

Supporting agriculture in protracted crises and rebuilding agriculture after conflict and disasters

Brigitte Rohwerder

Institute of Development Studies

14 December 2017

Question

What are the impacts of different approaches to supporting agriculture in protracted crises and rebuilding agriculture after conflict and disasters (caused by natural hazards)?

Contents

1. Overview
2. Impact of conflict and protracted crises on agriculture
3. Impact of disasters caused by natural hazards on agriculture
4. Supporting agriculture in protracted crises and ongoing conflict
5. Rebuilding agriculture after conflict
6. Rebuilding agriculture after disasters caused by natural hazards
7. References

The K4D helpdesk service provides brief summaries of current research, evidence, and lessons learned. Helpdesk reports are not rigorous or systematic reviews; they are intended to provide an introduction to the most important evidence related to a research question. They draw on a rapid desk-based review of published literature and consultation with subject specialists.

Helpdesk reports are commissioned by the UK Department for International Development and other Government departments, but the views and opinions expressed do not necessarily reflect those of DFID, the UK Government, K4D or any other contributing organisation. For further information, please contact helpdesk@k4d.info.

1. Overview

The agriculture sector holds great potential before, during and after crises such as conflict and disasters caused by natural hazards, to save lives and contribute to livelihoods, support rural households, and provide decent employment (Eynon, 2017, p. 2; Mayen, 2016, p. 2). This rapid review looks at recent available evidence on the impact of conflict, protracted crises, and disasters caused by natural hazards on agriculture and efforts to support agriculture during, and rebuild it after, these crises. It is important to understand the impact of these crises on agriculture in order to ensure efforts to promote agriculture during and after crises effectively deal with the challenges facing the agriculture sector.

The literature uncovered by this review suggests that while there is some available evidence, there seems to be **a need for more research into the impact of conflict, protracted crises and disasters caused by natural hazards on agriculture and especially into the effectiveness of different efforts to support and rebuild agriculture**. For example, Roberts & Wright (2012, p. 252, 254) argue that there is a need for more research to fully understand how to support the agricultural sector during and after conflict, and learn from past experiences of promoting agriculture during and after conflict. Much of the available literature uncovered by this review was descriptive of efforts to promote agriculture during and after crises rather than analytical as to their effectiveness and impact. Much of the focus seems to be on support packages to meet immediate needs, support for value chains, and resilience and disaster risk reduction. The available literature didn't really discuss the role of livelihood programmes linked to cash programmes and social protection programmes, although some mentions were made. Most of the available literature seems to be grey literature from organisations working in this sector, although a few academic articles have also looked at the issue. In the time available for this rapid review the information and examples provided are illustrative rather than exhaustive of the impacts of crises on agriculture and the different approaches to supporting and rebuilding it.

Conflict and natural disasters both cause damages and losses to the agricultural sector in a number of similar but also different ways, which require some different responses. Post conflict contexts are characterised by much higher levels of insecurity than natural disasters, for instance. Agricultural interventions need to deal with the impact of the specific crisis, as well as general agricultural development challenges.

The impact of conflict and protracted crises on agriculture which need to be addressed includes:

Environmental issues

- physical damage to agricultural land and produce, with crops destroyed or plundered, agricultural land contaminated by explosive remnants of war, and water sources and agricultural land polluted. Conditions caused by conflict and protracted crisis can be conducive to outbreaks of pests and diseases.
- damage to agricultural infrastructure including irrigation systems, veterinary services, markets, storage facilities, factories for processing produce, and agricultural extension facilities.
- agricultural coping practices which damage the environment and soil nutrition.

Social issues

- restricted mobility for agricultural labourers, input suppliers, processors, traders, and consumers due to security concerns.
- displacement, often protracted, which leads to neglect of produce, loss of access to productive agricultural areas, loss of traditional agricultural knowledge and practice, and a decline in interest in agricultural livelihoods.
- changes in the agricultural labour force, with higher numbers of women, the young, the elderly and infirm left to tend the land, leading to more small scale subsistence agriculture.

Economic issues

- high financial costs in terms of damages and losses.
- disruption to agricultural markets and value chains, which lessens incentives to engage in agricultural production beyond the subsistence level.
- higher production and marketing costs resulting in less income for farmers and lower quality inputs and processing.
- farmers forced into debt and/or lacking the capital to reinvest in agricultural livelihoods.
- a move to employment in other sectors and labourers who are unlikely to return to agriculture.
- a continuation of some farming or agricultural sub-sectors under challenging conditions, offering an element of food security and income but also revenue for armed groups in control of the territory. There may be an expansion of cropland to formerly un-cultivated areas, cropland abandonment, and a decrease of high-intensity cropland during conflict.
- a move to planting illegal crops by some farmers.

Governance issues

- disruption to the implementation of coherent national agricultural programmes and support for farmers.
- undermining of traditional governance systems for managing natural resources.
- confusion over land rights and dispossession of land.
- increased external assistance, potentially leading to a dependency culture.

The impact of disasters caused by natural hazards on agriculture which need to be addressed includes:

Environmental issues

- greater destruction to the crop and livestock sub-sectors, which are especially vulnerable to disasters. Crops are particularly vulnerable to floods, while livestock is extremely vulnerable to drought, forestry is most vulnerable to storms, and fisheries and aquaculture are particularly vulnerable to tsunamis and storms.
- physical damage to agricultural land and produce, including erosion, subsidence, and soil/water contamination.
- damage to agricultural infrastructure.
- increased vulnerability to pests and diseases.

Social issues

- mass displacement, although not necessarily long-term.

- labour shortages and the loss of valuable indigenous agricultural knowledge.

Economic issues

- high financial costs in terms of damages and losses. Crop and livestock production losses differ depending on the disaster type.
- lack of affordable agricultural inputs.
- unemployment and loss of income and capital to invest in agricultural livelihoods among farmers.
- adoption of coping and adaptation strategies such as crop switching, intensification of agricultural activity, increased labour supply, land transactions, sale of productive assets, temporary migration, or a move to non-farm employment.

Governance issues

- damage to the ministries which support agriculture.

These impacts from conflicts, protracted crises, and disasters have a lasting **negative effect on the viability of agricultural livelihoods, agricultural production, food security, and the economy.**

A combination of conflict and natural disasters, different disasters at the same time, or an accumulation of disasters increase the negative impacts on the agricultural sector.

Despite the severity of impacts on the agriculture sector of conflict and disasters, the FAO (2015, p. 51) found that 'just 3.4% of the estimated USD 121 billion spent on humanitarian aid between 2003 and 2013 was directed to the agriculture sector'.

However, **efforts to address these issues and support agriculture during ongoing conflict and protracted crisis** include, amongst others:

- **Resilience building** by investing in information and early-warning systems; addressing immediate needs in combination with longer-term interventions, including through cash transfers and support for commercialisation; supporting agricultural systems and agricultural value chains; maintaining the services needed to protect against disease; facilitating dialogue and peacebuilding; and using climate smart agricultural practices.
- **Support for less risky agricultural activities** which can be undertaken close to home, such as homebased gardens and small ruminant cultivation, mobile phone-based training, and peer to peer forums for information sharing on coping strategies.
- **Support for agricultural value chains and agricultural systems** by, for example, supporting peer lending and rotating credit, setting up quality assessment systems, supporting agricultural cooperatives, setting up/improving processing and storage facilities, for instance.
- **Stabilisation** projects have involved the military in agricultural reconstruction projects in insecure areas.
- **Linking relief and development** by providing food aid in exchange for labour in the rehabilitation of agricultural facilities, for example.
- It is important that the agricultural support provided is conflict sensitive and has a protection element.

Efforts to address these issues and rebuild after conflict include, amongst others:

- **Emergency livelihood interventions** such as the provision of seeds and tools, and cash for works programmes, although there are concerns that providing items for free can create a 'dependency syndrome'.
- **Land reform and clearance of ordinance** to enable affected populations to initiate agricultural activities.
- **Modernisation and support for value chains**, including efforts aimed at processing and storage, credit schemes, and transportation issues in relation to markets; although there are some concerns about interventions undermining the economies and communities of the people in post-conflict contexts.
- **Offering guaranteed markets**, such as through the World Food Programme's Purchase for Progress project, which provided smaller holder farmers in post-conflict countries with an assured formal market.
- **Agroecological approaches** such as permaculture, which have been used effectively in some post-conflict contexts.
- **Disarmament, demobilisation, and reintegration programmes** have sometimes encouraged agricultural activities as a way to reintegrate former combatants and provide them with a livelihood.
- Conventional agricultural development approaches aimed at maximising economic growth and returns may not be suited to post-conflict contexts.
- It is important to take a holistic approach and not only provide material goods but the transfer of know-how and reform of governance structures.
- Local actors should participate in agricultural programmes in post-conflict environments.

Efforts to address these issues and rebuild after disasters include, amongst others:

- **Disaster risk reduction and resilience**, which can minimise the impact of natural hazards on agricultural livelihoods.
- **Emergency livelihood interventions** such as the provision of seeds and tools, and cash for works programmes. The timing of the planting season should be considered.
- **Agricultural recovery programmes**, addressing food security, the development of agribusiness, and enhancing the social welfare of farming communities, as well as clear up after the disaster. They have faced challenges which impact negatively on attempts to increase agricultural production. Cash for works programmes and assistance to those with relevant pre-disaster agricultural experience were found to be helpful for agricultural rehabilitation.
- **Support for value chains**, including supporting the re-emergence of agricultural input markets.

The evidence available in the literature uncovered by this rapid review suggests that much more research is needed to really understand what works, and what doesn't work in relation to approaches to supporting and rebuilding agriculture in and after conflict, protracted crises, and disasters caused by natural hazards, as well as the impact these approaches have on agriculture.

2. Impact of conflict and protracted crises on agriculture¹

For many people affected by conflict and protracted crises², agriculture is their only means of survival (FAO, 2016c, p. 2; Lautze et al, 2012, p. 3). However, conflict, especially civil conflicts, and protracted crises undermine rural livelihoods and damage agriculture, leading to food insecurity and malnutrition (FAO, 2016c, p. 2, 16). The proportion of undernourished people is almost three times higher in countries in conflict and protracted crisis than in other developing countries and can have lasting, multi-generational impacts on human development (FAO, 2016c, p. 2, 4). Famine caused by drought and conflict can result in more deaths than are directly killed in conflict (FAO, 2016c, p. 17).

Agricultural production is directly affected by conflict 'through the destruction of natural resources and neglect, and indirectly, through the broader impacts of conflict' and its disruptive impacts on public and domestic life and the context in which agriculture takes place (Özerdem & Roberts, 2012, p. 19). Conflict leads to widespread death, injury, damage to personal property, buildings, and infrastructure, large-scale displacement, psychological trauma, the undermining of social structures and coping mechanisms, weakened systems of governance and rule of law, and prevents civilians from undertaking their daily activities and travelling to work, school or the marketplace (Özerdem & Roberts, 2012, p. 19).

