

United Nations Development Programme

DISASTER RISK REDUCTION AND RECOVERY



AGRICULTURE GUIDE

For Recovery Implementation



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1 Introduction

Post-disaster recovery programming in agriculture can play a critical role in meeting poverty reduction goals¹ and ensuring that affected people maintain their food security and livelihoods during and after disasters and build resilience over time. Agriculture recovery interventions that include disaster risk reduction (DRR) and building back better (BBB) practices, and are based on disaster sensitive policies and services, provide farmers with benefits (in terms of avoided damages and losses during hazard stress) that are on average 2.2 times higher than previously used farming practices.²

Mitigating risk exposure and strengthening the resilience of agricultural systems is the best way to

protect the most vulnerable, beat back poverty, and promote shared and sustained growth. The benefits of managing agricultural risks and associated volatility are multifold, with spillovers across development priorities. Blunting weather, pest/disease, and other shocks to agriculture boost productivity. Curbing production volatility protects rural jobs and household food security. Diversifying production systems and improving stewardship of natural resources (e.g., soil, water, and rangelands) nurtures biodiversity. Most importantly, by reigning in uncertainty, good risk management creates a more predictable environment for investments and sustained sector and rural growth.

¹ Sustainable Development Goals of the United Nations and the twin goals of ending extreme poverty and promoting shared prosperity of the World Bank.

² Food and Agriculture Organization (FAO), Policy Support and Governance. <http://www.fao.org/policy-support/policy-themes/disaster-risk-reduction-agriculture/en/>



1.1 Purpose of the Guide

The main purpose of this short and action-oriented guide is to assist senior national and local government advisors and planners, relevant private sector leaders, intergovernmental organizations, and implementing partners in executing agriculture-focused effective and efficient recovery programmes.

The guide describes the role of agriculture in a country's development and the potential impact that natural disasters can have on the sector. It recommends the types of agriculture interventions to be implemented in the short-, medium- and long-term stages of recovery and reconstruction taking into consideration DRR and BBB aspects.

It then highlights global best practices in post-shock recovery programming that can help address increasing vulnerability of agri-food systems and livelihoods to growing weather, water, climate, and other risks. It guides in the implementation of appropriate and timely actions by governments, supported by their development partners, that can aid not only the near-term, post-shock recovery of agri-food systems and rural livelihoods, but also can contribute to strengthening their resilience by aligning actions with mitigation investments over the medium to long term.

The guide builds upon the policy framework and intersectoral strategies that are based on the Post Disaster Needs Assessment (PDNA)³ and Disaster Recovery Framework (DRF).⁴ It enters into action when the lead recovery agency translates policy priorities to sector-specific recovery programmes that can be financed and implemented.

The guide aligns with the PDNA along the following dimensions:

- Repair or reconstruction of infrastructure and physical assets in the sector (Chapter 2)
- Resumption of production of goods and services and access to goods and services (Chapter 3)
- Restoration of institutional, financial, governance, and decision-making processes (Chapter 3)
- Reduction of vulnerabilities and risks (Chapter 3)

The guide also provides sector-specific guidance on the main aspects presented in the DRF:

- Governance and policy for recovery (Chapter 4)
- Mechanisms to make recovery more effective and efficient (Chapter 5)
- Identifying financing mechanisms for recovery (Chapter 6)

This document does not provide guidance on exactly how to implement a specific activity but includes descriptions and examples of potential recovery interventions (Table 7.1) and offers links to further readings (Chapter 8).

In this guide, agriculture refers to the four subsectors—crop, livestock, fisheries/aquaculture and forestry. It refers to natural disasters originated from i) hydrometeorological hazards (floods, waves and

³ Global Facility for Disaster Reduction and Recovery, PDNA Guidelines Volume B: Agriculture, Livestock, Fisheries and Forestry. https://www.gfdr.org/sites/default/files/publication/pdna-guidelines-vol-b-agriculture-livestock-fisheries-forestry_0.pdf

⁴ Global Facility for Disaster Reduction and Recovery (2015), *Guide to Developing Disaster Recovery Frameworks*, Sendai Conference Version, March. <https://www.gfdr.org/sites/default/files/publication/DRF-Guide.pdf>

surges, storms, droughts, etc.), ii) geological hazards (earthquakes, volcanic eruptions, etc.) and iii) biological hazards (epidemics, insect infestations, animal disease outbreaks, etc.), including those happening in a conflict context and looks at interventions to be implemented along the food system.⁵

Although the timing for recovery interventions varies with the context and intensity of the disaster, recovery interventions need to be aligned with response interventions and embedded into long-term development activities. The recovery process in practice is often initiated immediately after a shock, even at times alongside the response phase, or with the assessment of damages, losses, and recovery needs. The recovery and reconstruction process can often expand past five years into long-term development depending on the context and intensity of the disaster.

1.2 Role of Agriculture Growth in Poverty Reduction, Food Security and Livelihood

Worldwide, 2.5 billion people depend on agriculture for their livelihoods, 80% of whom are small and marginal farmers in developing countries with holdings of less than 10 ha.^{6, 7} Agricultural development is therefore essential in the fight against extreme poverty, in the promotion of inclusive economic growth, and in ensuring food and nutrition security.⁸ Agriculture contributes to economies both nationally and locally

through export earnings, food supplies, employment generation, and social stability.

According to the World Bank: “Growth in the agriculture sector is two to four times more effective in raising incomes among the poorest in developing countries, compared to other sectors.”⁹ Globally, 65% of low-income adult working force depends on agriculture for their living. The role of agriculture in economic growth is significant, accounting for an important part of the global GDP (e.g., in 2014, it accounted for a third of global gross-domestic product (GDP)).¹⁰

1.2.1 Crops

Within agriculture, the crop subsector can play a crucial role in supporting the global economy in the long-term with products such as food crop, fibres, and the conversion of **biomass** resources for bio-energy, provided that the process of production follows sustainable environmental practices.¹¹

1.2.2 Livestock

According to the FAO: “Livestock contributes 40% of the global value of agricultural output and supports the livelihoods and food and nutrition security of almost 1.3 billion people.”¹² Livestock plays a major role in sustainable food production systems; for example, manure is critical in nutrient management. Also, when used as draft animals, livestock can help boost productivity in regions where there is low

⁵ A food system is the path that food travels

⁶ FAO (2016), Increasing the Resilience of Agricultural Livelihoods. www.fao.org/3/a-i5615e.pdf

⁷ The Economist Intelligent Unit Report, *Food Sustainability and the Role of Smallholder Farmers*. <http://foodsustainability.eiu.com/food-sustainability-and-the-role-of-smallholder-farmers/>

⁸ World Bank, Understanding Poverty: Agriculture and Food. <http://www.worldbank.org/en/topic/agriculture/overview>

⁹ Ibid.

¹⁰ Ibid.

¹¹ FAO, Biodiversity and Ecosystem Services. <http://www.fao.org/agriculture/crops/core-themes/theme/biodiversity0/en/>

¹² FAO, Animal Production. <http://www.fao.org/animal-production/en/>

mechanization. Livestock are also important assets for vulnerable communities. Globally, around 500 million pastoralists rely on livestock for food, income, and as a store of wealth, collateral or safety net in times of need.^{13, 14}

1.2.3 Fisheries and Aquaculture

Fisheries and aquaculture are of critical importance for food, nutrition, and employment security of millions of people as pointed out in the FAO's *The State of World Fisheries and Aquaculture Report 2018*: "Fish production reached an all-time high of 171 million tons in 2016, of which 88% was utilized for direct human consumption."¹⁵ Fishery-related livelihoods are particularly important in coastal and remote areas where alternative employment is lacking. Fisheries strengthen resilience by acting as a food safety net during lean times and disasters when crops and livestock are destroyed.¹⁶

1.2.4 Forests

Forests make vital contributions to the people and the planet by supporting livelihoods, preserving biodiversity, and meeting the climate change challenge. According to *The State of the World's Forests 2018*:

"Forests act as a source of food, medicine and fuel for more than a billion people."¹⁷ Further to its role in mitigating climate change impact and protecting soils and water, forests also hold more than three-quarters of the world's terrestrial biodiversity, contributing to the socio-economic development of a large proportion of the rural population, particularly the world's poorest.¹⁸



the other hand, agriculture is an important driver of climate change, as it is the second largest economic sector that contributes to anthropogenic greenhouse gas emissions, mainly through deforestation, livestock production, and soil and nutrient management.¹⁹

1.3 Impact of Disasters on the Agriculture Sector

Agricultural systems and related livelihoods are particularly vulnerable to natural hazards, leading to widespread poverty and food insecurity among dependent populations.²⁰ The number and frequency of recorded disasters triggered by natural hazards (often attributed to climate change), along with the associated impact on livelihoods and economies (local and national), are increasing significantly, negatively impacting the whole food supply chain (FSC).^{21, 22}

¹³ FAO, Pastoralists' Complex Tenure Rights are Key to Community Resilience. <http://www.fao.org/news/story/en/item/454844/icode/>

¹⁴ World Bank, Moving Towards Sustainability: The Livestock Sector and the World Bank. <https://www.worldbank.org/en/topic/agriculture/brief/moving-towards-sustainability-the-livestock-sector-and-the-world-bank>

¹⁵ FAO (2018), *The State of World Fisheries and Aquaculture: Meeting the Sustainable Development Goals*. <http://www.fao.org/3/i9540en/i9540en.pdf>

¹⁶ Ibid.

¹⁷ FAO (2018), *The State of the World's Forests*. <http://www.fao.org/state-of-forests/en/>

¹⁸ Ibid.

¹⁹ P. Smith, M. Bustamante, H. Ahammad, H. Clark, H. Dong, E.A. Elsiddig, ... S. Bolwig, (2014), Agriculture, Forestry and Other Land Use (AFOLU), in *Climate Change 2014: Mitigation of Climate Change*, Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (pp: 811–922), Cambridge University Press. https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_chapter11.pdf

²⁰ World Bank, Understanding Poverty: Agriculture and Food. <http://www.worldbank.org/en/topic/agriculture/overview>

²¹ Vangimalla R. Reddy, Shardendu K. Singh, Venkatachalam Anbumozhi (2016), 'Food Supply Chain Disruption due to Natural Disasters: Entities, Risks, and Strategies for Resilience', *ERIA Discussion Paper Series*, Research Institute of Economy, Trade and Industry, May. <https://www.eria.org/ERIA-DP-2016-18.pdf>

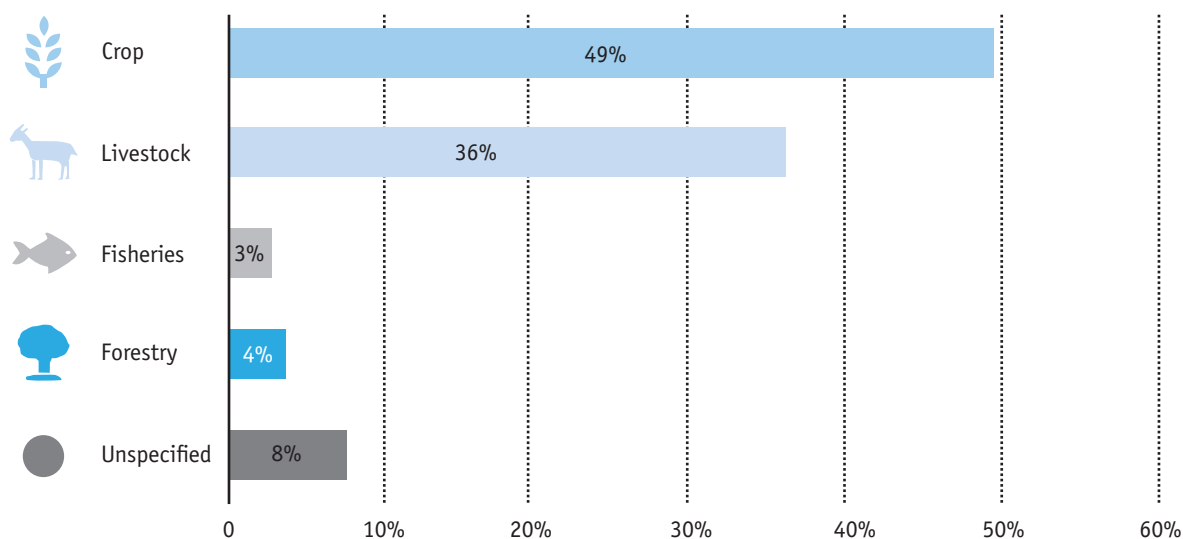
²² FAO (2015), The Impact of Natural Hazards and Disasters on Agriculture, Food Security and Nutrition. <http://www.fao.org/3/a-i5128e.pdf>

During disasters, critical agricultural assets, inputs and infrastructure can be damaged or destroyed, disrupting and jeopardizing production cycles, market access, trade flows, food supply and livelihoods. The affected populations could get pushed into the poverty trap that increases the prevalence of food insecurity and threatens to erode and even reverse the gains made in ending hunger and malnutrition.²³ Disasters can have long lasting impact on livelihood in general and agriculture in particular. It can lead to loss of family members and workforce, exacerbate social tensions and fuel civil unrest. Besides the direct effects of disasters on physical assets and economic losses, disasters also have longer term impact on food security and poverty, human health and development, natural resources and the ecosystem.²⁴

According to a PDNA review done by FAO in 2017: “The agriculture sector—including crops, livestock, fisheries, and forestry—absorbed approximately **23% of the economic impact** of medium- and large-scale disasters induced by natural hazards in developing countries between 2006 and 2016.²⁵ The percentage increased to **26% for climate-related disasters** such as floods, drought and tropical storms, which highlights the vulnerability of smallholder farmers to hazardous events. Almost half of the impact of disasters on agriculture is absorbed by the crop subsector, followed by livestock, while fisheries and forestry account for smaller shares.”²⁶ (Figure 1.1).

