



COVID-19 building back greener and more resilient

*Contributions of agroecology to a “new
normal” in Asia and the Pacific*

Abstract

In addition to the severe health crisis it created, the COVID-19 epidemic also caused the global economy to contract at a rate not seen since World War II. It has also led to a severe increase of poor and food-insecure people. The effects of the pandemic on agriculture have been exacerbated by the way in which the current industrial farming system is set up.

Integral to the common vision of the Food and Agriculture Organization of the United Nations (FAO) for sustainable food and agriculture, agroecology echoes the goals of the 2030 Agenda and can be seen as a key part of the global response to this climate of instability, offering an original approach to meeting significant increases in our future food needs while ensuring that no one is left behind. As recognized by the World Bank and FAO-led global agriculture assessment (IAASTD, 2019), and the landmark reports from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES, 2018, 2019), Intergovernmental Panel on Climate Change (IPCC, 2019) and FAO (2019a), agroecology has the capacity to reconcile the economic, environmental and social dimensions of sustainability.

This paper is a contribution to the regional dialogue on how to respond to the COVID-19 crisis. It first highlights some of the impacts of the pandemic on agriculture and food security in the Asia-Pacific Region. Then, mobilizing the framework of FAO's ten elements of agroecology, it provides selected examples of how agroecological approaches can contribute to transforming food systems and to developing a greener, more resilient and more inclusive "new normal".

Keywords

Agroecology, COVID-19, decent jobs, sustainable food systems, agricultural inputs, value chains, health and nutrition, biodiversity, pesticides, fertilizers, agrochemicals, animal welfare, environment, sustainable development, Food and Agriculture Organization of the United Nations (FAO), Asia and the Pacific

INTRODUCTION

Besides the severe health crisis, the COVID-19 epidemic also caused the global economy to contract at a rate not seen since World War II (World Bank, 2020a), and has led to a severe increase of poor (World Bank, 2020b; Sumner, Hoy and Ortiz-Juarez, 2020) and food-insecure people (Oxfam, 2020). The effects of the pandemic on agriculture have been exacerbated by the way in which the current industrial farming system is set up (Altieri and Nicholls, 2020). The intensification of agricultural production has been accompanied by unsustainable exploitation of natural resources, resulting in the degradation of ecosystems, rural society and knowledge. This degradation of the natural resource base, combined with increasing impacts of climate change and global uncertainties, exposes communities to more hazards and losses, and reduces their resilience in the future. Moreover, large-scale specialized livestock and feed production, which focus on the production of bulk commodities and rely on the use of agrochemicals, have been driving natural habitat loss and have pushed the agricultural frontier into wilder and less-arable lands. This has the potential to create conditions that favour the circulation and mixing of viruses, which can then be spread to humans (CBD and WHO, 2015; IPBES, 2020; Vidal, 2020).

Integral to the common vision of the Food and Agriculture Organization (FAO) for sustainable food and agriculture, agroecology echoes the goals of the 2030 Agenda and can be seen as a key part of the global response to this climate of instability, offering an original approach to meeting significant increases in our food needs of the future while ensuring no one is left behind. As recognized by the World Bank and FAO-led global agriculture assessment (IAASTD, 2019), and the landmark reports from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES, 2018, 2019), Intergovernmental Panel on Climate Change (IPCC, 2019) and FAO (2019a, 2019b), agroecology has the capacity to reconcile the economic, environmental and social dimensions of sustainability.

Agroecology is a holistic and integrated approach that simultaneously applies ecological and social concepts and principles to the design and management of food and agricultural systems (Altieri 1995; Francis *et al.*, 2003). It seeks to optimize the interactions between plants, animals, humans and the environment while taking into consideration social aspects to achieve sustainable and fair food systems. The goal is to achieve a transformation of food systems towards higher degrees of sustainability and resilience, as outlined in the five levels of transition defined by Gliessman (2015) and proposed by FAO's ten elements of agroecology (FAO, 2018).

Agroecology is not a new concept but it builds on both traditional knowledge (developed by producers, traders and indigenous peoples in their different contexts, based on empirical learning processes and knowledge transfer from generation to generation) and the latest scientific research for a better understanding and use of ecological processes operating in farming systems (Wezel, 2017).

This paper will first highlight some of the impacts of the COVID-19 pandemic on agriculture and food security in the Asia-Pacific Region, and then provide selected examples of how agroecological approaches can contribute to transforming food systems and developing a greener, more resilient and more inclusive “new normal”.