Unless the impacts of conflict on agriculture and the other challenges of post-conflict reconstruction are effectively addressed, food security and economic recovery is very challenging in post-conflict countries (Özerdem & Roberts, 2012, p. 25). The FAO (2016c, p. 4, 15) also points out that 'post-conflict countries with high food insecurity are 40% more likely to relapse into conflict within a 10-year timespan', although the nature of the relationship between food security, improved rural livelihoods, and the mitigation and prevention of conflicts and sustainable peace is underexplored.

Environmental issues

The most obvious impact of conflict on agriculture is physical damage, either through agriculture being deliberately targeted as a weapon of war or as a consequence of the violence (Özerdem & Roberts, 2012, p. 20; Moore, 2017, p. 2; RFSAN, 2016, p. 1). Ongoing conflicts such as in Syria, Iraq, and Yemen³ have seen agriculture being used as a weapon of war (RFSAN, 2016, p. 1). For, example ISIL⁴ is accused of deliberately destroying agricultural land as a form of long-term collective punishment during their retreats, with the damage inflicted extending to the poisoning of wells used for irrigation (RFSAN, 2016, p. 9; see also Lautze et al, 2012, p. 4).

¹ Information on pastoralist agriculture in protracted crises can be found in: DFID ART (2017). *Unpublished Review "Pastoralism, disasters and protracted crises in East Africa: A review of evidence and research needs"*. Agriculture Research Team, Research and Evidence Division, Department for International Development (DFID), UK.

² Protracted crises are situations in which a significant proportion of population is acutely vulnerable to death, disease and disruption of livelihoods over prolonged period (3 years+).

³ <https://www.theguardian.com/world/2017/dec/12/bombed-into-famine-how-saudi-air-campaign-targets-yemens-food-supplies>

⁴ Islamic State of Iraq and the Levant (ISIL), also known as Islamic State of Iraq and Syria (ISIS)/ Islamic State(IS)/Da'esh

Produce in the field or in storage may be burned or plundered, stored seed for the next planting season destroyed⁵, water resources and agricultural land polluted, equipment looted or damaged and livestock killed or stolen (Özerdem & Roberts, 2012, p. 20; FAO, 2017, p. 7, 11; IMU, 2017, p. 35; FAO, 2016c, p. 2, 19; Mayen, 2016, p. 3; RFSAN, 2016, p. 1, 9; Kimenyi et al, 2014, p. 23; Lautze et al, 2012, p. 4-5). Large scale aerial bombing can damage crops and kill or maim livestock; chemicals remaining after bombing can contaminate the soil and water; while unexploded bombs can restrict access to the land (Özerdem & Roberts, 2012, p. 20). Landmines also 'prevent safe access to land for crop production, grazing, water, wood, and other resources long after fighting has ceased' (Özerdem & Roberts, 2012, p. 20; Lautze et al, 2012, p. 5). In Cambodia for example, agricultural production was abandoned by some living in mined areas, while in Kosovo cluster munition contamination forced herders to graze cattle on land which had previously been used for crops, leading to a reduction in agricultural production (Özerdem & Roberts, 2012, p. 20). Conflict can also create the conditions for outbreaks of pests and diseases which can be important constraints to agricultural production (FAO, 2017, p. 8; FAO, 2016c, p. 10; Mayen, 2016, p. 3; Lautze et al, 2012, p. 5).

Agricultural infrastructure is deliberately damaged or falls into disrepair during conflict, affecting irrigation systems, access to veterinary services, markets, storage facilities, factories for processing produce, agricultural extension facilities, and mechanised farming through lack of fuel or spare parts (Özerdem & Roberts, 2012, p. 20; Moore, 2017, p. 3; FAO, 2017, p. 7, 11; IMU, 2017, p. 35; FAO, 2016c, p. 2, 19; Mayen, 2016, p. 3; RFSAN, 2016, p. 1, 9; Kimenyi et al, 2014, p. 23; Lautze et al, 2012, p. 4-5). Difficulties and costs in transporting agricultural produce to markets can reduce returns and act as a disincentive to large-scale production (Moore, 2017, p. 3).

Conflict may lead to people engaging in unsustainable environmental practices which damage agriculture (Özerdem & Roberts, 2012, p. 20). For example, as travel may be restricted, the usual crop rotation is not implemented (Özerdem & Roberts, 2012, p. 20). 'People concentrate on growing fast-yielding crops which drain the soil of nutrients' (Özerdem & Roberts, 2012, p. 20). Armed conflict has been found to 'have negative effects on vegetation productivity over time, thus potentially leading to land degradation' (Eklund et al, 2017, p. 1).

Migrating populations can destroy natural resources and cultivated land while on route and refugee camps can cause environmental damage because of overexploitation of natural resources such as water and wood, which can lead to drought and soil erosion (Özerdem & Roberts, 2012, p. 20).

Social issues

Ongoing conflict can lead to reduced mobility as people across agricultural value chains fear movement outside of protected areas because of attacks by combat actors (Kimenyi et al, 2014, p. 21; Wright & Weerakoon, 2012, p. 109; Lautze et al, 2012, p. 4). Farm workers and herders fear attacks when in the field or grazing animals; input suppliers have difficulty reaching customers; processors have a reduced amount of workers available to operate machinery;

⁵ Factors which have been found to help local seed systems to be resilient in conflict and natural disasters (e.g. in Zimbabwe, South Sudan, Haiti, Kenya) have included 'social networks (e.g. farmer-to-farmer barter exchange of seeds), recent bumper harvests, informal seed and grain markets, and local agro-dealers' (Chapagain & Raizada, 2017, p. 12).

traders and consumers limit their movements to markets due to intermittent attacks (Kimenyi et al, 2014, p. 21). Restrictions on movement, including checkpoints and curfews, limits time available to spend on agriculture production and marketing, and cropping choices (in favour of low maintenance crops), as well as increasing the cost of food (Lautze et al, 2012, p. 4). In some cases, farmers sometimes negotiate with combat actors to receive protection and necessary farm inputs (Kimenyi et al, 2014, p. 26).

Violence, or threats of it, during conflict can result in outmigration from productive areas (Lautze et al, 2012, p. 4). Protracted crises can cause vulnerable people to lose access to the range of resources necessary for food and agriculture production, which can contribute to displacement (FAO, 2016b, p. 3; Mayen, 2016, p. 3). Displacements during protracted crises and conflict can aggravate rural-urban outmigration (FAO, 2017, p. 6). Internally displaced persons (IDPs) may find it harder to make a living from agriculture in rural areas than non-IDP households, including as a result of disruption of social relations (which provide access to credit and informal self-help labour groups for tillage and weeding) (FAO, 2017, p. 6; Lautze et al, 2012, p. 4). In addition, displacement can lead to loss of access to productive land (Lautze et al, 2012, p. 4). For instance, IDPs camps in some areas of Syria are located on agricultural land, resulting in a decline in agriculture (IMU, 2017, p. 29).

Mass displacement as a result of conflict leads to neglect of produce (Özerdem & Roberts, 2012, p. 21). It is relatively simple to rehabilitate neglected crops if the duration of the conflict is short, however the neglect of livestock even for a short period of time has a long term impact as it takes time for animals to regain lost condition or to replace animals which have been killed (Özerdem & Roberts, 2012, p. 21).

Protracted displacement can lead to the loss of traditional agricultural knowledge and practice as it is often not passed on (Lautze et al, 2012, p. 4). Displaced children born in urban areas to rural parents often have no knowledge or little interest in undertaking agriculture (Özerdem & Roberts, 2012, p. 21). Rural youth who have been displaced or mobilised into armed groups may be uninterested in agriculture, or lack the relevant skills to engage in it (Moore, 2017, p. 3). The disruption to formal education can result in the population being less able to 'assume responsibility for its own agricultural development, engage in research to improve farming practices, and ensure that its agriculture sector is internationally competitive' (Özerdem & Roberts, 2012, p. 22; Moore, 2017, p. 11).

Displacement and conflict can also lead to farmers groups and producers' organisations dissolving, and the revival of these groups can be challenging in the post-conflict period (Moore, 2017, p. 2).

During the conflict those left behind to tend the land are often women, the elderly and infirm, as men of working age leave to join the fighting, are forcibly recruited, or flee before they are conscripted (Özerdem & Roberts, 2012, p. 21; FAO, 2016c, p. 16, 22; Lautze et al, 2012, p. 5). Women, the young and the old, often continue to bear the responsibility for the home and agricultural production post-conflict if male family members are killed or injured in the conflict, leading to high numbers of female-headed households (Özerdem & Roberts, 2012, p. 21; Moore, 2017, p. 3). In addition, as men are often the first to return home after conflict, or explore new areas to assess their potential for agriculture, they are most likely to be killed or injured by landmines or unexploded ordnances (Özerdem & Roberts, 2012, p. 21).

The changed demographics of the rural agricultural workforce may have an impact of the type of agricultural that is practiced post-conflict (Moore, 2017, p. 3). In Liberia, for example, the post-conflict workforce was mainly made up of women and over 50s who were less suited to reinstating plantation-style agriculture and thus the majority of post-conflict agricultural production was small scale and largely for subsistence purposes (Moore, 2017, p. 3; see also Sierra Leone in Bolten, 2012, p. 237). However, in some cases the demobilisation of male combatants can result in women losing their agricultural sector jobs when the men return after war, which was the case in Nicaragua in 1988 (Young & Goldman, 2015, p. 402).

Conflicts and disasters can have negative effects on child labour, as harvest failure increases the chances that children will be needed to support household income and production (Eynon, 2017, p. 5). In addition, children's involvement in agriculture may become more dangerous as they may be exposed to unexploded ordnance when tending crops; they may have to move heavy debris to clear the land for replanting; while displacement may require them to work in unfamiliar surroundings which puts them at greater risk of harm (Eynon, 2017, p. 5). Children are often used to negotiate armed barriers, where the movement of people and goods during conflict is restricted, placing them in greater physical and emotional danger (Eynon, 2017, p. 11). Agricultural support programmes during protracted crisis may act as pull factors for children to start working (Eynon, 2017, p. 8).

Economic issues

Ongoing conflict and protracted crises are costly to the agriculture sector. In Syria for example, it is estimated that the financial cost of damage and loss in the agriculture sector (2011–2016) is USD 16 billion (FAO, 2017, p. 3). 'Damage to the agricultural economy at the national and local level is immediate and devastating and can take years to repair' (Özerdem & Roberts, 2012, p. 22; Young & Goldman, 2015, p. 421). For example agricultural production in Angola fell to 6% in 2000 from 29% in 1991 as a result of the protracted civil war (Özerdem & Roberts, 2012, p. 22).

