



Guidance note

Promoting climate-resilient agriculture in smallholder farming

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Summary

This guidance note highlights why climate risk management is important for smallholder farmers, and why it is important for Irish Aid's work. It provides guidance on how climate risk management can be improved across development programmes. Drawing on Irish Aid's experience of working with smallholder farmers, it is designed to inform ongoing efforts to improve climate-resilient agriculture, and will be of interest and use to partner organisations and particularly Irish Aid's climate change community of practice.

Focusing on Irish Aid's key partner countries — the majority of which are Least Developed Countries (LDCs) — this note describes a framework for development programming for climate-resilient agriculture. The note is the result of consultation across government and with a range of stakeholders in Ireland and with partner countries.

Smallholder farming is the mainstay livelihood of many of the poorest households in Irish Aid's key partner countries. Climate risks could push these households further into poverty and deepen their food insecurity. Women-headed agriculture-dependent households are particularly vulnerable.

This guidance note has been developed to support our ongoing efforts to integrate climate risk management by supporting farming families to move from a status quo of 'hanging-in' and coping with climate risks, to 'stepping-up' and adapting to and prospering under climate risks.

It suggests how climate risk management can be integrated into development programming for smallholder farmers at different levels: household, watershed, local agricultural system and agriculture sector/national.

Key considerations for policymakers

- The future of households in agriculture-dependent economies is determined by how well they cope with, and adapt to, climate risks. Some households will succeed while others will leave farming.
- Smallholder agriculture largely sustains staple food production for growing populations in the poorest countries. Escalating climate risks need to be addressed through climate adaptation investments by local people and/or authorities at household, watershed, local agricultural system and sector/national levels.
- How effective investments in climate-resilient agriculture for smallholders are depends on whether benefits can be accessed fairly across gender and ages.
- Transforming the lives of poor people who rely on agriculture will depend on whether they can 'step-up' or if they have to 'drop-out' of agriculture. Agriculture sector programming responses are appropriate for stepping-up. Investments in provision of health, social protection and education are needed by those dropping-out.

Introduction

Smallholder farmers operate on small plots of land, growing subsistence crops and one or two cash crops. Typically, they rely almost exclusively on family labour. Smallholder farming includes crop cultivation and livestock keeping in different proportions — from farmers that plant only crops, to households that integrate crop and livestock keeping, and pastoralists that keep only livestock. Smallholder farmers often have other livelihood activities, but agriculture is usually the most important in terms of income and food security.

Climate risks are just one of the many challenges facing people whose livelihoods depend on agriculture and who are resource-constrained. Smallholder farming is dynamic and trajectories can emerge where sustainable agriculture intensifies, the status quo is maintained, or indeed all agricultural activities are abandoned.

Ireland's international development policy position on climate resilience and smallholder farming

Ireland's foreign policy '*The Global Island*'¹ recognises the impacts of climate change on weather and ecosystems, and its adverse effects particularly on the poorest people in the LDCs. In particular, it highlights the global nature of the challenge, which exacerbates tensions over land and water, impacting food and energy prices, and threatening food and nutrition security.

Ireland's international development policy '*One World, One Future*'² outlines three goals — *reduced hunger, stronger resilience; sustainable development, inclusive economic growth; and better governance, human rights and accountability*. Linked to these are priority areas for action — *global hunger; fragile states; climate change and development; trade and economic growth; essential services; and human rights and accountability*. These, together with Irish Aid's significant contributions to humanitarian action, form the reference points for development planning and programming.

All these goals and priority areas for action are relevant, given the diversity of smallholder agriculture and the risks faced by poor farmers. Specifically, the goal of *reduced hunger, stronger resilience* and the priority areas for action of *global hunger and climate change and development* are those most closely associated with practical programming for climate-resilient agriculture.

Hunger, gender equality and climate risks to agriculture are all linked. *One World, One Future* states that these three areas need to be “better understood and acted upon with the urgency that they require.” Building climate resilience in agriculture is doubly challenging in countries facing humanitarian crises related to conflict and other sources of instability.