SELECTED IMPACTS OF THE PANDEMIC ON AGRICULTURE AND FOOD SECURITY IN ASIA AND THE PACIFIC

Labour and job markets

Governments around Asia have imposed restrictions on movements and gatherings of people as important measures to curb the spread of COVID-19 (World Bank, 2020a). These measures have widespread effects on the economy, resulting in soaring unemployment numbers and lost incomes for wide parts of the population, especially in the sectors hardest hit by the pandemic, such as tourism and gastronomy (ICIMOD, 2020; FAO, 2020d, 2020e; WFP, 2020; NSB and UNDP, 2020). In addition to the loss of wages, many families in rural areas have also been affected by sharp decreases of remittances from family members working in other areas of their home countries or abroad, as these migrant workers were forced to return to their homes (ICIMOD, 2020; Altieri and Nicholls, 2020; Oxfam, 2020). Besides the loss of remittances, these returnees also increase the local demand for food, employment and other resources (ICIMOD, 2020). All these effects result in losses of disposable incomes of vulnerable and poor families in rural areas often hit especially hard, putting their livelihoods and food security at risk (Sumner, Hoy and Ortiz-Juarez, 2020; Gregorio and Ancog, 2020; World Bank, 2020b). Therefore, the creation of employment opportunities in rural areas represents an essential measure to counteract the devastating impacts of the pandemic and subsequent global upheaval (ICIMOD, 2020; NSB and UNDP, 2020).

While movement restrictions and the general decrease in economic activity has increased unemployment rates in many places, other areas are facing major challenges because of unavailability of migrant workers who usually play a crucial role in labour-intensive agricultural tasks, such as planting and harvesting (Gregorio and Ancog, 2020; IFPRI, 2020; FAO, forthcoming-a). Labour shortages can have severe impacts on food supply chains with potential implications for local economies and food security (FAO, 2020d). Reports show that the lack of migrant labour affects the production of food staples, such as the harvest of wheat in Nepal (WFP, 2020) and India (FAO, forthcoming-a), and the provision of commodities such as palm oil in Malaysia (Ranghu and Listiyorini, 2020).

Agricultural input markets

Agricultural production is highly dependent on timing; if inputs are not available during a crucial time in the production cycle, the whole cropping season or breeding cycle might be at risk (FAO, forthcoming-a). Reports show that the availability of inputs such as fertilizer, agricultural machinery, seeds and funds could become a major problem for farmers in areas where the planting seasons start during a lockdown (Sanderson *et al.*, 2020). Similarly, the timely availability of breeding stock, animal feeds and support services – including veterinary access and post-harvest services enabling milk collection, cooling and processing – are critical to supporting livestock production. A lack of seed and fertilizers have been reported to be major obstacles for farmers to start the cropping season in Myanmar, the Philippines and Sri Lanka (FAO, forthcoming-b and citations therein). In the case of seed distribution, a survey conducted by the Asia and Pacific Seed Association (APSA) revealed that a large share of respondents were experiencing major disruptions of the seed trade, including difficulties with freight and transportation as well as a reduction of new orders (APSA, 2020). The classification of agricultural inputs, including seeds as essential goods by most countries, is considered a major step to ensure

unhindered distribution although concerns remain whether sufficient amounts of seeds will be available in time for the cropping seasons ahead (OECD, 2020).

Marketing and supply chains

Global markets and supply chains for agricultural products have been relatively stable during the COVID-19 pandemic, and prices for most staples and commodities have not fluctuated much so far (FAO, 2020d; FAO, forthcoming-a). However, at regional and local levels, critical disruptions of value chains can be observed. Movement restrictions and regulations have led to a temporary closure of many hotels, restaurants, markets, schools and state administrations. This has led to reduced public procurement, which has impacted food producers heavily. Moreover, social gatherings, including wedding ceremonies and (religious) festivals, have been banned (FAO, forthcoming-b). As a consequence, smallholders and family farmers in particular have experienced great difficulties in finding a market for their produce (FAO, 2020a; FAO, forthcoming-b) and farm gate prices have decreased considerably in some cases in some locations (FAO, forthcoming-a).

Perishable agricultural goods such as fruits and vegetables have been especially affected by the crisis (FAO forthcoming-b), with consumer preferences shifting towards processed, storable foods, thus also contributing to the problem (Altieri and Nicholls, 2020). This situation has led to reports from various countries across the world where farmers were forced to dump their produce as no buyers could be found; these reports include strawberries and broccoli being fed to cattle, and grapes dumped in India, vegetables rotting in the fields in Pakistan, or cabbage remaining unsold in the Lao People's Democratic Republic (FAO, forthcoming-a, b). On the other hand, poor urban populations are at a high risk of experiencing difficulties in accessing fresh and healthy products during disruptions of food supply chains (Altieri and Nicholls, 2020; IPES-Food, 2017).

Livestock and products from fisheries and aquaculture have also been heavily impacted by the pandemic. Reduced demand for animal products, closed markets and slaughterhouses as well as restrictions to move live animals across international borders, such as the ban for animals from the Mekong region to be imported to China, have had devastating consequences, especially for smallholders (FAO, 2020f). Producers in the fisheries and aquaculture sectors have also been heavily affected because of the reduced international demand from major buyer countries in the European Union and the United States of America (FAO forthcoming-a, b) but also as a result from movement restrictions for ships and workers (FAO, 2020c).

Health and nutrition

The poor working conditions that many agricultural (migrant) workers are facing have existed long before the current COVID-19 outbreak. However, the pandemic – with all its economic, social and health implications – has contributed to exposing these issues (IPES-Food, 2020). These conditions include low wages, lack of access to social security and health care, insufficient sanitary provisions, and crowded working and living conditions (PANAP, 2020). While reports of agricultural operations aiming at protecting the health of their workers during the pandemic can be found (FLO, 2020), the usual news concerning farm workers during these times paint a little optimistic picture of the working conditions in Bangladeshi (ESSF, 2020) and Indian (Sen, 2020) tea plantations or Malaysian palm oil plantations (PANAP, 2020), while American and German

meat processing facilities have already emerged as hotspots of some of the worst COVID-19 outbreaks in their countries (PANAP, 2020).