Of all natural hazards, **floods, droughts and tropical storms** affect food production most adversely.²⁷ As

Figure 1.1
Damage and Loss in Agriculture by Agriculture Subsector (as a % Share of Total Damage and Loss), 2006–2016



Source: FAO (2017), Impact of Disasters and Crises on Agriculture and Food Security. <http://www.fao.org/3/I8656EN/i8656en.pdf>

²³ FAO (2018), *The State of Food Security and Nutrition in the World*. <http://www.fao.org/3/i9553en/i9553en.pdf>

²⁴ FAO (2017), Impact of Disasters and Crises on Agriculture and Food Security. <http://www.fao.org/3/I8656EN/i8656en.pdf>

²⁵ FAO (2017), The Impact of Disasters on Agriculture: Addressing the Information Gap. <http://www.fao.org/3/a-i7279e.pdf>

²⁶ Ibid.

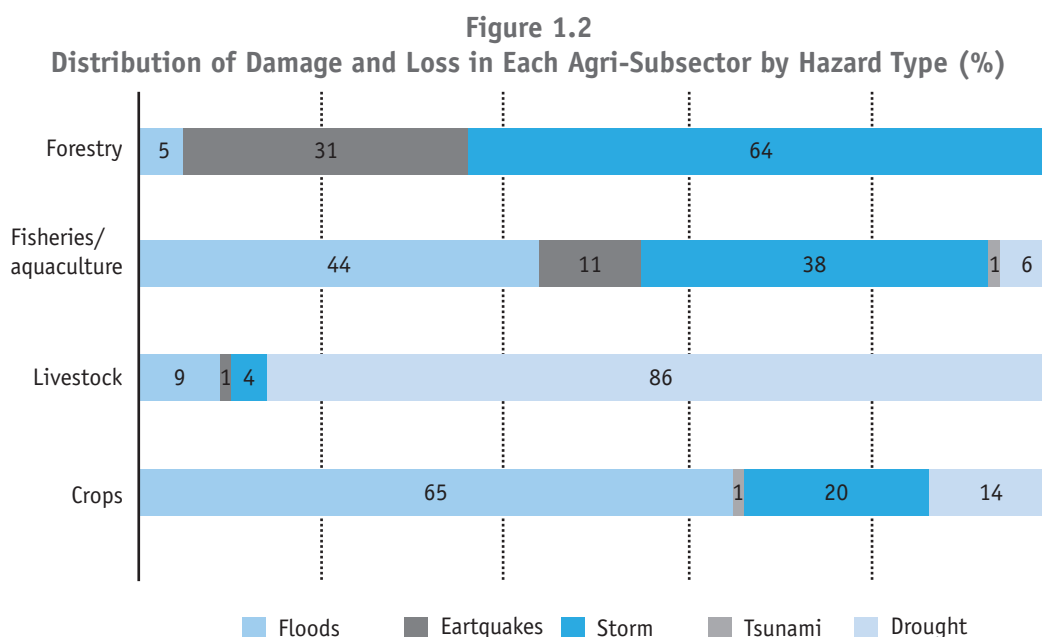
²⁷ FAO (2015), The Impact of Natural Hazards and Disasters on Agriculture and Food Security and Nutrition: A Call for Action to Build Resilient Livelihoods. <http://www.fao.org/3/a-i4434e.pdf>

stated by FAO, the **fisheries** subsector is most affected by **floods and storms**, the greatest economic impact on **forestry** is caused by **storms**, while livestock takes the greatest hit in times of drought (Figure 1.2).²⁸ According to FAO: “The percentage of the planet affected by **drought** has more than doubled in the last 40 years and in the same time span, droughts have affected more people worldwide than any other natural hazard. Climate change is exacerbating drought in many parts of the world, increasing its frequency, severity and duration.”²⁹ Climate change is also increasing the occurrence of **animal and plant pests and diseases**.³⁰

Table 1.1 summarizes the different effects and impact disasters can have on agriculture, in line with the PDNA methodology.³¹

1.4 Impact of Disasters on Vulnerable Populations

Vulnerable populations such as minority ethnic groups, people with disabilities, children, pregnant women, and women-headed households can be at particular risk when disasters strike.³² Disasters can adversely affect their livelihoods, food and nutrition security, and engagement in the agricultural



Source: Adapted from FAO (2017), Impact of Disasters and Crises on Agriculture and Food Security. <http://www.fao.org/3/I8656EN/i8656en.pdf>

²⁸ FAO (2017), Impact of Disasters and Crises on Agriculture and Food Security. <http://www.fao.org/3/I8656EN/i8656en.pdf>

²⁹ FAO, Drought and Agriculture. <http://www.fao.org/land-water/water/drought/droughtandag/en/>

³⁰ FAO (2008), ‘Climate-related Transboundary Pests and Diseases’, Technical background document from the expert consultation. <http://www.fao.org/3/a-ai785e.pdf>

³¹ For more information on the PDNA methodology in agriculture, see Global Facility for Disaster Reduction and Recovery, PDNA Guidelines Volume B: Agriculture, Livestock, Fisheries and Forestry. https://www.gfdr.org/sites/default/files/publication/pdna-guidelines-vol-b-agriculture-livestock-fisheries-forestry_0.pdf

³² O.D. Cardona, M.K. van Aalst, J. Birkmann, M. Fordham, G. McGregor, R. Perez, R.S. Pulwarty, E.L.F. Schipper and B.T. Sinh (2012), ‘Determinants of Risk: Exposure and Vulnerability’, in C.B. Field, V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.K. Plattner, S.K. Allen, M. Tignor, & P.M. Midgley (eds.), *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*, Special Report of Working Groups I and II of the IPCC, Cambridge University Press, Cambridge & New York, pp: 65–108. Cited in FAO and Red Cross Red Crescent Climate Centre (2019), *Managing Climate Risks through Social Protection: Reducing Rural Poverty and Building Resilient Agricultural Livelihoods*. Rome. <http://www.fao.org/3/ca6681en/CA6681EN.pdf>

TABLE 1.1: Effects and Impact of Disasters on the Agriculture Sector

Damage to Infrastructure and Assets			
<p>Total or partial destruction of assets, such as grain reserves and seed stocks, livestock, fisheries and forestry, agriculture lands, tools or machinery used in agro-production, perennial trees, increased soil erosion, declining rangeland quality, and salinization of soil</p>	<p>Total or partial destruction of agricultural infrastructure, such as irrigation systems (canals, dams, headworks, pumps, etc.), greenhouses and nurseries, livestock shelters and veterinary services, aquaculture equipment or hatcheries; post-production infrastructure, such as facilities for storage, processing, marketing and transport, buildings and equipment of farm schools and cooperatives; markets, as well as sector ministries and their departments, fishing vessels, fish ponds, nurseries, etc.</p>	<p>Total or partial destruction of transport and communication, such as farm access roads</p>	<p>Total or partial destruction of forests and other natural resources (wildlife and fish habitat) that support agriculture (e.g., cooking fuel), ecosystem degradation, etc.</p>
Losses of Production of Goods and Services			
<p>Disruption of service delivery and availability/ access to goods and services:</p> <ul style="list-style-type: none"> • Losses in production (crops, livestock, fishery and forestry) • Losses of inputs (seeds, fertilizers, feed, etc.) • Higher costs of production, lower revenues and higher operational costs in the provision of service • Food chain crises of trans-boundary or technological threats (including plant pests and diseases, animal diseases and food safety) 	<p>Disruption of governance and social processes:</p> <ul style="list-style-type: none"> • Disruption of government institutions and policies (e.g., disruption of agriculture services) • Weak social support networks • Disruption of farmer organizations • Loss of agriculture database 	<p>Increased risks and vulnerabilities:</p> <ul style="list-style-type: none"> • Additional hazards, such as further landslides, fire risk, etc. • Secondary shocks, such as fish disease resulting from inappropriate supplies for restocking or loss of processed fish due to prolonged lack of market access • Environmental risks, such as further deforestation, soil erosion, potential forest fire, proliferation of new or existing pests and diseases, etc. • Biodiversity loss • Social and political risks, such as upcoming elections, potential conflict between social groups • New vulnerabilities created by the disaster that may present additional threats to population groups (economic, social, geographic) that are especially vulnerable or food insecure 	
Macroeconomic and Human Development Impact			
<p>Macroeconomic decline:</p> <ul style="list-style-type: none"> • Decline in GDP from agriculture • Adverse impact on balance of payments and agriculture budget • Inflation • Decline in agriculture export • Increase in agriculture products import 	<p>Human development:</p> <ul style="list-style-type: none"> • Increased poverty (particularly rural poverty) • Increased food insecurity • Temporary decline in employment, income, and well-being of affected individuals and household 		

Source: Adapted from Global Facility for Disaster Reduction and Recovery, PDNA Guidelines Volume B: Agriculture, Livestock, Fisheries and Forestry. https://www.gfdrr.org/sites/default/files/publication/pdna-guidelines-vol-b-agriculture-livestock-fisheries-forestry_0.pdf

sector.³³ The poor, especially those living in rural areas whose livelihoods depend heavily on natural resources, bear the brunt of natural disasters including climate risks (e.g., river flooding, too much or too little rainfall and extreme changes in temperature). They generally live in high risk geographies (and are highly exposed) and have limited capacity to cope due to low

incomes, lack of savings, weaker social networks, low asset bases and heavy reliance on climate-sensitive livelihoods. Consequently, the poor experience higher losses in income and assets following disasters, as well as higher mortality rates in disaster-affected areas, compared to the non-poor.³⁴

³³ World Bank (2007), 'Gender and Crises: Implication for Agriculture', Module 11. <http://siteresources.worldbank.org/INTGENAGRLIVSOUBOOK/Resources/Module11.pdf>

³⁴ Economic and Social Commission for Asia and the Pacific (ESCAP) (2017), *Economic and Social Survey in Asia and the Pacific, Governance and Social Management*. <https://www.unescap.org/sites/default/files/publications/Survey%202017-Final.pdf>

Stephane Hallegatte, Adrien Camille Vogt-Schilb, Mook Bangalore, Julie Rozenberg (2016), *Unbreakable Building the resilience of the poor in the face of natural disasters* (English). Climate Change and Development series, Washington, D.C.: World Bank Group. <http://documents.worldbank.org/curated/en/512241480487839624/Unbreakable-building-the-resilience-of-the-poor-in-the-face-of-natural-disasters>

H. Winsemius, B. Jongman, T. Veldkamp, S. Hallegatte, M. Bangalore and P. Ward (2018), *Disaster risk, climate change, and poverty: Assessing the global exposure of poor people to floods and droughts*, *Environment and Development Economics*, 23(3), 328-348. doi:10.1017/S1355770X17000444. <https://www.cambridge.org/core/journals/environment-and-development-economics/article/disaster-risk-climate-change-and-poverty-assessing-the-global-exposure-of-poor-people-to-floods-and-droughts/BEAFC2320176380B7B9296B60CE71BCD>

2 Resilient Reconstruction of Infrastructure and Physical Assets

This section discusses the first of the four PDNA dimensions: reconstruction of infrastructure and physical assets in agriculture and its subsectors.