Conflict and protracted crises can disrupt markets and value chains (Mayen, 2016, p. 3; Cordaid, 2015, p. 7). Destroyed roads and bridges prevent access to local, national, and international markets for both small and large scale agricultural producers (Özerdem & Roberts, 2012, p. 22). The access to and relationships between farmers and others along the supply chain (suppliers of agricultural inputs, traders and markets) are often damaged, infrastructure destroyed, transaction costs are high, and there is little access to credit and information (Cordaid, 2015, p. 7; Kimenyi et al, 2014, p. 21). The lack of access to markets 'can lead to a shrinkage of the agricultural sector because there is no incentive to engage in agricultural production beyond the subsistence level' (Özerdem & Roberts, 2012, p. 22). The provision of food aid during conflict can affect the profitability of staple food production for local farmers when brought in from outside the community, as the market for their produce shrinks (Wright & Weerakoon, 2012, p. 109).

As a result of higher production and marketing costs, and very constrained purchasing power, during conflict, farmers make much less money on their agricultural produce (FAO, 2017, p. 6). Farmers in Syria face 'shortages of agricultural inputs (seeds, fertilisers, fuel to power irrigation pumps, etc.) or are unable to afford them due to soaring prices' (FAO, 2017, p. 7; IMU, 2017, p. 33). This can result in them stopping agricultural production (FAO, 2017, p. 8). In addition, agricultural inputs sourced from informal markets, such as pesticides, may be of poor quality, or even dangerous (FAO, 2017, p. 13).

The ability to process produce in some way increase the value of agricultural produce, yet during conflict 'the time and resources to add value through processing do not exist' as there is an immediate need to generate income, processing plants may be damaged or destroyed, and the fuel and spare parts needed to maintain them may be unavailable (Özerdem & Roberts, 2012, p. 22). Countries may lack the resources to invest in processing post-conflict (Özerdem & Roberts, 2012, p. 23). In Mali, the entry of new but unskilled butchers into the profession meant that the quality of meat suffered (Kimenyi et al, 2014, p. 23).

Rural populations often are left in debt and vulnerable to shocks after drawing on their savings and resources to survive in the short term and taking loans to reinvest in their livelihoods after exhausting their own reserves (Özerdem & Roberts, 2012, p. 21; Lautze et al, 2012, p. 5). Due to conflict-induced poverty, farmers often lack the capital to invest in restarting their agricultural activities (Wright & Weerakoon, 2012, p. 106).

The lack of plentiful or profitable agricultural work during or immediately after conflict has resulted in working age men in particular looking for employment elsewhere (Özerdem & Roberts, 2012, p. 22). If they are successful it is unlikely that those who worked as agricultural labourers will return to their jobs, and the gap in the labour market is often filled by the less physically able, such as women or the elderly (see social issues section above), or by foreign workers who send their wages home rather than investing in the local economy (Özerdem & Roberts, 2012, p. 22). The loss of the traditional labour force is likely to result, in the short to medium term at least, in agricultural production that is less profitable to the local population (Özerdem & Roberts, 2012, p. 22).

Agriculture in conflict

Agriculture can act as a safety net during conflict, 'providing food and income in a context of insecurity, market closures and disruptions and shortages of critical goods and services' (FAO, 2017, p. 4). For instance, agriculture remains a key part of the Syrian economy (26% of GDP) and more than 75% of households still grow food for their own consumption, despite six years of conflict and the massive losses it has suffered (FAO, 2017, p. 3; see also IMU, 2017, p. 25, 33). However, even when agricultural activity continues during conflict, food security can be compromised by access and affordability issues, and it is not always clear where produced crops end up (Eklund et al, 2017, p. 9). Despite continuing agricultural activity in Syria, it is not enough to provide the population with food security, for instance (IMU, 2017, p. 23). Farming households may 'try to balance crop production that is adequate for survival but insufficient to attract looting by armed forces and/or by storing food in multiple locations' (Lautze et al, 2012, p. 6).

The agricultural sector can become a target for combat actors in need of cash or food, leading to increased theft of cash, products and equipment (Kimenyi et al, 2014, p. 21; Lautze et al, 2012, p. 4). Reports suggest that 30% of ISIL's taxation revenue came from agriculture and food silos and other infrastructure have been regarded as strategic assets to be seized or confiscated (Eklund et al, 2017, p. 2; RFSAN, 2016, p. 7-8).

Little is still known about the effects of armed conflict on agricultural land use, although it is generally thought that conflict deaths and outmigration result in agricultural production decline and land abandonment (Eklund et al, 2017, p. 1, 8). However, agricultural production may also increase as a result of insurgents using agriculture as an income source or civilians expanding agriculture due to cuts in a stable food supply, should the nature of the conflict allow it (Eklund et al, 2017, p. 2). Recent research by Eklund et al (2017, p. 1, 6; see also RFSAN, 2016, p. 2) in

ISIL controlled areas in Syria and Iraq using satellite remote sensing, finds that there was a range of impacts on agricultural activity, including expansion of cropland to formerly un-cultivated areas, cropland abandonment, and a decrease of high-intensity cropland. Anecdotal evidence suggests that ISIL has 'encouraged agriculture to an extent or has at least sought to provide incentives to ensure that farmers do not completely abandon production' (RFSAN, 2016, p. 8). However, the longer conflict continues the harder it is for farmers to maintain high-intensity agriculture if there are shortages in agricultural inputs, such as seeds and fertilisers, unless trade routes for these goods exist (Eklund et al, 2017, p. 8; RFSAN, 2016, p. 8; see also Kimenyi et al, 2014, p. 22). In addition, assessments have found extensive long-term damage to agriculture in liberated areas that had been under ISIL control due to a combination of neglect and exploitation (RFSAN, 2016, p. 9).

War economies can sometimes lead to some communities making a living out of crops such as poppy or marijuana (Özerdem & Roberts, 2012, p. 31). In other cases, some farmers are benefiting from higher food prices during conflict (Cordaid, 2015, p. 6).

Some agricultural sub-sectors in some countries may be more resilient than others during conflict. For example, the fishing sector in Mali was resilient because fish were not a preferred food for the insurgents in Mali and were not profitable (Kimenyi et al, 2014, p. 22).

Governance issues

Authorities are too weak and the environment too unstable during conflict to initiate or continue to implement coherent national agricultural programmes to improve agricultural production (Özerdem & Roberts, 2012, p. 23). Ongoing protracted conflict can reduce governments' ability to support farmers to the extent they were previously able to, which is problematic when agricultural subsidies were substantial, as was the case in Syria (FAO, 2017, p. 13). Government initiatives to provide practical support to farmers, such as supplying them with fertiliser and developing agricultural research centres, are often suspended as a result of conflict (Özerdem & Roberts, 2012, p. 23). Lack of security provision during conflict can prevent farmers from cultivating their land or transporting their produce to markets (Cordaid, 2015, p. 6).

The period without coherent national agricultural programmes can set agricultural development back decades, and the 'level of investment in time and resources needed to rehabilitate agricultural production to match pre-conflict levels can be huge' (Özerdem & Roberts, 2012, p. 23). Özerdem & Roberts (2012, p. 23) find that 'calculations based on data collected from sub-Saharan African countries in conflict from 1970 to 1990 suggest that agricultural production is reduced on average by 12% during each year of conflict'. Countries which were previously self-sufficient can become reliant on food imports during and after conflict because they are unable to increase food production to meet the populations needs (Özerdem & Roberts, 2012, p. 23).

Conflict can also undermine traditional governance systems for managing natural resources (Özerdem & Roberts, 2012, p. 23). In Sudan for example, traditional systems enabled pastoralists and farmers to coordinate their uses of the same piece of land but years of conflict and increasing desertification have disrupted these traditional livelihood patterns and conflict-management mechanisms, exacerbating tension between the two groups (Özerdem & Roberts, 2012, p. 23).

Conflict can result in confusion over land rights and dispossession of land (Özerdem & Roberts, 2012, p. 24; Moore, 2017, p. 2; RFSAN, 2016, p. 10). 'Untangling who owns what after protracted

periods of conflict, when multiple previous systems of landownership have been used but have not been universally accepted, is a long term challenge' (Özerdem & Roberts, 2012, p. 24).

External assistance provided during conflict can have a negative impact on agriculture (Özerdem & Roberts, 2012, p. 24). The provision of food, for example, can create a dependency culture and the impetus to be self-sufficient is removed, which can result in the loss of the skills necessary to farm effectively (Özerdem & Roberts, 2012, p. 24). In Nepal for instance, the provision of rice led to the neglect of traditional staple foods which are more suited to the environment than rice (Özerdem & Roberts, 2012, p. 24).

3. Impact of disasters caused by natural hazards on agriculture

Disasters caused by natural hazards such as earthquakes, landslides, floods, droughts, fires, and hailstorms can 'destroy critical agricultural assets and infrastructure, disrupting production cycles, trade flows and livelihoods means' (FAO, 2017b, p. 9; FAO, 2015, p. xx).

Different natural hazards have greater impacts on different parts of the agricultural sector. The crop sector is the most vulnerable to the impact of disasters, followed by livestock, with fisheries and forestry accounting for much smaller shares (FAO, 2017b, p. 22). Crops are particularly vulnerable to floods, while livestock is extremely vulnerable to drought, forestry is most vulnerable to storms, and fisheries and aquaculture are particularly vulnerable to tsunamis and storms (FAO, 2017b, p. 23). Climate related disasters, including storms, floods, droughts and wild fires, which have a severe impact on the agricultural sector, are increasing worldwide and expected to intensify with climate change (FAO, 2016, p. 4; FAO, 2015, p. xiii). Agriculture is the sector most vulnerable to drought, with 84% of the damage and losses caused by droughts to the agriculture sector (FAO, 2015, p. xx, xxii).

Natural disasters and conflict can combine with serious consequences, as was the case in Ethiopia and Somalia (conflict and drought), or different types of hazards can combine to increase the impact (e.g. earthquakes during drought) (Chapagain & Raizada, 2017, p. 6; FAO, 2017, p. 8). An accumulation of disasters can also increase the severity of their impact on agriculture (FAO, 2015, p. xxi, 24).

Environmental issues

Natural disasters are physically destructive, destroying or damaging crops and crop lands, physical infrastructure, storage facilities, seed stores, polytunnels, livestock shelters, irrigation systems, veterinary services, agricultural tools, equipment, and machinery for instance (Chapagain & Raizada, 2017, p. 2, 5; Daly et al, 2017, p. 218; FAO, 2015, p. xx). For example, the physical impact of the 2004 earthquake and tsunami in Aceh, Indonesia, resulted in erosion, subsidence, coastal deformation, soil/water contamination, and widespread debris, all of which contributed to the degradation of rice fields and fish pond boundaries, water management systems, and seed stock necessary for both rice cultivation and aquaculture (Daly et al, 2017, p. 219). The destruction or damage of seed storage means surviving seed is also more vulnerable to rains post-disaster (Chapagain & Raizada, 2017, p. 8). Crops, livestock, and fisheries may be more vulnerable to diseases and pests post-disaster (Daly et al, 2017, p. 225).