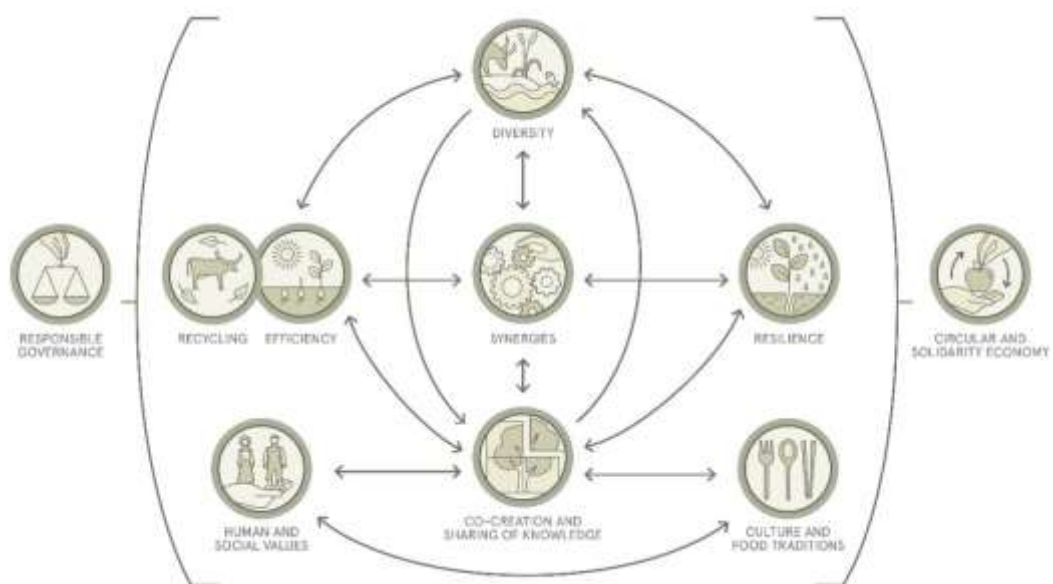
Consumer health could also be affected as a result of the pandemic because consumption habits have been observed to shift from fresh food towards highly processed foods and some populations – especially urban poor – might lose access to fresh food as mentioned above. This observable deterioration of dietary habits is especially worrisome as unhealthy diets contribute to some of the pre-existing conditions – especially overweight and obesity – that have been shown to contribute to severe disease progressions and fatalities caused by COVID-19 (Faucher *et al.*, 2020).

PROMOTING AGROECOLOGICAL APPROACHES FOR A GREENER, MORE RESILIENT AND MORE INCLUSIVE “NEW NORMAL”

The ten elements of agroecology

As a polysemic concept, agroecology does not have a unique definition. However, in order to operationalize agroecology, FAO developed the ten elements of agroecology framework, which was endorsed by its 197 member states in 2019 (FAO, 2019a). The elements in this framework describe the common characteristics of agroecological systems, its foundational practices and innovation approaches, as well as the context features and enabling environment that constitute the socio-ecological system (FAO, 2018). Figure 1 shows a graphical representation of the ten elements and highlights their interlinked and interdependent nature. The ten elements are considered to provide an analytical model that allows actors to evaluate transitions of agricultural systems towards agroecology in a holistic manner (Barrios *et al.*, 2020). Therefore, the ten elements of agroecology represent a suitable framework that can serve as a useful model to frame the discussion and enable actors to proceed with developing innovative, agroecological approaches for a post-pandemic world.

FIGURE 1: Graphical representation of the ten elements of agroecology and their interdependencies



Source: FAO, 2018

Creation of decent agricultural jobs

Employment opportunities and overall importance of agriculture for national economies in Asia has been decreasing significantly during the past decades, reducing the sector's ability to absorb large numbers of people during times of rising unemployment numbers (FAO, 2020e). Moreover, wages and working conditions in the agricultural sector tend to be not favourable or less favourable than in other sectors. For example, agricultural wages in the Lao People's Democratic Republic are 17 percent lower than the national median income, and up to 25 percent lower when it comes to rural youth ages 20–24 (Shattuck, Manivong and Vongthilard, 2019). This contributes to the fact that agriculture is generally seen as an unattractive career option for most youth. Additionally, today's Asian youth are usually better educated than their parents' generation and, therefore, expect better working conditions and opportunities (FAO, 2010).

Agroecological systems are highly diverse (element "diversity") and complex because they are based on the careful management of the various elements of the socio-ecological system (captured among others by the elements "synergies," "recycling," and "circular and solidarity economy"). Therefore, the management of agroecological systems is usually more knowledge- and labour-intensive than that of systems based on industrial modes of agriculture. This offers ample possibilities to create decent jobs in the agricultural sector, involving diverse areas of competence spanning from ecology to marketing to rural development. However, as outlined in the element "co-creation and sharing of knowledge", knowledge management is an integral part of agroecology. Therefore, dedicated efforts are needed to build a workforce that is equipped with the required competencies to fill these jobs across the value chain and food system.