Recovery intervention should ensure the use of appropriate technologies and practices in rehabilitation or replacement of infrastructure and assets so that future risks are reduced and vulnerability to future disasters minimized. This includes disaster-proof food and seed storage, sheds and preservation facilities,¹ improved shore-based infrastructures,² more efficient water management (including new water sources, irrigation, drainage, water harvesting

and saving technologies, desalinization, and storm and wastewater management)³.

In order to ensure that DRR and BBB approaches and practices are implemented, the use of codes (e.g., resilient warehouse building codes, vessels communications codes), norms (e.g., technical norms on resilient construction of animal sheds in flood-prone areas) and standards for disaster-proof techniques will need to be reinforced and farmer's capacity building on traditional and new techniques and standards will be needed.⁴ (Table 2.1; Annexe 1).

¹ For more information, see FAO (2014), 'Appropriate Seed and Grain Storage Systems for Small-scale Farmers'. <http://www.fao.org/3/a-i3769e.pdf>.

² For more information, see J.A. Sciortino (2010), Chapter 11: Shore-based Infrastructure and Renewable Energy, in 'Fishing Harbour Planning, Construction and Management', FAO Fisheries and Aquaculture Technical Paper No. 539, Food and Agriculture Organization of the United Nations, Rome. <http://www.fao.org/3/i1883e/i1883e11.pdf>

³ For more information, see FAO (2011), *The State of the World's Land and Water Resources for Food and Agriculture*, pp: 137–213. <http://www.fao.org/3/i1688e/i1688e.pdf?>

⁴ For more information on resilient infrastructure, see UN Habitat (2014), 'DRR Architecture: Key Practices for DRR Implementers'. <http://www.fao.org/3/a-i3773e.pdf>



TABLE 2.1: Recommendations for Rehabilitation and Reconstruction Compliant with DRR and BBB Norms

Affected asset	Affected subsector	Type of hazard	Rehabilitation/reconstruction recommendations for DRR and BBB		
			Short term: Emergency/early recovery	Medium term: Reconstruction	Long term: Policy framework/structural changes
Infrastructure					
Warehouses, animal sheds, greenhouses, farm building, fish ponds	All	Floods, storms and cyclones	Build secure temporary shelters	<ul style="list-style-type: none"> Rebuild infrastructure in safer location and/or on higher ground. Promote the use of resilient materials that can better withstand shocks (e.g., bamboo to reinforce wall course, lintels and corners). Provide community training on asset protection, including equipment and infrastructure (e.g., securing animal shelter roofs). 	<ul style="list-style-type: none"> Review laws, policies, and regulations to integrate resilient infrastructure, watershed management, the management of forests and other natural resources. Improve capacity of masons, engineers and architects in resilient construction techniques. Develop techniques for mitigation of soil erosion and water conservation including flood control and building of natural vegetative defences against landslides or storm surge. Support development of environmental impact assessments, risk assessments and hazard mapping.⁵
Irrigation channels and water points	All	Floods, storms, cyclones and drought		Run cash-for-work (CFW) schemes for rebuilding and repairing irrigation channels and water points. Consider design aspects, e.g., building check dams.	
Roads and power structures	All	Floods, storms, and cyclones		Offer CFW on road rehabilitation with innovative systems that will increase resilience to shocks (e.g., drainage systems).	<ul style="list-style-type: none"> Promote diversification of power source at farms (e.g., solar, wind, water).

⁵ For more information on impact assessment, see FAO (2012) Environmental Impact Assessment Guidelines for FAO Field Projects, <http://www.fao.org/3/i2802e/i2802e.pdf> and FAO (2017), Climate Smart Agriculture Sourcebook: Understanding Disaster Risk to Agriculture and Food Security. <http://www.fao.org/climate-smart-agriculture-sourcebook/enabling-frameworks/module-c5-climate-resilience/chapter-c5-2/en/>

Physical assets					
Agricultural assets (tractors, inputs and fishing gears)	All	Floods, storms, and cyclones	Set up cash+ toolbox ⁶ and food assistance for assets (FFA) ⁷ schemes to help farmer restart their livelihoods.	<ul style="list-style-type: none"> Promote dissemination of information on safer places to store assets and provide appropriate training on protecting assets from threats. 	<ul style="list-style-type: none"> Support sustainable mechanization strategies⁸ and facilities for securing fishing equipment and gear.
Degraded land	Livestock and crops	All		<ul style="list-style-type: none"> Offer CFW for restoration of degraded lands through grazing management and re-vegetation. 	
Boats	Fisheries	Floods, storms, cyclones and drought		<ul style="list-style-type: none"> Train fishermen on resilient repair techniques. Introduce resilient submersible fish cages. Promote fish pots as passive fishing gear to prevent fish losses. 	<ul style="list-style-type: none"> Improve design standards for fishing vessels (safe and stable boat construction, communication systems, etc.). Improve gear selectivity and marking to reduce unwanted fishing and adverse impact on marine habitat. Introduce biodegradable escape hatches to reduce impact of ghost fishing.
Forests and other natural resources supporting agriculture	All	Drought floods, storms and cyclones	Provide alternative bioenergy sources (e.g., energy crops, agriculture and forest wastes and by-products, manure, etc.)	<ul style="list-style-type: none"> Support reforestation with introduction of resilient species. 	<ul style="list-style-type: none"> Encourage a shift from traditional bioenergy to cleaner and more sustainable fuel efficient technology (e.g., by improving charcoal conversion efficiency, providing access to fuel-efficient stoves, producing solar bulbs using locally available materials such as plastic water bottles).⁹ Strengthen ecosystem services of forests.
Perennials trees	Crops and forestry	Floods, storms, cyclones and drought		<ul style="list-style-type: none"> Replant resilient varieties through CFW schemes.¹⁰ 	

⁶ FAO, Cash+ Toolbox, <http://www.fao.org/3/i7644en/I7644EN.pdf> and FAO and Cash+: How to maximise the impacts of cash transfers. <http://www.fao.org/3/I8739EN/i8739en.pdf>

⁷ World Food Program, Food Assistance for Assets. <https://www1.wfp.org/food-assistance-for-assets>.

⁸ For more information, see FAO (2016), 'Sustainable Agriculture Mechanization Factsheet'. <http://www.fao.org/3/a-i7473e.pdf>

⁹ For more information on sustainable energy, see FAO (2018), *Building resilience through Safe Access to Fuel and Energy (SAFE): Moving Towards a Comprehensive SAFE Framework*. <http://www.fao.org/3/CA0021EN/ca0021en.pdf>

¹⁰ Cash-for-work interventions can be used to restore soil fertility and plant trees on degraded land. For more information, see <http://www.fao.org/3/I7645EN/i7645en.pdf>, <http://www.fao.org/3/aq419e/aq419e.pdf>

3 Restoring the Production of, and Enabling Access to Goods and Services

In this section, recovery needs are addressed through the following PDNA dimensions:

1. Restoration of the production of goods and services, and access to goods and services
2. Restoration of governance and decision-making processes
3. Reduction of risks and vulnerabilities

According to the Global Facility for Disaster Reduction and Recovery, PDNA Guidelines Volume B: Agriculture, Livestock, Fisheries and Forestry: “The negative impact of natural hazards and other threats can be effectively reduced, mitigated or prevented by ensuring that recovery investments and strategies promote sustainable models of food production and the application of appropriate agricultural technologies

and practices which raise yields and increase resilience against production failure”¹

Recovery processes should enhance food access and nutrition, slow/reverse resource (soil, water and forest) degradation to increase resilience to future shocks and to better serve rural communities that depend on them by considering **risk sensitive technologies** and **good practices**. The aim is to increase sustainability and reduce the need for beneficiaries to resort to negative coping mechanisms (e.g., selling productive assets or forced migration) in response to shocks.

Recovery intervention is also an opportunity to re-invest in agriculture whilst also managing climate change risk and mitigation through best practices such as:

- investment in quality seeds and planting materials of well-adapted varieties for crops;²

¹ Global Facility for Disaster Reduction and Recovery, PDNA Guidelines Volume B: Agriculture, Livestock, Fisheries and Forestry. https://www.gfdrr.org/sites/default/files/publication/pdna-guidelines-vol-b-agriculture-livestock-fisheries-forestry_0.pdf

² For more information, see FAO (2017), ‘Climate-smart Crop Production Practices and Technologies’, in *Climate Smart Agriculture Sourcebook*. <http://www.fao.org/climate-smart-agriculture-sourcebook/production-resources/module-b1-crops/chapter-b1-2/en/>



- improved feeding, health, grazing and herd management practices for livestock;³
 - improved forest management and mangrove conservation for forestry.
 - improved feeding, vessel, storage and fish management practices for fishery and aquaculture;⁴ and
- A comprehensive list of DRR and BBB inclusive recovery activities is presented in Table 3.1 and good practices in Annexe 2.

TABLE 3.1: DRR and BBB Inclusive Recovery Interventions


Good and services affected	Subsector affected	Type of hazard	Recovery recommendations for DRR and BBB		
			Short term: Emergency/early recovery	Medium term: Rehabilitation	Long term: Policy framework/structural changes
Disruption of service delivery and availability/access to goods and services					
Losses in production (crops, livestock, fishery and forestry)	All	Floods, storms, cyclones, drought and extreme temperature	<ul style="list-style-type: none"> • Improve access to early maturing varieties/species to accelerate recovery, applying the concept of seed security systems (in-kind distribution, voucher, seed fairs or other interventions such as seed multiplication). • Run a CFW initiative for cleaning debris. • Ensure Early-Warning System (EWS) repair, re-activation, or reinforcement for food security surveillance and disease monitoring. • Restore the operational capacities of key DRR institutions. 	<ul style="list-style-type: none"> • Shift species, breeds and/or production systems (e.g., small ruminants, poultry, etc.) and promote multi-stress tolerant crops/livestock/fish varieties or species. • Implement conservation agriculture (mulching, minimum tillage) and climate-smart agriculture. • Support diversification, e.g., agro-forestry systems that make use of trees and shrubs as shelterbelts, windbreaks and live fences (see Guatemala example in Table 7.1). • Alter timing or location of agriculture activities. • Enhance management and conservation of water to increase water-use efficiency and productivity (rainwater, water storage and conservation techniques). • Strengthen seed/fingerlings production, supply and market mechanisms in both formal and informal systems (e.g., through seed security assessment)⁵ 	<ul style="list-style-type: none"> • Make appropriate changes in laws, policies, regulations and management practices to support more sustainable and resilient crop, livestock and fish production, such as the management of forests and other natural resources; and integrated coastal management. • Support national and local preparedness planning, contingency plans for agriculture, fisheries/aquaculture, forestry and livestock. • Support the establishment of Early Warning Early Action (EWEA)/Forecast-based Financing (FbF) systems. • Develop resilient seeds, seedlings, fingerlings, inputs, fodder storage and conservation methods. • Conduct risk mapping⁶ and monitoring, public information and training.