Social issues

Natural disasters can result in mass displacement (Chapagain & Raizada, 2017, p. 5). In some countries, such as Nepal, male migration to cities and abroad for work, meant that smaller holder farms in rural areas headed by women and the elderly, suffered the most as a result of the 2015 earthquake (Chapagain & Raizada, 2017, p. 2). The earthquake in Haiti on the other hand resulted in urban to rural migration which led to food shortages and loss of biodiversity in rural areas due to the consumption of planting materials (Chapagain & Raizada, 2017, p. 2). However, research looked at by Eskander et al (2017, p. 2) suggests that permanent migration is minimal among disaster affected households.

Natural disasters can result in labour shortages due to 'loss of human life and livestock, injury, and a change in priority towards rebuilding efforts rather than farming' (Chapagain & Raizada, 2017, p. 7). Part of the reason the rehabilitation of rice cultivation and aquaculture in areas inundated by the 2004 tsunami in Aceh has been limited is as a result of the diversion of labour by tsunami mortality and transition to alternative livelihoods, and re-purposing of rice fields for residential use during the reconstruction phase (Daly et al, 2017, p. 218). The loss of human life and displacement can result in the loss of valuable indigenous agricultural knowledge (Chapagain & Raizada, 2017, p. 1).

Economic issues

Research by the FAO found that in developing countries the agriculture sector absorbed 23% of the damage and losses due to natural disasters between 2006 and 2016, undermining agricultural sector growth⁶ (FAO, 2017b, p. 21; FAO, 2015, p. xix). Crop and livestock production losses differ depending on the disaster type (see Figure 1). The decline in output from crop, livestock, fisheries and aquaculture, and forestry production results in considerable economic losses to farmers and often has a domino effect on the food value chain, agro-industries, imports and exports and sector growth (FAO, 2015, p. xx). Over time, multiple disasters may strike a country's agricultural sector, adding up their sector economic impact and constraining agricultural growth and development (FAO, 2015, p. xxi, 24). Indirect losses (i.e. post-disaster production losses and changes in economic flows) to the agricultural sector are on average higher than direct damage (i.e. destruction of physical agricultural assets and infrastructure) (FAO, 2015, p. 50).

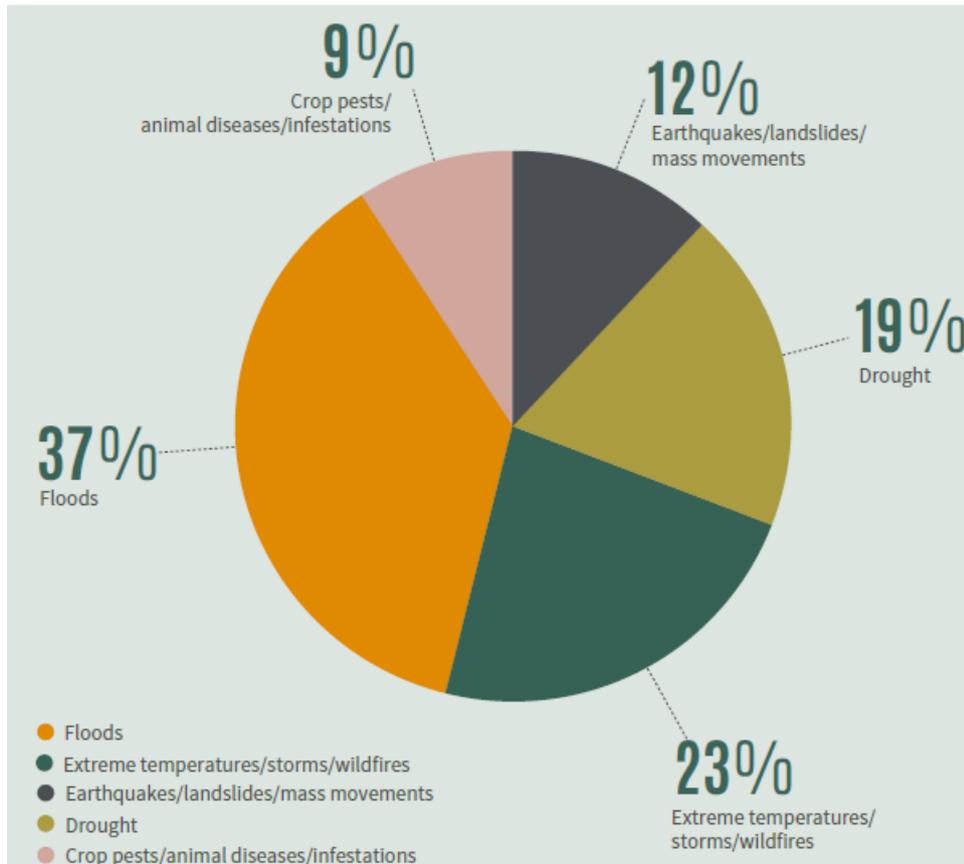
The FAO study shows that 'between 2003–2013, nearly USD 80 billion was lost as a result of declines in crop and livestock production after medium- to large-scale disasters in developing countries' (FAO, 2015, p. xxi). These figures are considered to be conservative as they don't take into account the thousands of small scale disasters which hit agriculture or cover all agricultural commodities (FAO, 2015, p. xxi).

The damage disasters such as typhoons cause to shops, supply routes, warehouses, stocks, and transportation networks can lead to a lack of accessible and affordable agricultural inputs for farmers, such as tools, seeds and fertiliser (CRS, 2015, p. 2).

⁶ Natural disasters may also slow overall economic growth, especially where agriculture and food production still account for a large share of gross domestic product and employment (FAO, 2017b, p. 9).

Disasters can also cause unemployment and/or a decline in wages among farmers and farm labourers (FAO, 2015, p. xx). They lower the availability of food commodities in local markets, leading to food inflation (FAO, 2015, p. xx). As a result, household's purchasing capacity is reduced, restricting access to food, depleting savings and possibly forcing the sale of vital productive assets and eroding livelihoods (FAO, 2015, p. xx). The consumption of planting materials in the aftermath of disasters due to food insecurity can lead to long term problems as farmers lack the resources to grow subsequent crops (Chapagain & Raizada, 2017, p. 13).

Figure 1: Crop and livestock production losses per disaster type, 2005–2014



Source: FAO (2017b, p. 13).

Natural disasters typically force rural farmers to ‘adopt coping and adaptation strategies such as crop switching, increased labour supply and land transactions (sell land or rent for use)—within the same area—or sale of productive assets and temporary migration—to another area (Eskander et al, 2017, p. 1). Farmers also usually intensify their agricultural activities to compensate for their lost income (Eskander et al, 2017, p. 16). Research by Eskander et al (2016, p. 1-3) looks at the unaddressed issue of the possibility of change in dependence on agriculture in the aftermath of a disaster. They find that farming households in Bangladesh move to non-farm employment as a coping strategy to tackle short-term reductions in their total household income (Eskander et al, 2017, p. 11). On the other hand, although farmers in Pakistan move away from agriculture, they eventually come back within a year of disaster exposure (Eskander et al, 2017, p. 15).

However, there is still a dearth of systematic data and information on damages or losses due to disasters in agriculture, and a need for deeper analysis of the relationship between natural disasters and agriculture (FAO, 2017b, p. 8, 10; FAO, 2015, p. xix, 50).

Governance issues

Disasters can cause damage to the sector ministries and their departments which support agriculture (FAO, 2015, p. xx).

4. Supporting agriculture in protracted crises and ongoing conflict

Support for the continuation of agriculture in protracted crises and ongoing conflict has had a number of different forms, some of which are outlined below.

Resilience building

The FAO (2016, p. 4; 2016b, p. 3) warn that protracted crises are one of the most challenging contexts in which to fight hunger, malnutrition and poverty, with the need to address both immediate needs and provide durable solutions. In response there have been efforts to strengthen the resilience of agricultural livelihoods in protracted crises, which involve investing in information and early-warning systems; addressing immediate needs in combination with longer-term interventions to strengthen resilience, including through cash transfers and support for commercialisation; supporting agricultural systems and agricultural value chains (including support for production, processing, storage, marketing and business development); maintaining the services needed to protect against disease; facilitating dialogue and peacebuilding; and using climate smart agricultural practices (Mayen, 2016, p. 5-12; Cordaid, 2015, p. 4).

In South Sudan, the FAO responded to the protracted crisis using a multitrack approach to resilience building (saving lives, saving livelihoods, and developing livelihoods) (FAO, 2016, p. 10). In 2015, IDPs in hard to reach areas were provided with portable lifesaving survival kits containing various supplies such as mosquito nets, short-maturity vegetable seeds, fishing supplies, water purification tablets and oral rehydration salts (FAO, 2016, p. 10). Livestock herds were targeted for vaccination and treatment to help protect them (FAO, 2016, p. 10). In order to ease the pace of deforestation and soil erosion, amongst other things, the FAO also distributed fuel efficient stoves to reduce the need for firewood from IDPs (FAO, 2016, p. 10).

In Yemen, the FAO has worked with local women's groups to support backyard farming through the distribution of seeds, tools and poultry and provided vulnerable farmers with solar-powered irrigation pumps with the help of water user associations (FAO, 2016b, p. 12). In addition, they have been helping farmers apply climate-smart agricultural practices aimed at improving productivity and water management (FAO, 2016b, p. 12).

Supporting less risky agricultural activities

Research in Mali and Nigeria suggests that donors should encourage less risky agricultural activities as alternatives to high-risk enterprises, even when this involves a move away from traditional farm operations if they are now high-risk activities for farmers, their families and farm

workers due to the dangers posed by routine travel in conflict (Kimenyi et al, 2014, p. 22). This may involve supporting kitchen gardens or backyard farms and homebased aquaculture as potentially less risky agricultural enterprises (Kimenyi et al, 2014, p. 22, 23). The research in Mali and Nigeria also suggests that encouraging small ruminant cultivation may be a promising strategy to support farming communities in conflict as goats and sheep don't require specialised feed, and can be raised in large numbers, closer to home (Kimenyi et al, 2014, p. 23). Meat and feed producers would then benefit from support in marketing their services and products to more resilient enterprises such as small ruminant production or fisheries (Kimenyi et al, 2014, p. 23). Kimenyi et al (2014, p. 24) suggest that it would be beneficial to research 'options for maintenance of veterinary access and animal health supplies throughout conflict and post-conflict'.