Calls to invest in and adapt information systems for farmers, such as extension and advisory services, as well as scaling up capacity development as a reaction to the current crisis and a precondition for rural development and increased attractiveness of the agricultural sector have been made (FAO, 2020b; Gregorio and Ancog, 2020). However, besides that call, major investments need to be directed towards education (both academic and vocational), focusing on integrated sustainable agriculture including agroecological approaches. Curricula should include the teaching and dissemination of knowledge on agroecological production practices. It is important that it addresses topics such as the diversity of cropping systems (agroforestry, inter-, cover- and relay cropping, crop rotations, integrated livestock and crop production systems), soil fertility management (integrated nutrient management, building of soil organic matter, reduced tillage) and integrated pest management (Wezel, 2017; Altieri and Nicholls, 2020). In addition, it is critical that curricula also focus on business, infrastructure, and marketing skills for the development of strong and resilient local, regional and global marketing opportunities for agroecological products. These investments in education are needed to equip the young generation with the skills required to perform the high quality, knowledge-intensive jobs needed to develop and sustain agroecological systems. However, this needs to be connected with investments targeted at increasing the value of high-quality agricultural products (certification, protected origin) and payment for ecosystem services and other associated costs. Moreover, consumers' understanding and awareness of the importance and value of sustainable practices in agricultural production, processing and distribution need to be raised in order to increase the readiness of buyers to pay appropriate prices for agroecological products. Jobs will only be attractive if salaries are competitive (which they often are not in the agricultural sector); in other words, the value created by agroecological systems (and the people working therein) must be paid for.

Replacing external inputs

The substitution of external inputs, such as fertilizers, pesticides and seeds, moving towards stewardship and better utilization of ecosystem services, is a central component of early agroecological transitions (Gliessman, 2015). These approaches are also reflected in four of the ten elements of agroecology defined by FAO, specifically in the elements “synergies,” “efficiency,” “recycling,” and “circular and solidarity economy” (FAO, 2018). The indices assigned to each of these elements in the TAPE (Tool for Agroecology Performance Evaluation) framework further clarify the approaches applied to achieve high levels of autonomy in regard to external inputs in agroecological systems (FAO, 2019c). Specifically, synergies relate to the integration of different elements of the agro-ecosystem (e.g. plants, animals, soils) in a context-specific way that aims at maximizing mutualistic interactions. Efficiency and recycling both illustrate different strategies that can be applied to use and reuse locally available resources in order to sustain productive agricultural systems. Finally, a circular and solidarity economy focuses on the economic and social aspects that are required to build a stable local food system, fully embodied in a specific territory.

In addition to strengthening local input systems (e.g. biopesticides, natural fertilizers) and local systems that reduce post-harvest losses (e.g. local drying and food processing operations), special attention needs to be directed towards the creation of functioning local seed systems and seed banks, as they are paramount to any resilient food system. Where farmers have unhindered physical access, decision-making, and legal control over their seeds, disruptions of supply chains and decisions made by large corporations situated anywhere on the globe will not put in danger entire cropping seasons. Large, although still insufficiently explored, potential lies in the utilization and propagation of local varieties and neglected underutilized species. These are often well adapted to specific, local conditions and provide the basis for a nutrient rich, diverse and healthy diet (Li and Siddique, 2018). As the COVID-19 pandemic has shown, current agricultural systems tend to be highly susceptible to disruptions in the input supply chains if they occur at critical moments in the production cycle. As outlined above, agroecology offers an extensive array of agricultural methods and techniques as well as economic approaches that help farmers reduce their dependency on external inputs, thereby increasing the resilience of farming systems.

Connecting farmers to consumers

Agroecologists have identified the separation of producers and consumers in large-scale, specialized and external-input-dependent agricultural production systems as a major factor contributing to the lack of resilience and sustainability of farming systems, and the oftentimes unsatisfactory incomes for producers (Gliessman, 2015; IPES-Food, 2016). FAO has integrated these considerations into its definition of the ten elements of agroecology in the form of the elements “circular and solidarity economy” and “responsible governance” (FAO, 2018). The TAPE indices informing “circular and solidarity economy” assess different aspects that help create local food systems and marketing opportunities for farmers, including producer networks, local exchange and trade of products and services, and farmers’ relationships with consumers (FAO, 2019c). The element “responsible governance” also discusses aspects that are relevant to the relationship between farmers and consumers but focuses on power distributions between market actors (FAO, 2019c). Empowering producers and establishing producers’ organizations and associations are seen as central elements of agroecological systems that help increase opportunities for farmers to defend their appropriate place in the market and obtain fair prices for their produce. Numerous examples of successful initiatives connecting producers to consumers and increasing marketing opportunities for farmers while providing high-quality foods to rural and urban populations have been described both in the context of the current pandemic (Faucher *et al.*, 2020), and unrelated to COVID-19 (Baker, Gemill-Herren and Leippert, 2019). One

particular example is community supported agriculture (CSA), which has been described as a safe and resilient alternative to industrial agriculture in the time of COVID-19. CSA networks contribute to preserving and building sustainable local and territorial food systems that connect producers and consumers, and provide healthy, nutritious food for all (URGENCI, 2020). CSA schemes have seen a tremendous increase in demand during the current pandemic (CSA China network reported an increase in demand by 300 percent in January 2020, for example). Another example of innovative initiatives are the open source and community-controlled platforms such as the not-for-profit global organization Open Food Network, which both enables farmers to connect to consumers and to collaborate with other farmers.