³ For more information, see FAO (2013), 'Tackling Climate Change Through Livestock, A Global Assessment of Emissions and Mitigation Opportunities'. <http://www.fao.org/3/a-i3437e.pdf>

⁴ For more information, see FAO, Fisheries and Aquaculture and Climate Change. <http://www.fao.org/fishery/climatechange/en>

⁵ For more information on seed security assessment, see FAO Seed Systems. <http://www.fao.org/agriculture/crops/thematic-sitemap/theme/seeds-pgr/seed-sys/en/>





⁶ For more information on risk mapping, see FAO (2017), 'C5 - 2.1 Mapping Multiple Risk and Vulnerabilities', in *Climate Smart Agriculture Sourcebook*. <http://www.fao.org/climate-smart-agriculture-sourcebook/enabling-frameworks/module-c5-climate-resilience/chapter-c5-2/en/>

				<ul style="list-style-type: none"> • Develop community nurseries combined with training on DRR techniques (including traditional storage techniques). 	<ul style="list-style-type: none"> • Carry out background studies/analysis for the main markets and food chains. • Build capacity of actors in DRR and BBB practices. • Explore risk insurance opportunities (see Guatemala example in Table 7.1).
		Storms and cyclones	Restore safety net function of fisheries. ⁷	<ul style="list-style-type: none"> • Migration of facilities related to fishing effort/strategies and processing/distribution • Ensure alternative fish meal/oil replacement and better feed management.⁸ • Work towards genetic improvement for alternative feeds.⁹ • Shift away from carnivorous species and culture of bivalves and seaweeds. 	
		Storms and cyclones		<ul style="list-style-type: none"> • Introduce low profile crop planting. • Routinely prune/brace trees prior to cyclone season. 	
	All	Animal and plant pests and diseases		<ul style="list-style-type: none"> • Provide sector preparedness planning support for identified high threat diseases (pest infestation, avian influenza, aquatic animal disease). • Provide conditional cash transfers to attend training on integrated pest/disease management. 	
		Drought		<ul style="list-style-type: none"> • Provide CFW to implement drip irrigation, mulching, innovative coverage techniques (e.g., guano fertilizer), fire breaks, rainwater harvesting and storages, aquifer recharge. 	

⁷ For more information, see FAO (2014), 'Fisheries and Aquaculture Emergency Response Guidance', p. 20. <http://www.fao.org/3/a-i3432e.pdf>

⁸ For more information on alternative fish meal and feed management, see FAO, 'Fish as feed inputs for aquaculture'. <http://www.fao.org/3/i1140e/i1140e01.pdf>

⁹ For more information, see FAO, Technical Guidelines for Responsible Fisheries 2018, Supplement 9, Aquaculture Development, 9. Development of Aquatic Genetic Resources. <http://www.fao.org/3/CA2296EN/ca2296en.pdf>

	All			<ul style="list-style-type: none"> • Increase protection, restoration and enhancement of mangroves and other coastal forests. • Restore/increase forest connectivity and wildlife corridors; assist migration; and take <i>ex situ</i> conservation actions. 	
	Drought		<ul style="list-style-type: none"> • Destock • Provide feed concentrate.¹⁰ • Provide water. 	<ul style="list-style-type: none"> • Promote seasonal breeding. • Restock. • Provide veterinary support. 	
	Floods and storms			<ul style="list-style-type: none"> • Build raised beds/network drains. • Raise wall trees to protect against high winds and floods. 	
	Landslides and floods			<ul style="list-style-type: none"> • Offer CFW to support resilient planting methods (e.g., hedgerow alley cropping, floating or keyhole garden, contour planting). 	
Disruption of governance and social processes					
Agriculture services, social support networks, loss of agriculture database	All	All		<ul style="list-style-type: none"> • Support the development of computerized database systems. • Support social network analysis to strengthen their resilience and cohesion during disasters. 	<ul style="list-style-type: none"> • Develop manuals and guidance material on DRR for national and local authorities.
Increased risks and vulnerabilities					
<ul style="list-style-type: none"> • Additional hazards, increased diseases and pests • Environment and social risks, vulnerable groups 	All	All		<ul style="list-style-type: none"> • See section 'Disruption of service delivery and availability/access to goods and services'. • Ensure social protection measures for environment, social risk and vulnerable groups. 	

¹⁰ For more details, see Livestock Emergency Guidelines and Standards (LEGS), p. 38 for destocking and p. 97 for feed provision and destocking in. <https://www.livestock-emergency.net>

4 Addressing Governance and Policy for Recovery

The recovery phase should be an opportunity to look for **means and ways to improve governance and decision-making processes** in the agriculture sector. Disasters can create good momentum for revising or adjusting legal, policy, and institutional systems to better integrate disaster risk prevention, mitigation and preparedness, and promote economic profitability as well as social and economic equity. It can be the opportunity to develop tools and measures that **strengthen the food chain system,¹ foster greater coordination between actors, and encourage private sector investment** in resilient agriculture. While boosting social protection and inclusivity, it could **put clear constraints on unsustainable or inequitable exploitation of land, water, forests and fisheries** and **reduce potential for conflict** (see Kerala recovery case study in Table 7.1).

Recovery implementation entails decision-making based on often-limited information on complex issues. While the government is a major actor, others—local actors and partners, external actors including other states, donors, international agencies and international non-governmental organizations—also influence decisions and their implementation. Coordinating the activities of these actors and of a large influx of resources is a key governance challenge during recovery implementation.

According to FAO: **“Governance** at all levels is **defined** by the processes through which public and private actors articulate their interests; frame and prioritize issues; and make, implement, monitor, and enforce decisions.”²

¹ See Lebanon example in Table 7.1.

² FAO, Policy Support and Governance. <http://www.fao.org/policy-support/governance/en/>



Implementing agriculture recovery interventions that will ensure resilience against future shocks thus requires contextual knowledge, inclusive planning and cross-sectoral and multi-stakeholder coordination and collaboration. Local governments, public and private sectors, civil society, local institutions, universities and research centres all have an important role to play in the recovery process. Inclusion of all relevant actors is important in order to ensure equitable and equal participation, facilitate conflict mitigation, and ensure economic connexions such as market linkages. At the same time, coordination and collaboration with and between external actors is crucial; these actors are accountable to their own public or funding bodies and have objectives and procedures that may differ from those of national governments and actors.

Recovery interventions in the agriculture sector can be composed of a wide range of activities covered by different agencies or institutions. The lead agency might need to coordinate and collaborate with specific agriculture related agencies and other sectors to ensure the implementation of part of the program:

- **Ministry of Agriculture** for issues related to crops, livestock, land use planning and fisheries;
- **Ministry of Natural Resources and Environment** for forestry, land and environment;
- **Ministry of Water Resources** for irrigation;
- **Ministry of Rural Development** for small rural infrastructure;
- **Meteorological Department** for strengthening early warning on food security surveillance;

- **Ministry of Health and Nutrition** for issues related to nutrition, food security and HIV/AIDS;
- **Employment sector** for issues related to alternative employment opportunities in the agriculture sector;
- **Environment sector** for issues related to restoration of natural assets (water, land, forest);
- **Ministry of Infrastructure** for issues related to irrigation and rural roads; and
- **Trade and research sectors** for agriculture diversification development.

As presented in an FAO/World Agroforestry (ICRAF) report related to cross-sectoral coordination: **“Multi-stakeholder collaboration** can contribute greatly to cross-sectoral coordination by bringing diverse actors from civil society, private sector and government (including multiple ministries in some cases) to enhance information exchange, increase possibilities for negotiation and advocacy, and inclusive decision-making across sectors, all of which can enhance governance.”³ Rules, roles and responsibilities for each actor need to be clearly defined. Open meetings with inter-departmental groups and line ministries and departments that cut across sectors can be organized by the lead recovery agency jointly with the relevant sector departments before, during and after the recovery implementation process. Issues such as capacity building and support services to be established (offices and human resources) should also be considered (see Tamil Nadu example in Table 7.1).

³ C. Neely, M. Bourne, S. Chesterman, I. Kouplevatskaya-Buttoud, D. Bojic, D. Vallée (2015), *Accelerating Impact through Cross Sectoral Coordination at Country Level*, Food and Agriculture Organization, Rome. FAO/World Agroforestry (ICRAF). <http://www.fao.org/3/a-i7749e.pdf>

Key national institutions and social organizations to consider while implementing recovery in agriculture are listed in Table 4.1 .

TABLE 4.1: Key Institutions and Social Organizations for Agriculture Recovery Implementation

- **Government institutions:** Ministry of Agriculture, Ministry of Natural Resources and/or Environment, Land, Forestry, Fishery Ministry, Infrastructure and Energy Ministry, local government offices, DRR agency responsible for the implementation of the overall multi-sector recovery strategy.
- **Private sector:** Labour unions and professional organizations, seeds producers, food processors and traders
- **Economic institutions:** Markets, rural banks, private companies, micro-credit lending institutions, saving schemes, land rights, and tax system
- **Socio-cultural groups:** Kinship, marriage, inheritance, ethnic or religious groups, women’s organizations
- **Social networks:** farmer cooperatives, community-based organizations or non-governmental organizations, exchange labour groups (see India example in Chap 7)
- **Vocational structures:** Technical or vocational schools, farmer field schools, agricultural extension, etc.
- **Agriculture related universities and research centres** are key in developing and testing new resilient solutions adapted to local realities, in close collaboration with the public and private sector players
- **Political organizations:** Political parties, Parliament, law and order, etc.
- **Cross-cutting sectors:** Ensure close collaboration and coordination in terms of interventions with: **health sector**, for issues related to nutrition, food security and HIV/AIDS; **employment and livelihood sector** for issues related to alternative employment opportunities in the agriculture sector; **environment sector** for issues related to restoration of natural assets (water, land, forest); **Ministry of Infrastructure** for issues related to irrigation and rural roads.

Source: Adapted from Global Facility for Disaster Reduction and Recovery, PDNA Guidelines Volume B: Agriculture, Livestock, Fisheries and Forestry. https://www.gfdrr.org/sites/default/files/publication/pdna-guidelines-vol-b-agriculture-livestock-fisheries-forestry_0.pdf

⁴ FAO, Technical Guidance for Involving Non-State Actors in the Country Programming Framework (CPF), Partnerships and Advocacy Branch (OCPA). http://www.fao.org/fileadmin/user_upload/private_sector/pdf/FINAL_CPF_Guidelines.pdf.

BOX 4.1: Role of the Community, Civil Society, Private Sector, and Affected Groups in the Recovery Plan and Programme⁴

- **Policy dialogue:** Community participation in policy dialogue nurtures a sense of ownership that will enhance sustainability of policy adoption and implementation.
- **DRR and BBB standard setting:** The recovery intervention in the agriculture sector might include the development of new DRR and BBB standards. The involvement of the community, the future beneficiaries and the private sector in their design and implementation is critical to their success.
- **Advocacy and communication:** Engaging civil society and the private sector in advocacy and communication activities can allow the recovery intervention to reach a wider audience, with strengthened scope and impact across broader sections of the population. Partnership can enhance public awareness and build strong support and political will.
- **Knowledge management, sharing, dissemination, and capacity development:** Non-state actors can have substantial roles in providing data and information on market trends and emerging technologies. The recovery intervention could also capitalize on the detailed knowledge that civil society organizations have from the grassroots to the regional level, which complements the existing stock of knowledge and technical expertise.

The **community** and most affected groups must be fully included in sector recovery plans and programme preparation, implementation, and follow-up (Box 4.1). This will ensure customization, context-relevance, and ownership of resilient recovery options. The **domestic private sector**, composed of millions of farmers and other local businesses, is by far the biggest investor in agriculture and must be fully involved in governance decisions, together with **institutions and organizations** supporting livelihoods.

Table 4.2 suggests some ways to improve DRR and BBB during recovery.

