Food and Agriculture Organization of the United Nations

# Farmer seed systems and sustaining peace

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# Contents

# Preface

Certain characteristics of farmers' seed systems indeed contribute to sustaining peace.

The examination of the role of farmers' seed systems in sustaining peace, with a focus on social cohesion as a pathway to positive local collective action, is both important and timely considering the increasing concentration of hunger and undernutrition in countries in fragile situations and those affected by conflict; the increasing number of violent conflicts, particularly at the local level;[1] and the complex interaction between fragility and conflict and the impact on societal trust.[2] Trust and confidence building are key approaches in peacebuilding, and the prevention of conflict as well as food and nutrition strategies. In particular, community-based approaches could play an important part in increasing social capital.[3]

The findings, which are based on an extensive literature review and supplemented with input from subject experts and other contacts in the field, reveal that certain characteristics of farmers' seed systems indeed contribute to sustaining peace. For instance, case studies from Nepal and Uganda demonstrate that community seed banks can provide valuable access to diverse quality seed, which, particularly in times of conflict, can serve as important safety nets and lead to increased community resilience. Rising levels of local and national food security and nutrition and increased cooperation as a result of positive and reinforcing experiences were also reported (Poudel *et al.*, 2003).

Farmers' seed systems are essential for the management and conservation of agricultural biodiversity. This diversity contributes to the socio-ecological resilience of our global food and agriculture systems and plays an important part in the livelihoods of rural communities. Agricultural biodiversity is critical to food security and nutrition. Under the right circumstances, farmers' seed systems can support social cohesion and serve as positive sources of local collective action in terms of, for example, providing equitable access to diverse quality seed.

However, the research also revealed that problems within farmers' networks might reduce their willingness to work together, affecting the outcome of collective action. For example, a lack of social cohesion in the group prevented farmers of a Special Programme in Nepal (SPIN) supported by the Food and Agriculture Organization of the United Nations (FAO) from achieving higher levels of food production and in

1 Many of today's conflicts are localized, in that they only affect certain areas or regions and thereby affect livelihoods at the local level (FAO *et al.*, 2017).

2 Both vertical (between citizens and state) and horizontal (between citizens) trust may be affected by conflict.

3 The universality, breadth and indivisibility of the Sustainable Development Goals (SDGs) adopted in 2015 have important implications for work on food security and nutrition on conflict-affected settings. Along with the eradication of hunger, peace is essential for achieving the SDGs. The latter recognize the link to peaceful, just and inclusive societies as part of sustainable development.


doing so undermined development efforts (Poudel *et al.*, 2003). This finding implies that peacebuilding strategies – specifically focusing on building trust and social cohesion, reducing prejudices, and empowering marginalized groups by linking them into the community – could be seen as an important way to increase the effectiveness of such agricultural development projects while at the same time strengthening prevention of, or increasing resilience to, conflict.

Moreover, this finding also highlights the two-way interaction of peacebuilding and agricultural development. Although the relationship between these processes is complex and varies according to context, there appears to be the potential for a mutually reinforcing relationship – a virtuous circle – which would warrant further research to tease out the nature of these relationships through analysis of further examples.

This paper serves as a think piece – with the intention to provoke thought in terms of the potential contribution of farmers' seed systems to sustaining peace. As such, it has relied on inter-disciplinary collaboration and consultation.

# Acknowledgements

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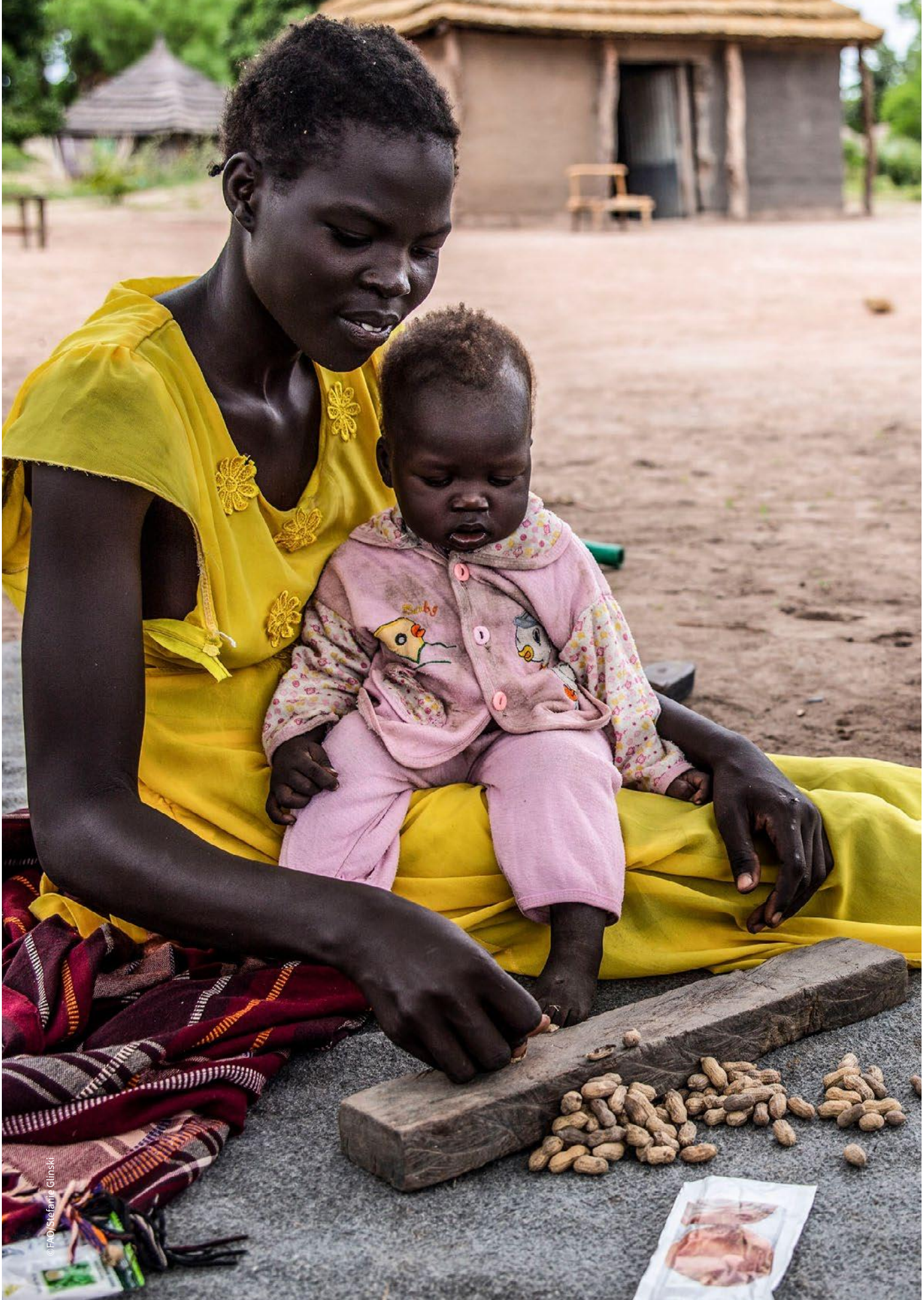
The paper benefited from the input, discussions and support of Susan Bragdon (Seeds for All), Florence Foster (QUNO), Diane Hendrick (QUNO), Julius Jackson (FAO) and Shawn McGuire (FAO).



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# Introduction

Farmers' seed systems have been defined as "social networks that emerge with the formation of ties by seed transfer events" (Coomes, McGuire and Garine, 2015). Farmers obtain up to 90 percent of their seed from sources within the farmers' seed systems – such seed is produced, re-used, and stored on-farm or at community level and *in situ* by farmers from their own harvest; through exchange and barter among friends, neighbours, and relatives; and through local grain markets. Farmers' seed networks can take a variety of forms and configurations. However, for all of them, the circulation of seed is a social process, which is based on trust, possibly mutual, and is influenced by socio-cultural norms and practices.

Farmers' seed systems are important for the social-ecological resilience of our global food system as well as for the ability of local rural communities to build resilience to conflict.

Farmers' seed systems are important for the social-ecological resilience of our global food system as well as the ability of local rural communities to building resilience to other shocks and stresses, including conflict. In terms of social-ecological resilience, the majority of agricultural biodiversity is actively maintained through farmers' seed systems. This diversity is what enables our global food system to adapt and respond to environmental and other changes. Small-scale farmers in developing countries depend on agricultural biodiversity to maintain sustainable production and meet their livelihood needs. The current erosion of agricultural biodiversity diminishes farmers' capacities to cope with such changes and leads to yield instability and loss, increasing their vulnerability to become food insecure.

Under the right circumstances, farmers' seed systems provide equitable access to diverse quality seed and therefore play an important role in fulfilling both local and national seed requirements and eventually in helping to achieve food security and nutrition. In particular, the storage of seed at communal level may in provide important safety nets and serve as a risk management strategy during times of conflict. For instance, some research reports that in times of insufficient yields, farmers rely on their social network to resupply depleted seed stores.

Networks of trust are the foundation of the societal fabric and, once destroyed, they are difficult to reconstruct. Conflict affects relationships and can lead to reduced levels of trust within and across society, as well as between society and the state. This social erosion can be a major impediment to 'sustaining peace' – a term which was first introduced within the United Nations (UN) system by the Advisory Group of Experts conducting the 2015 review of the UN Peacebuilding Architecture. As a concept sustaining peace has since been recognized by UN member states through near identical resolutions by the UN Security Council and the UN General Assembly in 2016[4] and serves as a unifying framework for addressing the root causes of conflict.

Sustaining peace in the UN system has evolved from the more limited notion of peacebuilding, which was first used in this context in An Agenda

4 S/RES/2282 and A/RES/70/262. These resolutions are the first ones to explicitly link peacebuilding and conflict prevention.

for Peace in 1992 by the then UN Secretary-General Boutros Boutros-Ghali.[5] In this Agenda, post-conflict peacebuilding was presented as a logical follow-on to peace-making and peacekeeping with the main objective being to prevent relapse into conflict once a peace agreement had been secured (UN, 2015). However, outside of the UN system, in civil society and academia, peacebuilding has long been understood in a more holistic manner – namely, as a concept that not only applies to post-conflict situations but also before, during and after conflict, including, but not limited to, the facilitation of peace processes. This understanding now informs the UN concept of sustaining peace (FAO, 2017).

