



The nutrition advantage

Harnessing nutrition co-benefits of climate-resilient agriculture

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of climate-resilient agriculture**

“Climate, the environment and nutrition are fundamentally interlinked. What we eat depends on what can be grown on land facing degradation and in a changing climate. And what we eat conditions the land and the climate. This is why we need to accelerate our work and learn how to address both better. Not only this, but we also need to go for solutions that integrate gender and youth dimensions if we are to achieve the transformations we need.”
Gilbert F. Hounbo, President, IFAD

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Cover photograph: ©IFAD/N. Hertweck. Soum Son Seun Jai adopted a multisectoral approach to tackle food and nutrition insecurity. This means delivering at the same time and to the same child a package of high-impact interventions that range from agriculture to health, water, sanitation and hygiene (WASH) and education. Lao People’s Democratic Republic – Soum Son Seun Jai – Community-Based Food Security and Economic Opportunities Programme (December 2015).

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Abbreviations

ASAP	Adaptation for Smallholder Agriculture Programme
ASHA	Adaptation for Smallholders in Hilly Areas
CCAFS	CGIAR Research Program on Climate Change, Agriculture and Food Security
CGIAR	<i>formerly</i> Consultative Group on International Agricultural Research
FAO	Food and Agriculture Organization of the United Nations
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
KAP	knowledge, attitudes and practices
PRAREV	Programme to Reduce Vulnerability to Climate Change and Poverty of Coastal Rural Communities (Djibouti)
PRIDE	Programme for Rural Irrigation Development (Malawi)
PRODEFI	Inclusive Value Chain Development (<i>Projet de développement de filières inclusives</i>) (Mauritania)
UNICEF	United Nations Children's Fund
WFP	World Food Programme



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Introduction

Climate change and malnutrition are among the greatest problems in the twenty-first century; they are “wicked problems”, difficult to describe, with multiple causes, and no single solution. The impacts of climate change have become evident in crop, livestock and fisheries systems, threatening all aspects of food security, including access, utilization and price stability (Porter et al., 2014). On the other hand, malnutrition, including undernutrition, overnutrition and micronutrient deficiencies, is having devastating impacts on global health and economy. In this report, we examine how investments in climate-resilient agriculture can be leveraged not only to deliver benefits to secure food security under a changing climate, but also to contribute to efforts to eradicate malnutrition.

The climate change challenge in agriculture

Agriculture is the sector that will be most affected by climate change. The Fifth Assessment Report of the Intergovernmental Panel on Climate Change stresses that climate change impacts have become evident in crop, livestock and fisheries systems (Porter et al., 2014). These impacts are being felt in the context of increasing pressure on the sector to ramp up production to feed a growing population. It is estimated that 60 per cent more food will need to be produced by 2050 (Alexandratos and Bruinsma, 2012) to feed a population of 9 billion. At the same time, the sector is a key contributor to climate change, with food systems contributing up to a third of global emissions (Vermeulen, Campbell and Ingram, 2012).

Researchers estimate that in order to meet the global target of limiting warming to 2° C, the sector will need to reduce emissions by 1 gigatonne of carbon dioxide equivalent per year (GtCO₂e/yr) by 2030 (Wollenberg et al., 2016). In addition to climate change, agriculture is also faced with other environmental challenges, such as land degradation, biodiversity loss, and water pollution and depletion.

The nutrition challenge

Malnutrition affects an individual's physical and intellectual capacities, leading to a loss of earnings and lower income for the household and, ultimately, the nation. Poor nutrition contributes to poor health, and can increase death and disease from communicable and non-communicable diseases such as heart disease and diabetes. Unforeseen health costs, or even just trying to access health services, can create serious problems for a poor family. Health-related expenses may force a household to tap savings, sell assets or go into debt, inevitably pushing the household further into poverty. Government expenditures on health services will also increase as a result. Malnourished individuals also lose years of schooling and have reduced capacity for labour, meaning that they may lag behind in terms of learning as well as productivity.

The climate change and malnutrition nexus

Climate change impacts in agriculture and malnutrition challenges are deeply intertwined. On the one hand, nutrient-rich foods are particularly susceptible to climate change impacts such as droughts, pests, diseases and temperature change, thus affecting the availability and accessibility to nutritious foods. On the other hand, the effects of malnutrition, including lower incomes and financial assets, lower physical capabilities and reduced intellectual capacities, make livelihoods more vulnerable under climate change. The nexus of climate change and malnutrition intensifies in vulnerable regions, such as sub-Saharan Africa and South Asia; regions which face the most severe impacts of climate change also have the highest burdens of malnutrition (Global Panel on Agriculture and Food Systems for Nutrition, 2015). The international community has called for urgent actions to tackle these twin challenges; for example, the Rome Declaration on Nutrition (Second International Conference on Nutrition, 2014) calls for actions to tackle the impacts of climate change on nutrition, including in various aspects of the food system. The Global Panel on Agriculture and Food Systems for Nutrition has appealed for measures to improve climate change resilience and the nutritional value of agricultural products across the value chain.

The changes that are required can affect the incomes of smallholder families, and may require changes in production, storage, processing and marketing that smallholders and other market actors may have difficulty achieving alone. Results of such changes also tend to appear over the long term, which is challenging for smallholders. Promoting diversified, climate-smart food systems that take nutritional considerations into account can help smallholders to be more resilient, provide more stable incomes and improve dietary quality, while at the same time addressing climate change (IFAD, 2015a).

Harnessing nutrition co-benefits of climate-resilient agriculture

Globally, investments in climate action in agriculture are scaling up rapidly, taking cognizance of the challenges faced by the sector. In this context, there is an opportunity to integrate nutrition considerations into climate actions, ensuring that in addition to climate benefits these investments also deliver nutrition-related benefits. The International Fund for Agricultural Development (IFAD) has established the Adaptation for Smallholder Agriculture Programme (ASAP), a US\$285 million programme, which is the world's largest source of climate change adaptation funding for smallholder farmers, with support from multiple donors. A key partner for IFAD is the Global Environment Facility, which cofinances the Niger-based project mentioned below, as well as including the Fisheries Resources Management Programme in Eritrea, which has been classified as "nutrition-sensitive" by IFAD. In this report, we examine how such climate change adaptation projects, designed to deliver climate change adaptation benefits, also deliver nutritional benefits and set out a way forward for maximizing such benefits.

Box 1: IFAD's renewed commitment to nutrition

As part of its renewed commitment and in response to increased global attention to the importance of nutrition, in 2015 IFAD endorsed an Action Plan to mainstream nutrition-sensitive agriculture. The Action Plan explains how IFAD will work to achieve the following strategic outcomes:

1. Nutrition-sensitive projects shape agriculture and food systems in ways that contribute to nutritious diets.
2. Projects promote behaviour change communications and related nutrition education to improve food choices and preparation and post-harvest practices.
3. Projects promote the equality and empowerment of women in ways that help them improve nutrition for themselves, their children and their families.
4. Activities in policy engagement, advocacy and partnerships, as well as research and knowledge management, contribute to better nutrition governance, a supportive enabling environment for more effective projects.