TABLE 4.2: Issues to Consider on Governance and Decision-Making Processes

Governance aspects	DRR and BBB considerations
Legal, policy, institutional system	<p>Facilitate political dialogue in supporting the development and implementation of appropriate legal, policy and institutional systems in order to:</p> <ul style="list-style-type: none"> • integrate disaster risk reduction into rural and agricultural development policies and plans;⁵ • develop agricultural sector-specific national strategies on disaster risk reduction across the whole food system from production to consumption for agriculture, fisheries/aquaculture, forestry and natural resource;⁶ • prepare and plan for disaster recovery by identifying existing vulnerabilities and capacities, formulating the framework for post disaster planning, strengthening capacities of institutions and other actors to facilitate recovery operations; • enhance food security information systems, such as statistical baselines, livelihood profiles, vulnerability and risk analysis, etc., and their links to policy-making on livelihoods; • improve early warning systems and communication related to agricultural livelihoods and food security (crop forecasting, food price monitoring, monitoring of plant pests, animal diseases, fish disease and biosecurity risks, wild fires, etc.) and natural hazards such as drought, floods, storms, etc.; • reduce unsustainable or inequitable exploitation of land, water, forests and fisheries; and • modify tax and credit policies to encourage a more diverse and disaster resilient system.
Knowledge, skills, resources, accountability and reporting systems ⁷	<ul style="list-style-type: none"> • Reinforce disaster recovery capacities of actors and strengthen the institutional environment: Strengthen the capacity of line ministries to deliver national legislation, policies and strategies on disaster risk reduction through technical advice, human resources and expertise, training, practical tools and services. • Strengthen local government capacity to lead and implement recovery interventions • Establish transparent rules for budget allocation (national and local level) and beneficiary selection using secure payment systems and following clear procurement procedures will ensure a smooth implementation process and ensure that transparency and accountability are met in support of national development goals. This includes: <ul style="list-style-type: none"> * putting administrative systems in place before disbursing public funds for purchases, contracts, subsidies, and other purposes; * establishing accountability standards and regular reporting using agreed formats; * establishing a system to track the distribution of recovery assistance to households; and * establishing a system for addressing grievances.
Inclusion and participation (see Kenya example in Table 7.1)	<p>Ensure local level participation (local government, community and most vulnerable groups) in recovery policy, strategy, plans and programmes for ownership and sustainability of recovery intervention (reflecting beneficiaries' priority needs and indigenous knowledge).</p>

⁵ For examples of DRR integration in agriculture policy, see UNESCAP (2017), *Mainstreaming Disaster Risk Reduction and Climate Change Adaptation Within the Agriculture Sector In The Pacific: A Guide for Practitioners*. https://reliefweb.int/sites/reliefweb.int/files/resources/publication_WEBdrr03_DRRCCA.pdf

⁶ For an example of agriculture specific strategy on DRR, see FAO (2011), Strategic Framework for the Ministry of Agriculture, Lands Forestry and Fisheries for Disaster Risk Reduction in Agriculture, Forestry and Fisheries, Saint Lucia, prepared under joint MALFF/FAO TCP Project Disaster Risk Mitigation in Agriculture, Forestry, Fisheries. https://www.preventionweb.net/files/60917_32715063749da6a00a2bba0e843260256f6.pdf

⁷ FAO (2019), 'Strategic Work of FAO to Increase the Resilience of Livelihoods', Strategic Programme to Increase the *Resilience of Livelihoods to Threats and Crises*. <http://www.fao.org/3/a-i6463e.pdf>

Partnerships(see India, Kerala example in Table 7.1)	<ul style="list-style-type: none"> • Promote partnerships and synergies with academic, UN, civil and private sector agencies to improve communication, social cohesion and knowledge sharing. • Promote partnership with key union or sector stakeholders to represent the sector.
Coordination (see Malawi, Bolivia examples in Table 7.1)	<ul style="list-style-type: none"> • Reinforce inter-institutional coordination within the sector: Ministry of Natural Resources and Environment for forestry, land and environment, Ministry of Water Resources for irrigation, Ministry of Rural Development for small rural infrastructure. • Strengthen cross-sectoral coordination⁸ at the: <ul style="list-style-type: none"> * <i>national level</i> across the national government, business and industry, traders and processors, science and technology, workers and trade unions, * <i>local level</i> across local authorities, farmers, youth, indigenous people, women’s group, business and industry • Plan for coordination of interventions by external actors
Communication	Inclusive and sustainable agriculture recovery requires quality communication systems, considering the number and diversity of actors involved. Equally important as information disseminated is finding the most appropriate ways and methods of communication, and clear and timely flow of information both to and from affected communities, especially when they involve socially, economically or politically marginalized groups (see Aceh example in Table 7.1).
Conflict sensitivity	In a situation where resources are scarce, there is a potential for conflict . These conflicts could arise over assets, livelihood opportunities or access to natural resources. Ensure recovery interventions do not create new tensions or reinforce existing tensions but do strengthen social cohesion through inclusiveness, regular and open communication, and information exchange.
Water resource management	Take into account ownership, management and governance arrangements of irrigation system, water user-associations, their roles, responsibilities (see Uganda example in Table 7.1)
Land tenure	Review rights to land organization and examine whether adequate institutional arrangements exist to determine who has rights to land, for how long, for what purposes, and under what conditions. ⁹
Seed policy	Review the seed policy and institutional arrangements in the country for supporting the seed sector, including plant breeding, regulating varieties and seed quality, extension, capacity-development and measures to maintain seed security. Any review should consider all seed systems used by small farmers, especially as informal seed systems (social networks, local markets, etc.) supply the majority of seed to small farmers in many countries. ¹⁰

⁸ For more example of cross-sectoral coordination, see C. Neely, M. Bourne, S. Chesterman, I. Kouplevatskaya-Buttoud, D. Bojic, D. Vallée (2015), Accelerating impact through cross-sectoral coordination at country level, FAO/ICRAF. <http://www.fao.org/3/a-i7749e.pdf>

⁹ For more information, see FAO, Land Tenure. <http://www.fao.org/tenure/resources/collections/land-tenure/en/>

¹⁰ FAO (2016), *Seed Security Assessment: A Practitioner’s Guide*. <http://www.fao.org/3/a-i5548e.pdf> and *The Voluntary Guide for National Seed Policy Formulation*. <http://www.fao.org/3/a-i4916e.pdf>

5 Making Agriculture Recovery Implementation More Effective and Efficient

5.1 Policies and Principles

Successful recovery programmes invariably rest upon certain DRR-friendly, BBB principles and policies. The

core principles that governments need to apply to ensure efficient and effective recovery interventions are outlined in Box 5.1.

BOX 5.1: Core Principles for Effective Implementation of Recovery Interventions in Agriculture

- **Apply building back better (BBB) and disaster risk reduction (DRR) principles** to minimize future risk and strengthen resilience. This includes integrating DRR measures into the restoration of physical infrastructure and societal systems, and into the revitalization of livelihoods, economies and the environment.
- **Adopt a development approach.** Humanitarian response and early recovery activities form the first two phases of the **recovery continuum**, with all interventions smoothly embedded into the development process. Creating a continuum between relief, rehabilitation and development is essential for ensuring that former development initiatives are least disrupted and recovery interventions are aligned with development plans and initiatives.
- **Ensure integrated and interdisciplinary interventions** that combine technologies and practices in agriculture, livestock, fisheries/aquaculture, forestry and natural resource management for a coherent approach to building resilience across the livelihoods of smallholders (say, through climate-smart agriculture, catalysing climate adaptation of production and marketing systems, as also, scaling up and improving access to weather information and climate advisory services). In most cases, disaster-impacted populations have multiple livelihood strategies that straddle various agriculture subsectors and often extend beyond them. It is therefore essential to understand these strategies and design programmes that maximize recovery potential. Prioritization will depend on a number of factors including seasonality, livelihood portfolios and hazard types.
- Ensure an **ecosystem perspective** to integrating management of land, water and other key resources and promoting conservation and sustainable use in an equitable way (e.g., watershed-level and community-driven sustainable land management approaches and integrated water management systems).



- **Adopt an approach based on inclusiveness, doing no harm, leaving no one behind, and remaining accountable to affected populations.** Identify excluded and at-risk populations groups to ensure their inclusion in the recovery process. Improve accountability by ensuring beneficiary participation at all phases, including programme design and implementation, by building deep understanding of the vulnerable groups and their roles, rights and responsibilities in livelihoods activities. As documented in the case of Central Asia, elements in the programme design that are at odds with traditional practices and local beliefs can lead to costly mistakes and even programme failure (Table 7.1).
- **Social protection and inclusivity.** Consider risk transfer and cash/voucher-based transfer modalities whenever possible to strengthen social protection and inclusivity (see examples related to Lebanon and Cambodia in Table 7.1).
- **Apply a risk management approach** to identifying, evaluating, and monitoring risks related to natural hazards and environmental and technological disasters (for instance, Bolivia in Table 7.1).
- While designing recovery interventions (ideally pre-disaster), consider developing systems that strengthen sustainability and cushion or minimize the impact of future shocks. Examples include:
 - * **Social Protection Systems:**¹ A well-functioning and scalable social protection system can reduce people’s vulnerability to disaster and enhance their capacity to manage risks by fulfilling the following functions (see Cambodia and Lebanon in Table 7.1):
 - **prevention function** for risk mitigation providing ex-ante security against disasters, say, through insurance;
 - **protection function** for risk mitigation through ex-post protection against natural disasters;
 - **promotion function** for risk reduction and adaptation through long-term adaptation based on livelihood promotion and diversification; and
 - **transformation function** for adaptation that addresses the structural causes underlying vulnerability.
 - * **Early Warning Early Action (EWEA) System:** The EWEA also known as Forecast-based Financing (FbF), is another modality that can reduce the impact of future shocks (see Bangladesh and Mongolia in Table 7.1). According to FAO: “Early Warning Early Action (EWEA) System translates warnings into anticipatory actions to reduce the impact of specific disaster events. It focuses on consolidating available forecasting information and putting plans in place to make sure FAO acts when a warning is at hand. Acting early before a disaster has occurred or reached its peak is critical: it can save lives and protect livelihoods from the immediate shocks as well as protecting longer term development gains by increasing the resilience of local communities over time.”²

5.2 Monitoring and Evaluation

Does our intervention make a difference and why? Has the recovery intervention sustainably improved agricultural resilience of the targeted beneficiaries? How and why has this been made possible? To answer these questions, a plan for Monitoring and Evaluation (M&E) must be incorporated into the recovery implementation modality. The M&E plan should be **result-oriented**, focusing on a few critical indicators, for evaluating the effectiveness of the intervention against each stated strategic objective, impact and

outcome. Streamlining these indicators into the data collection strategies of the Ministry of Agriculture, the national DRR agency and other partner agencies allows for more efficient and collaborative monitoring of indicators pertaining to the sector. The M&E plan should establish the timing and frequency of M&E activities to ensure that data arrives at critical moments for decision makers to make informed decisions about implementation/strategy and, where applicable, adaptation. It should also suggest the human and budgetary resources required for M&E. The mobilization

¹ FAO (2017), ‘Social Protection and Resilience: Supporting Livelihoods in Protracted Crises and in Fragile and Humanitarian Contexts’, FAO Position Paper, published by the Food and Agriculture Organization of the United Nations and the Institute of Development Studies. <http://www.fao.org/3/a-i7606e.pdf>

² FAO in Action, Early Warning Early Action. <http://www.fao.org/emergencies/fao-in-action/ewea/en/>

and disbursement of resources and expenditure on various activities also need to be monitored. Result-oriented approaches to M&E should consider:

- Quality of the intervention/strategy: Are we on track to achieve stated objectives? Are “do no harm” principles being followed?
- Operational effectiveness and efficiency: Will we achieve the stated objectives within the timeframe and resources allocated?