One World, One Future further describes climate change as “perhaps the most pressing issue facing poor countries today” and commits to putting it at the centre of international development efforts. Recognising the social, environmental and economic benefits of agriculture, and the importance of food security for smallholder farmers, this guidance note aims to bring climate risks to smallholder farmers into focus but also into perspective, i.e. in relation to other risks faced by farmers. This approach places climate resilience of smallholder farming high on the agenda of Ireland's contribution to the fight against global poverty and hunger.

The challenges of smallholder farming in LDCs

Rural poverty, population growth, farm size and productivity: crop farming and livestock rearing are the main sources of income and employment for 2.5 billion people in low income countries. Two thirds of those are in smallholder farming households, mostly in developing countries. These households generate four fifths of all food produced in Asia and sub-Saharan Africa. But these same people represent a large majority of the poorest and hungry.³

According to the UN Department of Economic and Social Affairs' 2015 population projections report,⁴ there will be significant population increases in Irish Aid's key partner countries by 2030: Ethiopia, 40 percent increase to 138m; Uganda, 37 percent increase to 62m; Tanzania, 57 percent increase to 53m; Malawi, 59 percent increase to 27m; and Mozambique, 46 percent increase to 41m. Agriculture and related informal activities in value chains will provide many of the millions of new jobs required to employ these growing populations.⁵

Population growth in some rural areas has led to fragmentation of landholdings and reduced farm size, a trend projected to continue in sub-Saharan Africa. Formal and informal barriers to rural-urban migration and distortionary land policies all contribute to downward pressure on farm size — and farm size links

Climate-resilient agriculture initiatives of the Department of Agriculture, Food and the Marine

As a major food producer and leading innovator in agricultural technologies, Ireland can make a significant contribution to tackling global food and nutrition needs through the continued production of sustainable food products, enhanced cooperation with poorer countries, sharing expertise, partnerships between Irish companies and those in developing countries, and through Irish Aid. Ireland with the Department of Agriculture, Food and the Marine (DAFM) as lead, in conjunction with Irish Aid and the Department of Communications, Climate Action and Environment (DCCAE), was one of the first nations to pledge its support to the Global Alliance for Climate-Smart Agriculture (GACSA) at the UN Climate Summit in New York on 23 September 2014. GACSA is a voluntary alliance of partners, dedicated to addressing the challenges facing food security and agriculture by tapping a wealth and diversity of resources, knowledge, information and expertise. It takes into account and, where possible, draws upon existing programmes and initiatives to avoid duplication or creating parallel organisations.

In addition to supporting GACSA, Ireland is engaged with other important agricultural initiatives at the international level including:

- The Global Research Alliance on Agricultural Greenhouse Gases — focusing on research, developing and extending technologies and practices that will help deliver ways to grow more food (and more climate-resilient food systems) without increasing greenhouse gas emissions.
- The EU Joint Programming Initiative on Agriculture, Food Security and Climate Change — providing and steering research to support sustainable agricultural production and economic growth, to contribute to a European bio-based economy while maintaining and restoring ecosystem services under current and future climate change.

DAFM works with the UN Food and Agriculture Organisation to address food waste and losses in food crop value chains in Malawi and Timor Leste, and on greening food value chains in Uganda and Rwanda.

DAFM is also engaged in the Global Agenda for Sustainable Livestock that seeks to build consensus on the path towards sustainability and catalyse coherent and collective practice change through dialogue, consultation and joint analysis. The Agenda addresses the following three issues: (i) global food security and health, (ii) equity and growth, and (iii) resources and climate.

In March 2015, DAFM supported the launch of the Leadership Forum on Climate-Smart Agriculture by the Institute of International and European Affairs (IIEA) and the Royal Dublin Society (RDS), providing an international platform for expert speakers. Following 18 months of collaboration, the forum published the report *A Climate-Smart Pathway for Irish Agricultural Development: Exploring the Leadership Opportunity*⁶ designed to help policymakers frame a future that ensures global food and nutrition security while tackling climate change. IIEA and RDS are examining opportunities to run a second series on the subject.