IFAD is not new to either climate-resilient agriculture or to nutrition-sensitive programming. Improving the nutritional level of the poorest populations in developing countries is a principal objective of the Agreement Establishing IFAD. In recent years, as the impacts of climate change and environmental degradation have become additional stressors in development programmes and budgets, IFAD has systematically scaled up and mainstreamed actions to improve climate risk management and more sustainable environmental and natural resource management throughout its portfolio. With regard to nutrition-sensitive programming, IFAD has become more systematic in mainstreaming nutrition-related activities into its work (see Box 1). These efforts have been supported through strategic knowledge partnerships, such as with the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) and the CGIAR Research Program on Agriculture for Nutrition and Health, or A4NH.

Such efforts have helped IFAD to better understand the multiple dimensions of nutrition and food security in development programmes. IFAD now embraces a broader approach to tackling malnutrition, which takes into account other dimensions affecting people's nutritional status, including climate change.¹ Encouragingly, preliminary findings from an ongoing review by IFAD's nutrition team indicate that out of 37 projects classified as "nutrition sensitive" according to rigorous criteria in line with the Nutrition Action Plan, 13 projects (over a third) benefited from financing from ASAP and several others from the Global Environment Facility financing (GEF), while still others were climate sensitive as well as nutrition sensitive but did not draw on climate finance.

For example, in Sudan, in response to climate change impacts on water availability, the IFAD-supported Gash Sustainable Livelihoods Regeneration Project focused on irrigation and governance of vulnerable land and water resources. Complementary training on nutrition and food processing has allowed women to learn about the nutritional benefits of less commonly consumed foods, such as vegetables, eggs and milk. They learned how to prepare dishes with high nutritional value and the importance of good hygiene – and their diets became more diverse (IFAD, 2014a). In Niger, in response to a harsh climate and land degradation, IFAD's Family Farming Development Programme works with women's groups to increase the availability of staple foods during the lean season and the production of foods with high nutritional value. Behavioural changes in food, nutrition and hygiene and training in cooking to promote high nutritional values are also emphasized. Grain stores for women and "nutrition gardens", as well as kits to increase access to foods with high nutritional value such as *moringa oleifera* and *cassia tora*, also help to promote resilience to climate shocks.

1. This is underpinned by the conceptual framework for the causes of malnutrition developed by the United Nations Children's Fund (UNICEF, 1998) and global initiatives, such as the Global Panel on Agriculture and Food Systems for Nutrition, in line with IFAD's mandate.

An integrated approach towards climate change, environmental sustainability, nutrition and gender

While the focus of this report is on the nutrition co-benefits delivered by investments in climate-resilient agriculture, there is an opportunity to make explicit links between the adaptation of agricultural systems to climate change, the environmental sustainability of farming systems, and nutrition-sensitive and gender-inclusive development. Such an integrated approach to development programming can support rural transformation in response to climate change impacts and environmental degradation, taking into account the changes to food consumption patterns and traditional gender roles.

IFAD's actions will focus primarily on the contributions that climate-resilient agriculture and food systems can make to improved nutrition, environmental sustainability and gender equality. To ensure investments have a positive impact in these areas, investments at IFAD need to have explicit objectives, activities and indicators, with identification of a clear "impact pathway" – from production to consumption. A key issue affecting this impact pathway is the extent to which climate change and environmental sustainability issues are affecting nutrition-relevant actions and outcomes along the pathway, changing gender roles, raising new challenges for natural resource management, and causing changes in crops, livestock and fish production, processing, storage, marketing and ultimately in consumption (IFAD, 2015a).

Entry points for harnessing nutrition benefits of climate-resilient agriculture

Based on IFAD's experience in harnessing co-benefits for nutrition within climate-resilient and environmentally sustainable agriculture projects, we have developed a series of entry points that can deliver co-benefits.

Table 1. Potential entry points for harnessing nutrition benefits of climate-resilient agriculture

Climate-resilient and environmentally sustainable agriculture actions		
Nutrition entry points	Crop diversification	Climate-resilient food production systems
Objective: Nutrition-sensitive projects shape agriculture and food systems to contribute		
Opt for nutritious as well as resilient commodities (crops, fish and livestock), as related to the nutrition problem – generally more fruits and vegetables and fish and other animal-source products	✓	✓
Promote production systems that are environmentally friendly, sustainable and resilient, for example, through greater diversification of commodities or intercropping, leading to more diverse food choices in the food system and therefore improved diet quality	✓	✓
Opt to incorporate local, traditional, and frequently neglected and underutilized species, which can have more local acceptance as well as being more nutritious, more environmentally friendly, and better adapted to local agroecological conditions	✓	✓
Promote multifunctional water use, including for kitchen gardens and better household hygiene and sanitation		✓
Support producer households to diversify livelihoods from production in ways that promote climate change resilience/mitigation, as well as promote nutrition outcomes such as moving up the value chain and into processing and marketing		
Objective: Projects promote behaviour change communication and related nutrition education		
Target women and men to increase demand and promote appropriate consumption among producers and consumers, particularly of crops, fish and livestock with the greatest climate/nutrition payoffs		✓
Integrate nutrition considerations and awareness into climate-smart agriculture extension and advisory services		✓
Include local varieties, foods, customs and practices in extension and advisory services for men, women and youth		
Communicate appropriate messages on water use for food safety and hygiene at the farm and household level, including conservation, waste, re-use and recycling		
Promote expenditure of income from diversified and off-farm activities in ways that improve nutrition (e.g. healthy diets and sanitation)		

	Sustainable fisheries	Climate-resilient value chain development	Indigenous adaptation	Water management	Livelihoods diversification
to nutritious diets					
	✓	✓			✓
	✓	✓		✓	✓
			✓		
				✓	
		✓			✓
to improve food choices and nutrition-enhancing preparation and post-harvest practices					
	✓				
	✓	✓			
			✓		
				✓	
					✓

Table 1. Potential entry points for harnessing nutrition benefits of climate-resilient agriculture (continued)

Objective: Projects promote equality and empowerment of women in ways that improve nutrition		
Increase women's voice and capacities for commodity selection, production and natural resource management, transformation, marketing and consumption		✓
Build on women's and men's unique knowledge of local varieties for climate resilience as well as nutritional benefits		
Promote practices and technologies to reduce women's time and energy deficits in accessing safe water		
Ensure women have voices, resources (e.g. financial) and capacities to develop diversified activities suitable for them and do not exacerbate time and energy deficits		
Objective: Policy engagement, advocacy and partnerships, and research and knowledge environment, and projects that improve nutrition at global and country levels		
In climate policies, seek to use an approach that encourages multifunctionality, particularly resilient production, marketing, transformation and consumption of a variety of nutritional foods	✓	✓
Support effective development and implementation of multisectoral, multilevel approaches that bring nutrition, production, natural resource management and climate change together in a gender-sensitive way		✓
Support research and knowledge management to learn from experiences and improve implementation of projects with nutrition-climate change synergies		✓
Support research on local practices and varieties on how they contribute to nutrition (e.g. nutritious varieties), climate change adaptation/mitigation, and natural resource management		✓
Promote discussion among stakeholders about importance and potential of local varieties, customs and practices – encourage public policies to support use of climate-smart, nutritious varieties (e.g. public purchasing programmes)	✓	✓
Advocate for both nutrition and climate resilience/mitigation outcomes in water management policies		