Key steps for result-oriented M&E for the agriculture sector include:

- 1. Defining the parameters of the M&E system:** What are the objectives, outcomes, outputs and activities to monitor and evaluate? For example:
 - a. Objective: To reduce disaster risks and climate extremes
 - b. Outcome: Small producers are risk informed
 - c. Outputs: Water retention in soil is increased and farmers have access to crop insurance
 - d. Activities: Crop residue mulching and development of early warning message system
- 2. Establishing the structure of the M&E:** Structure is defined by the elements of M&E developed with the participation of all stakeholders, thus building a sense of ownership. For example:
 - a. Result framework or logframe: a tool to organize intended results
 - b. M&E plan: a description of the functions required to gather results indicators’ data and the required methods and tools
 - c. Information system management: an organized repository of data to manage the data collected
- 3. Defining agreed and participatory set of monitoring and evaluation DRR indicators:** Defining information (indicators) needed to track progress of activities and achievement of the outcomes/objectives. Examples of indicators:
 - a. number of farmers who have adopted new agriculture risk resilient good practices;
 - b. number of farmers with crop insurance; and
 - c. number of communities with early warning message system in place.
- 4. Defining responsibilities:** Who will collect data, visit field sites, meet concerned officials and communities, and report on the progress made? How will these activities be carried out with the full involvement of beneficiaries? For example, number of field technical assistants responsible for data collection and monthly monitoring.
- 5. Deciding the monitoring frequency:** Appropriate frequency of monitoring will ensure that data is collected, processed and analysed on a regular basis to allow for optimized tracking of progress and mid-course adjustments. For example: every three months for a three-year recovery intervention.
- 6. Defining financing needs for M&E:** Estimate financial resources needed for M&E, ensure that sufficient resources are provided for in the project document, and check that such resources are available. Example: a time frame with planned human, financial, material, and service resources needed.

5.3 Key Elements for Successful Implementation

- 1. Understanding agriculture context, effect and impact:** The PDNA and DRF results should provide

a good understanding on the agriculture context and identify priority recovery needs along with time frame (see example related to Aceh example in Table 7.1).

2. **Full integration and linkages:** Priority recovery needs should be in line with the long term agriculture strategy, policy and plans of the government, and take into consideration agriculture-related emergency interventions.
3. **Support household self-recovery:** Agriculture recovery begins from the day of the disaster. Self-recovery—using household resources, salvaged seeds and materials, and community labour—is the driving force behind quick recovery. The government can encourage self-recovery in various ways: (a) removing debris from agriculture lands and sites; (b) providing training and technical assistance in communities to both men and women; and (c) providing financial incentives. A simple, effective strategy is to disseminate guides on quick agriculture practices directly to builders and affected households as soon as possible after a disaster. Guides should be written for all literacy levels.
4. **Ownership and leadership:** Decentralized planning and decision making that meaningfully involve local people and allow them to shape their future will ensure successful recovery.
5. **Identification of the available resources and existing capacity:** This will ensure effective implementation of recovery interventions.
6. **Address cross cutting issues:**
 - a. **Livelihood:** Identify underlying risks and the measures that need to be taken during the recovery process to protect agricultural livelihoods, reduce vulnerability and improve the resilience of farmers, herders, fisherfolk and forest-dwellers against similar crises.
 - b. **Food security and nutrition:** Identify ways to reduce food insecurity in close coordination with the health and nutrition sector.
 - c. **Gender and social equity:** Ensure that gender and social equity is embedded in the recovery intervention as recovery processes have the potential to reinforce social inequities or contribute to greater inequality between differentiated social groups, such as those based on age, ethnicity, disability or gender (see Kenya example in Table 7.1).



6 Identifying Financing Mechanisms for Sector Recovery

Funding for agriculture recovery can be mobilized from a range of domestic and international sources as shown in Table 6.1.

TABLE 6.1: Potential Sources of Recovery Funding

Domestic sources	International sources
Public Funding	
<ul style="list-style-type: none"> • Reallocation of funds under the agriculture budget from “less” to “more” disaster-hit sectors • Government operational and capital budgets* • Disaster risk financing insurance (in collaboration with the private sector) • Levying tax or surcharge for recovery: e.g., local tax levies on agriculture products to promote quick market restocking, tax levies on agriculture income • Government disaster contingency funds • Contingency financing arrangements • Issuing sovereign reconstruction or development bonds • Diverting sector budget funding 	<ul style="list-style-type: none"> • Traditional specialized international agencies supporting the agriculture sector recovery such as FAO, European Union, World Bank, Asian Development Bank, Research Center for Food and Development A.C., Hermosillo, Sonora, Mexico (CIAD), International Fund for Agricultural Development • International financial institution loans* • Bilateral donor assistance* • Multi-donor trust funds • Regional funding sources
Private Funding	
<ul style="list-style-type: none"> • Introducing policy incentives for the private sector such as financial incentives (subsidies, grants) that lower the cost of conducting research for development of resilient crop varieties, disaster resilient sheds and agriculture infrastructure • Private company cash and in-kind contributions • National funding for non-governmental organizations (NGOs)* • Insurance proceeds (private assets) • Household savings and borrowing* • Remittances and gifts 	<ul style="list-style-type: none"> • International private cash and in-kind contributions • International NGO funding* • Disaster risk financing insurance (in collaboration with the government) such as weather, crop, livestock insurances

*Most common sources for agriculture recovery



Private sector entities may provide human, logistical, managerial and financial resources to specific activities in various ways, e.g., know-how, expert services, in-kind donations or funds. Partnership with a range of civil society actors, from large international and national NGOs to grassroots organizations, can leverage a wide variety of contacts and resources, human and financial, which may be very effective.

Table 6.2 provides some aspects to consider while searching for financial assistance.

TABLE 6.2: Key Decisions on Financial Assistance

Key question	Considerations
In what form will assistance be delivered?	<ul style="list-style-type: none"> • Funding for infrastructure projects can be channelled through normal public financial systems. • Household assistance can be delivered as cash, in-kind, or vouchers. Each requires an appropriate distribution channel (banks, distribution hubs, debit cards, etc.). Make sure every beneficiary has access. • Distribution of goods, for example, seeds, seedlings, fingerlings, etc., is sometimes warranted. Engage normal market participants to assist, since they will be more efficient than the government. • Make sure the entities distributing assistance have adequate security and record-keeping.
What conditions are attached to the assistance?	<ul style="list-style-type: none"> • Conditions such as compliance with quarantine, land use and irrigation standards are often attached to agriculture assistance, with funds delivered in stages as conditions are met. • Infrastructure projects need to meet design standards.
How will compliance with conditions be assured?	<ul style="list-style-type: none"> • Involving the right department (such as the quarantine department) for inspection and training for builders, inspectors and households helps ensure compliance with building standards. • A system for sanctions and appeals may also be required. • Social audit has been an effective oversight mechanism in many recovery programmes.
How will physical and financial progress be recorded, reported and audited?	<ul style="list-style-type: none"> • Systems will be needed to record and report on the steps in the qualification and funding process (beneficiary qualification, deposit of funds, use of funds, final inspection, etc.). • Consider that record-keeping systems will need to function in diverse locations and conditions. Online systems and photographic records of progress create an audit trail and increase accountability.



7 Examples of Recovery Implementation in the Sector

TABLE 7.1: Examples of Recovery Implementation in the Sector

Description	Country	Recovery aspect covered
<p>The floods in Kerala in 2018 opened a window of opportunity for the state to move away from regular practices and implement a set of short-, medium- and long-term resilient recovery and rehabilitation interventions.</p> <ul style="list-style-type: none"> • Short-term <ul style="list-style-type: none"> * Restore the soil so that farming can continue * Provide short-cycle crops for farmers who have lost their ability to generate income • Medium-term <ul style="list-style-type: none"> * Introducing a people’s programme called Punarjani (rebirth in Malayalam) * Helping farmers to restart agriculture by providing financial support * Giving moratorium on bank loan repayment * Helping in getting short-term bank loans • Long-term <ul style="list-style-type: none"> * In places with recurrent floods risks, the Government of Kerala is launching a programme on zero budget natural farming (ZBNF) which will help the state’s farmers develop self-reliance and climate resilience. * Kerala plans to have a scientific transition from chemical farming to organic and natural farming. 	Kerala, India	Disaster impetus for change: Short-, medium- and long-term resilient recovery interventions



<p>Malawi has developed a National Disaster Recovery Framework (NDRF) for drought and floods. The institutional arrangements for the NDRF were established to ensure governance, management and oversight of recovery across existing and future disasters covered under the framework. Central oversight to recovery and reconstruction policy and implementation will be provided by the National Disaster Preparedness and Relief Committee, while the Department of Disaster Management Affairs (DoDMA) will lead day-to-day monitoring and co-ordination of recovery and reconstruction programmes. As the custodian of the NDRF, DoDMA will be the lead agency responsible for its development and implementation. This will be accomplished in close coordination with ministries, departments and agencies; local and district authorities; and key stakeholders including development partners, civil society organizations, non-governmental organizations and the private sector. The National Disaster Preparedness and Relief Technical Committee (NDPRTC) will centrally support inter-cluster coordination to ensure that recovery and reconstruction activities are aligned and synchronized.¹</p>	Malawi	Inter-institutional coordination
<p>After the floods in Kerala in 2018, the state departments of agriculture, soil, livestock and fisheries, coordinated the recovery strategy with the local self-government system and the local-level crop, livestock and fish-farming community, represented by cooperatives and associations, as grassroots partners. Other government agencies like the Kerala State Cooperative Federation for Fisheries Development Ltd. (MATSYAFED) and Agency for Development of Aquaculture, Kerala (ADAK) is supporting the fisheries department in recovery and reconstruction activities. Technical support is to be provided by institutes under the Indian Council of Agriculture Research (ICAR) and the Food and Agriculture Organization (FAO). Relevant non-government organizations may also play facilitating roles.²</p>	Kerala, India	Inter-institutional coordination and partnership
<p>Community contingency funds (CCFs) as agricultural risk insurance for vulnerable households. CCFs are an innovative risk protection and financial mechanism to provide a form of farm insurance to those who do not have access to conventional financial systems. They are a solidarity fund whose resources are managed by a farmers' association and seek to provide assistance to members following unexpected or extreme events such as droughts, hurricanes, floods and earthquakes. CCFs help families mitigate a crisis by funding different activities according to needs, including the purchase of supplies for the new farming season in case of crop losses, to meet household expenses, or enable productive and commercial activities in case of the loss of income sources. As such, CCFs strengthen the livelihoods' resilience of the most vulnerable families.³</p>	Guatemala	Recovery financing
<p>Early warning message dissemination. An effective system for dissemination of early warning messages was established among the vulnerable communities in the Chars (riverine sandy islands) of Gaibandha district, Bangladesh, in order to strengthen their coping mechanisms, and to reduce loss and damage caused by floods.⁴</p>	Bangladesh	Early Warning Early Action long term recovery intervention

¹ Government of Malawi (2017), Malawi National Disaster Recovery Framework, Building Back a Disaster-Affected Malawi Better and Safer, September 2017, published by Office of the Vice President, Department of Disaster Management Affairs, Government of Malawi. https://www.preventionweb.net/files/60964_nationaldrfmalawiweb.pdf

² For more information, see United Nations (2018), Kerala Post Disaster Needs Assessment: Floods and Landslides 2018, published by the United Nations with Asian Development Bank, Government of Kerala, World Bank, and the European Union. <https://reliefweb.int/report/india/kerala-post-disaster-needs-assessment-floods-and-landslides-august-2018-october-2018>

³ For more information, see FAO (2016), 'Community contingency funds: An agricultural risk insurance for vulnerable households', Resilience Good Practices: Natural Hazards, I5876E/1/07.16. <http://www.fao.org/3/a-i5876e.pdf>

⁴ For more information, see N. Harari, A. Gavilano and H.P. Liniger (2017), Where People and Their Land are Safer: A Compendium of Good Practices in Disaster Risk Reduction, Centre for Development and Environment (CDE), University of Bern, Bern and Lucerne, Switzerland, and Swiss NGO Disaster Risk Reduction (DRR) Platform, with Bern Open Publishing. <https://www.wocat.net/library/media/122/>

<p>Early warning early action to protect the livelihoods of Mongolian herders from a dzud winter. The <i>dzud</i> risk map produced by the Mongolian Meteorological Service was a driving force for risk information, which was combined with global and regional early warning sources. Early warning thresholds were established, and when these were reached, action on the ground was triggered, including feed and cash distribution to prevent and mitigate livestock damage and losses among the most vulnerable households.⁵</p>	Mongolia	Early Warning Early Action
<p>Community safety nets. Establishment of rice seed banks at the village level as a community safety net system where farmers can loan both rice seed for cultivation and rice grain for consumption from a communal storage house. The purpose is to increase their food security by guaranteeing: (i) year-round access to high quality planting material and rice for food, (ii) access to both rice seed and rice for consumption after an extreme weather event (e.g., drought, flood), and (iii) sustained access to improved seeds through the provision of emerging new varieties better adapted to local conditions (e.g., fast maturing, floating rice).⁶</p>	Cambodia	Social protection
<p>Comprehensive agrarian risk management (GRAI or Gestión del Riesgo Agrícola Integral). To address disaster risks and climate extremes, GRAI is tailored to the needs of small rural producers. It includes measures for prevention, mitigation, preparedness, and risk transfer in order to create resilience against natural disasters. Good practices for agrarian producers were promoted, while financial mechanisms for risk transfer were identified through a form of insurance and matched to the needs of rural producers.⁷</p>	Bolivia	Risk Management system
<p>Municipal risk management units (UGR or Unidad de Gestión de Riesgos) with a participatory approach. This intervention is the result of inter-institutional cooperation carried out through the commitment of many stakeholders at different decision-making levels to manage disaster risks. UGRs are created to institutionalize risk management and, being underpinned by participatory action, to ensure ownership and sustainability of the process.⁸</p>	Bolivia	Risk management, multi-stakeholder cooperation
<p>Catchment-based integrated water resource management (CbIWRM) and resilience. This is an integrated process that promotes the coordinated development and management of water, land and related resources in order to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. It builds upon existing land and water management practices and creates resilience to climate change and enhances water security. It thus contributes directly to development by increasing the resilience of livelihoods to threats and crises that affect agriculture, food and nutrition.⁹</p>	Uganda	Water resource management

⁵ For more information, see FAO (2018), 'Mongolia: Impact of EWEA'. <http://www.fao.org/3/ca2181en/CA2181EN.pdf>

⁶ Ibid.