In addition, Irish Aid are also working with Teagasc, the Agriculture and Food Development Authority in Ireland. This collaboration is to enhance Ireland's contribution to development through support for agricultural research, training and extension in developing countries, aiming to achieve better functioning climate-resilient food systems and markets, which are accessible to, and benefit, the rural poor.

to productivity. In Kenya, research has found that when rural populations increase in density above a certain threshold, this correlates with declining farm size, declining incomes and lower agricultural labour productivity.⁷

Smallholder agriculture involves family and other labour in intensive closely managed practices and incorporates local knowledge, while larger farms take advantage of

advanced technology and capital-intensive market-oriented agriculture.⁸ Smallholder agriculture is therefore apt for highly context-specific climate adaptation processes.

Migration to urban areas is leading to a growing demand for food and a trend towards industrialised food systems. There are many barriers to smallholder farmers

participating in these value chains, including meeting required levels of product quality and productivity as well as industry standards, and poor organisation and access to infrastructure (roads to markets, price information access etc.). Smallholder agriculture has an important role in local and national food security, and value chain barriers need to be resolved.

Smallholder farming — dynamic and differentiated: most smallholder farming households earn income in multiple ways and sale of crops or livestock is just part of the total income.⁹ So smallholder agriculture communities need to be understood as a highly differentiated set of households operating in different economies.

Smallholder farming and technology — innovation and improvements: ‘agricultural technology’ covers a vast range of tools, on-farm practices, plant and animal species, and highly technical solutions all helping to make agriculture more productive and resilient. Only some will be suitable for, or affordable to, smallholder farmers on marginal lands. Even for those more appropriate technologies, the task of promoting existing and developing new technologies for smallholder farmers is challenging due to the complex and diverse nature of the farming systems.

There is good experience with participatory innovation methods whereby technologies are developed in consultation with farmers.¹⁰ This enables exchange of methods, information, experience, expertise and knowledge between households and outside agencies, helping to support changes in practice and technologies. Farmer cooperatives are often good entry points for supporting innovation. It is important to thoroughly understand the household economies within smallholder farming families, to understand potential barriers to uptake and what measures might be necessary to ensure sustained funding flows.

Composition of farming households and climate resilience

Women are crucial to smallholder agriculture. They are often responsible for food crop production and small livestock and, along with children, provide labour for producing marketed crops. Men meanwhile often dominate (and take the benefits from) cash cropping and larger livestock.¹¹ The demographic makeup of smallholder farming communities is changing rapidly, with a discernible youth bulge in some areas and an ageing population in others. Approaches to understanding exposure to risk and smallholder farming trajectories will need to take into account the role of women farmers and the barriers they face, as well as the

age profile of communities and how equitably benefits or resources are distributed.

The enabling environment for smallholder farming: despite important international initiatives such as the Comprehensive Africa Agriculture Development Programme¹² and the Malabo Declaration,¹³ public investment in agriculture (donor funded or otherwise) in many countries is still inadequate. This disproportionately impacts the poorest farmers. Where solid policy frameworks do exist, smallholder needs and opportunities are often not adequately addressed. Despite the advent of mobile banking, many households cannot access the more affordable loans and saving accounts now available. This renders them unable to secure much-needed capital and means they lack the buffer against adversity and shocks that financial and insurance services can offer. Private sector investment is rarely directed at working with smallholder farmers and, if it does, is often not well-supported by governments. In many cases, social and political marginalisation of smallholder farmers means their needs are overlooked by government policies. Indeed the regulatory environment for the markets of some crops vital to smallholders, e.g. maize, can sometimes work against them, increasing their vulnerability to climate and economic shocks. Furthermore, localised conflict automatically impacts the productivity of small farms.