	✓	✓	✓	✓	✓
			✓		
				✓	
					✓
management contribute to a more supportive nutrition governance, an enabling					
	✓	✓			✓
	✓	✓		✓	
		✓			
		✓	✓	✓	
		✓	✓		
				✓	



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Case studies

This section presents five IFAD investments as part of the ASAP programme that integrate nutrition dimensions in different ways and in different contexts. The case studies below are the result of a rapid review to identify good practices and potential entry points for nutrition in IFAD projects, which focus on climate resilience and environmental sustainability. As well as representing work from different regions, they were also selected according to key thematic focus areas of IFAD's work in climate change: (i) indigenous climate adaptation approaches; (ii) sustainable fisheries; (iii) water management; (iv) climate-resilient value chains; and (v) diversified crops and food systems.

Livelihoods diversification is also a key thematic area, as shown above, and runs through a number of the case studies. A key impact pathway here has to do with stepping up behaviour change communications² so that families make better food choices with increases in earned income. Although there is no dedicated case study in this report, nutrition education features in the Djibouti, Malawi and Mauritania case studies. It is also one of the likely entry points for the Nepal project, which is starting up.

Indigenous climate adaptation approaches and nutrition

"An intricate relationship is shared between the indigenous peoples and the ecosystems where they have thrived for thousands of years. They depend on these diverse ecosystems for their nutritional, economic, cultural, social and spiritual existence" (Tebtebba Foundation, 2009).

2. Henceforth referred to as "nutrition education", noting that IFAD promotes two-way and change-oriented communication rather than simply giving people information.

IFAD has long promoted indigenous knowledge, including in climate change adaptation for food security and nutrition. It also recognizes that many of the world's poorest people are indigenous peoples. Even though in many cases they suffer from economic and social marginalization, their traditional livelihood systems, including food cultures, are under increasing threats from many sources, including climate change. The Bolivia case study is an example of how IFAD is working with indigenous communities to harness their unique knowledge to protect their staple food, the potato. For example, the project is also building on local agrobiodiversity and diversification as a climate change adaptation measure to promote home gardens that include local horticultural and medicinal plant species and communal seed banks to be used and exchanged between families, thus increasing resilience and delivering nutrition benefits to indigenous communities.

Sustainable fisheries

Fish products are essential for food security and nutrition, and aquaculture is the fastest growing food sector in the world (FAO, 2014). Fish already provides essential nutrition for 3 billion people, including 50 per cent of protein and essential minerals for 400 million people, mainly in poor countries. Small-scale fisheries and aquaculture are major sources of employment and self-employment in developing countries; women account for more than 15 per cent of all those directly engaged in the fisheries primary sector and up to 90 per cent in secondary activities such as processing and marketing (FAO, 2014). Under climate change, aquaculture and capture fisheries are important adaptation measures which can help provide sustainable sources of protein (Dinesh, 2016), and well-managed fisheries can also contribute significantly to reducing greenhouse gas emissions.

Unfortunately, poor management and weak governance have contributed to overfishing and environmental degradation globally, and this degradation is compounding the damages from climate change impacts. In 2011, it was estimated that almost a third of marine fish stocks were overfished and 61.3 per cent were fully fished at their biological limits (FAO, 2014). This damage to fish stocks, combined with pollution, unplanned coastal development, upstream water use, destruction of mangroves and other forms of environmental degradation, enhances the potential for and the magnitude of negative climate change impacts (Perez et al., 2013 in IFAD, 2015c).

The Djibouti case study shows how IFAD is taking an ecosystem approach to restore degraded mangroves, protect fish stocks, and create employment opportunities for women and youth that directly contribute to improved nutrition and climate change adaptation outcomes.

Water management

The inability of the ecosystem to meet demands for water, or water stress, is one of the most common impacts of climate change and land degradation. Without adequate water, some of the most commonly proposed solutions to improve nutrition, such as homestead gardens and diversification of production to include livestock or fish, would not be feasible. With a limited water supply, smallholders may barely be able to produce enough to eat, let alone sell for income. Agriculture is already the biggest consumer of water, accounting for 70 per cent of global water withdrawals (UNW-DPAC, 2011). In this context, adaptation measures need to work at multiple levels (farm level, irrigation system or catchment level, and national or river basins planning level) to improve water use efficiency (Dinesh, 2016).

IFAD works through various context-specific approaches to maintain access to water for smallholders under a changing climate. The case study in Malawi shows how IFAD has tried to integrate solutions for ensuring a reliable water supply for both rainfed and irrigated production with a strong nutrition focus. In Guatemala, another initiative implemented by the social arm of the national coffee producers' association supported school vegetable gardens using various micro-irrigation techniques. Commercially available kits, intended for plots as large as 600 square metres, were adapted for much smaller plots, making them more suitable for smallholders. This support was complemented by training in preparing organic fertilizers and pesticides and training in nutrition, health and hygiene for a comprehensive and successful approach to improving food security of the target communities.

Climate-resilient value chains

According to the Food and Agriculture Organization of the United Nations (FAO), a food value chain consists of all the activities undertaken by stakeholders who participate in the coordinated production and value-adding activities needed to make food products, from inputs to consumption (FAO, 2014). Climate change can have major impacts on different aspects of this value chain; therefore, efforts to enhance climate resilience involve identification of key climate risks and undertaking efforts to target those most vulnerable to climate risk (Vermeulen, 2015). Nutrition-sensitive value chains specifically “leverage opportunities to enhance supply and/or demand for nutritious food, as well as opportunities to add nutritional value (and/or minimize food and nutrient loss) at each step of the chain, thereby improving the availability, affordability, quality and acceptability of nutritious food” (FAO, IFAD, WFP, with Bioversity and IFPRI, 2017). In the context of changes to the food production environment due to climate change and population growth, it is vital to incorporate sustainability and resilience in a value chain approach for lasting impacts on nutrition (IFPRI, 2015a).

IFAD has already been working to improve climate resilience of value chains,³ and its project in Mauritania, Inclusive Value Chain Development (PRODEFI), is an example of how IFAD also took on the challenge of further adding a “nutrition lens”, drawing on in-house and national nutrition expertise as well as global thinking.

3. See “How to do climate change risk assessments in value chain projects”. (IFAD, 2015d), a result of IFAD's collaboration with the CGIAR to promote the application of a climate lens in IFAD investments.