According to the preamble of the 2016 UN Security Council Resolution, sustaining peace "encompasses activities aimed at preventing the outbreak, escalation, continuation and recurrence of conflict, including by addressing root causes and moving towards recovery, reconstruction and development" (UNSCR S/RES/2282). Such activities may be at the local,

5 The term peacebuilding was first coined in the 1970s by Johan Galtung. However, it was not so widely used until An Agenda for Peace in 1992.

Sustaining peace highlights the importance of enhanced understanding of the relationship between development, peace and conflict.

regional, national or international levels and may be of formal or informal nature, such as food security and nutrition strategies promoting social cohesion and stability. Strategies and activities to sustain peace are best led and undertaken at national and local level, in an inclusive manner, with the UN and other international actors facilitating and accompanying the process (FAO *et al.*, 2017).

Sustaining peace highlights the importance of enhanced understanding of the relationships between development, peace and conflict, and of how reducing risks and building resilience to conflict can contribute to peaceful societies. This holistic approach is well reflected in Agenda 2030 and the Sustainable Development Goals (SDGs). Their universal, integrated and indivisible nature serves as an overarching framework for global sustainable development and illustrates the interconnectedness of many of today's issues. Consequently, achieving each of the SDGs by 2030 is dependent on the achievement of the others.

Peace is a foundation for Agenda 2030. Many of the SDGs are of relevance for sustaining peace. Nevertheless, the importance of SDG 16, which aims to reduce all forms of violence, including by working with countries and communities to address root causes of, and find lasting solutions to, conflict and insecurity, is worth emphasizing in the context of this paper (FAO *et al.*, 2017).

This paper is divided into three sections. The first part of section one provides a brief introduction to food and agriculture, and sustaining peace and how they relate to each other, including the links between conflict and food insecurity and malnutrition and the importance of agricultural biodiversity. This discussion is followed by the identification of the three elements of resilience, social cohesion and positive local collective action as key aspects of sustainable food and agriculture systems that are also relevant to sustaining peace.[6] Focusing in on social cohesion, the paper explores its role in sustaining peace as well as its relationship with natural resources, identifying specific examples of social cohesion around community managed natural resources. A second section includes a review and description of farmers' seed systems with specific examples of social cohesion functions.

The paper then draws together lessons learned, identifying gaps in knowledge as well as challenges and threats faced by farmers' seed systems. It concludes with recommendations for further areas of research and suggestions for potential policy implications, as well as peacebuilding and conflict prevention activities.

6 Here, it is important to point out that sustaining peace is not a set concept with a concrete and exhaustive list of indicators. Rather, it is a notion that has evolved over time and is understood differently in various fields and across sectors.

# Food and agriculture, and sustaining peace

The following section provides a brief overview of the complex relationship between agriculture and sustaining peace, in particular in terms of the link between conflict and food security and nutrition. This is followed by a discussion around the identification of three key elements related to agriculture that are also relevant to sustaining peace – resilience, social cohesion and positive local collective action. While exploring social cohesion, the paper also covers its role in sustaining peace, as well as its relationship with natural resource management.

## Overview

Food – the way it is grown, produced, traded, transported, processed, stored, and marketed – is an important path to inclusive economic, social, and environmental development (FAO, 2016). Its relevance for humankind has been recognized through the Right to Adequate Food by the UN in Article 25 of the Universal Declaration of Human Rights and in Article 11 of the International Covenant on Economic, Social and Cultural Rights (ICESCR).[7]

Globally, 815 million people currently suffer from hunger – 489 million of whom are living in conflict-affected contexts.

In 1999, the Committee on Economic, Social and Cultural Rights (CESCR), in its General Comment 12, interpreted the human right to adequate food as realized "when every man, woman and child, alone or in community with others, has the physical and economic access at all times to adequate food or means for its procurement" (UN, 1999). The right to food was further defined by the UN Special Rapporteur on the Right to Food as "the right to have regular, permanent and unrestricted access, either directly or by means of financial purchases, to quantitatively and qualitatively adequate and sufficient food corresponding to the cultural traditions of the people to which the consumer belongs, and which ensure a physical and mental, individual and collective, fulfilling and dignified life free of fear" (UN, 2008). As such, food, and the subsequent right to adequate food lie "at the very heart of the 2030 Agenda for Sustainable Development" (FAO, 2016). Unfortunately, for many this right is not being realized. After more than a decade of steady decline, global food and nutrition insecurity are on the rise again. Globally, 815 million people currently suffer from hunger – 489 million of whom are living in conflict-affected contexts. Even more people suffer from hidden hunger, which means they are able to take in sufficient calories but are not provided with enough micronutrients to lead a healthy, happy, active adult live (undernutrition) (FAO *et al.*, 2017). Others on the other hand, consume foods in excess (overconsumption) (Simmons, 2013).

Underpinning both undernutrition and overconsumption is dietary simplification – a result, *inter alia*, of the modern agriculture system. While modern, high-input, high-yield agriculture and long-distance transport has increased the availability and affordability of refined carbohydrates such

7 The ICECSR is a binding instrument for those states having ratified it.

Food insecurity may contribute to sustaining conflict, and may also exacerbate other conflict factors.

as wheat, rice or sugar, this system has also contributed to the erosion of dietary diversity, nutrient deficiencies and increasing rates of associated chronic diseases (QUNO, 2017).

The state of the world's food and nutrition insecurity correlates with the erosion of agricultural biological diversity and the disruption of farmers' seed system – the systems through which the vast majority of seed is sourced by small-scale farmers, particularly in the Global South. Dietary diversity ultimately is derived from the diversity of what is grown (Herrero *et al.*, 2017). Agricultural biodiversity is defined as the "crop biodiversity that acts as the cohesive social and ecological life-support system" and consists of agricultural ecosystems, crop varieties, genes in plants and animal species (Brush, 1991). Seed, as an important source of food and agriculture, is the backbone of sustainable development as the diversity and the quality of seed are key contributors to sustainable food production and ultimately to ensuring global food security and nutrition (Poudel *et al.*, 2003).

Farmers obtain seed for agriculture from both farmers' seed systems and formal seed systems. However, more commonly, farmers access their seed from sources within farmers' seed systems, such as local grain and seed markets (90.2 percent), and social networks (McGuire and Sperling, 2013). The majority of such crop varieties are farmer varieties, which have traits that support performance in specific agroecologies or which are valued by specific users. They make up the majority of annual seed grown by subsistence farmers' and provide dependable seed access of nutrient-rich varieties. Farmers' varieties can also be saved for repeated use in upcoming seasons. Hence, agricultural biodiversity supports and protects human lives as it provides continued inputs for the evolution, and increases the productive capacity of, ecosystems. The majority of agricultural biodiversity is actively managed, used and developed by small-scale farmers and is exchanged through the use of farmers' seed systems. In doing so, the farmers engage in social contracts with one another, exchanging seeds to ensure they have enough to plant each season (McGuire, 2007).

The erosion of agricultural biodiversity is occurring as the farmers' traditional production systems, including their systems of seed exchange, and the cultivation of diverse landrace varieties through farmers' seed systems are replaced with more modern, industrialized production systems and the cultivation of uniform, high-yielding varieties, some of which cannot be replanted without loss of productivity (FAO, 2010). The decline of agricultural biodiversity has also been further exacerbated by decreases in landholdings (Pautasso *et al.*, 2012). As a result, we are facing negative repercussions in terms of nutrition, resilience to environmental shocks,[8] and loss of traditional knowledge and cultural diversity.

8 The resilience and capacity of the ecosystems to deal with change is weakened when agricultural biodiversity becomes less diverse.

Small-scale farmers, as the principal stewards of agricultural biodiversity, who use and depend upon agricultural biodiversity for their livelihood, are particularly vulnerable to becoming food insecure and having their livelihoods undermined. Their vulnerability, and the vulnerability of rural communities in general, therefore increases in times of conflict, as many conflicts are in rural areas, potentially resulting in the destruction and depletion of livelihood assets, such as crops and livestock (FAO *et al.*, 2017).

The negative repercussions of conflict on food security and nutrition and agriculture are uncontested.[9] In fact, conflict is a leading cause of food insecurity and hunger in several parts of the world and is a common denominator in situations of severe food crisis and recent famine (FAO *et al.*, 2017). It is often linked to disruptions in food production and food systems, with direct or indirect influence on the availability, access and utilization of food, all of which are core elements of the aforementioned human right to adequate food (FSIN, 2017).

Food insecurity may also contribute to sustaining conflict, and may also exacerbate other conflict factors. If post-conflict recovery proves difficult and food insecurity remains high, this can strengthen incentives for reigniting such conflict. Post-conflict countries with high levels of food insecurity are 40 percent more likely to relapse within a ten-year time span than those with low levels (Collier, Hoeffler and Soederbom, 2008). Hunger and undernutrition are significantly worse where conflicts are prolonged and compounded by weak institutional capacity and/or adverse climate-related events (FAO *et al.*, 2017).

In sum, with the increasing number and complexity of conflicts and rising levels of hunger and undernutrition in countries in fragile situations and those affected by conflict, it is imperative to understand the relationship between hunger, conflict and peace. This requires, *inter alia*, a need to recognize the linkage between farmers' seed systems and agricultural biodiversity, which is essential for the socio-ecological resilience of our global food and agriculture systems as well as for the livelihoods of rural communities. This understanding and recognition may assist in designing approaches to prevent conflict and more holistic food security and nutrition strategies, including those aimed at building or strengthening resilient livelihoods, fostering inclusive and positive community-based approaches, and building the capacity of institutions. All of which could contribute to sustaining peace.[10]

Conflict is a leading cause of food insecurity and hunger in several parts of the world and is a common denominator in situations of severe food crisis and recent famine.