⁷ For more information, see N. Harari, A. Gavilano and H.P. Liniger (2017), Where People and their Land are Safer: A Compendium of Good Practices in Disaster Risk Reduction, Centre for Development and Environment (CDE), University of Bern, Bern and Lucerne, Switzerland, and Swiss NGO Disaster Risk Reduction (DRR) Platform, with Bern Open Publishing. <https://www.wocat.net/library/media/122/>

⁸ Ibid.

⁹ For more details, see FAO (2017), 'Integrating climate change adaptation and mitigation into the watershed management approach in Eastern Africa', Discussion paper and good practices, p. 45. <http://www.fao.org/3/a-i7489e.pdf>

<p>Partnership with beneficiary communities in project implementation.¹⁰ The main purpose of the approach is to enhance project ownership, while fostering capacity for management of outcomes. Ultimately, the sustainability of project results is only achievable given community empowerment and meaningful participation. The approach also aims at cost-effectiveness as the community is required to contribute substantially in terms of locally available materials, labour and sometimes cash. Community mobilization and capacity building are central to preparing the community members to fulfil their roles and responsibilities.</p>	Kenya	Partnership with the beneficiary communities
<p>Conditional cash assistance to build resilience against water scarcity. By creating employment opportunities and enhancing adaptive capacities to recurrent drought within protracted crises, this project addresses the need for a comprehensive response to water scarcity and diminished local food production stemming from declining access to water. Through household cistern building, supplementary irrigation for crops during critical periods of the year has been instrumental in helping farmers sustainably alleviate this downturn in productivity. When household water cisterns are used, a buffer of water storage capacity is created, allowing households to buy water in greater quantities and at cheaper prices per cubic metre and improving their capacity to respond to natural and man-made shocks.¹¹</p>	Lebanon	Social protection, drought recovery
<p>Addressing the food chain crisis through SMS Gateway: SMS Gateway allows computers to send and/or receive information and urgent updates on livestock health through Short Message Service (SMS) technology used by mobile phones. It can improve rural communication, support animal disease crisis management, and contribute to livelihood resilience for small-scale farmers.¹²</p>	Bangladesh	Food chain crisis livestock
<p>Women's leadership in disaster risk reduction. Rural livelihoods are affected by a multitude of shocks, such as unpredictable weather patterns, drought and animal diseases. Through a joint project of the FAO, World Food Program and International Fund for Agricultural Development, aimed at empowering women in resilience building and DRR, women were trained and equipped as community-based vaccinators to strengthen animal disease control and reduce bird deaths, thus enhancing food security with minimal inputs and little space. The project also succeeded in introducing drought-resistant seed varieties, reducing pests and diseases affecting vegetables, increasing household incomes (four-fold in some households), diversifying family diets, and increasing women's access to local decision-making structures.¹³</p>	Kenya	Gender leadership, drought, climate change, diseases, livestock
<p>Kuxur rum agro-forestry system against natural hazards. The <i>Kuxur rum</i> practice integrates agricultural production with agro-forestry to build resilience to heat waves and other natural hazards in the Ch'ortí region. The practice is based on traditional soil, crop and forest management methods, combined with alley cropping to restore forest landscapes. The same piece of land can produce both wood and grains, thus reducing household vulnerability.¹⁴</p>	Guatemala	Agro-forestry, temperature fluctuation

¹⁰ For more information about this project, see N. Harari, A. Gavilano and H.P. Liniger (2017), *Where People and their Land are Safer: A Compendium of Good Practices in Disaster Risk Reduction*, Centre for Development and Environment (CDE), University of Bern, Bern and Lucerne, Switzerland, and Swiss NGO Disaster Risk Reduction (DRR) Platform, with Bern Open Publishing. <https://www.wocat.net/library/media/122/>, pp: 133–141.

¹¹ For more information, see FAO (2016), 'Conditional cash assistance to build resilience against water scarcity in the West Bank', Resilience Good Practices: Conflict and Protracted Crises, I5747E/1/06.16. <http://www.fao.org/3/a-i5747e.pdf>

¹² For more information, see FAO (2017), 'SMS Gateway: Improving Animal Health through Information and Communication Technologies', Good Practice Case Study, December 2016, I6768EN/1/03.17. <http://www.fao.org/3/a-i6768e.pdf>

¹³ For more information, see FAO (2016), 'Gender mainstreaming as a key strategy for building resilient livelihoods', Resilience Promising Practices: Gender and Resilience Brief, I5631E/1/05.16. <http://www.fao.org/3/a-i5631e.pdf>

¹⁴ For more information, see FAO (2017), 'Kuxur rum agro forestry system against natural hazards in Guatemala', Resilience Good Practices: Natural Hazards, I6814EN/1/03.17. <http://www.fao.org/3/a-i6814e.pdf>

<p>Timely interventions including well-timed input distribution. The types of agricultural assistance provided in post-tsunami areas, such as seeds, fertilizer, equipment and credit, were premature because basic infrastructure was not yet ready to allow these inputs to be used.</p> <p>Right information dissemination in short term. Immediately after the tsunami, farmers would have liked information on the local soil conditions, soil desalination and rehabilitation techniques, growing salt-tolerant rice varieties, weeding, minimizing empty rice pods, and obtaining agricultural equipment and funding.</p> <p>Local connections. Groups with a history of working in the local communities had particular success and were still managing activities four years on in post-tsunami and post-conflict issues. Successful initiatives rested upon firm commitments to buy back the harvest in the first year of recovery and assist with marketing of produce. The farmers' risks were thus underwritten as they returned to farming in uncertain circumstances.¹⁵</p>	Aceh	<p>Lessons learnt:</p> <ul style="list-style-type: none"> • Timing of intervention • Appropriate information dissemination • Leveraging local connections
<p>Effective responses to the tsunami in the fishing and agricultural communities of India were largely due to the presence of local networks.¹⁶</p>	India	<p>Lessons learnt: the power of local networks</p>
<p>Building the technical and professional capacity of local extension staff had a long-term impact on agricultural recovery for local farmers. The comprehensive package included three sets of activities—desalination and other mechanical and engineering works before the farming season in the immediate term, soil fertility restoration and other measures during the farming season in the short term, and activities to promote the sustainability of the farm in the long term.¹⁷</p>	India: Tamil Nadu	Capacity building
<p>The input trade fair targeting smallholder farmers promoted market linkages between smallholders and firms and stimulated provision of quality agricultural inputs. The value of the voucher was up to \$150 per household, 60% to be repaid after harvest to community-based organization and the rest retained by the farmer.¹⁸</p>	Cambodia	<p>Facilitation of timely and easy access to inputs builds livelihood resilience to disasters such as earthquakes</p>
<p>In countries such as Afghanistan, Tajikistan and Uzbekistan, the maintenance of irrigation systems, garbage collection and other similar tasks are traditionally undertaken by villagers as part of voluntary community service known as <i>hashar</i>. Introducing cash-for-work programmes to pay for such tasks (that were previously undertaken for free as <i>hashar</i>) could hurt the ethos of voluntary work in the community in the long run.¹⁹</p>	Central Asia	<p>Lessons learnt: Interventions should be designed keeping in mind local customs and practices.</p>

¹⁵ For more information, see Gavin Tinning (2011), 'The Role of Agriculture in Recovery Following Natural Disasters: A Focus on Post-Tsunami Recovery in Aceh, Indonesia', *Asian Journal of Agriculture and Development*, Vol. 8, No. 1, June, pp: 19–38, Box 2 on p. 29 and Box 3 on p. 30. <https://ageconsearch.umn.edu/record/199318/?ln=en>

¹⁶ Patrick Kilby (2008), 'The Strength of Networks: The Local NGO Response to the Tsunami in India', *Disasters*, Vol. 32, Issue 1, pp. 120–130. <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-7717.2007.01030.x>

¹⁷ G.M. Chandra Mohan (2008), 'Post-tsunami Agriculture Livelihood Restoration, Nagapattinam, Tamil Nadu, S. India - A District-Level Coordination Effort', in F. Agus and G. Tinning (eds) (2008), *Proceedings International Workshop on Post-tsunami Soil Management*, 1-2 July 2008, Cisarua, Bogor, Indonesia. Indonesian Agency for Agricultural Research and Development, Jakarta, Indonesia and New South Wales Department of Primary Industries, Wallongbar, NSW, Australia, pp: 83–96. https://www.dpi.nsw.gov.au/_data/assets/pdf_file/0006/260547/Proceedings-Posttsunami-Java-July-2008.pdf

¹⁸ FAO (2014), *Input Trade Fairs in Cambodia*. <http://www.fao.org/3/a-i4450e.pdf>

¹⁹ For more information, see FAO (2013), *Guidelines for Public Works Programmes: Cash, Voucher and Food for Work*. <http://www.fao.org/3/aq419e/aq419e.pdf>

ANNEXE 1: Examples of Good Practices on Reconstruction and Rehabilitation of Infrastructure and Assets

Good Practice	Country	Main hazard addressed
Raised floors (for poultry production) lead to greater resilience to flooding by reduction in poultry loss, better ventilation of poultry houses, and more efficient harvesting of waste. ²⁰	Jamaica	Floods
Check dams on steep slopes as a part of soil conservation programmes and slope stabilization lead to soil loss reduction, sustainable crop production on steep slopes, increased water infiltration, sustainable water supply, and flood control in lower part of stream. ²¹	Jamaica	Floods, cyclones, storms
Infiltration ditch or soil and water conservation channel is an excavated trench along the contour, with earth ties within the channel at regular intervals. These trap water and soil washed down slope during a downpour. ²²	Uganda	Floods and landslides
Farmer Managed Natural Regeneration (FMNR) is a proven Sustainable Land Management (SLM) technology to restore degraded wasteland and improve depleted farmland. The farmer regulates and facilitates the re-growth of existing trees stumps, or self-sown seeds in the soil, and thus promotes soil fertility and through better ground cover, increases protection from runoff and erosion. ²³	Kenya	Floods, landslides, drought and cyclones

ANNEXE 2: Examples of Good Practices in Recovery

Recovery loss good practice description	Country	Main hazard addressed
Planting of low-profile crops in areas susceptible to wind damage reduces damage to crops and maximizes the use of land area. ²⁴	Jamaica	Cyclones and storms
Incorporation of tree management into land management (cut back) leads to slope stabilization, soil loss reduction, sustainable crop production on steep slopes, increased infiltration of water, reduced loss from hurricane winds, and more efficient harvesting of food trees (can harvest from the ground if sufficiently cut back).	Jamaica	Landslides, flooding and strong winds
Contour planting of pineapples promotes slope stabilization, soil loss reduction, sustainable crop production on steep slopes, increased water infiltration, and sustainable water supply.	Jamaica	Landslides

²⁰ For further information on example from Jamaica, see FAO (2008), 'Assistance to Improve Local Agricultural Emergency Preparedness in Caribbean Countries Highly Prone to Hurricane Related Disasters: Good Practices for Hazard Risk Management in Agriculture Summary Report', Jamaica TCP/ RLA/3101, April. <http://www.fao.org/3/a-bl127e.pdf>

²¹ Ibid.