Despite some positive developments in the sector, such as advances in agricultural research that can dramatically increase productivity, the overall enabling environment and political economy outlook for smallholder farmers remains bleak, further contributing to their vulnerability.

Drivers of climate resilience in smallholder farming

Climate challenges facing smallholder farming households: climate risks affect all those involved in and dependent on agriculture. But there is scientific consensus that risks to smallholder farmers in particular will escalate and that

In East Africa, climate change is projected to lead to less annual rainfall, and less frequent but more intense precipitation. This is expected to affect water resources in different ways including: a) excessive surface runoff; b) poor groundwater recharge; c) increased salinity in agricultural fields, especially those under irrigation; and d) beyond-threshold deficits in soil moisture content. All water-related climate risks could be exacerbated by increased temperatures.¹

this will increase overall vulnerability, especially in LDCs. Risks include failed harvests and falling yields, changes in pest and disease epidemiology, and asset loss and damage. Yields of crops grown for subsistence by many smallholders, e.g. wheat, maize, rice and potatoes, will be reduced by erratic rainfall, rising temperatures and evapotranspiration stress.¹⁴

The uncertainty in climate projections and in the level of circulating carbon emissions makes future climate challenges difficult to predict. Global climate models must be downscaled to meet regional needs and seasonal weather forecasting requires improvement. Climate risks to agriculture-based livelihoods are many, and they often overlap and can have cumulative effects.

Livelihood responses: according to the 2016 IFPRI *Global Food Policy Report*,³ smallholder farming households “are not a homogeneous group [...] but are rather a diverse set of households living in different types of economies.” A broadly accepted stratification of smallholder farming households is as follows:

- ‘Hanging-in’ — remaining on the land and producing staple foods to meet some household needs, but depending on other activities.
- ‘Stepping-up’ — investing in farming to raise productivity and output.
- ‘Stepping-out’ — spending more time on non-farm activities, including migration (temporary and/or permanent) where in time the farmland may be sold or let out, or become a part-time or weekend farm.
- ‘Dropping-out’ — dropping-out into acute poverty can occur when the livelihood strategies related to these trajectories fail. In this case, social protection measures are needed.

Using these categories, we see that smallholder farming families can prosper either through a ‘step-up’ or ‘step-out’ strategy. While some small family farmers have the potential to undertake profitable commercial activities in the agricultural sector and expand their farm operation, others can be supported in exiting agriculture and seeking non-farm employment opportunities.¹⁵

Other factors influencing the climate resilience of farmers

Environmental challenges: the productivity of smallholder agriculture, and how well it supports local

economies, determines food security and can keep households out of poverty. Smallholder productivity is also closely related to ecosystem services management and how far this benefits farmers. This includes soil fertility management, access to fresh water, crop pollination, and disease and pest management. Smallholder farmers have a custodial role over common and private property resources that are integral to healthy ecosystems. It is crucial to understand the trade-offs between the integrity of natural ecosystems and how agro-ecosystems are managed for livelihoods, including habitat modification, extraction of natural resources and the use of external inputs in smallholder farming.⁸

How climate risks affect men and women differently: smallholder farming is the main livelihood activity of 80 percent of women in LDCs,¹⁶ and an estimated 600m women are small livestock keepers.¹⁷ But according to a recent study led by UN Women and carried out in Malawi, Tanzania and Uganda, gender-based inequalities in accessing financial resources inhibit agricultural productivity and reduce food security. Women-headed smallholder farming households tend to lack sufficient labour for agriculture and income-earning activities.

Climate risks affect rural women disproportionately by increasing their household responsibilities (e.g. water collection), causing damage and loss of assets, and increasing the burden of agricultural labour as men migrate to find work.¹⁸

Growing time pressures can mean women, especially those from poor households, are unable to participate in community-based climate adaptation initiatives or may reject practices that increase their labour burden.¹⁹ Additional obstacles to women taking up new technologies or participating in initiatives may arise in the form of insecure land tenure and their routine exclusion from agricultural extension and training services, and policy and decision-making processes both at household and community level.