Public procurement can also play an important role in food systems, such as in the form of school feeding schemes, public canteens and restaurants, and food distribution policies for vulnerable groups (e.g. relief programmes initiated by many governments during the COVID-19 pandemic) (FAO, 2020a). These procurement schemes should be used by governments to support a green transformation of local and national agricultural systems directly. This can be achieved by sourcing products from farmers (or farmer groups and associations) that implement production methods that comply with high standards of environmental and social sustainability. This can also be achieved by stimulating post-harvest value-addition and local processing of goods to move local foods beyond commodities and into the realm of value-added enterprises. The procurement of foods produced according to agroecological standards not only creates market opportunities for high-quality products from smallholders and family farmers but can also help to assure free (or at least affordable) access to healthy and safe food products for the beneficiaries of these government programmes.

Urban and peri-urban agriculture represents a promising way to close the physical distance with producers by moving food production closer to urban buyers. Different forms of urban agriculture range from home and community gardens that mainly aim at subsistence food production for urban poor to high intensity urban vegetable farms that produce for local markets (IPES-Food, 2017; WFC, 2020). While urban farming is often based on very intensive systems using large amounts of external inputs, agroecological approaches such as the use of organic fertilizers and composts produced from household waste offer great opportunities to close urban nutrient and energy cycles. Moreover, urban societies and urban agriculture are often highly dynamic and, therefore, lend themselves to be promising starting points for an agroecological transformation of food systems (Tornaghi and Dehaene, 2020).

Human and animal wellbeing and revival of food traditions

Human wellbeing is at the core of an agroecological system as stated in the element “human and social value” defined by FAO (FAO, 2018). A special focus is placed on the protection of the rights of those who are often especially vulnerable and underprivileged such as women, agricultural labourers and rural youth (FAO, 2019c). Agroecological systems are usually based on the workforce of family members. Hired labour might be present in agroecological systems, but there is close social and economic proximity between employees and farmers. Good working conditions, protection of labourers’ rights, and decentralized structures make agroecological farms excellent role models when it comes to reducing exposure to health risks of people working in agriculture during a pandemic as well as benefits sharing.

Agroecology also values the wellbeing of animals and the use of diverse and locally adapted animal species and breeds (see FAO’s elements “diversity” and “human and social values”) (FAO, 2019c; 2018). This ensures that livestock population densities on agroecological farms tend to be lower and genetic diversity higher than in specialized, industrial animal production. Moreover,

agroecology aims at reducing the expansion of large-scale specialized agricultural operations into natural landscapes and, therefore, lowers the contacts of livestock and humans with wild animals that potentially carry dangerous pathogens (Altieri and Nicholls, 2020). Therefore, if the agroecological principles of good animal husbandry and wellbeing are followed, the spillover of viruses and other pathogens from wild animal populations to livestock can be reduced while at the same time, the resistance of livestock populations to diseases is increased. Besides protecting the health of livestock and reducing the need for veterinary services and antibiotics and other medicine in animals, this could also ultimately reduce the risks for antimicrobial resistance and emerging zoonotic diseases.

Healthy and culturally appropriate human diets based on locally available ingredients and traditional modes of food preparation suited to local contexts are considered an essential element of an agroecological system (element “culture and food tradition”) (FAO, 2018). Supporting and reinforcing the understanding of healthy, nutritious and diversified diets in communities increases the health of its members and lowers the occurrence of some nutrition-related pre-existing conditions that have been shown to increase severity of symptoms caused by COVID-19, such as overweight and obesity potentially leading to diabetes type 2. Moreover, if nutrition is based on local plant varieties and locally adapted animals, and traditional knowledge of food preparation is kept alive in communities, the continuous availability of appropriate food can be secured even during times of large-scale disruptions to markets, value chains and logistical networks.

In other words, agroecology embraces a set of values that help to create food systems that: 1) place decent working conditions and the livelihoods of humans at its centre, 2) respect animal and environmental wellbeing, and 3) value the importance and context-specificity of traditional knowledge concerning production and food preparation. These values play a crucial role in safeguarding the dietary health of agricultural communities and resilience of food systems during times of crisis.

CONCLUSIONS

First, agroecological principles offer valuable approaches that can help to increase the resilience of food systems and therefore represent a coping strategy to mitigate the immediate disruptions caused by a pandemic such as COVID-19. Resilience of agroecological systems is achieved by increasing the diversity within production systems, replacing external inputs with ecological processes, and efficient use and recycling of the resources in the system. Moreover, sale and distribution of products in agroecological systems is based on strong farmers’ organizations and direct connections between producers and consumers. These short and established supply chains ensure stable markets for both sellers and buyers during times of disruption, such as a pandemic.