It might also be worth exploring the potential of mobile phone-based applications for training and information, to minimise the need for travel in high-risk environments (Kimenyi et al, 2014, p. 22). Kimenyi et al (2014, p. 22) suggest that donors should look into exploring innovations in the delivery of inputs or subsidised costs for crop producers to increase input use, or prioritising investments in less input-intensive crops. Forums which enable farmers and other stakeholders to share and learn from each other the diverse coping strategies they pursue, may be a potential way to 'leverage new ways to support agricultural investments, prepare for future crises and cope with existing levels of instability' (Kimenyi et al, 2014, p. 27). As things become more stable, support could also be provided to repair and replace farm equipment (Kimenyi et al, 2014, p. 22).

Supporting value chains and agricultural systems

As agricultural value chains have been disrupted by conflict and protracted crises, efforts have also been focused on supporting different elements of the chain and agriculture related services to keep them operating during conflict (Kimenyi et al, 2014, p. 24). For example peer lending and rotating credit may offer opportunities for providing farmers in conflict with low-risk credit (Kimenyi et al, 2014, p. 24). This support could enable crop and livestock farmers to absorb conflict-associated costs and develop their businesses (Kimenyi et al, 2014, p. 24). Linking agricultural extension services to respected local leaders could be a way of maintaining links with communities (Kimenyi et al, 2014, p. 25). Donors could also look into rebuilding services that provide safety nets for farmers, such as storehouses for crops and feed, which may involve relocating storage to a safer area (Kimenyi et al, 2014, p. 25).

Support for livestock value chains in Somalia included establishing a Meat Inspection and Control Act, a Meat Hygiene Code and quality assessment system, as well as ten hygiene units in Somaliland and Puntland, which helped improve the competitiveness of the Somali meat industry (Mayen, 2016, p. 8). Improving the dairy value chain in Lebanon through technical and institutional support for over 3,500 vulnerable farmers, helped them to produce more and better quality dairy products and to be part of sustainable dairy cooperatives, and contributed to supporting agricultural livelihoods (Mayen, 2016, p. 9).

Some organisations approaches are even more wide ranging; for example Cordaid's agricultural programmes in protracted crises include supporting communities' access to healthcare, education and professional training, encouraging clear regulatory frameworks and supportive policies; dealing with gaps in value chains, investing in the competencies of smallholders, providing access to finance; addressing constraints faced by female farmers and traders, empowering smallholders through training and knowledge transfer, and strengthening rule of law

(Cordaid, 2015, p. 7-8). Farmers are trained in improved farming practices and business skills, with tools and practices for conflict resolution often included as part of the training (Cordaid, 2015, p. 9). They encourage farmer cooperatives to help achieve quality improvement and economy of scale, as well as helping farmers to voice their collective needs and concerns and encouraging greater trust (Cordaid, 2015, p. 9).

For example, support was provided for developing processing and appropriate and affordable storage facilities, including a trial of the *Wakati*, which allows vegetables and fruit to be kept fresh for up to ten days without electricity, in Uganda, Haïti and Afghanistan. In North Kivu, Democratic Republic of Congo (DRC), Cordaid supported a cooperative of female farmers supplying a local brewery to use higher quality seeds to improve rice production and with the building of storage facilities that complied with the technical standards required by the breweries (Cordaid, 2015, p. 10). The improved quality of the rice and the increased volumes meant buyers were eager to do business with the cooperative and they were able to compete with imported rice (Cordaid, 2015, p. 10).

In Sierra Leone, Cordaid encouraged some local farmer cooperatives to turn to vegetable farming which can be planted and harvested every three months, rather than rice farming which spans a year (Cordaid, 2015, p. 11). In order to respond to the likelihood of growing competition, efforts were put into building the capacities of the farmers to raise their production levels and developing innovative marketing skills (Cordaid, 2015, p. 11). The cooperatives were also linked to financial and formal government institutions which allowed farmers access government-funded initiatives and other financial services (Cordaid, 2015, p. 11).

Cordaid also explored the use of mobile-phone market price information systems in DRC and Uganda, and found that market transparency increased and allowed smallholders to negotiate fair market prices (Cordaid, 2015, p. 12).

Cordaid used the warehouse receipt system with female rice producers in the DRC and in Burundi, which provides farmers with access to credit and reliable storage facilities for their crops, enabling them to conserve more product at better quality, and to sell when the price is best (Cordaid, 2015, p. 12). Building these storage facilities together also help restore mutual trust (Cordaid, 2015, p. 12).

Rural populations in Syria suggest that even under current protracted conflict conditions agricultural production could be kick-started if they were initially provided with inputs (in particular fertiliser and seeds in the case of crops and feed and medicines for livestock), and then credit, marketing and processing support, as well as asset repair (FAO, 2017, p. 16). It is suggested that such agricultural support would either discourage people from leaving rural areas and/or encourage them to come back (FAO, 2017, p. 17). The FAO has been working in the majority of Syria's governorates to support agricultural production during the conflict by providing improved seeds to farmers in cultivatable areas; and backyard production kits so conflict-affected families can produce food close to home without the use of land (FAO, 2016c, p. 6).

Stabilisation

In situations where the risks are too great for civilian staff, military units have been playing a greater role in the reconstruction of agricultural systems (Roberts & Wright, 2012, p. 252). The agricultural approach they take is a mixture of military perspective and understanding of agricultural issues, with input from agricultural experts, and tend to have a limited life span, so

they select activities which show impacts in a relatively short period of time (Roberts & Wright, 2012, p. 252). One example of this approach is suggested to be the British Government's Stabilisation Unit, although its handbook on Quick Impact projects does not directly refer to agriculture (Roberts & Wright, 2012, p. 252).

Linking relief and development

Özerdem & Roberts (2012, p. 31) indicate that it is important for relief projects providing food aid in conflict and protracted crises to have a long-term vision for reconstruction, perhaps by providing it as an exchange for labour input in the rehabilitation of agricultural facilities such as irrigation systems. The FAO in Syria highlights that an 'important consideration for recovery of the agriculture sector is the question of production incentives, and the linked issues of irrigation and climate smart agriculture' as Syrian farming will need to cope with increased temperatures and more frequent droughts in the future (FAO, 2017, p. 19).

Roberts & Wright (2012, p. 253) argue that any external assistance should aim to build on existing traditional coping mechanisms to maintain agricultural production and avoid establishing parallel systems that may undermine existing capacities.

Providing conflict sensitive support and protection

Kimenyi et al (2014, p. 25) warn providing support in conflict zones has a risk of exacerbating conflict dynamics and the activities taken should be conflict sensitive. Cordaid (2015, p. 6) also highlight the importance of agricultural programmes in crises starting with a thorough conflict analysis to ensure that interventions do not stabilise or deepen conflicts. Lautze et al (2012, p. 12) highlight the recommendation that agricultural interventions in protracted crises should 'be designed according to the broader political and security environment and based on an understanding of vulnerability that incorporates notions of powerlessness'.

International Humanitarian Law has provisions relating to agriculture which can frame approaches that apply a protection framework to agriculture in protracted crises (Lautze et al, 2012, p. 12). The FAO's publication *The Right to Food in Emergencies* can be referenced for the range of specific legal provisions on which to draw for a protection agenda for agriculture (Lautze et al, 2012, p. 12). Support for small livestock and vegetable gardens close to home also protect farmers who experienced attacks travelling to their fields for instance (Lautze et al, 2012, p. 12). Agricultural assistance provided by the humanitarian community should take care not to endanger beneficiaries by their presence (Lautze et al, 2012, p. 12). The *Sphere Standards*, minimum standards for humanitarian assistance, make some mention of agriculture, taking a holistic approach to agricultural support, and encouraging participatory input from local populations (Roberts & Wright, 2012, p. 252).

5. Rebuilding agriculture after conflict

The recovery of agriculture after conflict comprises a complex mix of challenges: those dealing with the impacts of conflict, combined with those of agricultural development (Wright & Weerakoon, 2012, p. 103). Efforts to rebuild after conflict may need to simultaneously address recent damage and account for long-term neglect to the agricultural sector (RFSAN, 2016, p. 2). Efforts to simply restore the sector to its previous state will ultimately fail in the long term if they do not address reforms that were urgently needed before the conflict (RFSAN, 2016, p. 2). It is

important to not only deal with the technical or economic aspects of agricultural support, but also socio-political dynamics which impact on agriculture (Lautze et al, 2012, p. 2).

Rebuilding agriculture is often considered a government priority in post-conflict policy making, viewed as important for economic revitalisation and as the sector most able to reincorporate displaced people and former fighters, although it can take a few years for a formal agricultural policy to be put in place (Moore, 2017, p. 4, 6). It is important to have a coherent national strategy based on a thorough understanding of conditions in the country that, where appropriate, looks at ways of accessing international markets (Roberts & Wright, 2012, p. 253). Agriculture should be considered from the very beginning of post-conflict reconstruction to ensure planting seasons are not missed (Wright & Weerakoon, 2012, p. 108). The first phase of agricultural policies during the emergency or relief phase often focuses mainly on food security (Moore, 2017, p. 4). Other efforts may focus on attempts to rebuild large-scale production systems, use modern technologies, develop value chains and markets, or 'pro-poor' livelihoods strategies designed to enhance the production capacity and yields of smallholder farmers (Moore, 2017, p. 4). Agricultural extension services have also been provided by governments, donors and non-governmental organisations (NGOs) (Moore, 2017, p. 5). The dynamics of the conflict can leave certain of the areas underserved by efforts to rebuild agriculture after conflict (Moore, 2017, p. 10). This may be due to security concerns, which side of the conflict the group in that area were on, or physical access issues (Moore, 2017, p. 10).

Roberts & Wright (2012, p. 251), in their study of the impact of conflict on agriculture, find that 'to date, there has been little debate on the nature of agricultural strategies in post-conflict situations'. International NGOs strategies for dealing with post-conflict situations tends to draw on strategies for agricultural rehabilitation post-natural disaster as there are similarities in terms 'of levels of displaced persons, the breakdown of traditional structures and processes, the loss of life, the destruction of the physical infrastructure, and the increased threat of disease and food insecurity' (Roberts & Wright, 2012, p. 251). However, post conflict situations are characterised by much higher levels of personal insecurity, whereas natural disasters tend to more directly impact the productive base through flooding, landslides, or drought (Roberts & Wright, 2012, p. 251). Approaches to agricultural programmes vary, 'and to a large extent depend on the knowledge and understanding of the implementing body' (Roberts & Wright, 2012, p. 251). Roberts & Wright (2012, p. 252) find that the objective of agricultural support in post-conflict countries is often a more conventional focus on increasing production per se, whereas others argue it should 'aim to enhance consumption, markets and livelihoods' which would require increased access by farmers to appropriate technology options, inputs and services (Roberts & Wright, 2012, p. 252).

Support for rebuilding or reconstructing agriculture after conflict has had a number of different forms, some which are outlined below.