Ensuring sustainability: uptake of communal land management practices, as part of a climate-resilient agriculture programme, may represent some sacrifices for individuals, in terms of labour contribution. Within a poor household, the decision of whether to adjust technology or techniques deployed on an individual farm is often fraught with difficulties. Cash may not be available to make upfront investment in inputs. Unless inputs are 100 percent subsidised, the risk of crop failure may discourage uptake by risk-averse farmers. There is always a risk that inputs may not be

100 percent successful or may be less profitable than the farmer's previous cropping arrangements. This underpins the importance of a solid evidence base and participatory process for introducing new inputs or techniques.

Any subsidy introduced would need to have a long-term financing strategy, whether through market mechanisms or public funding. It is important to undertake a thorough cost-benefit analysis at farm level to ascertain whether farmers are being asked to make economically rational decisions. Programmes have many options to overcome these concerns but they can only be used if development programming understands them well enough. Sometimes communal action, for example at cooperative level, to invest in storage or sell in bulk to get better prices, may help farmers to adopt a slightly riskier but potentially more productive pathway.

Climate into focus and in perspective: ways to integrate climate risks into development programming for smallholder farming

Smallholder farming households are particularly vulnerable to climate risks due to exposure to chronic food insecurity, poor access to formal safety nets and high reliance on climate-dependent agriculture. Development programmes to support smallholders can operate in different ways and take different entry points, depending on the scale of intervention desired. A range of development programming options, entry points and target groups are set out in Table 1.

The options for programming are grouped according to livelihood trajectories of smallholder households. Programming options are provided for groups at the following levels: household, watershed, local agricultural system and agriculture sector/national.

Support targeted at households

i. Households dropping-out of agriculture

Climate risk management strategies for households that are dropping-out of agriculture include adaptive social protection²⁰ measures through public works programmes and cash transfer schemes. A forthcoming technical note will provide more detail on ways to assess links between social protection and climate adaptation.²¹

ii. Households seeking to step-up

These households are the principal focus of this guidance note. Options for integrating climate risks into development programming for this group include:

- Multi-stakeholder climate risk assessment involving communities, government and possibly private sector, for collective action.
- Farmer-led and iterative promotion and development of appropriate technologies and techniques. This should reflect existing resources available to farmers, reflect the needs and realities of women farmers, and be adapted to the local agro-ecological and economy context.
- Engagement of farmers and their organisations, particularly women farmers, in local climate adaptation processes.
- Innovative financial and insurance services in support of climate adaptation.^{22,23}

iii. Households stepping-out of agriculture

Stepping-out of agriculture is happening across the developing world and reflects what has happened to farming-based livelihoods in the global North, including Ireland, over generations. Here, interventions are only appropriate when the decision to step-out is made by the households themselves. Interventions include:

- Education and training for non-farm employment.
- Supported migration to urban centres and other agricultural areas with greater profit potential.
- Flexible arrangements for land transfer e.g. so land can be capitalised on and/or passed onto members of extended family that stay in agriculture.

Climate-resilient agriculture interventions at entry points beyond household level

Watershed level: here it might be appropriate to support land/soil carbon management (including land restoration) and enhance water availability for increased productivity. Successful watershed management interventions can have a transformational impact on the productivity of individual farms, as Irish Aid's experiences in Tigray, Ethiopia, bear out.²⁴ At a wider landscape level,

Table 1: Options for integrating climate risk management at different levels of development programming