Second, agroecology also provides the framework needed to build back a greener and more sustainable agricultural system after a crisis. Besides ample benefits for farmers, agroecological production systems can also help reduce the negative externalities associated with large-scale conventional and specialized agricultural production. The reduction of external inputs, the movement of production closer to consumers, and the increase of agro-biodiversity contribute to reducing and reversing the environmental degradation caused by current food systems, such as contamination of soils and waterbodies with agrochemicals, eutrophication resulting from the excessive use of mineral fertilizers, greenhouse gas emissions caused by transporting agricultural goods around the globe, and accelerating loss of agricultural and wild biodiversity. Moreover, by creating decent jobs and protecting the wellbeing and livelihoods of people working in the

agricultural sector, agroecology also contributes to strengthening the social systems supporting food production and the wellbeing of producers.

Therefore, investments need to be made to up- and out-scale the use of agroecology and thus support a greener future for post-pandemic agriculture. There are two major areas where investments are specifically needed. First, education and research (at all levels including universities, vocational schools and farmer field schools) on well-integrated sustainable agricultural practices and agroecology must be vastly expanded in order to create a new generation of professionals in the agricultural sector who are equipped with the knowledge, skills and competences required to support and lead to a “systems thinking” that enhances the agroecological transition. Second, there is a great need to develop and further expand schemes that allow for the fair compensation for positive externalities (and penalties for negative ones) associated with agricultural production. These schemes include, among others, direct payments for ecosystem services, fair market access, and certification of products produced according to agroecological principles.

REFERENCES

- Altieri, M.A.** 1995. *Agroecology. The science of sustainable agriculture*. Second edition. Boca Raton, USA, CRC Press.
- Altieri, M.A. & Nicholls, C.I.** 2020. Agroecology and the reconstruction of a post-COVID-19 agriculture. *Journal of Peasant Studies*, 47(5): 1–18.
- APSA (Asia and Pacific Seed Association).** 2020. *Asia-Pacific seed trade reeling from COVID-19 lockdown* [online]. Asia and Pacific Seed Association. [cited 27 November 2020]. www.apsaseed.org/asia-pacific-seed-trade-reeling-from-COVID-19-lockdown-survey
- Baker, L., Gemill-Herren, B., & Leippert, F.** 2019. *Beacons of hope: Accelerating transformations to sustainable food systems*. Biovision Foundation and Global Alliance for the future of Food.
- Barrios, E., Gemill-Herren, B., Bicksler, A., Siliprandi, E., Brathwaite, R., Moller, S., Batello, C., & Tittone, B.** 2020. The 10 elements of agroecology: Enabling transition towards sustainable agriculture and food systems through visual narratives. *Ecosystems and People*, 16(1):230–247. (also available at www.tandfonline.com/doi/full/10.1080/26395916.2020.1808705).
- CBD (Center for Biological Diversity) & WHO (World Health Organization).** 2015. *Connecting global priorities: Biodiversity and human health: A state of knowledge review*. Geneva, Switzerland, WHO Press. (also available at www.who.int/globalchange/publications/biodiversity-human-health/en/).
- ESSF (Europe Solidaire Sans Frontières).** 2020. *Asian workers battle COVID-19, wage cuts and ruthless managers* [online]. Europe Solidaire Sans Frontières. [cited 27 November 2020]. www.europe-solidaire.org/spip.php?article52901
- FAO.** 2010. *Rural youth employment in developing countries: A global view: Overview/Synthesis #1*. Rome. 48 pp. (also available at <http://www.fao.org/3/al414e/al414e00.pdf>).
- FAO.** 2018. *The 10 elements of agroecology: Guiding the transition to sustainable food and agriculture systems*. Rome. 13 pp. (also available at <http://www.fao.org/3/i9037en/i9037EN.pdf>).
- FAO.** 2019a. *Council. 163rd Session. The ten elements of agroecology*. Document CL 163/13 Rev.1. Rome. 9 pp. (also available at www.fao.org/3/ca7173en/ca7173en.pdf).
- FAO.** 2019b. *Scaling up agroecology to achieve the sustainable development goals*. Proceedings of the Second FAO International Symposium. Rome. 365 pp. (also available at www.fao.org/3/ca3666en/ca3666en.pdf).
- FAO.** 2019c. *TAPE: Tool for agroecology performance evaluation – Process of development and guidelines for application. Test version*. Rome. 87 pp. (also available at fao.org/policy-support/tools-and-publications/resources-detals/en/c/1257355/).
- FAO.** 2020a. *Coronavirus disease 2019 (COVID-19) and family farming*. Rome. 8 pp. (also available at www.fao.org/3/cb0417en/CB0417EN.pdf).
- FAO.** 2020b. *Extension and advisory services: At the frontline of the response to COVID-19 to ensure food security*. Rome. (also available at www.fao.org/3/ca8710en/CA8710EN.pdf).
- FAO.** 2020c. *How is COVID-19 affecting the fisheries and aquaculture food systems*. Rome. (also

available at www.fao.org/3/ca8637en/ca8637en.pdf).