Emergency livelihood interventions: food aid, seeds, and cash for works

Often there has been a tendency to start with food aid and then to phase this out and replace it with the provision of seed, tools and fertilisers, ignoring that farmers 'require access to a broad spectrum of inputs and services that are interdependent, such as water, fertilisers, credit and market information services' and should participate in the process (Roberts & Wright, 2012, p. 251-252). Sometimes cash for works schemes have been put in place to provide farmers with capital to invest in restarting their agricultural livelihoods (Wright & Weerakoon, 2012, p. 106).

The provision of free seeds, tools and inputs to farmers in the emergency phase and later on may create a 'dependency syndrome' that can undermine future capacity building efforts (Moore, 2017, p. 7). In addition, there are concerns that the provision of free services such as seeds and free livestock treatment will undermine efforts to establish a private sector capable of providing farmers with these services in the long run (Levine & Sharp, 2015, p. 24). The type of seeds provided may also cause problems (Wright & Weerakoon, 2012, p. 106). In post-conflict Sri Lanka, farmers were provided with hybrid seed varieties, which meant communities had to purchase new seeds for every cropping season, incurring expenses that were beyond their capacity to pay for (Wright & Weerakoon, 2012, p. 106).

Land reform and clearance of ordinance

Land reform and clearance of landmines and other unexploded ordinances are important short term post-conflict steps to take in order for affected populations to be able to initiate their agricultural activities (Özerdem & Roberts, 2012, p. 29; RFSAN, 2016, p. 11).

Modernisation and agricultural development

Countries recovering from conflict, may 'include 'pro-poor' strategies designed to enhance the production capacity and yields of smallholder farmers, thereby improving rural livelihoods and increasing incomes' (Moore, 2017, p. 4). In Liberia, this included investing in agricultural extension services which had more of a pluralistic, participatory, value chain approach than the largely top down, technology transfer model used in the pre-war period (Moore, 2017, p. 6).

Post-conflict investment in agricultural processing is also necessary so that countries can add value to exported agricultural goods (Roberts & Wright, 2012, p. 253). Institutions to support and develop the agricultural sector and research institutions to strengthen agriculture should be also established or rehabilitated (Roberts & Wright, 2012, p. 253).

However, Roberts & Wright (2012, p. 253) warn that in countries emerging from conflict, 'the modernisation and development of the agriculture sector to improve its economic potential and increase competitiveness on the international market needs to be approached with caution' as 'large-scale international interventions can undermine the economies of the people they are trying to help unless they are managed well by national authorities'.

Support for value chains and agricultural systems

In Liberia, a full value chain approach is being taken by public, donor-led and NGO service providers, promoting 'agriculture as a business' (Moore, 2017, p. 13). However, the lack of pre-established markets is a major obstacle (Moore, 2017, p. 13). Experience from Liberia suggests that agricultural programmes need to be designed with a consideration of demand and market conditions (Moore, 2017, p. 18). Export markets may be more feasible as a long-term objective, and a focus on local markets a more realistic immediate approach, especially if care is taken not to flood local markets with commodities (Moore, 2017, p. 18). Additional issues for the value chain approach in Liberia which may be applicable to other post-conflict countries include adequate training on processing and storage; programmes or lending schemes that allow farmers to purchase necessary equipment or materials; and transportation issues resulting from post-conflict infrastructure conditions, security concerns, low post-conflict private sector

involvement and distance to markets (Moore, 2017, p. 18). These gaps in the value chain approach lead to high post-harvest loss in Liberia (Moore, 2017, p. 18).

However, research in Afghanistan suggests a 'greater emphasis on strengthening farming systems overall, and less focus on the market chains for agricultural products' is needed to 'balance the goal of fostering a competitive rural economy with the need to build a stable rural society' (Young & Goldman, 2015, p. 440).

The FAO has been working with former combatants from the Moro Islamic Liberation Front (MILF) in the Philippines who wanted to return to farming or fishing (FAO, 2016c, p. 8). This involved not only replacing lost productive assets but also providing smaller holder farmers and marginal fishers with an understanding of how markets work, facilitating their access to improved production systems and making their farms more climate-resilient (FAO, 2016c, p. 8-9).

RFSAN (2016, p. 12) suggest that restoring agricultural markets in post conflict Iraq will probably not only mean ensuring demand and consumption at the household level, but providing support to other points in the value chain as well. For example, restoring the wheat market may require support to bakers, such as loans or grants to increase their rolling stock of wheat flour, and partnerships with millers and silos (RFSAN, 2016, p. 12).

Guaranteed markets: Purchase for Progress (P4P)

The World Food Programme (WFP) implemented the Purchase for Progress (P4P) project in a number of post-conflict countries during its pilot phase (WFP, 2015, p. 8). The WFP aimed to use P4P to use its food purchases for general food distribution, school feeding, food for assets, and institutional feeding programme activities more effectively to help develop staple crop markets and spur improvements in smallholder agriculture (WFP, 2015, p. 8-9). P4P provides smallholder farmers with an assured formal market while improving their access to knowledge and resources (WFP, 2015, p. 9). WFP (2015, p. 9) finds that the market opportunity they offer is an 'incentive for smallholder farmers and their organisations to invest in agricultural productivity by using improved inputs and learning new skills'.

In the DRC, P4P supported the rehabilitation of nearly 200 km of rural roads between farms and markets, in partnership with the government, FAO and UNOPS, and communities were encouraged to contribute materials and labour for road maintenance through WFP's food assistance for assets programme, which provides food in exchange for work on rehabilitation projects (WFP, 2015, p. 23).

In Liberia, P4P worked with FAO, other United Nations agencies and the Ministry of Agriculture, to encourage farmers to join cooperatives and realise that it was worth their while to put the effort into producing high-quality rice, as farmers weren't willing to invest time and resources in increasing production with no assurance their efforts would pay off (WFP, 2015, p. 54-55). In 2015, WFP found that farmer's organisations were growing and 'functioning as effective businesses with timely deliveries and fewer defaults' (WFP, 2015, p. 55).

However, an evaluation of the pilot phase of the programme notes that purchasing from smallholder farmers in post-conflict areas means the WFP have to bear higher costs than if they purchased from elsewhere (Percy et al, 2014, p. vi, xi).

Agroecological approach

Agroecological approaches relating to the sustainability of the natural resource base, such as organic, biodynamic, and permaculture, have often been sidestepped by international development actors due to concerns over yield performance, although 'recent studies show ecological farming approaches achieve significant yield increases over both traditional and industrial agriculture, and in particular in resource-poor regions on marginal lands and in tropical and subtropical climates' (Wright & Weerakoon, 2012, p. 104-105). Wright & Weerakoon (2012, p. 2015) argue that taking an agroecological approach in post-conflict societies 'would encourage localisation of resource management, a broader and more diverse range of local opportunities (including higher labour requirements), a more localised food security system, and stabilisation of the natural resource base'.

Examples of agroecological approaches in conflict/post-conflict contexts include programmes in Sri Lanka and Afghanistan, described by Wright & Weerakoon (2012). They find that lack of funding can be a serious hindrance to agricultural projects (Wright & Weerakoon, 2012, p. 111). Local ownership helps with the success of agroecological approaches (Wright & Weerakoon, 2012, p. 111). It is crucial to build people's capacity and knowledge around agroecological approaches, which also requires building capacity of staff in agricultural intervention programmes (Wright & Weerakoon, 2012, p. 112). Wright & Weerakoon (2012, p. 112) suggest that permaculture is very suitable for post-conflict agricultural rehabilitation as it has fast-acting results over broad areas and does not require huge funding investments. Experiences from permaculture projects in refugee camps has also shown that it is suited to such contexts (Wright & Weerakoon, 2012, p. 112).

DDR and reconciliation using agriculture

Sometimes disarmament, demobilisation, and reintegration (DDR) programmes have encouraged agricultural activities as a way to reintegrate former combatants and provide them with a livelihood. In Sierra Leone this involved encouraging ex-combatant and civilian farming cooperatives with donor funding for agricultural activities, which the civilians were not able to access otherwise (Bolten, 2012, p. 238-239). However, Bolten (2012, p. 238) notes that from research there, that post-conflict cooperative agriculture between ex-combatants and civilians needs to be voluntary in order to be successful rather than an obligatory condition imposed by funders of agricultural support post-conflict who hope to encourage reconciliation.

Blattman & Annan (2012) looked at a programme in Liberia which recruited ex-combatants and other high-risk youth and offered them several months of agricultural skills training and psychosocial counselling, along with a start-up package. Participation in the programme saw increased engagement in agriculture, although revenue generation and employment generation as a result of the agricultural enterprises was modest, perhaps as a result of issues around access to markets (Blattman & Annan, 2012, p. 3-4, 6).

Things to consider: conflict sensitivity

Approaches to supporting agriculture production post-conflict need to be tailored to each specific context (Roberts & Wright, 2012, p. 253). These approaches need to 'take into account local capacities and traditional practices, as well as the potential impacts of the conflict, which may mean that it is not possible or desirable to return to pre-conflict agricultural practices' (Roberts &

Wright, 2012, p. 253; Lautze et al, 2012, p. 2). Young & Goldman (2015, p. 409, 434) point out that the conventional agricultural development approach, that of maximising economic growth and returns, may not be suited to post-conflict contexts as this approach may exacerbate inequality and heighten political tensions.

Things to consider: taking a holistic and participatory approach

Özerdem & Roberts (2012, p. 25) warn that rebuilding alone in post-conflict countries is not enough as it could reinforce the 'structural inequalities and discrimination that created ripe conditions for the conflict in the first place' so a rebuilding plus reform approach is needed. This requires taking a holistic approach, which in terms of the agricultural sector means not only the provision of material goods but the transfer of know-how and reform of governance structures for better access to natural resources (Özerdem & Roberts, 2012, p. 25). As well as measures specifically aimed at the agricultural sector, 'the disruption to education, rule of law, land rights and access to natural resources needs to be tackled in the post-conflict period to ensure that the population has adequate skills, resources and rights to (re-)establish the agricultural sector' (Roberts & Wright, 2012, p. 253). For example, in order to assist with post-conflict recovery and peacebuilding, the FAO works to support agriculture based livelihoods, ensure effective coverage of social protection systems, address issues of land tenure and of access to natural resources, and foster employment opportunities for youth (FAO, 2016c, p. 3).

Özerdem & Roberts (2012, p. 29) argue that it is important for local actors to be involved in agricultural programmes in post-conflict environments in order to avoid problems and programme failure. Agricultural policy making is often dominated by the interests of political and economic elites which may go against those of local agricultural communities, for example in terms of land reform (Özerdem & Roberts, 2012, p. 29). Governments may be reluctant to make a transition to demand-driven and participatory models, based on farmer-led priority setting, hands-on and demonstration-based teaching and peer-to-peer learning, as a result of unwillingness to empower regions or ethnic groups with ties to the conflict (Moore, 2017, p. 10). Donor and NGO programmes are less likely to face these post-conflict concerns and have been more successful at incorporating participatory extension methods into their work with farmers, although their efforts should still be conflict sensitive in their design and practice (Moore, 2017, p. 11, 18).