Diversified crops and food systems

Diversifying crops and food systems offers various ways to improve nutrition as well as support climate change adaptation. In the context of climate change adaptation, diversification includes: (i) diversification at the farm level through cultivation of multiple species; (ii) introduction of better adapted species and crop/livestock varieties; and (iii) integration of trees and shrubs into production systems (López Noriega et al., 2017). Ensuring that diversification strategies also take into account the nutrition benefits can help deliver nutrition outcomes in addition to building resilience. Benefits of diversification include economic benefits, improved household food security, higher crop yields, and environmental sustainability benefits. In the Sahel, IFAD has been promoting agroforestry systems with woody species that bring multiple benefits. For example, baobab leaves and fruit offer high-quality nutrition, and *Vitellaria paradoxa* (shea nut) provides highly nutritious fruit that boosts food supply, at least in terms of micronutrients, in the lean period. In Nepal (see case study), IFAD is working to integrate a nutrition focus into a project that has just started and where a detailed study will help identify entry points.



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Bolivia: Indigenous climate adaptation approaches and nutrition

Key facts

Project name	Economic Inclusion Programme for Families and Rural Communities in the Territory of the Plurinational State of Bolivia (ACCESOS) with funding from ASAP
Development goal	Greater resilience of target communities, including greater protection of people and their productive activities from the impacts of climate change
Dates	2014-2017
Target groups	Vulnerable communities in Chuquisaca, Potosí and Tarija



Development challenges

Nutrition

A baseline survey for the project found the following prevalences of child undernutrition (children under 5 years of age):

- Percentage of children with low height-for-age (stunting): severe malnutrition 17 per cent and moderate malnutrition 19 per cent
- Percentage of children with low weight-for-height (wasting): severe malnutrition 6 per cent and moderate malnutrition 12 per cent
- Percentage of children with low weight-for-age (underweight): severe malnutrition 7 per cent and moderate malnutrition 15 per cent

Women's malnutrition is also of concern. The design report of the project noted that women have heavy workloads, and therefore need more energy – but cultural practices mean that they miss out on precious calories as they prefer to give up food so that their families can eat better.

Climate change

Water is increasingly scarce, and keeping livestock alive is now getting difficult. In addition to the immediate nutrition impacts of losing out on meat and milk to eat or sell, related complications include a lack of manure, which communities normally use as a natural and very effective fertilizer. As most smallholders simply do not have access to commercial fertilizers (and likely not organic fertilizer either), climate change means that without livestock manure they are also finding that other crops are not growing as well. This includes crops like the staple potato, once the pride of the project area in terms of variety and a rich source of nutrients. Families cannot grow enough potatoes to feed themselves, let alone to sell.

Expected impacts

Nutrition

The overall nutrition indicator for the goal of the project is the reduction of child malnutrition by 30 per cent, and specifically:

- Percentage of children with low height-for-age (stunting): severe malnutrition reduced to 11.9 per cent and moderate malnutrition reduced to 13.3 per cent
- Percentage of children with low weight-for-height (wasting): severe malnutrition reduced to 4.9 per cent and moderate malnutrition reduced to 10.5 per cent
- Percentage of children with low weight-for-age (underweight): severe malnutrition reduced to 4.2 per cent and moderate malnutrition reduced to 8.4 per cent

Climate adaptation and environmental sustainability

These include:

- Some 74 georeferenced community “talking maps” have been developed that include indigenous practices for adaptation and science-based approaches.
- At least 11,000 families receive technical support through *concursos* (see below) to adopt climate-resilient practices and technologies, reduce losses and improve food security.
- Around 6,000 hectares of land are preserved or restored to increase resilience and reduce climate risk based on the *concursos* approach.

The project has a strong gender focus; for example, out of the total number of families with increased capacities to recover and manage natural resources as well as increased assets, over half are to be headed by women.

Project approach to achieve expected impacts

Nutrition

The project was designed with food security and nutrition in mind. The main approach corresponds to IFAD’s nutrition strategic outcome to increase the availability of nutritious and diverse foods in local and broader food systems despite the negative impacts of climate change on soil quality and water availability. Because this is a potential direct effect of the project, IFAD will consider incorporating related indicators into similar projects in the future, given that the present project’s potential contributions to reducing child malnutrition are less direct. Future projects with a similar focus could also make the “impact pathway” stronger by including activities to improve child malnutrition, such as nutrition education and non-food approaches including water and sanitation. Better nutrition for the community is also a criterion for selecting which community climate-resilient proposals are financed (see below).

Climate change and the environment

A component on capacity development for community adaptation has been strengthening community capacities in terms of awareness about climate change issues and supporting communities’ adaptive capacity. This includes identifying and disseminating knowledge and experiences about indigenous adaptation practices, which have potential for replication. Georeferenced “talking maps”, a visual and inclusive form of natural resource mapping that is especially suitable in areas with low literacy, have been bringing together science and traditional community knowledge to identify key issues as well as adaptation techniques and priorities.

These efforts led to an inventory of options for financing, and funding is released through a system of local competitions, or *concursos*, which has already been tested in other IFAD-funded projects. *Concursos* have proven to be a successful mechanism to encourage communities to engage in natural resource management. With support from the programme to ensure the equal participation of community members including women, communities are encouraged to decide on their own priorities for funding, according to various criteria that are also agreed with them. These criteria include social criteria, and specifically “contribution to improvements in community health, nutrition and education”.



Available at www.ifad.org/topic/r4c/tags/climate_change/bolivia/588316.

Chairo soup is one of Bolivia's traditional dishes, but the climate is threatening the potato, a key ingredient. IFAD is trying innovative ways to bring home the reality of climate threats to food security and nutrition through ASAP – but behind this video is a report by CCAFS that takes a critical look at the IFAD approach to protect potato cultivation from climate change.

A short documentary produced by IFAD shows an example of how the project has been supporting one Bolivian village, whose main water source had dried up. As their potato yields have fallen correspondingly, many young people have left the village in search of work. The documentary *Bolivia: Potatoes in Peril* examines how the project is working with the village to construct irrigation canals and develop new irrigation techniques that can ensure the future of the potato crop there. A technical report by CCAFS (CCAFS, 2015) also examines the assumptions on which IFAD has based the climate change strategy and validates IFAD-identified climate threats to potatoes (increased temperatures, changes in growing seasons, increased incidence of extreme weather events) and solutions (introduction of more appropriate and hardy varieties of potatoes, and more sustainable practices with yields maintained or even increased). However, the report also adds further suggestions for consideration.

ACCESOS-ASAP has been building on this mechanism to embed community-driven adaptation priorities into local planning. The project has also been encompassing proposals to diversify local economies through complementary environmentally friendly activities like rural tourism, which allows households to buy what they do not grow.

ACCESOS-ASAP is also building on local agrobiodiversity promotion and diversification as a means to adapt to climate change. Building on traditional agroecosystems, such as the *aynokas* (vertical sections of the watershed in which each year a different crop is communally grown) and the *sayanas* (family lands usually close to the houses used by the families to complement the production of the *aynokas*), the project is promoting and developing home gardens that include local horticultural and medicinal plant species and communal seed banks to be used and exchanged between families.

Looking to the future, Bolivia is one of three countries to benefit from an IFAD grant to the International Potato Center to strengthen the income, food security and climate resilience of small potato producers.⁴ Although not explicitly part of the scope, IFAD could start to integrate the nutrition dimensions of this and similar research into the project.