- FAO.** 2020d. *Impacts of coronavirus on food security and nutrition in Asia and the Pacific: Building more resilient food systems*. Bangkok. (also available at: www.fao.org/3/ca9473en/CA9473EN.pdf).
- FAO.** 2020e. *Impacts of COVID-19 on the food systems in the pacific small island developing states (PSIDS) and a look into the PSIDS responses*. Apia, Samoa. (also available at www.fao.org/uploads/pics/COVID-19_impacts_on_food_systems_in_PICs_CRFS_.pdf).
- FAO.** 2020f. *Mitigating the impacts of COVID-19 on the livestock sector*. Rome. (also available at www.fao.org/3/ca8799en/CA8799EN.pdf).
- FAO.** forthcoming-a. *Food supply chains and trade disruptions in Asia under COVID: A regional analysis and policy response options*.
- FAO.** forthcoming-b. *Smallholders' food production and resilience: Policy options for post-COVID recovery*.
- Faucher, A., Louison, L., Perrine, J., & Isaac, G.** 2020. *A territorial approach to ensure food resiliency: Lessons to learn From the COVID19 health crisis - Results of the international COVID 19 let's food Questionnaire July 2020*. Bordeaux/Lyon, France, Let's Food. (also available at letsfoodcities.com/wp-content/uploads/2020/07/EN_-Article-LF-COVID.pdf).
- FLO.** 2020. *Safety first: How farmers and workers are rising to the challenge of COVID-19* [online]. Fairtrade International. [cited 27 November 2020]. www.fairtrade.net/news/safety-first-how-farmers-and-workers-are-rising-to-the-challenge-of-covid-19
- Francis, C., Lieblein, G., Gliessman, S., Breland, T.A., Creamer, N., Harwood, R., Salomonsson, L., Helenius, J., Rickerl, D., Salvador, R., Wiedenhoef, M., Simmons, S., Allen, P., Altieri, M., Flora, C. & Poincelot, R.** 2003. Agroecology: The ecology of food systems. *Journal of Sustainable Agriculture*, 22 (3): 99–118.
- Gliessman, S.** 2015. *Agroecology – The ecology of sustainable food systems*. Third edition. Boca Raton, USA, CRC Press.
- Gregorio, G.B. & Ancog, R.C.** 2020. Assessing the impact of the COVID-19 pandemic on agricultural production in Southeast Asia: Toward transformative change in agricultural food systems. *Asian Journal of Agriculture and Development*, 17 (1): 1–13.
- IAASTD.** 2019. *Agriculture at a crossroads. International assessment of agricultural knowledge, science and technology for development. Global report*. McIntyre, B.D., Herren, H.R., Wakhungu, J., Watson, R.T. (eds.). Washington, D.C, International Assessment of Agricultural Knowledge, Science and Technology for Development.
- ICIMOD.** 2020. *COVID-19 impact and policy responses in the Hindu Kush Himalaya*. Kathmandu, International Centre for Integrated Mountain Development.
- IFPRI.** 2020. *How much will global poverty increase because of COVID-19?* [online]. IFPRI Blog: Research Post. Washington, DC, International Food Policy Research Institute. [Cited 27 November 2020]. www.ifpri.org/blog/how-much-will-global-poverty-increase-because-covid-19
- IPBES.** 2018. *The IPBES assessment report on land degradation and restoration*. Montanarella, L., Scholes, R., and Brainich, A. (eds.). Bonn, Germany. Secretariat for the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Sciences. (also available at ipbes.net/sites/default/files/2018_ldr_full_report_book_v4_pages.pdf).