6. Rebuilding agriculture after disasters caused by natural hazards

People living in rural areas often depend heavily on agriculture for their livelihoods, yet the needs and issues of rural farm families are often neglected in the aftermath of disasters when the impact on cities appears to be more dramatic (Chapagain & Raizada, 2017, p. 2; Eskander et al, 2016, p. 1). As rural areas can be remote and difficult to access, emergency responses can be slow to arrive, especially if compounded by lack of disaster preparedness, political instability and poor leadership, bad governance, and poor coordination among international, national, and local actors (Chapagain & Raizada, 2017, p. 3). In the aftermath of natural disasters, efforts to help with agricultural recovery may not reach all those in need (Chapagain & Raizada, 2017, p. 2). For example, in the aftermath of the Nepalese earthquake longer term recovery efforts for farmers were limited to regions near cities and reached only thousands of farmers (Chapagain & Raizada, 2017, p. 2).

Chapagain & Raizada (2017, p. 1, 6) review of the literature on the impacts of natural disasters on smallholder farmers finds that ‘many national governments and foreign NGOs are ineffective at assisting rural farmers in the short and long term’ and insufficient attention has been paid to rural agriculture after natural disasters. They find that there is a gap in knowledge in relation to effective products to target farm households after a disaster as the current literature does not focus on efforts to assist farmers (Chapagain & Raizada, 2017, p. 1, 2).

Support for rebuilding agriculture after disasters may not have as much impact as the wider contest as research carried out in Aceh, looking at coastal agriculture and aquaculture after the 2004 tsunami, found that ‘social, economic, and environmental factors can be stronger determinants of how coastal livelihoods rebound and change following destructive inundation events than livelihood rehabilitation aid’ (Daly et al, 2017, p. 218).

Disaster risk reduction and resilience

Investments in disaster risk reduction and resilience can minimise the impact of natural hazards on agricultural livelihoods and may be more cost effective than relying on emergency response (FAO, 2017b, p. 10, 24; FAO, 2016, p. 15). The Sendai Framework for Disaster Risk Reduction 2015–2030, is expected to galvanise and reinforce efforts to mainstream risk reduction across the agriculture sector (FAO, 2015, p. 55). It is recommended that disaster risk reduction and management is systematically embedded into agriculture sector development plans and investments (FAO, 2015, p. xiii). However, the FAO (2015, p. 51) finds that ‘there is no comprehensive study on the links between disaster impact on agriculture and investments made in risk reduction within the sector’. ‘Further work is needed to quantify the cost-benefit ratio of investing in disaster risk reduction in agriculture compared with: (i) other kinds of agriculture sector investments; and (ii) post-disaster support to the sector’ (FAO, 2015, p. 52).

As different types of hazards have significantly differing effects on the agriculture sector and its subsectors, and across countries and regions, tailored risk reduction interventions in terms of policy, planning and financial investments in prevention and sustainable post-disaster recovery responses are required (FAO, 2015, p. 50).

Adequate disaster risk and crisis governance needs to be put in place, which involves appropriate and enabling policies, institutional structures, capacities and financing for disaster risk reduction and crisis management at the local, national, regional and global levels to reduce increasing levels of threats from multiple types of shocks affecting the agriculture sector (FAO, 2016, p. 6). The FAO (2015, p. xxii-xxiii) points out that in order to design well-informed risk reduction strategies and investments within the agriculture sector there is a need to improve information systems on disaster impact for the agriculture sector. Putting in place risk monitoring coupled with timely alerts helps to prevent, prepare for and reduce the impact of shocks on the agricultural sector (FAO, 2016, p. 6). Reducing the vulnerability of agricultural livelihoods through crisis and disaster risk protection, prevention and impact mitigation through the application of risk sensitive technologies and good practices, risk transfer, and social protection can help reduce the impact of shocks on agricultural livelihoods and enable them to bounce back faster (FAO, 2016, p. 6). Putting in place emergency preparedness and response measures for agricultural livelihoods can help agricultural households to become self-reliant again quickly after disasters strike (FAO, 2016, p. 6). However, the necessary investments in disaster risk reduction and resilience in the agricultural sector are often not being made (FAO, 2016, p. 15).

In the Philippines, for instance, the FAO has been strategically supporting the government in laying the groundwork for disaster risk reduction and climate change adaptation in the agriculture sector and facilitating the upscaling of good practices and technologies for agriculture and fisheries that boost productivity sustainably, while strengthening resilience to threats and crises (FAO, 2016, p. 10).

In Central America, it has worked to tackle the impact of drought by helping to implement a three-year resilience programme that included 'interrelated and complementary priority actions for formulating national plans of action for disaster risk management in the agriculture sector; tailoring agroclimatic early warning information systems with a drought focus; investing in participatory and integrated management of watersheds for disaster risk reduction; supporting the implementation of financial risk transfer mechanisms to reduce the vulnerability of farming households to drought; and establishing a network of producers of certified quality seeds and prepositioning strategic seed stocks for emergency pre-positioning' (FAO, 2016, p. 12).

Emergency livelihood interventions: seeds and tools

Agricultural recovery efforts after natural disasters have involved measures designed to enhance the production of crops, livestock, and fisheries by replacing tools and machinery, restocking of lost animal stock, provision of seeds, planting materials, and fertiliser, reconstruction of agriculture infrastructure, establishment of emergency seed stocks, seed storage and conservation, extension services, veterinary care, and restoration of small farmer-managed irrigation systems (Chapagain & Raizada, 2017, p. 2, 5). In some cases, reconstruction and reinforcement of infrastructure took place through cash-for-work programmes (Chapagain & Raizada, 2017, p. 5). Planting seasons need to be taken into account when providing assistance to make sure key timings are not missed (Chapagain & Raizada, 2017, p. 2).

Chapagain & Raizada (2017, p. 1, 7-13) suggest that it would be useful to provide farming households with rolls of agricultural-grade plastics, low-oxygen grain storage bags, waterproof gardening gloves, multi-use shovels, seeds of early maturing crops, fertilisers, inexpensive farming tools, temporary food support, and first-aid kits, with correct use and re-purposing of the products explained using accompanying graphical illustrations, as short-term relief after natural disasters – see table 1. They propose using pre-existing alcohol/cigarette/snack food distribution networks to distribute these goods to rural areas (Chapagain & Raizada, 2017, p. 1, 13).

Some issues with such assistance include poorly designed seed aid, which can undermine local resilience by providing untested new varieties, narrowing crop diversity, and adversely impacting local seed enterprises, so seeds should be carefully considered for distribution (Chapagain & Raizada, 2017, p. 12). , In some cases seed aid is not needed (Chapagain & Raizada, 2017, p. 12). The response in Haiti was also criticised for neglecting to take measures to improve soil fertility (Chapagain & Raizada, 2017, p. 5, 12).

Table 1: Ten-high impact agricultural interventions after disasters

Products	Purpose
Emergency needs (immediate)	
Rolls of agricultural-grade plastic	Inexpensive shelter for humans, cattle and seeds, for later re-purposing to construct a greenhouse or use as groundcover to suppress weeds, conserve water and soil
Low-oxygen grain storage bag	To protect seeds from monsoon rains and prevent losses due to moulds and insects
Waterproof gardening gloves	To clear debris and later re-purpose for farm work to reduce female hardship
Foldable military shovel	To clear debris and can be re-purposed for agricultural needs
First-aid kit	Frontline care, and to reduce infections which would otherwise cause declines in farm labour
Medium-term needs (1–4 months)	
Seed package of rapid maturing grains/ starch crops	To allow farmers to produce calories rapidly and prevent consumption of sowing seeds
Seed package of rapid maturing beans (legumes)	To allow farmers to produce protein rapidly and prevent consumption of sowing seeds
Seed package of rapid maturing vegetables	To allow farmers to produce vitamins and minerals (micronutrients) rapidly, especially required for pregnant women and children
Bag of nitrogen fertiliser (5 kg)	An inexpensive method to promote an immediate increase in food production within 3 months
Low-cost tool package	To mitigate losses in farm labour caused by death/injury to humans and livestock

Source: Adapted from Chapagain & Raizada (2017, p. 8)

Agricultural recovery programmes

After the 2004 tsunami the Indonesian government put in place a 5-year recovery programme to target the agricultural sector with a focus on addressing food security, the development of agribusiness, and enhancing the social welfare of farming communities (Chapagain & Raizada, 2017, p. 6). 'A wide range of donor and government funded programs supported the physical rehabilitation of rice fields and fish ponds (which included clearing debris, rebuilding field/pond barriers and water management features, reconnecting roads and paths), including through cash for work programmes; provision of technical assistance (assessing levels of salinisation, soil and water chemistry, introducing new approaches that combine mangrove planting and aquaculture, etc.); provision of productive assets (tools, seeds, fertiliser, fencing, new fish and crab species); grants and micro-credit programs; and small business skills training' (Daly et al, 2017, p. 219, 221).

However, the programme faced multiple challenges, including lack of technical expertise in the reclamation and rehabilitation of saline-affected soils, resulting in reduced productivity and low farm income; incomplete agricultural packages (e.g. seed, fertiliser, fence, hand tractor, and thresher) and poor quality seeds and/or delays in their distribution, resulting in poor or no seed germination; and a lack of focus on rural farmers (Chapagain & Raizada, 2017, p. 6). In some cases, there were also problems with the targeting of agricultural aid, and people received it who were not interested in putting the necessary time and effort in (Daly, 2017, p. 227).

However, few studies in Aceh had the necessary data needed to comment fully on the success of rehabilitation efforts (Daly et al, 2017, p. 219). In response, a study by Daly et al (2017, p. 229) gathered the necessary data and found that despite significant support for agricultural rehabilitation, there was a significant reduction in both rice cultivation and aquaculture yields from their pre-tsunami levels ten years after the tsunami in three different study sites. This was due to significant land degradation and ecological changes; new land owners who inherited as a result of the high mortality rates who were not interested in agriculture; new employment opportunities created during the reconstruction period reducing the motivation to resume farming or fishing; and increasing urbanisation of areas which were previously farmland (Daly et al, 2017, p. 222, 225, 229). In areas where there was a lack of alternative livelihood options, there were stronger incentives to return to rice cultivation (Daly et al, 2017, p. 227). In some areas there were notable increases in aquaculture production as people took advantage of new opportunities supported by supported by a range of government assistance and private investment (Daly et al, 2017, p. 229). However, Daly et al (2017, p. 229) question how much this commercial aquaculture is benefiting former fishers.