9 While research has demonstrated that conflict can cause food insecurity and undernutrition, food insecurity and undernutrition as such have not yet been found to be the sole causes of conflict. However, they may, when coupled with other factors, such as volatile food prices, increase the likelihood of conflict (FAO *et al.*, 2017).

10 Some pathways through which food security and nutrition interventions can build resilience to conflict and contribute to sustaining peace are explored in the joint agency report, the *2017 State of Food Security and Nutrition in the World* (FAO *et al.*, 2017).

## Resilience, social cohesion and positive local collective action

Resilience, social cohesion and positive local collective action are important and common elements of both farmers' seed systems and sustaining peace. The following section will discuss each element and its importance for both agriculture and sustaining peace, broadening it to include social cohesion's relationship with natural resource management. This will be supplemented with brief case studies to illustrate the practice (additional information is available in the annex).

### Resilience

The concept of resilience has been widely accepted by those working in the fields of agriculture and peacebuilding. For both areas, it is understood that resilience is an important concept for coping with conflict and ensuring that shocks and stressors do not have long-lasting consequences for food security and nutrition (McGuire, 2013).

In agriculture, one of the key frameworks is that of social-ecological resilience, where systems are conceived as a collection of interlinked social and ecological systems. Rather than being determined by asset levels or individual household characteristics, resilience in this context is considered key to maintaining or restoring desired ecosystem states and for the livelihood of the people connected to those states (Bahadur, Ibrahim and Tanner, 2010; Clifton, 2010; Coomes, McGuire and Garine, 2015).

From that point of view, agriculture represents an obvious area where such social and ecological systems are closely intertwined. Small-scale farmers and the agricultural biodiversity they manage, use and develop are integral to global food security and nutrition, both in terms of stable production over time and quality (QUNO, 2017).[11] The diversity of agricultural systems, including genetic, species and ecosystem diversity as well as the diversity of small-scale farming communities themselves, is what enables our global food system to adapt and respond to change at a micro and macro level. Greater diversity contributes to resilience within the global food system, i.e. greater responsiveness to changing conditions and adaptability to environmental or socio-economic shocks (QUNO, 2015). This is particularly important in the face of climate change variability.

Small-scale farmers and rural communities in developing countries continue to depend on genetic diversity to maintain sustainable production and meet their livelihood needs. The loss of genetic choices diminishes farmers' capacities to cope with changes in pest and disease infection, and leads to yield instability and loss (PAR, 2017). Such a

11 Globally, small-scale farmers, including fisher folk, forest dwellers and pastoralists, contribute between 50 to 70 percent of the total food supply yet they themselves often remain food insecure and poor. This figure is even higher for food produced in the industrialized world – up to 80 percent.

narrowing of diversity threatens global food security and nutrition by increasing the vulnerability of agricultural systems as well as reducing the resilience of rural farming communities to respond to catastrophic events, including conflict (Tscharntke, Klein and Kruess, 2005). Rural farming communities are particularly vulnerable during times of conflict as agriculture is their dominant form of livelihood. It is in such situations, when they most depend on their ability to "prevent, anticipate, prepare for, cope with, and recover from conflicts in order to bounce forward" (FAO *et al.*, 2017).

There are common elements in most definitions of resilience. In relation to the three Rome-based Agencies'[12] focus on agriculture, food security and nutrition, resilience is about the inherent capacities of individuals, groups, communities and institutions to withstand, cope, recover, adapt and transform in the face of shocks. This implies that all interventions must begin by identifying and building upon existing capacities and resources. Under the strategic programme on resilience, FAO takes the perspective of resilience as grounded in three capacities – adaptive, absorptive and transformative. These abilities represent the core of building resilience in FAO under this strategic programme and are therefore applicable in terms of 'building resilience to conflict' as well as others shocks and stressors (FAO *et al.*, 2017). As such, they provide a framework through which to assess activities aimed at building resilience to conflict (FAO *et al.*, 2017). Farmers' seed systems are an example of important existing capacity and resources. Through their seed systems, farmers collectively manage, develop and exchange agriculturally biodiverse seeds that help provide:

- food security and nutrition, and
- resilience (because diversity provides the ability to adapt and respond to change).

In the *2017 State of Food Security and Nutrition in the World*, a number of pathways are suggested through which food security and nutrition can also help build resilience to conflict and ultimately contribute to sustaining peace. Resilience in this context highlights that successful prevention, mitigation and transformation of conflict is dependent on certain qualities of local communities, such as trust networks, shared narratives, and common interests. In fact, it may be that it is the strength of this internal social capital and other local or communal trust networks that underlie the feature of resilience (Menkhaus, 2013).

In sum, farmers' seed systems are important for the social-ecological resilience of our global food system as well as for the ability of local rural communities to build resilience to conflict. In terms of social-ecological resilience, farmers' seed systems promote heterogeneity – meaning that the majority of agricultural biodiversity is actively maintained through farmers' seed systems. This diversity is what enables our global food system to adapt and respond to environmental and other changes.

12 The three Rome-based Agencies are FAO, the International Fund for Agricultural Development (IFAD) and the World Food Programme (WFP).

Small-scale farmers in developing countries depend on agricultural biodiversity to maintain sustainable production and meet their livelihood needs. The current erosion of agricultural biodiversity diminishes farmers' capacities to cope with such changes and leads to yield instability and loss, increasing their vulnerability to becoming food insecure. Moreover, farmers' seed systems are the main way most poor farmers access seed and therefore play an important role in fulfilling both local and national seed requirements and in eventually achieving food security and nutrition (Pautasso *et al.*, 2012). As will be illustrated in the case studies below, the storage of seed at communal level in particular may provide an important safety net and risk management strategy during times of conflict. For instance, some research indicates that in times of insufficient yields, farmers rely on their social network to resupply depleted seed store (Poudel *et al.*, 2003).[13]

## Social cohesion

As previously discussed, social cohesion remains contentious, not least because of the lack of empirical evidence when it comes to demonstrating its positive aspects and the difficulties of measuring something that is regarded by some as intangible. While definitions vary accordingly, it appears that they all revolve around the quality and nature of connections between people and among groups (Marc *et al.*, 2013). This quality and nature may be determined by common norms, values or understandings, which can lead to increased feelings of trust and connectedness, which in turn can serve as incentives to cooperate. Hence, the more people feel connected and the higher the levels of trust, the more cohesive the group and the more likely they are to cooperate (Larsen, 2013; Marc, William and Aslam, 2013; OECD, 2012).[14] From that point of view, social cohesion and the underlying trust are pivotal for sustaining peace (Marc, William and Aslam, 2013).

The absence of social cohesion, or so-called social erosion, can often be a condition for conflict (Cox, Osborn and Sisk, 2014). At the same time, conflict and violence affect the dynamics and patterns of social cohesion and can lead to fragmentation. As the processes of conflict intensify and move from polarization to segregation, lower levels of cross-cutting social cohesion between so-called in-groups and out-groups can result. In some cases, the reduction of social cohesion between certain groups can also mean the intensification of social cohesion within other groups. In particular, feelings of prejudice and discrimination can play a role in such patterns. It is also possible that traumatic events, such as conflict, increase

> Farmers' seed systems can serve as an important safety net and/or coping mechanism in times of conflict.

13 However, other research notes that in chronically-stressed areas certain degrees of 'donor-fatigue' can also exist. In other words, those able to give seed to others year after year tend to give to those they already know and like. Others on the other hand, may get less access through social networks (McGuire, 2008).

14 Some argue that social cohesion can best be measured as trust between citizens within countries (Larsen, 2013). Others find that community participation may also serve as a measurement for social cohesion (FAO and IDS, 2017).


Trust and confidence building are integral to peacebuilding and to the prevention of conflict.

social cohesion. However, again with the shadow side of increasing the separation of those perceived as being beyond the group i.e. the enemy (Brewer, 1999; Taifel and Turner, 1979; Taifel, 1982).

As conflict impacts social relationships, it also influences the relationships between state and society in multiple ways, including creating lower levels of trust within societies. Conflict can also undermine the effectiveness of traditional institutions with social networks, both within and across neighbouring communities (FAO *et al.*, 2017). These networks provide in many contexts important safety nets and coping mechanisms to protect populations against shocks (FAO, IFAD and WFP, 2014).

## Social cohesion and sustaining peace

Trust and relationships are the foundation of society's fabric and once destroyed, they are difficult to reconstruct. Conflict can lead to the erosion of social capital and to increased fragility. Hence, trust and confidence building are integral to peacebuilding and to the prevention of conflict (FAO *et al.*, 2017).[15]

Typical peacebuilding efforts and approaches to prevent conflict therefore often begin by working with all sectors and levels of society to develop a common vision for the future to contribute to the increased mutual understanding and the rebuilding of trust. In doing so, safe spaces for dialogue, ideally at the local level, can serve as important platforms for key stakeholders to discuss context-specific issues and concerns, which can establish a basis of commonality and understanding. This, in time, can

15 At the same time, social erosion itself can often be a condition for conflict and violence (Cox, Osborn and Sisk, 2014).

enable the respective group(s) to collectively move forward in a positive way (Interpeace, 2017). This is further discussed in the case studies below.

It is therefore important to emphasize the role of local ownership in ensuring the sustainability of peacebuilding efforts and approaches to prevent conflict. Setting up spaces for dialogue that allow for the active and inclusive participation of local people ensures that priorities are determined locally and that local concerns are at the core of the peacebuilding activities (Interpeace, 2017). Depending on these priorities and concerns, as well as on the complexity and the context of each situation, such trust- and confidence–building approaches might have to precede, follow, or go hand-in-hand with any kind of food and nutrition strategy to be most effective. In any case, both agricultural development and peacebuilding approaches should be complementary and build on each other.[16]

Social cohesion may further be weakened when groups in a society perceive that their situation is unfair or that they have not been treated fairly in the past as compared to other groups (Marc, William and Aslam, 2013). Economic inequality is amongst the strongest predictors of differences in social trust between identity groups – as such, purely economic development approaches may also generate new patterns of social exclusion and marginalization, possibly creating conflict-inducing grievances (Cox, Osborn and Sisk, 2014; Larsen, 2013). High levels of persistent inequality can have negative effects on the functioning of markets, the accumulation of human capital and socio-political stability by increasing general discontent and mistrust and therefore reducing social cohesion (Justino, 2015). However, as mentioned above, this can also lead to further societal segregation as the in-group levels of social cohesion increase and the out-group levels decrease.