- IPBES.** 2019. *Global assessment report on biodiversity and ecosystem services*. Brondizio, E.S., Settele, J., Díaz, S., Ngo, H.T. (eds.). Bonn, Germany. Secretariat for the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Sciences.
- IPBES.** 2020. *IPBES workshop on biodiversity and pandemics* [online]. Workshop report. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Sciences. [Cited 27 November 2020]. ipbes.net/sites/default/files/2020-10/20201028%20IPBES%20Pandemics%20Workshop%20Report%20Plain%20Text%20Final_0.pdf
- IPCC.** 2019. *Climate change and land: An IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems*. [Shukla, P.R., Skea, J., Calvo Buendia, E., Masson-Delotte, V., Pörtner, H.-O., Roberts, D.C., Zhai, P., Slade, R., Connors, S., van Diemen, R., Ferrat, M., Haughey, E., Luz, S., Neogi, S., Pathak, M., Petzold, J., Portugal Pereira, J., Vyas, P., Huntley, E., Kissick, K., Belkacemi, M., Malley, J. (Eds.)]. International Panel on Climate Change. (also available at www.ipcc.ch/site/assets/uploads/sites/4/2020/08/200730-IPCCJ7230-SRCL-Complete-BOOK-HRES.pdf).
- IPES-Food.** 2016. *From uniformity to diversity: a paradigm shift from industrial agriculture to diversified agroecological systems*. International Panel of Experts on Sustainable Food systems.
- IPES-Food.** 2017. *What makes urban food policy happen? Insights from five case studies*. International Panel of Experts on Sustainable Food Systems. (also available at www.ipes-food.org/_img/upload/files/Cities_full.pdf).
- IPES-Food.** 2020. *COVID-19 and the crisis in food systems: Symptoms, causes, and potential solutions*. Communiqué by IPES-Food, April 2020, International Panel of Experts on Sustainable Food systems. (also available at www.ipes-food.org/_img/upload/files/COVID-19_CommuniqueEN.pdf).
- Li, X. and Siddique, K.H.M (eds).** 2018. *Future Smart Food – Rediscovering hidden treasures of neglected and underutilized species for Zero Hunger in Asia*. Bangkok, FAO. 242 pp.
- NSB & UNDP.** 2020. *Rapid socio-economic impact assessment of COVID-19 on Bhutan's tourism sector*. Thimphu, National Statistics Bureau of Bhutan & United Nations Development Programme.
- OECD.** 2020. *Policy responses to COVID-19 in the seed sector* [online]. Organisation for Economic Cooperation and Development. [Cited 27 November 2020]. read.oecd-ilibrary.org/view/?ref=132_132622-ahipnwhwhw&title=Policy-responses-to-COVID-19-in-the-seed-sector
- Oxfam.** 2020. *The hunger virus: How COVID-19 Is fuelling hunger in a hungry world* [online]. Oxfam Media Briefing. [Cited 27 November 2020]. <https://oxfamilibrary.openrepository.com/bitstream/handle/10546/621023/mb-the-hunger-virus-090720-en.pdf>
- PANAP.** 2020. *Upholding labor standards for agricultural workers, more urgent during COVID-19 crisis* [online]. Penang, Malaysia, Regional advocacy group PAN Asia Pacific. [Cited 27 November 2020]. panap.net/2020/05/upholding-labor-standards-for-agricultural-workers-more-urgent-during-covid-19-crisis-panap/
- Ranghu, A., Listiyorini, E.** 2020. Malaysia farms face \$3 billion hit from palm oil worker shortage. *Bloomberg*, 5 June 2020. (also available at www.bloomberg.com/news/articles/2020-06-05-malaysia-farms-face-3-billion-hit-from-palm-oil-worker-shortage).

04/malaysia-farms-face-3-billion-hit-from-palm-oil-worker-shortage)

- Sanderson, T., Chapman, G., Walker, D. & Horne, P.** 2020. *Food systems security, resilience and emerging risks in the Indo-Pacific in the context of COVID-19: A rapid assessment*. ACIAR Technical Reports Series No. 95. Canberra, Australian Centre for International Agricultural Research.
- Shattuck, A., Manivong, V. & Vongthilard, S.** 2019. *Towards 'people centered agriculture': Rethinking rural labour, youth employment and the agrarian transition in Laos*. Vientiane, Department of Policy and Legal Affairs and Ministry of Agriculture and Forestry.
- Sen, S.** 2020. COVID-19 has pushed India's already suffering tea plantation workers into deeper crisis. *The Wire*, 11 May 2020. (also available at thewire.in/labour/covid-19-lockdown-tea-workers-labour).
- Sumner, A., Hoy, C. & Ortiz-Juarez, E.** 2020. *Estimates of the impact of COVID-19 on global poverty*. WIDER Working Paper 2020/43. Helsinki, United Nations University World Institute for Development Economics Research. (also available at www.wider.unu.edu/sites/default/files/Publications/Working-paper/PDF/wp2020-43.pdf).
- Tornaghi, C., & Dehaene, M.** 2020. The prefigurative power of urban political agroecology: Rethinking the urbanisms of agroecological transitions for food system transformation. *Agroecology and Sustainable Food Systems*, 44 (5): 594–610.
- URGENCI.** 2020. *Community supported agriculture is a safe and resilient alternative to industrial agriculture in the time of COVID-19* [online]. International Network URGENCI. [cited 27 November 2020]. urgenci.net/community-supported-agriculture-is-a-safe-and-resilient-alternative-to-industrial-agriculture-in-the-time-of-covid-19/
- Vidal, J.** 2020. Tip of the iceberg': Is our destruction of nature responsible for COVID-19? *The Guardian*, 18 March 2020. (also available at www.theguardian.com/environment/2020/mar/18/tip-of-the-iceberg-is-our-destruction-of-nature-responsible-for-covid-19-aoe).
- Wezel, A.** 2017. *Agroecological practices for sustainable agriculture*. London, World Scientific Publishing Europe.
- World Bank.** 2020a. *Global economic prospects, June 2020*. Washington, DC.
- World Bank.** 2020b. Projected poverty impacts of COVID-19 (Coronavirus) [online]. World Bank Group. [cited 27 November 2020]. www.worldbank.org/en/topic/poverty/brief/projected-poverty-impacts-of-COVID-19
- WFC (World Food Council).** 2020. *Local governments and civil society working together for food security: 9 recommendations on how to strengthen civil society's role in advancing urban food security in the global South* [online]. World Food Council. [cited 27 November 2020]. www.worldfuturecouncil.org/wp-content/uploads/2020/07/wfc_food-security_v03_spreads.pdf
- WFP (World Food Programme).** 2020. *Nepal COVID-19 food security & vulnerability update 2* [online]. World Food Programme. [cited 27 November 2020]. docs.wfp.org/api/documents/WFP-0000115489/download/?_ga=2.16688246.1768718738.1596684211-1990443680.1596684211

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