Daly et al (2017, p. 230) conclude that financial and material support had a limited but important impact on coastal livelihood rehabilitation in Aceh. Cash for works programmes to clear land and rebuild water management infrastructure were found to be essential for agricultural rehabilitation (Daly et al, 2017, p. 229). Replacing and/or upgrading physical assets lost during the tsunami were generally helpful for beneficiaries with relevant pre-tsunami livelihood experience but ineffective for those without (Daly et al, 2017, p. 230).

Support for agricultural value chains

Support for agricultural livelihoods recovery in the Philippines in the aftermath of Super Typhoon Haiyan included giving people access to agricultural inputs and training on short-term crop production, and indirect support through helping local blacksmiths restore the local market for agricultural tools (CRS, 2015). This was after an assessment had identified a strong consumer preference for locally produced tools over imported tools; yet local blacksmiths had lost the necessary business assets and were finding it difficult to restart production (CRS, 2015, p. 2). Blacksmiths were provided with cash grants early in the recovery phase to restart their businesses with the agreement that they sold their tools at agricultural input fairs where programme beneficiaries were provided with vouchers to buy agricultural inputs, including seeds and tools (CRS, 2015, p. 2). The blacksmiths were able to meet local demand, which enabled programme participants to resume agriculture activities (CRS, 2015, p. 3).

Things to consider

‘Aid providers need to work with local communities to carefully balance rehabilitation of subsistence livelihoods with diversification into new livelihoods’ or agricultural rehabilitation can

be impeded (Daly et al, 2017, p. 230). There need to be sufficient financial buffers in place so that beneficiaries don't use start-up capital for short-term needs (Daly et al, 2017, p. 230). This needs to go beyond just supporting the first harvest cycle for beneficiaries with limited financial means (Daly et al, 2017, p. 230). In addition, Daly et al (2017, p. 230-231) suggest that it is 'not an efficient use of resources to roll out large-scale, standardised livelihood rehabilitation projects without considering the often highly localised environmental and social conditions that will most likely determine the success or failure of such projects'.

7. References

- Blattman, C., & Annan, J. (2012). *Reintegrating and employing high risk youth in Liberia: Lessons from a randomized evaluation of a Landmine Action an agricultural training program for ex-combatants*. Yale University. https://www.poverty-action.org/sites/default/files/publications/blattman_annan_ex-com_reintegration_ipa_liberia_1.pdf
- Bolten, C. (2012). The Only Way to Produce Food is to Cooperate and Reconcile? Failures of Cooperative Agriculture in Post-war Sierra Leone. In A. Özerdem, & R. Roberts (eds). (2012). *Challenging Post-conflict Environments: Sustainable Agriculture*. Taylor and Francis.
- Catholic Relief Services (CRS). (2015). *Support to the local tool market post-Typhoon Haiyan*. CRS. https://www.crs.org/sites/default/files/tools-research/a4_ph_livelihoods_study_results_final_low_res.pdf
- Chapagain, T., & Raizada, M.N. (2017). Impacts of natural disasters on smallholder farmers: gaps and recommendations. *Agriculture & Food Security*, 6:39, 1-16. <https://doi.org/10.1186/s40066-017-0116-6>
- Cordaid. (2015). *Smallholders and food security in fragile contexts - Cordaid's approach and track record*. Cordaid. https://www.cordaid.org/en/wp-content/uploads/sites/3/2015/06/Cordaid-Position_paper_FoodSecurity-LR.pdf
- Daly, P., Halim, A., Nizamuddin, Ardiansyah, Hundlani, D., Ho, E., & Mahdi, S. (2017). Rehabilitating coastal agriculture and aquaculture after inundation events: Spatial analysis of livelihood recovery in post-tsunami Aceh, Indonesia. *Ocean & Coastal Management*, 142, 218-232. <http://dx.doi.org/10.1016/j.ocecoaman.2017.03.027>
- Eklund, L., Degerald, M., Brandt, M., Prishchepov, A.V., & Pilesjö, P. (2017). How conflict affects land use: agricultural activity in areas seized by the Islamic State. *Environmental Research Letters*, 12:054004. <https://doi.org/10.1088/1748-9326/aa673a>
- Eskander, S.M.S.U., Fankhauser, S., & Jha, S. (2017). *Do natural disasters change savings and employment choices? Evidence from Bangladesh and Pakistan* (ADB Economics Working Paper Series N. 505). ADB. <https://www.adb.org/sites/default/files/publication/218876/ewp-505.pdf>
- Eynon, A. (2017). *Child Labour in Agriculture in Protracted Crisis, Fragile and Humanitarian Contexts*. FAO. <http://www.fao.org/3/a-i7403e.pdf>
- FAO. (2017). *Counting the Cost - Agriculture in Syria after six years of crisis*. FAO. <http://www.fao.org/3/b-i7081e.pdf>

- FAO. (2017b). *The impact of disasters on agriculture – Addressing the information gap*. FAO. <http://www.fao.org/3/a-i7279e.pdf>
- FAO. (2016). *Increasing the resilience of agricultural livelihoods*. FAO. <http://www.fao.org/3/a-i5615e.pdf>
- FAO. (2016b). *Migration and Protracted Crises - Addressing the root causes and building resilient agricultural livelihoods*. FAO. <http://www.fao.org/3/a-i6101e.pdf>
- FAO. (2016c). *Peace and Food Security – Investing in resilience to sustain rural livelihoods amid conflict*. FAO. <http://www.fao.org/3/a-i5591e.pdf>
- FAO. (2015). *The impact of disasters on agriculture and food security*. FAO. <http://www.fao.org/3/a-i5128e.pdf>
- Information Management Unit (IMU). (2017). *DYNAMO- Syria Dynamic Monitoring Report Issue 6*. Assistance Coordination Unit (ACU). <https://www.acu-sy.org/en/dynamo6/>
- Kimenyi, M., Adibe, J., Djiré, M., Jirgi, A.J., Kergna, A., Deressa, T.T., Pugliese, J.E., & Westbury, A. (2014). *The impact of conflict and political instability on agricultural investments in Mali and Nigeria* (Africa growth initiative working paper 17). Brookings. https://www.brookings.edu/wp-content/uploads/2016/06/14-07-22-Impact-of-Conflict-MaliNigeria_FINAL.pdf
- Lautze, S., Raven-Roberts, A., Sotomayor, D., Seid, F., & Martin-Greentree, M. (2012). *Agriculture, Conflict and Stability: A call for renewed focus on protection and conflict sensitive programming in agriculture and food and nutrition security*. Rome: High level expert forum on food insecurity in protracted crises. http://www.fao.org/fileadmin/templates/cfs_high_level_forum/documents/Agriculture-Conflict-Stability_Lautze_01.pdf
- Levine, S., & Sharp, K. (2015). *TOPIC GUIDE: Anticipating and responding to shocks: livelihoods and humanitarian responses*. Evidence on Demand. http://dx.doi.org/10.12774/eod_tg.november2015.levineandsharp
- Mayen, F. (2016). *Livestock in protracted crises - The importance of livestock for resilience-building and food security of crisis-affected populations*. FAO. <http://www.fao.org/3/a-i6637e.pdf>
- Moore, A. (2017). *Agricultural Extension in Post-Conflict Liberia: Progress Made and Lessons Learned*. In P.E. McNamara & A. Moore (eds). *Building Agricultural Extension Capacity in Post-Conflict Settings*. CAB International. https://cab.presswarehouse.com/sites/stylus/resrcs/chapters/1786390590_1stChap.pdf
- Özerdem, A., & Roberts, R. (eds). (2012). *Challenging Post-conflict Environments: Sustainable Agriculture*. Taylor and Francis.
- Percy, R., Buckley, J., Carpio, A., Guest, M., Jones, S., & Uppal, V. (2014). *Strategic evaluation - WFP 2008-2013 Purchase for Progress Pilot Initiative: Evaluation Report - Volume I*. WFP. http://documents.wfp.org/stellent/groups/public/documents/reports/wfp271430.pdf?_ga=2.231255711.1449806757.1513307058-953569664.1511223871

Regional Food Security Analysis Network (RFSAN). (2016). *The Impact of ISIS on Iraq's Agricultural Sector*. RFSAN.

https://reliefweb.int/sites/reliefweb.int/files/resources/07122016_IRQ_Iraq_Agri_Brefing_V2.pdf

Roberts, R., & Wright, J. (2012). Concluding Remarks: Looking to the Future – Agriculture Post-conflict. In A. Özerdem, & R. Roberts (eds). (2012). *Challenging Post-conflict Environments: Sustainable Agriculture*. Taylor and Francis.

World Food Programme (WFP). (2015). *P4P Purchase for Progress - The Story - Connecting farmers to markets*. WFP.

http://documents.wfp.org/stellent/groups/public/documents/communications/wfp287308.pdf?_ga=2.25937597.1449806757.1513307058-953569664.1511223871

Wright, J., & Weerakoon, L. (2012). Taking an Agroecological Approach to Recovery: Is it worth it and is it possible? In A. Özerdem, & R. Roberts (eds). (2012). *Challenging Post-conflict Environments: Sustainable Agriculture*. Taylor and Francis.

Young, H., & Goldman, L. (2015). Managing natural resources for livelihoods: Helping post-conflict communities survive and thrive. In H. Young & L. Goldman (eds.). *Livelihoods, Natural Resources, and Post-Conflict Peacebuilding*. Environmental Peacebuilding.

Acknowledgements

We thank the following experts who voluntarily provided suggestions for relevant literature or other advice to the author to support the preparation of this report. The content of the report does not necessarily reflect the opinions of any of the experts consulted.

- Lind Eklund, Lund University

Key websites

- FAO in emergencies: <http://www.fao.org/emergencies/en/>

Suggested citation

Rohwerder, B. (2017). *Supporting agriculture in protracted crises and rebuilding agriculture after conflict and disasters*. K4D Helpdesk Report. Brighton, UK: Institute of Development Studies.

About this report

This report is based on ten days of desk-based research. The K4D research helpdesk provides rapid syntheses of a selection of recent relevant literature and international expert thinking in response to specific questions relating to international development. For any enquiries, contact helpdesk@k4d.info.

K4D services are provided by a consortium of leading organisations working in international development, led by the Institute of Development Studies (IDS), with Education Development Trust, Itad, University of Leeds Nuffield Centre for International Health and Development, Liverpool School of Tropical Medicine (LSTM), University of Birmingham International Development Department (IDD) and the University of Manchester Humanitarian and Conflict Response Institute (HCRI).

This report was prepared for the UK Government's Department for International Development (DFID) and its partners in support of pro-poor programmes. It is licensed for non-commercial purposes only. K4D cannot be held responsible for errors or any



consequences arising from the use of information contained in this report. Any views and opinions expressed do not necessarily reflect those of DFID, K4D or any other contributing organisation. © DFID - Crown copyright 2017.