Food security and nutrition strategies that build the capacity of institutions to deliver equitable access to services may help to restore confidence in state effectiveness and legitimacy and reduce prejudice towards other groups, while increasing incentives for the population to maintain peace and stability (FAO *et al.*, 2017). This could be equally true for building the capacity of non-state-level institutions, such as farmers' seed systems, to provide better services for local communities.[17] Consequently, the provision of social protection, cash and in-kind support, may enhance equity and cohesion among communities and within local networks.

16 To that end, this publication represents a joint research project between the two QUNO programmes of Peace and Disarmament and Food and Sustainability, and the Food and Agriculture Organization of the United Nations, under its Strategic Programme 5 on Resilience.

17 However, while poor basic service delivery can undermine state legitimacy and perpetuate conflict, improved service delivery does not have to lead to enhanced state legitimacy (FAO *et al.*, 2017). The latter would have to be accompanied by improvements of other forms of societal trust as well.

Community-based management of natural resources plays a vital role in restoring collaboration at the local level and therefore in overall local peacebuilding and prevention efforts.

## Social cohesion and natural resources

The relationship between natural resources and conflict can be complex and depending on the specific context may play out at different levels.[18] Their interlinked nature may lead to a vicious cycle whereby conflict may have fundamental impacts on natural resources themselves (e.g. depletion) as well as on the functioning of environmental governance systems. At the same time, the competition over natural resources can also be a trigger for conflict, e.g. in times of scarcity (UNEP, 2009; FAO *et al.*, 2017). This is particularly dangerous, considering that natural resources, such as freshwater, cropland, rangeland, forests, fisheries and wildlife, are vital for the livelihoods of many communities worldwide. Consequently, in such situations, their livelihoods, including their food security and nutrition, may be threatened and/or negatively affected – impacts, which can be compounded when coupled with natural hazards, possibly leading to protracted crisis and continued fragility (FAO *et al.*, 2017).

Within the UN system, the UN Environment Programme (UNEP), more specifically the *Disaster and Conflicts Programme*, has been at the forefront of linking peacebuilding with natural resources. UNEP promotes an "environmental peacebuilding" approach that integrates natural resource management into efforts around the prevention of conflict, mitigation, resolution and recovery to build resilience in communities affected by conflict, including addressing root causes and making use of opportunities from natural resources for trust building (UNEP, 2017).

Since one of UNEP's flagship policy reports in 2009, the agency has collected field evidence on conflict risks and peacebuilding opportunities from natural resources based on a range of sources, and has been developing global training programmes from these materials. In partnership with universities and institutes,[19] UNEP has also established the largest global research programme on natural resources and post-conflict peacebuilding. The material developed as a result of this partnership has led to the launch in 2013 of an international knowledge platform and community of practice on environmental peacebuilding.[20] The following section, including the case studies (see Boxes 1 and 2), is based on the extensive experience and approaches developed by UNEP and its partners.

Various groups use natural resources in different ways and then collaborate through trade and exchange to meet the needs of their families and communities. The basis on which they interact over the management and control of natural resources is determined by governance arrangements, which may be customary and/or formal. Regardless of their nature, such

18 FAO *et al.* (2017) cite sources reporting that over the past 60 years, 40 percent of civil wars have been associated with natural resources.
19 Major collaborations include the Environmental Law Institute (ELI), the University of Tokyo and McGill University.
20 See: www.environmentalpeacebuilding.org [cited on 20 November 2017].

arrangements can be undermined or destroyed as a result of the influence of conflict on social cohesion and public trust. However, at the same time, the communal management of natural resources, in particular at the local level, may also serve as the basis for rebuilding key relationships and trust, thereby promoting governance and peacebuilding (UNEP, 2009).

Therefore, creating the space for and facilitating dialogue in ways that rebuild the bonds of trust, confidence and cooperation between affected parties can be considered core peacebuilding and governance activities. To that end, finding new approaches to governance should similarly be understood as conflict prevention and mitigation measures as they may reduce the risk of violent clashes between livelihood groups by providing an agreed upon framework for peaceful resolution of disputes (UNEP, 2009).

As the examples in the boxes demonstrate, cooperative planning and managing of shared natural resources can provide a platform for dialogue by promoting communication and interaction between stakeholders and communities, transforming insecurities and establishing mutually recognized rights and expectations (UNEP, 2009). Over time, improving cooperation over natural resources may then lead to cooperation in other areas by establishing a basis of trust for continued joint of action (UNEP, 2009).

**Box 1. Research Programme, Camel Herders, Tufts University and UNEP – Northern Rizaygat, Darfur, Sudan, 2009**

The research programme by Tufts University in partnership with UNEP contributed to furthering equitable access to natural resources and trust in governance arrangements that support the livelihoods of pastoralists and sedentary groups. Tufts and UNEP continuously worked on establishing relationships and trust between government institutions, nomadic communities and civil society until the founding of the Pastoralist Union (PU). The PU is an inclusive and participatory discussion forum consisting of all key stakeholders. It provides a platform for dialogue around pastoralist topics at the local level. More information is available in the annex.

Good resource governance should be reflective of a network of collaborative relationships among communities, institutions of government, civil society and the private sector, with each group pursuing their respective objectives in an equitable manner.[21] At the core, however, should be local ownership and innovation – representing the inclusive and participatory nature of the governance process. As such, natural resource governance can support communities in escaping chronic cycles of conflict over resources and in developing environmentally sustainable and resilient livelihoods (UNEP, 2009).

Natural resource management depends on livelihood decisions, which include, *inter alia*, how resources are used, what they are used for and how to collaborate and compete over them with others. As such, livelihood may serve as a critical entry point for understanding the interaction of communities and the social, political, environmental and political context in which they operate and navigate (UNEP, 2009). To that end, the link between resource use and social relations is particularly evident. For instance, if one group overuses a resource, the latter is no longer available for others, thereby possibly undermining their livelihoods and resilience to future shocks. Hence, strengthening relationships and building confidence amongst groups and communities is an important element of promoting community resilience and of approaches to prevent conflict.[22]

21 Depending on the context, equitable arrangements for governance will need to be complemented by overarching resolution of the higher levels of conflict (UNEP, 2009).

22 According to UNEP (2009), the quality of relationships within communities may determine the level of equitable access to assets in times of shocks, thereby enhancing resilience.

**Box 2. Integrated Water Resource Management (IWRM), UNEP – Wadi El Ku, North Darfur, Sudan, 2009–2013**

The IWRM approach represents an important pillar of the Sudan Integrated Environment Project (SIEP). Wadi El Ku, North Darfur, Sudan is an example of IWRM – a rainwater-harvesting project that took place between 2009–2013. It brought together all water users as key participants in the management of the available water resources, ensuring efficient, sustainable and equitable water access. More information is available in the annex.

In sum, community-based management of natural resources plays a vital role in restoring collaboration at the local level and therefore in overall local peacebuilding and prevention efforts. This is important, as an increasing number of conflicts are fought around natural resources and at the local level.[23] Enhancing relationships at community level can increase both the communities' resilience to future shocks as well as promoting social cohesion by providing inclusive and participatory frameworks of collaboration – as illustrated in the examples. Establishing levels of trust and relationships can then lead to future collective action in other areas.

This review illustrates that farmers' seed systems can indeed serve as an important safety net and/or coping mechanism in times of conflict. Moreover, farmers' seed systems can provide equal access to diverse quality seed, contributing to reducing sentiments of insecurity and uncertainty and feelings of injustice – consequences, which specifically relate to the prevention of conflict.[24]

At the same time, certain case studies reveal a much broader complexity, supporting the need for agricultural development, peacebuilding and conflict prevention approaches to be complementary. For instance, an evaluation of the Special Programme in Nepal (SPIN), reported that a lack of social cohesion in community seed level production led to less effective cooperation and ultimately to a reduction in food production. SPIN (1995–1997) was funded by FAO and jointly implemented with District Irrigation Offices through farmers groups in four districts of Nepal with the goal to increase food production and resource productivity in order to enhance food security. While the participating farmers received training and were able to save seed for their own use, some were unable to cooperate efficiently as group dynamics reduced the willingness to work together (Poudel *et al.*, 2003). This example demonstrates the need to understand and further explore the potential contribution of peacebuilding to the effectiveness of some of these local systems that support resilience as well as post-conflict recovery and development.

## Positive local collective action as pathway to social cohesion

Positive local collective action may be seen as a pathway to increased social cohesion. As discussed above, the level of horizontal and vertical trust is seen as an important aspect of social cohesion. Societal trust can help networks collaborate and work together (Larsen, 2013). And it is such social cooperation that underlies collective action (Justino, 2015).

23 According to Cox, Osborn and Sisk (2014) there is land-identity nexus that must be taken into account in relationship to social cohesion. The unequal distribution of land along identity lines is a major factor that prevents the emergence of cohesive societies, along with access to state resources and services.

24 However, it cannot be generally assumed that seed exchange crosses all societal divides, or that, after conflict, such social divisions lead to fragmentation.

The effectiveness of social cooperation however, can be negatively affected by feelings of "anger, hopelessness, unfairness and a lack of social justice among sectors of the population" (FAO *et al.*, 2017). Such feelings can be triggered by poverty, hunger and food insecurity, along with a highly unequal distribution of income and material goods. In particular, food insecurity, or even the threat thereof, can activate grievances (FAO *et al.*, 2017).

As discussed above, inequalities are likely to have profound effects on the social fabric of local communities and their ability to cooperate by affecting social relations between family members, neighbours and acquaintances as well as how communities relate internally and with other communities more broadly (Justino, 2015). Such impact is particularly important to understand as in post-conflict settings, local governments and communities may assume some of the state's responsibilities for getting agricultural development off the ground again (Simmons, 2013). Thus, traditional post-conflict policies and actions have generally focused on increasing agricultural production in short periods through, for example, the provision of inputs and rehabilitation of infrastructure.