Levels	Level description (current status)	Pressures/shocks	Responses by stakeholders	Development programming opportunities that integrate climate risk management
Farm/ household level	Highly differentiated Complex, diverse and risk prone	Socio-economic and environmental shocks, cycles and trends	Dropping-out	Adaptive social protection — Public Works Programmes, Cash Transfers etc.
			Hanging-in to stepping-up	Participatory and gender-sensitive development of climate-resilient agricultural technologies Engagement of farmers' organisations (especially women) in adaptation processes Innovative financial services to support climate adaptation
			Stepping-out	Education and training for non-farm employment — especially for youth Supported migration to areas with greater employment opportunities Flexible arrangements for land transfer
Local administrative unit/market level	Highly differentiated Complex, diverse and risk prone	Socio-economic and environmental shocks, cycles and trends	Invest in systems	All-weather communications infrastructure Landscape level investments in water resources, soil conservation, afforestation Climate information services Weather indexed crop and/or livestock insurance
Watershed and local agro-ecosystem	Complex, differing levels degradation	Local over exploitation, climate stresses	Promotion of integrated landscape level management	Participatory watershed management Terracing, soil and water conservation, afforestation Link to Public Works Programme
Agriculture Sector and national	Agriculture-based Transforming Transformed	Internal/external food commodity demand Erratic input and commodity prices	Prioritise national food security	Investment in climate-proofed infrastructure Climate-resilient agricultural R&D and extension, smart subsidies
			Promote market access for smallholder farmers	

this can be complemented by soil conservation or afforestation, for example.

Local agricultural systems level: here appropriate investments might include investments in all-weather communications infrastructure, transport infrastructure, post-harvest storage and handling technology, and targeted training of agricultural extension officers. The entry point could be local government programmes or through local cooperatives. In the case of the latter, good practice exists using local cooperatives to ensure sustainable supply of agricultural inputs or savings schemes that help smallholder farming households manage disruptions to their cashflow. Interventions should be informed by multi-stakeholder conflict risk assessment.

Agriculture sector/national level: investments in national meteorological services can improve the quality of climate and weather information, and public or private sector mechanisms for transmitting that information, targeting smallholder farmers.²⁵ Investments in climate-proofed infrastructure related to agriculture markets and communications have also been effective, as well as climate-resilient agricultural R&D and extension.

Timeframes and measuring success

Many measures of success in climate-resilient agriculture will, by definition, emerge over longer-term horizons than the typical three-year project cycle. Physical changes in soil organic matter, ability of a household to accumulate savings and number of growing seasons required to embed a new technique or technology, all take time. It is important that climate-resilient agriculture programming can continue to support smallholder farmers in their basic needs while they wait for investments to pay off.

Measuring the success of adaptation interventions is also a challenge, because it is effectively an attempt to measure something that has *not happened*. Here the TAMD framework,²⁶ developed by IIED and usefully applied in Kenya, Tanzania and Mali, has proven a helpful way to track developmental outcomes, while also assessing wider institutional and societal capacity to withstand, and recover from, climate shocks or stresses.

Conclusions

Smallholder farming is the mainstay livelihood of many of the poorest households in Irish Aid's key partner

countries. Climate risks to smallholder farmers threaten these people with food insecurity, poor nutrition and poverty. Women-headed, agriculture-dependent households are particularly vulnerable.

In line with the Irish government's international development policy objective of *reduced hunger, stronger resilience* through priority areas for action on *global hunger* and *climate change and development*, Irish Aid's development programming will continue to integrate climate risk management. Our focus will remain on how smallholder farmers move from hanging-in, coping with climate risks, to stepping-up — and adapting to climate risks. We also recognise that some households will face beyond-threshold climate risks. For those households that have sufficient resources, stepping-out of agriculture may be the best strategy to take. In line with Ireland's commitment to targeting the most vulnerable, we strive to ensure that those households that are dropping-out will have their needs met through social protection schemes and aim to make those schemes responsive to climate factors.

At the watershed level, land and water management will be a priority for sustaining food production systems in the long term. At the local agricultural system and agriculture sector/national levels, investments in climate-proofed infrastructure related to agriculture markets and communications have been effective, as well as climate-resilient agricultural R&D and extension.

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Notes

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- ²² See for example: <http://pubs.iied.org/G04103>
- ²³ See for example: www.iied.org/insuring-against-climate-risk-kenya
- ²⁴ See: www.climatelearningplatform.org/irish-aid-climate-change-and-development-learning-platform-tigray-case-study-final-report
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