we felt before the corona crisis, (b) continuation of food production while minimizing the spread of corona, (c) more production of nutritious food to help the human immune system (d) avoidance of habitat destruction and fragmentation to diminish risks of transfer of pathogens from wild animals to humans, and (e) promotion of local supply chains and home gardening.

Current measures to deal with corona in the agricultural sector are among others: application of physical distance, promotion of self-sufficiency, temporary subsidies, loans, etc. to stimulate food production, food support programmes, construction of food storage facilities, monitoring of prices and import/export restrictions or stimulation. Measures that need priority according to many respondents are: local value chains, digitalization of farmers, improved hygiene and good governance which would take into consideration multiple time horizons and multiple level organization.

The respondents offer many suggestions how to combine corona smart and climate-smart agriculture. Some ideas are both mentioned under 'corona smart agriculture' and under 'corona and climate smart agriculture'. That emphasises the need to take on board the two issues together. More emphasis should be on local and sub-national value chains, including circular agriculture. Local organisations, institutions and platforms should be strengthened. Self-sufficiency (home-gardening) should be promoted. Some respondents plea for a move towards more agricultural diversification, agro-ecology and indigenous techniques. Approaches on health and climate-smart should be integrated, silos should be broken down e.g. when supporting farmers in the field. Such initiatives should be sustained by more research. Smallholder farmers should get more access to smart technology, including the digitalisation of farmers (e.g. better internet connection and availability of necessary electric power). Promotion of healthy food (a balanced diet) could also help to enhance the body immune system. Environmental protection help to stay food secure and healthy and reduces compounded negative

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effects. Governments should play an active role in all this, but should first of all remove transport barriers for food and provide social protection for vulnerable groups ((e.g looking for possibilities to open up informal and peri-urban markets). This pandemic shows that, although in almost all countries national perspectives have been dominant, COVID-19 is an international problem which needs international cooperation to strengthen sustainable and resilient food systems as well as climate change adaptation options.

Sometimes there is a competition between COVID-19 measures and climate-smart/green. In some cities authorities apply different sanitizers and soaps in the streets. Some organisations reduce the numbers of workers in e.g. agricultural extension, which leads to less climate-smart activities. In some countries new funds are allocated to COVID-19 measures, while disasters like floods, remain less attended or unattended. However, many respondents have not yet observed a negative effect of COVID-19 measures on climate-smart programmes and activities. It is too early for them to draw conclusions. In some countries a positive relation is reported, like less pollution because of reduced traffic. In some cases agricultural programmes include activities that help to mitigate the effects of COVID-19. The COVID-19 crisis could have long-term positive effects: "Governments will shift towards believing in science, because now they practically understand the cost of not believing in science. So climate change deniers may shrink more and instead science based policies be on the front line which may benefit 'green' activities."

Finally a conclusion on the methodology applied in this study. A network of alumni of an international course can generate in a fairly short time information from many countries in a disturbed and disturbing situation (as we may characterise this corona crisis). The quality of the information is not always guaranteed. Respondents encountered limitations to gather information, because they cannot go to the field or visit communities that are most affected by the crisis. Some respondents answered with much more details than others. The number of respondents per country varies considerably: from several countries we have only one report, so triangulation of the information is not always possible. But still we believe we received valuable information, for which we acknowledge the respondents.