However, such interventions do not generally address people's feelings of uncertainty and insecurity as they generally focus on immediate economic growth versus communal needs. On the contrary, economic development projects can contribute to the generation of new patterns of social exclusion and marginalization, leading to the further undermining of the societal fabric (Cox, Osborn and Sisk, 2014). Therefore, complementarity in approaches to building social cohesion is necessary. In other words, fostering social cohesion requires the integration of security, peace and development efforts (Cox, Osborn and Sisk, 2014). Creating an environment, through positive local collective action, in which such attitudes and behaviours can be reduced in the long run can lead to increased confidence and trust in communities and between households leading to future opportunities for cooperation (FAO *et al.*, 2017).

This review has demonstrated that trust among farmers can increase cooperation within immediate farming communities, as well as across wider regions. For instance, there are case studies reporting lower transaction costs, increasing bargaining power within the market structure, and the possibility of sharing the risk associated with experimentation and adoption of new innovation as a result of the cooperation (QUNO, 2015).[25] Moreover, as several examples illustrate (see Boxes 3 and 4), increased cooperation based on trust and shared norms and values have also lead to increased food production and equitable access to seed.

25 There is also some evidence that small-scale farmer innovation is positively correlated with the strength of intracommunity relations (QUNO, 2015).

# Review and description of farmers' seed systems

The following section reviews farmers' seed systems and examples of where these systems have contributed to increased social cohesion and, by doing so, how they have paved the way to positive local collective action.

Seed systems, consisting of the breeding, management, replacement, and distribution of seeds, are at the core of sustainable food and agriculture systems (GIZ, 2014). Seeds are first and foremost the source of all food and agricultural production and are therefore essential in feeding and nourishing the planet as well as in ensuring secure livelihoods of agricultural communities. Seeds are genetic resources and carry plant genetic diversity – a diversity that enables food and agriculture systems to be resilient to shocks and adverse conditions. A farmers' capacity to cope with such conditions is based on these properties of seed (Louwaars and De Boef, 2012) and the world depends on the farmer's capacity to do so in order to be fed.

Farmers obtain seed for agriculture from both farmers' seed systems and formal seed systems. However, more commonly, farmers access their seed from sources within farmers' seed systems, such as local grain and seed markets (90.2 percent) and social networks (Louwaars, Le Coent and Osborn, 1994; McGuire and Sperling, 2013; McGuire and Sperling, 2016). The boundaries between these two systems are not straightforward. Rather, farmers' seed systems and formal seed systems represent a continuum of seed system types, differing in their use and maintenance of plant genetic resources for food and agriculture.[26]

Seed obtained from farmers' seed systems are produced, re-used, and stored on-farm or at community level and *in situ* by farmers from their own harvest; through exchange and barter among friends, neighbours, and relatives (social networks); cash purchase; gifts received and through

26 This paper focuses on the role of farmers' seed systems. Therefore, only certain aspects of formal seed systems are included.

**Box 3. Community Seed Bank Project, Nepal Agricultural Research Council (NARC), Local Initiatives for Biodiversity, Research and Development (LI-BIRD) and Bioversity International Kachorwa – Bara District, Nepal, 2003**

In 2003, NARC, LI-BIRD and Bioversity International supported a farming community to establish a community seed bank in Kachorwa, Bara District, Nepal. The community seed bank project brought awareness among the communities about the importance of local crop diversity and supported the farming community to conserve and utilize local varieties. As part of the project, seeds were provided on a loan basis to both members and non-members of the community seed bank within the village. This led to increased access to quality seeds of both local and improved varieties at a reasonable price and increased trust as the seeds sold at the community seed bank were produced locally by trained people. The farmers in Bara District were able to see the performance of the standing crop and, in case of unsatisfactory seed quality, they were able to complain easily and demand refunds. More information is available in the annex.

**Box 4. Kiziba (Kabwohe) Community Seed Bank, Bioversity International – Sheema District, Uganda, 2010**

The Kiziba community seed bank was established to improve productivity and resilience for farmers of the District through enhanced use of crop varietal diversity. The farmers that access seed from this community seed bank are trained in proper agronomic practices, enabling them to produce seed that meet the quality standards of the seed bank. As a result, seed security as well as yields have increased for most of the beneficiary households. This in turn has led to improved levels of food security and nutrition and household incomes from the sale of the surplus production. The collaboration around the seed management has fostered cooperation and social harmony among the households of Kiziba and has considerably affected the overall social cohesion in the community. Through the sharing of positive experiences, information, and training, similar community seed banks have been established in the District of Sheema. More information is available in the annex.

**Box 5. Ranibas Organic Agriculture Cooperative Society – Ranibas, Sindhuli District, Nepal, 2007**

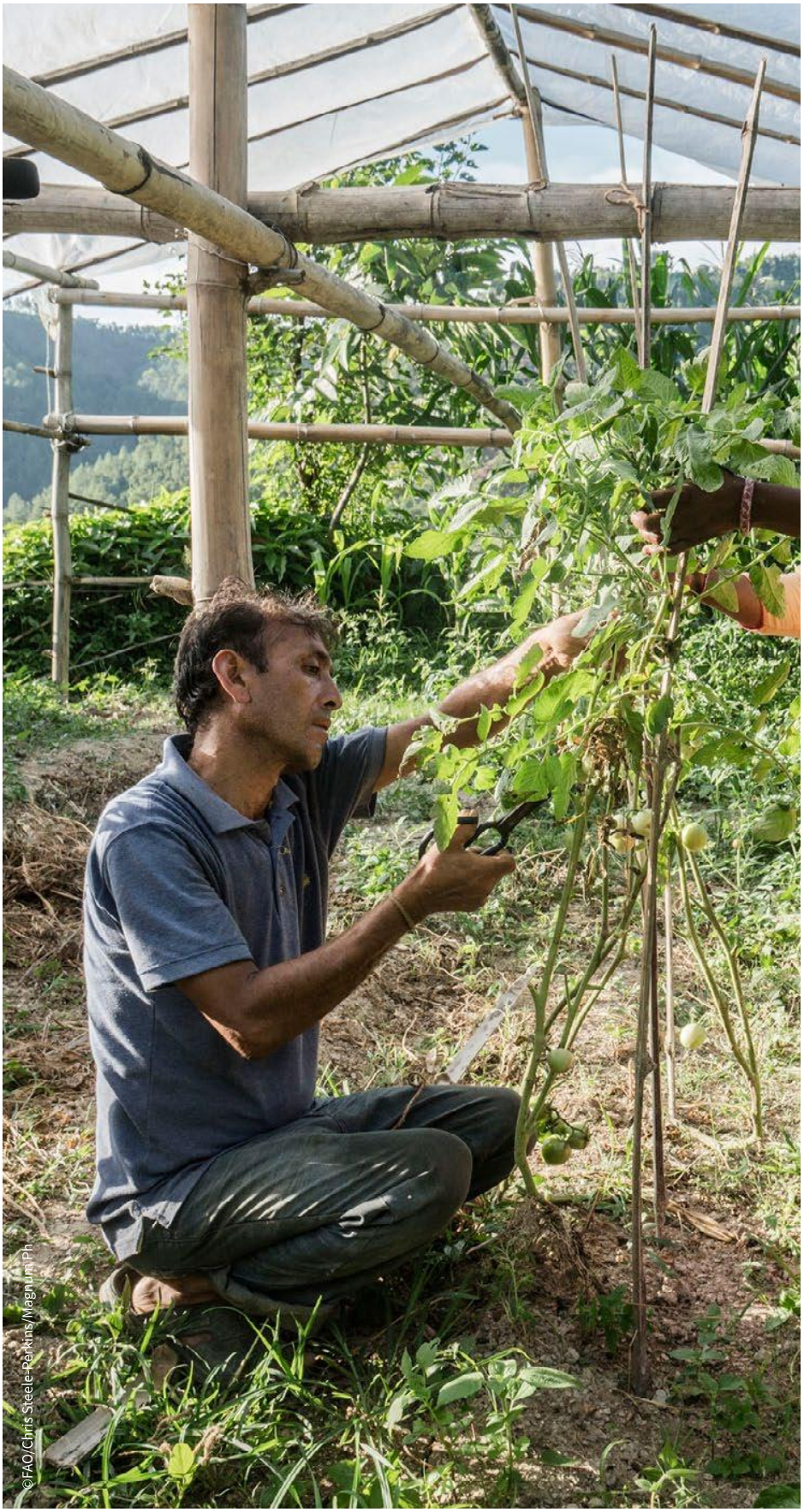
In 2007, the community of Ranibas Village of Sindhuli District organized a cooperative named Ranibas Organic Agriculture Cooperative Society. This cooperative started conserving local varieties of various crops through the establishment of an agrobiodiversity resource center. Through the centre's regular meetings, oorientations and discussions, members of the cooperative have been receiving direct benefits, such as access to information on the availability of seeds, the type and quantity required for the season and who has what variety of seed. In doing so, the centre has been serving as a good forum for discussion and building of social capital. More information is available in the annex.

local grain markets (FAO, 2017).[27] Thus, farmers are members of a society with rights, expectations, contacts, and traditions. Even when trade occurs in markets, seed circulation is typically a social process, which is based on trust, possibly mutual, and is influenced by socio-cultural norms and practices (Pautasso *et al.*, 2012). To that end, farmer seed networks can take a variety of forms and configurations. Broadly considered, they are "social networks that emerge with the formation of ties by seed transfer events" (Pautasso *et al.*, 2012).