Originating in the Andes, over 4,000 varieties of potato are grown in Bolivia. A combination of irrigation canals and improved soil and water management, drawing on indigenous techniques and blending with modern ones, is set to improve the food and nutrition security of Francisco, a project beneficiary, in this ASAP-supported community.



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3. Details at: www.ifad.org/where/region/operations/tags/pl/bolivia/17189915



©IFAD/Franco Mattioli

Djibouti: Sustainable fisheries for blue growth, micronutrients and more

Key facts

Project name	Programme to Reduce Vulnerability to Climate Change and Poverty of Coastal Rural Communities (PRAREV) ⁵
Development goal	Increase incomes, enhance food security and reduce vulnerability for smallholders
Dates	2015-2021
Target groups	Smallholder farmers and fishers, particularly women and young people



5. Programme d'appui à la Réduction de la Vulnérabilité dans les Zones de Pêche Côtières.

Development challenges

Nutrition

In project areas, the prevalence of wasting in children under 5 was estimated to be between 10.7 and 21.4 per cent in December 2013, while stunting was between 37 and 63.5 per cent (UNICEF, 2013).

The baseline study for this project also examined the accessibility and quality of household food consumption, including dietary diversity. This was done by looking at the number of food groups consumed in the previous seven days and also the number of days that a particular food group was consumed. Diets were found to be lacking in diversity, and families were mainly eating cereals, with few other food groups like vegetables and animal proteins consumed in the previous seven days. Household food consumption varied greatly by location and education levels, with coastal rural areas seeing 13.4 per cent compared to 7.6 per cent in coastal urban settlements. The Tadjourah region fared worst, with the lowest prevalence of households with adequate diets. Higher education levels were linked to better nutrition.

Climate change and the environment

An ASAP-supported vulnerability assessment used the “coastal hazard wheel” to identify challenges.⁶ Key findings indicate that large stretches of the coastline face significant ecosystem disruption, mainly related to coral reefs and mangroves. Other stretches are exposed to gradual inundation and saltwater intrusion.

But climate change is affecting water temperature and ocean currents, which adversely impact fish stocks. The rise in sea temperature is causing fish migration further from the coast. Fishers do not have the equipment and skills to maintain their incomes and food security from this sector. Ecosystems and coastal habitats such as coral reefs and mangroves, which are vital for fish stocks, show considerable degradation. Furthermore, sea level rise and extreme weather events, such as storms and floods, are impacting coastal infrastructure, including production and post-production equipment. Extreme erosion of the coast is also a challenge. Mangroves are also under threat, with fewer than 15 per cent of those interviewed in the project baseline feeling responsible for their protection, and even fewer people feeling responsible for the health of coral reefs. Sea level rise and extreme weather events, such as storms and floods, also damage coastal infrastructure including production and processing equipment for fish.

All these have serious consequences and fishers lack the equipment and skills to keep up with the increasing challenges in obtaining good catches.

Expected impacts

Nutrition

The project aims to contribute to a reduction in child malnutrition in project areas and specifically to increase the availability of fish as a nutritious food, increase incomes so that people can afford better foods more regularly, as well as empower

6. See “Application of the Coastal Hazard Wheel Methodology for Coastal Multi-Hazard Assessment and Management in the State of Djibouti” (L.R. Appelquist and T. Balström, 2014).

women through the income obtained from selling the fish and greater knowledge of fish as part of a healthy diet. One of the related project expected results is credit for fishers and fish sellers to buy fishing boats, marketing equipment and fish sales kits. Related indicators are: (i) the number of women benefiting from a loan to buy tricycle carts with cooling equipment; and (ii) the number of people benefiting from a loan to buy fish sales kits and other equipment. These results relate to making fish more accessible to local communities.

Climate adaptation and environmental sustainability

- Local communities trained and organized to carry out more climate-resilient activities and natural resource management
- Fishers have access to climate-resilient infrastructure
- Mangroves rehabilitated and 100 square kilometres of coral reefs protected
- Increase in cubic metres of freshwater per day mobilized to meet the needs of communities affected by climate change
- Climate change adaptation strategies integrated into three national policy areas (poverty reduction strategy, national adaptation programme and fisheries policy)

Project approach to achieve expected impacts

Nutrition

As mentioned above, the project is taking the “food availability and accessibility” and “affordability” pathways to improve the nutritional situation of people living in the project area, as well as that of empowering women in ways that enhance nutrition. Participants in discussion groups during the design phase of the project, particularly women and youth, emphasized that fisheries constituted an important development opportunity for the region. Many women were already engaged in marketing fish and welcomed the additional investments and the protection they were offered against climate change impacts on their livelihoods.

Specifically, the project is helping poor fishers access fishing boats and better equipment to get to increasingly hard-to-reach fish stocks. The project will finance ice plants, solar refrigerators for marketing associations in order to improve the post-harvest quality of fish catch, and tricycles with special cooling equipment. These mobile sales points are expected to help bring fresh fish closer to rural homes and therefore make it easier for people to buy it.

But access to fish is not enough. In order to further strengthen the link between project actions and nutritional outcomes, the project is integrating nutrition education into capacity-development initiatives, so that the women selling fish understand the importance of also consuming some of the fish they sell as part of a healthy diet for their families. In this way, they are also better able to offer advice on recipes and preparation to clients, thereby advocating better practices in the community. Globally, the importance of fish in the diet of a population is now widely recognized, especially in the diets of young children, infants and pregnant women. The project’s focus on nutrition education aims to ensure that project beneficiaries also understand the benefits of fish consumption as part of a balanced and nutritious diet.

In Djibouti, as in many low-income countries, staples supply most of a person's energy and nutrients. However, some essential micronutrients are not found in these staples, or found only in small quantities – iron, iodine, zinc, calcium, vitamin A and vitamin C, for example. These nutrients must be supplied by other foods such as fish or vegetables. Fish is particularly rich in these micronutrients. Fish is also an important source of fatty acids that are necessary for the development of the brain and body (Committee on World Food Security, 2014).

All this is important to communicate at both the household and the community level, but also to policymakers. As confirmed by the Committee on World Food Security, "When the environment, production ecosystems and/or the resources bases (fish stocks) are degraded or overexploited, the capacities of the sector to deliver its food security and nutrition functions are limited or reduced. The sustainability of fisheries in their environmental and natural resource dimensions is therefore recognized to be a *sine qua non* condition for food security and nutrition. In practice, however, the links between the two are complex and remain not sufficiently documented."

Climate change and the environment

PRAREV is working to protect the longer-term viability of fish stocks by protecting the ecosystem that provides this resource from climate change impacts. This is being achieved through engaging people in participatory mangroves and ecosystems management, as well as institutionalizing these capacities through co-management plans led by the government. A project component is related to capacity-building, at both the community and government level. The idea is to support national policies and put the potential of fisheries in the spotlight in terms of both adaptation and nutrition, and to explore other avenues of income generation, such as through developing more processed fish products. PRAREV is also reducing the vulnerability of fragile emerging fish value chains through investments in renewable energy to improve the conservation of fish products.