²² For further information, see N. Harari, A. Gavilano and H.P. Liniger (2017), Where People and their Land are Safer: A Compendium of Good Practices in Disaster Risk Reduction, Centre for Development and Environment (CDE), University of Bern, Bern and Lucerne, Switzerland, and Swiss NGO Disaster Risk Reduction (DRR) Platform, with Bern Open Publishing. <https://www.wocat.net/library/media/122/>

²³ Ibid.

²⁴ For further information on examples from Jamaica, see FAO (2008), 'Assistance to Improve Local Agricultural Emergency Preparedness in Caribbean Countries Highly Prone to Hurricane Related Disasters: Good Practices for Hazard Risk Management in Agriculture Summary Report', Jamaica TCP/ RLA/3101, April. <http://www.fao.org/3/a-bl127e.pdf>

Raised beds/network drains reduce the depth and area extent of floods, reduce crop loss from flooding, and lead to regulation of soil moisture.	Jamaica	Floods
Seasonal breeding of livestock reduces loss from droughts, maximizes soil moisture resource, and leads to synchronization between nutritional requirements and feed availability.	Jamaica	Drought
Home gardening with botanical pesticides and liquid compost leads to better pest control. ²⁵	Cambodia	Pest outbreaks
Guano fertilizer application helps to keep moisture and improve soil fertility in paddy fields in drought-affected areas.	Lao PDR	Dry spell
Cattle raising in silvo-pastoral systems can reduce the impact of drought on pastures.	Bolivia	Dry spell
Keyhole gardens are built near homesteads in floodplains and consist of circular vegetable gardens (three meters diameter) raised on a plinth to withstand floods and droughts.	Bangladesh	Floods and drought
Floating garden is a traditional technology, practiced in the southern parts of Bangladesh. The technology allows production of vegetables or seedlings in flood-prone areas.	Bangladesh	Floods
Input trade fairs can improve access to a diverse range of good quality and adapted seed and planting materials, hand-tools and fertilizers, etc.	Haïti, Burundi, Malawi, South Sudan	All disasters
Promotion of farmer-led or small-scale seed enterprises can improve the availability and quality of seed and enhance farmers' access to these inputs. ²⁶	Mesoamerica, Mozambique, South Sudan, Haïti, DRC, Burundi	All disasters
In 2014, a World Bank-supported project helped expand climate-smart agriculture. Better water-use efficiency on 44,000 hectares of farmland and new technologies improved soil conditions and boosted production of rice by 12% and maize by 9%. More than 29,000 farmers' cooperatives reported higher incomes and increased climate resilience. ²⁷	People's Republic of China	Climate change impact
Capacity building can strengthen farmers' skills for managing seed (e.g., selection, storage) and increasing crop productivity using appropriate and sustainable practices, to enhance benefits they obtain from improved access to seed. ²⁸	Mesoamerica, Mozambique, South Sudan, Haïti, Democratic Republic of Congo, Burundi	All disasters

²⁵ For more information on the examples from Cambodia, Lao PDR, Bolivia, Bangladesh, Haïti, Burundi, Malawi, and South Sudan, see FAO (2017), 'Benefits of farm level disaster risk reduction practices in agriculture: Preliminary findings'. <http://www.fao.org/in-action/kore/good-practices/good-practices-details/en/c/1025946/>

²⁶ For more information, see FAO (2010), 'Promoting the Growth and Development of Smallholder Seed Enterprises for Food Security Crops: Best Practices and Options for Decision Making'. <http://www.fao.org/3/i1839e/i1839e00.pdf>

²⁷ For more information, see <http://www.worldbank.org/en/topic/climate-smart-agriculture>

²⁸ For more information, see FAO (2011), Factsheets: Guidance on approaches to produce more with less, 'Save and Grow'. <http://www.fao.org/ag/save-and-grow/en/factsheets/index.html>

ANNEXE 3: Key Definitions²⁹

Biological disasters are of organic origin or conveyed by biological vectors, including pathogenic microorganisms, toxins and bioactive substances. Examples are bacteria, viruses or parasites, as well as venomous wildlife and insects, poisonous plants and mosquitoes carrying disease-causing agents.

Building back better is the concept of using post-disaster reconstruction/rehabilitation and recovery as an opportunity to improve physical, social, environmental and economic conditions to create a more resilient community, region or country in an effective and efficient way.

Capacity building includes efforts to develop human skills or societal infrastructures within a community or organization needed to reduce the level of risk. In extended understanding, capacity building also includes development of institutional, financial, political and other resources, such as technology at different levels and sectors of the society.

Climate change adaptation refers to the adjustment of natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

Climatological disasters are disasters caused by long-lived, meso- to macro-scale atmospheric processes ranging from intra-seasonal to multi-decadal climate variability.

Climate-smart agriculture (CSA) is an integrated approach to managing landscapes—cropland, livestock, forests and fisheries—that address the interlinked challenges of food security and climate change.

Damage refers to the monetary value of total or partial destruction of physical assets and infrastructure in disaster-affected areas, expressed as replacement and/or repair costs. In the agriculture sector, damage is considered in relation to standing crops, farm machinery, irrigation systems, livestock shelters, fishing vessels, pens and ponds, etc.

Disaster is a serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental loss and impacts.

Disaster recovery has three distinct but interrelated meanings. First, it is a goal that involves the restoration of normal community activities that were disrupted by disaster impacts—in most people’s minds, exactly as they were before the disaster struck. Second, it is a phase in the emergency management cycle that begins with stabilization of the disaster conditions (the end of the emergency response phase) and ends when the community has returned to its normal routines. Third, it is a process by which the community achieves the goal of returning to normal routines. The recovery process involves both activities that were planned before disaster impact and those that were improvised after disaster impact.

Disaster risk management is the systematic process of using administrative decisions, organization, operational skills and capacities to implement policies, strategies, and coping capacities of the society and communities to lessen the impacts of natural hazards and related environmental and technological disasters. This comprises all forms of activities, including structural and non-structural measures to avoid

²⁹ <https://www.undrr.org/terminology>

(prevention) or to limit (mitigation and preparedness) adverse effects of hazards.

Disaster risk reduction is the conceptual framework of elements considered with the possibilities to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development. The disaster risk reduction framework is composed of the following fields of actions:

- Risk awareness and assessment including hazard analysis and vulnerability/capacity analysis
- Knowledge development including education, training, research and information
- Public commitment and institutional frameworks, including organizational, policy, legislation and community action
- Application of measures including environmental management, land-use and urban planning, protection of critical facilities, application of science and technology, partnership and networking and financial instruments
- Early warning systems including forecasting, dissemination of warnings, preparedness measures and reaction capacities

Early recovery restores the capacity of national institutions and communities to recover from a conflict or a natural disaster, enter transition or 'build back better', and avoid relapses. Early recovery is a multidimensional process guided by development principles that begins in a humanitarian setting, and seeks to build on humanitarian programmes and catalyze sustainable development opportunities. It aims to generate and/or reinforce nationally owned processes for post-crisis recovery that are resilient and

sustainable. It encompasses the restoration of basic services, livelihoods, transitional shelter, governance, security and rule of law, environment and other socio-economic dimensions, including the reintegration of displaced populations. It strengthens human security and aims to begin addressing the underlying causes of the crisis.

Early warning system is an integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities systems and processes that enables individuals, communities, governments, businesses and others to take timely action to reduce disaster risks in advance of hazardous events.

Emergency management is the organization and management of resources and responsibilities for addressing all aspects of emergencies, in particular preparedness, response and initial recovery steps.

Food chain: The series of processes by which food is grown or produced, sold and eventually consumed.

Geophysical disasters originate from the Earth's internal processes. Examples are earthquakes, volcanic activity and emissions, and related geophysical processes such as mass movements, landslides, rockslides, surface collapses and debris or mud flows. Hydro- and meteorological factors are important contributors to some of these processes. Tsunamis are difficult to categorize: although they are triggered by undersea earthquakes and other geological events, they essentially become an oceanic process that is manifested as a coastal water-related hazard.

Hazard is a potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation. **Natural hazards** can be classified according to their geological

(earthquake, tsunamis, volcanic activity), hydro-meteorological (floods, tropical storms, drought) or biological (epidemic diseases) origin. Hazards can be induced by human processes (climate change, fire, mining of non-renewable resources, environmental degradation and technological hazards) Hazards can be single, sequential or combined in their origin and effects.

Hydrological disasters are disasters caused by the occurrence, movement and distribution of surface and subsurface freshwater and saltwater.

Loss is defined as the change in economic flows occurring as a result of a disaster. In agriculture, loss may include declines in crop production, decline in income from livestock products, increased input prices, reduced overall agricultural revenues and higher operational costs and increased unexpected expenditure to meet immediate needs in the aftermath of a disaster.

Meteorological disasters are events caused by short-lived/small- to meso-scale atmospheric processes (in the spectrum from minutes to days).

Mitigation includes structural and non-structural measures undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards.

Preparedness refers to the activities and measures taken in advance to ensure effective response to the impact of hazards, including the issuance of timely and effective early warnings and the temporary evacuation of people and property from threatened locations.

Prevention refers to activities aimed at outright avoidance of the adverse impact of hazards and means to minimize related environmental, technological

and biological disasters. *Depending on social and technical feasibility and cost/benefit considerations, investing in preventive measures is justified in areas frequently affected by disasters. In the context of public awareness and education related to disaster risk reduction, changing attitudes and behaviour contribute to promoting a “culture of prevention”.*

Relief/response refers to the provision of assistance or intervention during or immediately after a disaster to meet the life preservation and basic subsistence needs of the people affected. It can be of an immediate, short-term or protracted duration.

Resilience is the capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to increase its capacity for learning from past disasters for better future protection and to improve risk reduction measures.

Risk refers to the probability of harmful consequences, or expected losses (deaths, injuries, destruction of property and livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions. Conventionally, risk is expressed by the notation $Risk = Hazards \times Vulnerability$.

Sustainable development goals (SDGs) are a universal call to action from 2015 to 2030 to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. All countries—developed and developing—in a global partnership, recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality and spur economic

growth—all while tackling climate change and working to preserve—oceans and forests.

Twin goals that the World Bank has committed itself to are eliminating extreme poverty by 2030 and boosting shared prosperity, measured as the income of the bottom 40 percent in any given country.

Vulnerability refers to the conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards. *For positive factors, which increase the ability of people to cope with hazards, see definition of ‘capacity building’.*



AGRICULTURE GUIDE FOR RECOVERY IMPLEMENTATION

The main purpose of this short and action-oriented guide is to assist senior national and local government advisors and planners, relevant private sector leaders, intergovernmental organizations and implementing partners in executing agriculture-focused effective and efficient recovery programmes.

The guide describes the role of agriculture in a country's development and the potential impact that natural disasters can have on the sector. It recommends the types of agriculture interventions to be implemented in the short-, medium- and long-term stages of recovery and reconstruction taking into consideration disaster risk reduction and build back better aspects.

It then highlights global best practices in post-shock recovery programming that can help address increasing vulnerability of agri-food systems and livelihoods to growing weather, water, climate and other risks. It guides in the implementation of appropriate and timely actions by governments, supported by their development partners, that can aid not only the near-term, post-shock recovery of agri-food systems and rural livelihoods, but also can contribute to strengthening their resilience by aligning actions with mitigation investments over the medium to long term.