In contrast to formal seed systems, farmers' seed systems tend to produce and maintain less uniform materials, such as mixed races, heterogeneous and landraces, which are adapted to local requirements and which prove themselves more resilient to environmental and other changes. It is this exact heterogeneity and diversity of seeds that makes farmers' seed systems resilient to environmental shocks. However, the fact that landraces are adapted to particular agroecological settings limits their use value in international markets. At the same time, the level of seed quality can vary within farmers' seed systems, depending on the source of the

27 In situ conservation is "the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated species, in the surrounding where they have developed their distinctive properties" (UN, 1992). With regards to farmers' preferred source of access to seed, the literature reveals differing evidence. This may be associated with the vast varieties of existing farmers' communities.

Farmers' seed systems remain the primary source of seed for most crops throughout the world.



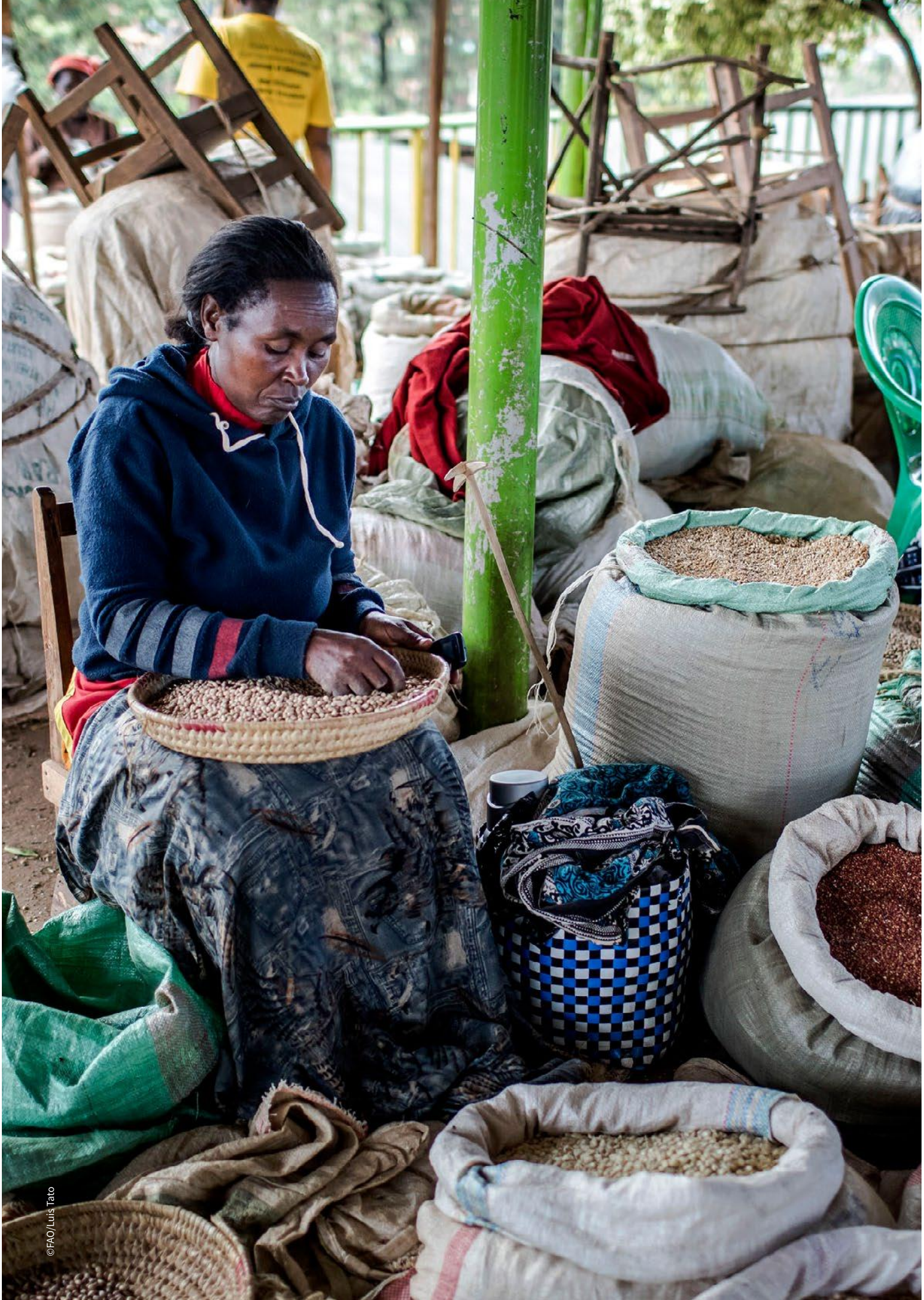
seed, among other factors. Farmers also create their own varieties using germplasm and drawing on traditional practices (Louwaars, Le Coent and Osborn, 1994; Pautasso *et al.*, 2012). Such innovation is an essential part of farmers' seed systems. It happens through social interaction and is cumulative in nature, as individuals and communities build off one another and strategically adapt new tools and techniques to suit their particular circumstances (QUNO, 2015).

The processes involved in farmers' seed systems are integrated in the larger farmers' production system. As such, they are not monitored or controlled by any formal regulations or policies.[28] As a result, formal certification and quality control mechanisms are mostly non-existent in farmers' seed systems. Rather, customary law, such as local technical knowledge and standards and local social structures and norms, guides the process (FAO, 2017).

Disregard of farmers' seed systems will lead to the erosion of farmers' varieties and landraces, which are key in the conservation of agricultural biodiversity – the majority of which is actively maintained through farmers' seed systems (African Centre for Biodiversity, 2016). Local seed exchange networks are essential to agricultural biodiversity conservation, because they permit timely and sufficient access to quality seed as well as the maintenance of landraces, which are locally adapted, in agro-ecosystems throughout the world Pautasso, *et al.*, 2012). Moreover, farmers' seed systems remain the primary source of seed for most crops throughout the world (FAO, IFAD and WFP, 2014).[29]

28 The process includes variety choice, variety testing, introduction, seed multiplication, selection, dissemination, and storage (FAO, 2017).

29 For instance, it is estimated that eighty percent of all seed in Africa is produced in the informal system, and for minor crops this is most likely closer to a hundred percent and FAO, IFAD and WFP (2014) asserts that this is likely to remain the case for the foreseeable future.



# Conclusion

The purpose of this paper is to assess the role of farmers' seed systems in contributing to sustaining peace, with a particular focus on the element of social cohesion and positive local collective action. The intent is to raise awareness and provoke thought around certain features and functions of farmers' seed systems and demonstrate how these could contribute to more peaceful, just and inclusive societies.

## Premise

As laid out in the introduction, the underlying premise of this research is the assumption that farmers' seed systems are themselves a form of positive local collective action for food security and nutrition – by fostering trust and confidence among farmers and across farmers' communities and maintaining and developing agricultural biodiversity by means of the cooperation experienced through the transferring of seed via social networks. The identification of key aspects related to the field of agriculture also relevant to sustaining peace – resilience, social cohesion and positive local collective action – provide the framework for this analysis. The paper looks at the relationship between natural resources and social cohesion and how community-based natural resource management, in particular, can contribute to local peacebuilding activities. Examples from within farmers' seed systems were then explored, such as community seed banking, to see whether they could function in an analogous way.

## Farmers' seed systems as positive source of local collective action

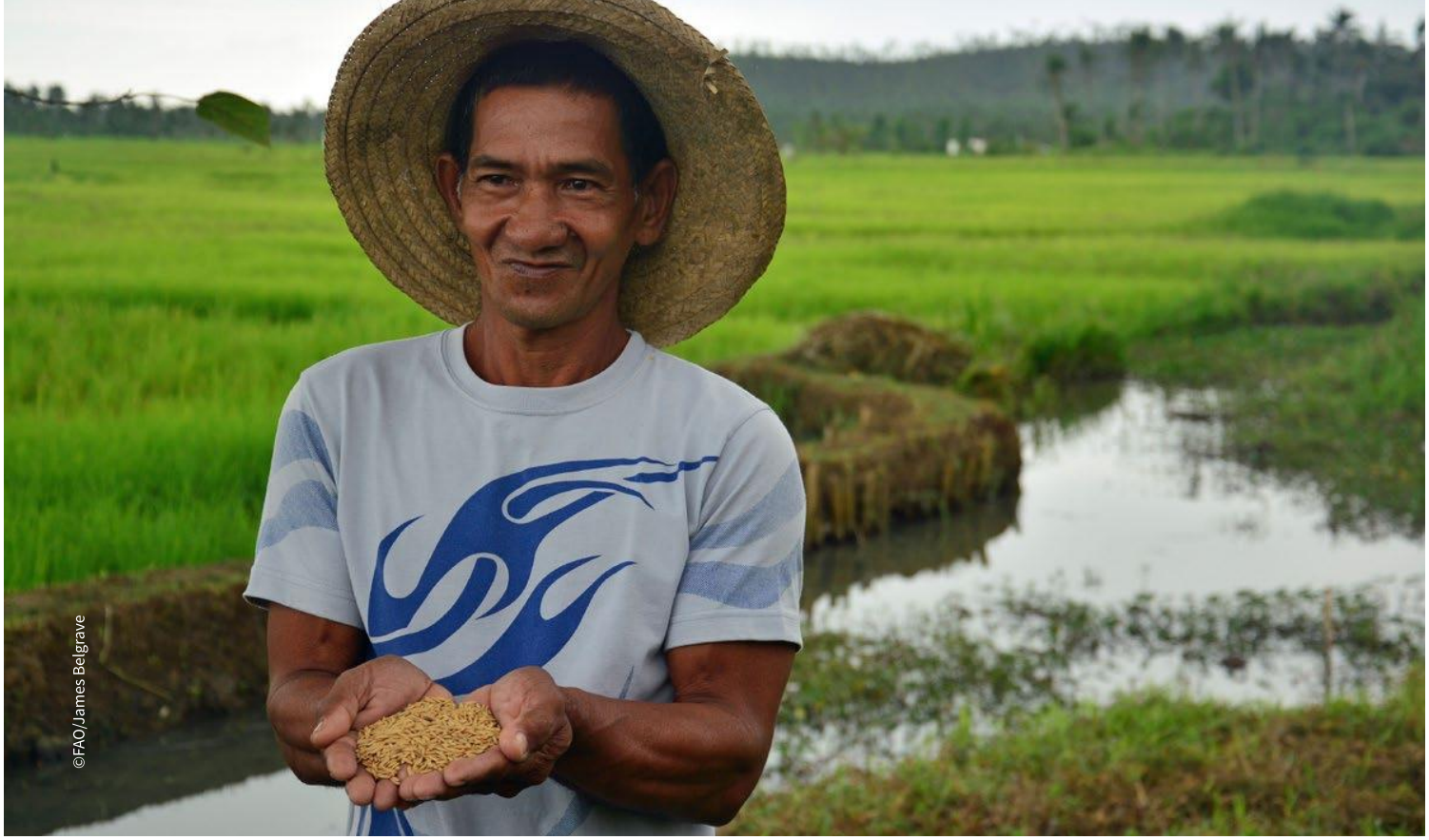
As previously discussed, conflicts heighten grievances, erode trust, undermine credibility of authorities and damage networks. Farmers' seed systems, which are considered social and economic networks based on trust and reciprocity, may also be affected by such types of conflict. This could lead to, *inter alia*, the erosion of agricultural biodiversity and to reduced access of diverse quality seed for farmers. This in turn can have affect the overall resilience of our global food and agriculture systems and on local and national food security and nutrition and undermine the livelihoods of rural communities, which may contribute to sustain the ongoing conflict. However, precisely because of their nature as trust networks and their function in managing and exchanging agricultural biodiversity, farmers' seed systems could also provide an important pathway to increased social cohesion through positive local collective action, resulting in the increased resilience of individuals, households and communities to conflict.