PRAREV is working to get nutritional and economic benefits to local communities by protecting the local ecosystem from climate change impacts.



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Malawi: Water management for nutrition and climate resilience

Key facts

Project name	Programme for Rural Irrigation Development (PRIDE)
Development goal	Reduce the vulnerability of smallholder communities to food insecurity, climate change effects and market risk
Dates	2017-2024
Target groups	Smallholder farmer communities in and around medium-scale irrigation systems



Development challenges

Nutrition

Malawi has one of the highest child stunting rates in Africa, and child malnutrition is estimated to be costing the economy nearly US\$600 million a year (Government of Malawi, 2015). This alarming situation is caused by various interlinked reasons, including poor access to food in terms of quantity, quality and diversity, inadequate education, and lack of knowledge in food processing and utilization, as well as cultural beliefs that mean women and children end up not getting the nutrition they need.

Within this context and that of IFAD's newly adopted Action Plan on Nutrition, IFAD also commissioned a study in 2015 to assess food knowledge, attitudes and practices (KAP) of communities in the areas of the planned PRIDE.⁷ The study confirmed the national findings on the burden of malnutrition, and identified variations between districts. Child stunting was found to be disturbingly high, especially in Ntchisi and Thyolo districts. The survey also delved into the detailed food consumption patterns of households, including the food distribution between household members, and explored attitudes to new agricultural practices.

Consumption of legumes and nuts, eggs, dairy and flesh foods (meat and fish) was minimal. This pattern of consumption was pronounced for women of reproductive age and infants (6-23 months). More than half of the surveyed women and over a third of infants were not likely to be able to meet their micronutrient needs. Monotonous diets and overdependence on white maize, limited income, seasonality of food production, inadequate post-harvest technology for food processing and storage, poor complementary feeding practices, and inappropriate intra-household food distribution were some of the factors identified as likely to affect food consumption in the target districts.

On the other hand, the survey found that respondents were open to increasing their nutrition knowledge, which offers fertile ground to build up sustainable nutrition-sensitive agricultural practices and skills to improve the nutrition status of household members.

One of the recommendations of the study was to improve integrated homestead gardens by increasing livestock production and consumption where possible, as well as improving dietary diversification and food processing for value addition, and encouraging behaviour change and developing and promoting nutritious recipes. It was also recommended that women and adolescent girls should be especially targeted.

Climate change and the environment

Over the past 20 years, droughts and prolonged dry spells have become more frequent, resulting in poor crop yields and, in some cases, total failure. Climate models predict a wetter regime for the northern regions while the south is expected to be drier with shorter and more intense rainfall periods. Intense rains, as experienced in January 2015, lead to severe floods and increased rainfall variability, which means that farmers are sometimes forced to delay planting and to replant their crops.

7. The study was on smallholders participating in the IFAD-funded "Rural Livelihood and Economic Enhancement Programme", and it informed the design of PRIDE. IFAD. Government of Malawi. 2015. Baseline report on food knowledge, attitude and practice (KAP).

Less than 4 per cent of cultivated land is under irrigation, and smallholders experience major problems around distribution of water and access to irrigated land. The implications for nutrition of the changes in rainfall caused by climate change are multiple. Homestead gardens, one of the solutions proposed by the study, need a reliable water supply. Increased consumption of animal proteins out of farmers' own production would also require adequate water for livestock and aquaculture.

Expected impacts

Nutrition

PRIDE aims for the following impacts with regard to nutrition:

- Reduction in child malnutrition
- Around 17,000 smallholder households reporting decreased incidence of hunger periods, measured by number of meals per day and by increased dietary diversity
- Some 15,000 women trained to prepare nutritious meals
- Smallholder farmers trained in improved production, post-production, processing and marketing

Climate adaptation and environmental sustainability

Expected impacts include the following:

- Environmentally and economically sustainable agricultural production systems adopted by smallholder households on both rainfed and irrigated lands, with over 17,000 farmers with reliable access to land and water and over 5,000 additional hectares of irrigated land throughout all seasons.
- Smallholder households sustainably operate climate-resilient land and water management systems on both rainfed and irrigated lands (an ASAP outcome), including 1,000 hectares of erosion-affected and vulnerable rainfed land recovered, and 17,000 farmers reporting 20 per cent yield increases and adopting climate-smart practices. Resilience will be measured by households having access to irrigated land, cultivating at least three different crops (diversification) and applying good agriculture practices.

Project approach to achieve expected impacts

Nutrition

PRIDE sets out to mainstream nutrition in most of its activities, from the choice of crops or value chain commodities, and to support this through the following practical measures:

- Promoting diversified and improved nutrient-rich production and consumption through integrated homestead food production encompassing both crops and livestock
- Integrating a nutrition perspective in all climate-smart "good agricultural practices" to be promoted
- Nutrition education
- Policy engagement through dialogue on nutrition at the community and national levels in order to gather lessons and contribute to refining existing regulations

Figure 1
Schematic of PRIDE's targeting strategy in scheme cluster areas



Climate change and the environment

Investing in irrigation is key as a strategy to cope with rainfall variability and increase smallholders' adaptive capacities. Precise and timely application of irrigation water can help to produce crops in predictable quantities, quality and time frames. Good preparation and maintenance of irrigated soils also help maximize soil storage of moisture, and erosion management helps maintain vital nutrients.

PRIDE is therefore investing in improving smallholder productivity from both irrigated and rainfed agriculture on lands belonging to villages involved in government irrigation scheme "cluster areas". However, an estimated 90 per cent of smallholders in these villages will retain lands for rainfed farming while adopting irrigated agriculture, and the remaining 10 per cent will continue to work only on their rainfed land outside the irrigated area as they are not willing to make the transition into irrigated agriculture. PRIDE therefore supports irrigated and rainfed farms, as well as mixed systems farms, with rainfed farms benefiting from support for good agricultural practices and market linkages (see Figure 1).

Increasing production of high-value cash crops, including legumes, will be explored as one good agricultural practice that is water efficient and good for the soil. This would also bring economic and nutritional benefits, as increased availability of legumes would help to meet unmet internal demand. Supporting the introduction of improved cooking stoves will also reduce time spent on cooking, as well as the need for fuelwood, by as much as 60 per cent.

PRIDE is set to achieve even greater impacts in both nutrition and climate resilience by combining it with an integrated approach pilot cofinanced by the Global Environment Facility. The "Enhancing the Resilience of Agro-Ecological Systems" project aims to promote the resilience and sustainable management of ecosystem services and to climate-proof critical food production systems. The project will provide training to women responsible for household food production in order to improve climate resilience and food security, as well as introduce interventions to reduce women's workloads.



More water will help Malawians diversify and improve their diets even as climate change increases water stress.

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Mauritania: Towards climate-resilient and nutrition-sensitive value chains

Key facts

Project name	Inclusive Value Chain Development (PRODEFI, from project name in French: <i>Projet de Développement de Filières Inclusives</i>)
Development goal	Promote sustainable, inclusive and climate-resilient value chains in the context of climate change
Dates	2016-2022
Target groups	Producers and other actors along selected value chains, with a focus on women and youth



Development challenges

Nutrition

The project areas include the “poverty triangle” of Mauritania, and an assessment of key issues at the project design stage highlighted that nationally food insecurity is around 24 per cent of all households and over 65 per cent in rural areas, with households headed by women more affected. Micronutrient deficiencies are prevalent, with almost 40 per cent of women of reproductive age suffering from anaemia and over half the country’s children with vitamin A deficiency (WFP, 2015). In the project areas, the situation is alarming, with almost 90 per cent of households food insecure and 37 per cent of children under 5 suffering from stunting.

Local diets contain little meat, fish and milk and few vegetables; they are based on cereals, which are especially vulnerable to climate change. Interviews revealed that food taboos or acceptability are not barriers to good diets, but rather the lack of local availability of nutritious foods, high prices, and limited awareness of the importance of a balanced diet and good practice for child nutrition. This highlighted a demand for crops with high nutritional values and appropriate to local culinary culture, which are resilient to climate change impacts.

Climate change and the environment

Climate change impacts significantly on fragile ecosystems and agriculture in Mauritania, increasing natural risks such as hot and dry sirocco winds bearing dust and sand, drought and periodic floods. It also exacerbates anthropogenic problems, including overexploitation of pastures, deforestation and erosion of precious soils, all aggravated by the advance of desertification. Water is increasingly scarce because of dwindling total rainfall, resulting in poor recharging of groundwater and water points. Intense rains also mean more erosion of soils, and the shift of the rainy season will impact the crop calendar; if the rains come after November, plant disease is likely to reduce yields. Finally, heatwaves and expected temperature increases will negatively impact livestock yields and post-harvest food safety. Against this background, smallholders’ adaptive capacities are held back by a lack of investment.

Expected impacts

PRODEFI aims to improve the food security and nutrition of target groups, especially women of reproductive age and children. Expected nutrition impacts include:

- Greater availability and accessibility of nutritious and healthy food products (e.g. from market gardens and apiculture) in markets and in households throughout the year
- A 40 per cent increase in household incomes, especially of women
- Increased consumption of agricultural production through the promotion of appropriate nutritional practices to over 10,000 people at the community level

Expected climate change and environmental sustainability impacts include:

- Around 10,000 vulnerable households have access to water for production and agricultural transformation
- Some 14,000 households are more resilient to climate change impacts, with resilience understood as having access to at least two of the following: affordable irrigation, clean energy, sustainable management of non-timber forest products, sustainable animal fodder management and climate-smart cultivation techniques

Project approach to achieve expected impacts

Phase 1 of PRODEFI will support value chains found to have pro-poor potential in ProLPRAF⁸: goat milk, market gardens and non-timber forest products. A pilot in the fisheries sector will also be introduced in the area of Lake Fom Gleita. Phase 2 of the project will introduce new value chains based on studies carried out in phase 1, and take nutrition potential into account. This phased approach allows learning to be put into action, which was felt to be important in introducing new elements.

PRODEFI incorporates learning from another IFAD investment to reduce poverty through supporting selected agricultural value chains (ProLPRAF). A “4P” approach will be rolled out, which involves working through public-private-producer partnerships, including the European Union, FAO and the World Health Organization.

Nutrition

Project actions build on the food and nutrition assessment, and focus on selecting crop varieties and animal breeds that are well adapted to climate change impacts and that also have high nutritional values. Short production cycles are also a priority in order to meet demand. Value chains were selected for market potential, climate resilience and, importantly, their nutrition potential. The baobab fruit, for example, is one of the most nutritious fruits in the world, with around five times the amount of vitamin C of oranges and more than twice the amount of calcium in milk. Its leaves are also very rich in protein and iron. Goat milk and products also offer well-documented nutritional benefits. These sectors were also chosen for their appeal to women and to attract youth.

The project also considered how to respond to seasonal gaps in supply – either because foods were no longer in the market or too expensive to purchase. It seeks to promote crops that will be available during those periods, as well as promote appropriate preservation so that foods are available throughout the year.

As IFAD is aware that often smallholders will not automatically keep enough of what is produced for them to have any nutritional benefits, nor spend any income on nutritious diets, nutrition education is a key element of Component 2. It focuses on the development and promotion of production models, and specifically on promoting the adoption of resilient and marketable models with nutrition benefits for smallholders.

8. *Programme de Lutte contre la Pauvreté par l'Appui aux Filières.*

Climate change and the environment

ASAP financing will essentially enable the project to make targeted sectors more resilient to climate change. This will be achieved through the introduction of irrigation systems that require less water, promoting solar energy, and better management of natural resources such as water and pastures. Table 2 presents examples of how PRODEFI is working to integrate both a climate and a nutrition lens, including gender dimensions, into selected value chains within the framework of IFAD’s nutrition priorities.

Table 2. Integrating a climate and nutrition lens in agricultural value chains in Mauritania

Expected project nutrition impacts	Climate change dimension	Actions
Greater availability of nutritious food products in markets and in households	Reduced productivity due to heat (fish, gardens) and erosion, as well as perishability (non-timber forest products), lack of water (market gardens), and lack of cold storage and reduced milk production due to less fodder (goat milk).	<p>Non-timber forest products: capacity development (e.g. in sustainable collection techniques and equipment to improve quality); solar energy and sustainable land and water management; seed planting to regenerate plants; and research and development for continued quality and production improvements.</p> <p>Market gardens: capacity development (e.g. in water-saving cultivation techniques); improved water management and access to water through solar pumps; and promotion of windbreaks to stop erosion.</p> <p>Goat milk: development of quality irrigated feeding areas; development of fodder crops in market gardens in off-peak season; and development of solar-powered cooling techniques.</p> <p>Fish: explore improving the ecological balance of the Foug Gleita dam.</p> <p>Nutrition education.</p>
Increased household incomes, especially for women	Increased perishability, and lower productivity leading to food loss and less income.	Diversify production and above measures. Gender aspects are also taken into account in the diverse village committees; the project aims to improve the climate resilience of market gardens based on the capacities of targeted women’s groups. Drying equipment will help women to better manage stock and unsold goods while preserving the nutritional benefits for domestic consumption or sale.

Beautiful baobab: tree saplings
promise resilience and
nutrition in harsh climates.



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In conclusion, the project approach attempts to enhance both the supply and the demand for nutritious food through education, as well as to add nutritional value and minimize food and nutrient loss at different points in the selected value chains to improve the availability, affordability and quality of nutritious food – all within the context of a changing climate.