As trust networks, farmers' seed systems can provide an important pathway to increased social cohesion through positive local collective action, resulting in the increased resilience of individuals, households and communities to conflict.

## Challenges and threats faced by farmers' seed systems

Considering their potential in contributing to sustaining peace, it is important to be aware of the challenges that farmers' seed systems are currently facing, with potentially severe impacts on the socio-ecological resilience of our global food and agriculture systems. For instance, the erosion of agricultural biodiversity is occurring as farmers' traditional production systems and the cultivation of diverse landrace varieties through farmers' seed systems are replaced with more modern, industrialized production systems and the cultivation of uniform, high-yielding varieties, some of which cannot be saved each year (FAO, 2010). As a result, we are facing negative repercussions in terms of nutrition, resilience to environmental shocks, and loss of traditional knowledge and cultural diversity – all of which can lead to food insecurity if not appropriately addressed (Pautasso, *et al.*, 2012). Small-scale farmers, as the principal stewards of agricultural biodiversity, who use and depend upon agricultural biodiversity for their livelihood, are particularly vulnerable.

Moreover, formal seed systems are often perceived to be more suitable for the provision of commercial seed, the modernization of agriculture, and for food security and nutrition in the face of increasing population pressure and climate change. However, it is argued that this discourse is in fact based on common misconceptions, which contribute to limiting the appreciation of farmers' seed systems in the international policy arena (Coomes, McGuire and Garine, 2015). Also, humanitarian interventions, in particular food and/or seed assistance, may, if not appropriately designed, undermine the functioning of farmers' seed systems.




# Recommendations

The concept of sustaining peace calls upon all national actors along with the support of the international community, to work towards preventing the outbreak, escalation, continuation and recurrence of conflict, including by addressing root causes and moving towards recovery, reconstruction and development. This provides an opportunity for strategies supporting food security and nutrition and agricultural livelihoods to contribute to the prevention of conflict and sustaining peace – understanding and strengthening farmers' seed systems may provide just such an entry point.

For an audience interested in sustaining peace, this think-piece illustrates the need for an integrated approach to a sustaining peace in which development around agriculture can play both a preventive and a peacebuilding role. This potential needs to be better recognized and reflected through increased inter-disciplinary collaboration and consultation. The aim of this paper is to stimulate this by providing a specific illustration related to seed systems as forms of social cohesion. For the more agriculturally-focused audience, the value of this research project is the realization that work in this area can be consciously understood and shaped as contributing to sustaining peace as well as development, drawing on expertise from the peacebuilding side to enhance analysis and strategy development.

The following three recommendations are suggested:

1. Further consideration should be given to strengthening social cohesion as part of peacebuilding activities before implementing agricultural development projects. While such an approach could ensure the positive effect of agricultural development projects, it would, however, also require a better understanding of context and of sequencing of interventions, and how best to design peacebuilding and agricultural development strategies in a complementary manner – beyond conflict sensitivity into active analysis and collaboration.

2. As the focus should be on locally owned action rather than external actors, peacebuilding in this context involves the restoration of a network of relationships or new arrangements for inclusive and participatory governance. To that end, further research is required to gain a better understanding of how conflict may impair existing trust networks, e.g. among and between farmers, and how that social capital may be strengthened to withstand conflict.

3. Further research on positive examples should be undertaken. These can be valuable as such case studies demonstrate a shift in approach – away from focusing on risks to highlighting opportunities. Such illustrations can show how to capitalize on elements that are working, thus helping to build a virtuous cycle. At the same time, it is also important to identify threats and challenges faced by such positive examples. In that regard, more consideration should be given to support farmers' seed systems and to the possible disruptions of these systems and the effect on agricultural biodiversity through agricultural development.

# Annex

# Annex

## Illustrative examples

The following illustrative examples are of community-based management of natural resources, highlighting how this approach can restore collaboration at the local level, and of farmers' seed systems that have contributed to increased social cohesion, paving the way to positive local collective action. They expand upon the boxes in the main part of the paper.

### Integrated Water Resource Management (IWRM), UNEP

**Darfur, Sudan, 2009–2013**

In 2009, UNEP along with a range of local and international partners sought to develop, introduce, and pilot new forms of environmental governance with the potential to contribute to community resilience and peacebuilding in Darfur, Sudan. In doing so, the key challenge was to find ways to build relationships between livelihood groups where they had been destroyed, and where national and local institutions lacked the capacity – and at times legitimacy – to engage in effective resource management.

The work undertaken as part of the Sudan Integrated Environment Project (SIEP) demonstrated that natural resources can indeed be used as a platform for rebuilding trust and relationships between stakeholders and with their governing institutions. Moreover, SIEP may illustrate that community-based natural resource management at the most local level can enable resource users to manage resources in an integrated and participatory way. In the context of Darfur, such a finding is particularly important, considering that the element of conflict that relates to natural resources – particularly land – takes place primarily at the local level.

One example under the SIEP is work on Integrated Water Resource Management (IWRM) in Wadi El Ku, North Darfur, Sudan – a rain water harvesting project. This project differed from other approaches in that it ensured that all water users were key participants in the management of the water, leading to the efficient use of water resources and improving the access to water in an equitable manner for all users; it ensured that all interventions were implemented in an environmentally-friendly way, leading to sustainable water access for all users; and it took into account the need to improve the sustainable water access for the current generation without affecting the ability of the future generation to meet their water needs in a sustainable manner.

## Research Programme, Camel Herders, Tufts University and UNEP

### Northern Rizaygat, Darfur, Sudan, 2009

Pastoralist activities in Sudan may account for up to 90 percent of the livelihood sector. However, this is poorly reflected in national economic planning as much of their trading happens outside the formal economy. There is a strong perception among pastoralists that they are marginalized and, given their contribution to the national economy, they are advocating for greater recognition of and support for their activities (Young *et al.*, 2009).

Pastoralists' livelihoods have suffered throughout the conflict in Darfur as their trading and migration opportunities have been severely reduced. As a result, some have adapted livelihood choices, which have exacerbated the conflict, e.g. some have joined the government militia or others have harvested timber from forests owned by people who were displaced (Young *et al.*, 2009).

A research programme by Tufts University played an important role in enabling a clear agenda for pastoralist development in Darfur. At the core of this was the goal of lasting peace in Darfur – hence, a peace in which pastoralists and sedentary groups have equitable access to natural resources and trust in governance arrangements that support their livelihoods (Young *et al.*, 2009).

Tufts University established relationships with government institutions, a presidentially appointed group representing nomadic communities, and civil society representing pastoralist views and identified them as key stakeholders in their study. After collectively solving a problem around the importing of devices to track cattle on long-distance migration, the preconditions of joint action were established. This milestone then led to the founding of the Pastoralist Union, a forum consisting of the above four stakeholders as well as the University of Sudan, which meets every two to three months to discuss topics of pastoralists interests (Young *et al.*, 2009).

## Community Seed Bank Project, Nepal Agricultural Research Council (NARC), Local Initiatives for Biodiversity, Research and Development (LI-BIRD) and Bioversity International

Kachorwa, Bara District, Nepal, 2003

Community gene and/or seed banks (CSBs) have a history of about 30 years. They emerged in different parts of the world in response to concerns about the loss of agricultural biological diversity, the loss of seeds caused by natural disasters such as floods and hurricanes, the impact of climate change, declining access to quality seeds, and demand from farmers to participate in locally driven biodiversity management strategies. They can be found around the world under different names, and are diverse in terms of size, form and function (Shrestha *et al.*, 2013). CSBs have emerged as an effective rural institution at the community level. CSBs strengthen farmers' access to diversity of crop genetic resources, which in turn contributes to local food security of poor farmers and ensures the conservation of agrobiodiversity on farm (Shrestha *et al.*, 2004).

The element of collective action underlies all community gene/seed banks. In many cases, community gene/seed banks build on traditional institutions of access to and sharing of seeds, cooperation (pooling of land, labour and knowledge), reciprocity (mutual support), and fairness. Many of them make use of participatory action research and learning methods and tools, for example, by means of participatory plant breeding, including variety selection, which deepens knowledge, skills and practices of collective action (Shrestha, Vernooy and Chaudhary, 2013).

In practice, collective action ranges from small scale (groups of households, a village), mostly for exchange of seeds and related knowhow, to large scale (national level), for the commercialization of seeds. It ranges from a focus on taking care of traditional varieties to a broad range of materials including modern varieties. Community gene/seed banks are most often part of local seed systems. They are characterized by their local nature – confined to a geographic area, managed by people from that area, and involving seed exchanges within that area (Shrestha, Vernooy and Chaudhary, 2013).

The Nepal Agricultural Research Council (NARC), Local Initiatives for Biodiversity, Research and Development (LI-BIRD) and Bioversity International supported a farming community to establish a community seed bank in Kachorwa, Bara in 2003. Bara district is highly influenced by modern agricultural technologies, which has resulted in loss of traditional varieties and increased dependency for agricultural inputs. In spite of this situation, crop landraces have still been found in limited areas grown by a number of households to meet the seed requirements for variable growing environments and various household needs. Bioversity International's Global *in situ* conservation project brought awareness among the communities about the importance of local crop diversity

and supported farming community to conserve and utilize the local gene pool. Supported by the project, the Bara CSB focused on the conservation and enhancement of local varieties. LI-BIRD has since supported the establishment of 14 community banks around the country.

According to LI-BIRD's experience, the community seed bank is an approach that provides farmers access to seeds of local crop varieties and performs the function of community level safety nets for genetic resources. It also serves as a repository of associated knowledge and as an institution to organize, mobilize and represent farmers' interests. Community seed banks have developed a number of mechanisms to provide easy access to seeds. For example, in Kachorwa, Bara, seeds are provided on a loan basis to both members and non-members within the village, but for outsiders only on a cost-recovery basis. If a member takes a kilogramme of seed during planting time, they have to return 1.5 kilogrammes of pure seed to the community seed bank after harvesting the crop. In case of the gourd family, borrowers have to return a single matured fruit from which seeds are then taken by the community seed bank. Many of the community seed banks promoted by LI-BIRD have employed this system for distributing seeds. Experience has demonstrated that this system is very important for poor members of the community who do not have cash to buy seeds (Shrestha, Vernooy and Chaudhary, 2013). LI-BIRD demonstrates that community seed banking helps to build social capital through the mobilization of the local community, leading to empowerment (Shrestha *et al.*, 2012).

LI-BIRD has also assisted in establishing a community biodiversity management fund that provides the opportunity to generate additional income mostly from farm-based income-generating activities. The establishment of such fund can promote on-farm management of genetic resources and improve livelihoods through the mobilization of local social as well as financial capital (Shrestha *et al.*, 2012). LI-BIRD also found that the establishment of community seed bank can best be started when community people are convinced about its roles in seed security, food security and conservation of valuable plant genetic resources (Shrestha *et al.*, 2012).

Higher volume seed production of selected local as well as improved varieties that have high demand in the locality is another task that community seed banks have been carrying out since their establishment. This function of community seed banks has been highly valued by local people because they can buy quality seeds of both local and improved varieties at a reasonable price at their doorstep and on time. It is also a matter of trust as seeds are produced locally, by trained people, and people have the advantage of seeing the performance of the standing crop. In case the quality of seed is unsatisfactory, it is easy to complain and even demand money back, which is hard to do if seeds are purchased from outsiders.

## Ranibas Organic Agriculture Cooperative Society

**Ranibas, Sindhuli District, Nepal, 2007**

In 2007, the community of Ranibas Village of Sindhuli District organized a cooperative – the Ranibas Organic Agriculture Cooperative Society. The Society started conserving local varieties of various crops through the establishment of an agrobiodiversity resource centre. The resource centre is functioning as a community seed bank in the village. The resource centre is playing a vital role in the conservation of local crops of the area through social mobilization. Its regular meetings, orientations and discussions are instrumental to encouraging community members to conserve local varieties. Members of the cooperative are receiving direct benefits from the agrobiodiversity resource centre in many ways. They have access to information on the availability of seeds, the type and quantity required for the season and who has what variety of seed. The centre informs all of its members if any new suitable variety for the area is found and/or if any variety that is lost from the region is found in other places. The centre also responds to members' request for new varieties through contacting larger networks. It serves as a good forum for discussion, and eventually enhancing seed security at the community level through conserving and promoting locally adapted crop landraces (Shrestha, Vernooy and Chaudhary, 2013).

## Kiziba (Kabwohe) Community Seed Bank, Bioversity International

**Sheema District, Uganda, 2010**

Small-scale farmers in Uganda as well as in other developing countries continue to depend on genetic diversity to maintain sustainable production and meet their livelihood needs. Loss of genetic choices therefore, diminishes farmers' capacities to cope with changes in pest and disease infection and leads to yield instability and loss. The Kiziba (Kabwohe) seed bank was established in Kabwohe site, Sheema district to improve productivity and resilience for farmers through enhanced use of crop varietal diversity, focusing on common bean and banana. In 2014, the seed bank opened another distribution centre in Sheema town council and also started a seed production business, to ensure sustainability of the seed banking activities (Nankya *et al.*, 2016).

The farmers that access seed from the seed bank are trained in proper agronomic practices, including farm management, pests and disease control and postharvest handling. This means that they are able to produce seed that meet the quality standards of the seed bank. As a result, there is seed security, improved training, and increased yields by 50 percent for most of the beneficiary households which has led to improved food security and nutrition and household incomes from the sale of the surplus production. Also, the cooperation and social harmony

has increased in the households as a result of working together, which has impacted the overall social cohesion in the community (Nankya *et al.*, 2016).

The management committee consists of 12 farmers, of which 6 are female. The committee shares information with different stakeholders who are visiting the seed bank to learn from their experiences so that they can replicate them. The committee has also started opening distribution centres in other areas of the Sheema district and is training farmer groups so they can run similar banks in other areas (Nankya *et al.*, 2016).

Throughout the project, activities were undertaken to better understand the stress and factors that were hindering their use of diversity, and to enable both men and women to participate and contribute to the management of the project. Both men and women were included in the technical committee, the National Implementation Unit, and the site coordination committees that were spearheading the implementation of this project. In addition, they also participated in various project activities such as farm trials, community project meetings, capacity building workshops, cross site visits and diversity fairs to share experiences about managing and benefiting from crop diversity including the benefits from community seed banks. Kiziba community seed bank is benefitting its community by providing good quality seed which when planted and managed well, gives improved yields thus increasing the communities' food security. It is specifically proving to be advantageous to women by providing them with skills of common bean management – leading to increased yields – and leadership opportunities. Women are selling the surplus common beans for further empowerment and financial stability (Nankya *et al.*, 2016).

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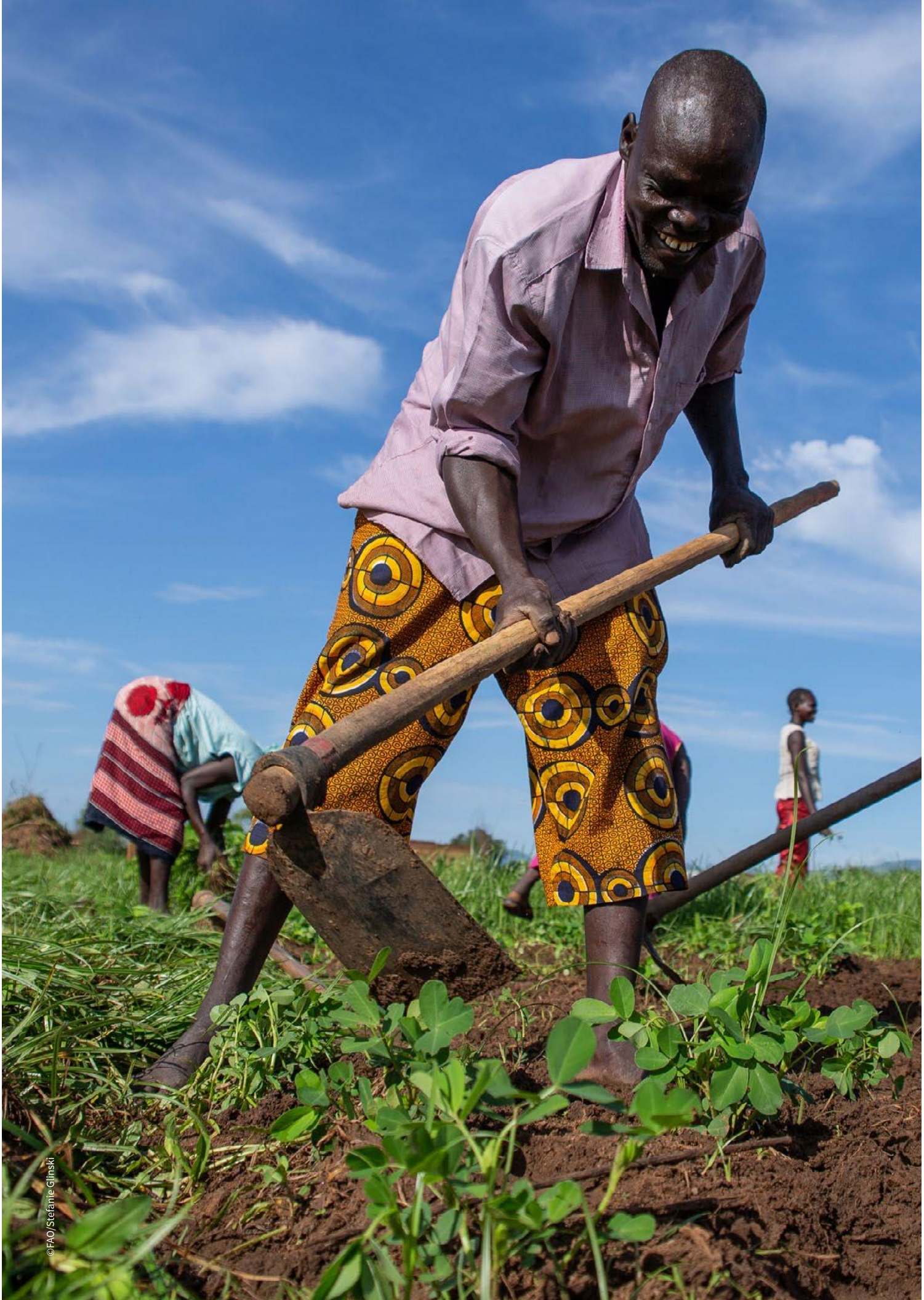

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