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Nepal: Diversified crops and food systems for dietary diversity

Key facts

Project name	Adaptation for Smallholders in Hilly Areas (ASHA) project
Development goal	Reduce vulnerability of local communities to climate-related risks and strengthen the enabling institutional environment for climate change adaptation
Dates	2016-2022
Target groups	Vulnerable households and communities, in particular poor women and men, landless households, dalits, janajatis and other ethnic minority and socio-economically marginalized groups, and village development committees



Development challenges

Nutrition

Nepal faces serious challenges with regard to food security and nutrition, with an estimated 3.7 million people having inadequate access to sufficient caloric intake. Dietary diversity is also a problem, and this worsens with food price fluctuations and increases. Given that Nepal's poorest households spend more than 75 per cent of their income on food, high food prices will continue to erode the recent gains made in poverty alleviation (World Bank, 2006). The results are that under-5 stunting (chronic undernutrition) stands at 37.4 per cent, under-5 wasting at 11.3 per cent, low birthweight at around 12 per cent, and 36 per cent of women aged between 15 and 49 years have anaemia (IFPRI, 2015b). The cost of mineral and micronutrient deficiencies alone in Nepal is estimated at up to 3 per cent of gross domestic product annually (Government of Nepal, Planning Commission, 2012).

The far western region has the worst poverty, malnutrition, human and gender development statistics in the country. In Kalikot, for example, an IFAD gender and nutrition assessment found that most families are too poor to access adequate food and their own production is too marginal to meet their nutrient requirements. To compound matters, the little money available is used regularly to buy "ready meals"; women reported that this helps them save time, as the preparation of traditional meals is too time-consuming. However, this food has little or no quality nutrient value and is exacerbating the poor nutritional situation of children.

Climate change and the environment

The climate of Nepal varies significantly from one region to the next because of the wide variation in altitude. The variable geo-climatic conditions, unplanned settlements, degradation of natural resources, and growing population pressure make the country increasingly vulnerable to extreme climate events. Climate model projections indicate that the average annual temperature in Nepal will rise by an average of 1.2° C by 2030 and vary both spatially and temporally.

Climate change is undermining national efforts to reduce poverty, particularly in rural areas where families are largely dependent on subsistence farming on small parcels of land that barely produce enough food for the family. They rely more on local natural resources such as forests and water and would therefore suffer the most from the drying up of local water sources and changes in vegetation cover. Climate change is already negatively impacting smallholder agricultural production, and poor, often ethnic minority households are the most vulnerable as they lack the knowledge, resources and services to cope and adapt. It is not all negative: in some areas, local communities explained that rising temperatures have provided an opportunity for using areas that were previously unsuitable for cropping, in particular for millet and fruit crops such as apple, lychee and mango.

Expected impacts

Nutrition

When initially conceived, the main explicit nutrition-related impact was a reduction in the prevalence of child malnutrition (stunting), as compared to baseline. The refreshed IFAD commitment to step up a nutrition focus provided an opportunity to cast a “nutrition lens” on this project, and a knowledge, attitudes and practices (KAP) survey is planned. It will draw on the actions carried out for Malawi and is expected to promote a better understanding of “weak spots” if nutrition is to be improved, and it may provide suggestions that ASHA can integrate. Although these suggestions will cover the whole project, there will be a specific focus on crop diversification and food production systems. The overall question that the survey will aim to answer is, “To which of IFAD’s strategic outcomes in nutrition can ASHA contribute as it works to reduce vulnerability to climate change?”

The survey will also seek out synergies with another IFAD investment – the High-Value Agriculture Project in Hill and Mountain Areas – as this project is already operating in four of the same districts as ASHA, namely Kalikot, Dailekh, Salyan and Jajarkot.

Climate adaptation and environmental sustainability

The main climate and environmental impacts expected are as follows:

- Some 100,000 direct beneficiary households (70 per cent of target households) are less vulnerable to climate change vulnerability, disaggregated by sex, caste and ethnicity of household head.
- Targeted districts and ministries have climate-informed policies, programmes, plans and staff capacity.
- Each US\$1 of ASAP financing will leverage at least US\$2 from other sources for the Local Adaptation Plan for Action implementation in at least six ASHA districts, and over 500,000 tons of greenhouse gas emissions (CO₂e) are avoided and/or sequestered.

Project approach to achieve expected impacts

Nutrition

The KAP survey will take into account the ASHA baseline survey and is to be implemented through the IFAD-CGIAR Learning Alliance⁹ and draw on IFAD’s Malawi experience. In terms of crop diversification and food production systems, the survey will seek to find practical entry points based on the planned focus on “climate resilient practices” in target households. The Project Coordination Unit will develop a detailed list of climate change adaptation measures related to sustainable land and water management, forests, livestock, storage, and renewable energy practices to be supported by ASHA. These measures will be informed by the IFAD baseline survey, which will establish whether households in the target areas are using approaches such as diversified crop and livestock farming, the cultivation of non-timber forest products, improved animal housing, agroforestry with fodder, shade and fertilizer trees, as well as forage conservation, feed resource development and better storage facilities.

9. The “Learning Alliance for Adaptation in Smallholder Agriculture” is implemented through CCAFS, and aims to enable agricultural policymakers and practitioners to make science-based decisions in the context of climate change.

All of these climate-resilient practices have practical entry points for nutrition. For example, for diversified crop and livestock farming and non-timber forest products, the project could promote the combination that offers the highest and diversified nutritional and environmental benefits. As well as increasing the availability of these foods in the area (IFAD nutrition strategic outcome 1), the income earned would allow families to buy the food they cannot grow. Nutrition education can help to promote consumption and balanced diets in the target communities, including encouraging nutritious positive choices for the family when spending income earned from sales. Education programmes can also explain how practices such as early marriage and pregnancy and the weak voice of women in many household decisions can negatively impact child nutrition (IFAD nutrition strategic outcome 2).

The introduction of labour-saving technologies, especially for women of childbearing age, could also help to ensure that climate-resilient food production/gathering, processing and marketing do not contribute to time and energy deficits, given women's well-known workloads (IFAD nutrition strategic outcome 3). The KAP survey will establish what knowledge, attitudes and practices regarding food production systems are already in place with both climate and nutrition benefits for the target communities. The survey will also make recommendations on entry points. The project also offers an entry point for IFAD's nutrition strategic outcome 4, policy engagement and partnerships. The KAP survey will explore how target communities can feed their priorities into the Local Action Plans for Adaptation to climate change so that food production decisions at the local level can explicitly deliver on both nutrition and climate resilience goals. This innovation has excellent policy uptake potential and could help to render the national nutrition plan more climate sensitive and vice versa, as these plans attract government and international investments.

As mentioned above, the KAP survey will draw on synergies with the High-Value Agriculture Project in Hill and Mountain Areas. For instance, interviews for its gender and nutrition assessment in Kalikot district indicated that women would like to grow fresh vegetables, but their short shelf life and sensitivity during transport would need to be addressed, for example, with solar drying and use of safe storage practices.

Climate change and the environment

The ASHA approach involves building the knowledge and methodologies needed to improve participatory planning and facilitate adaptive change. It will promote strategic government cofinancing of investments in climate-resilient livelihoods at the household and community levels by strengthening the natural, physical, social, human and financial capital of vulnerable communities.

A resilient household is expected to have the following characteristics: (i) diversified livelihood and income streams; (ii) improved natural resource and risk management based on better access to knowledge about adapting to climate change; (iii) membership in social networks, especially farmer groups; (iv) protection of community infrastructure from specific climate hazards; and (v) direct engagement in village-level planning and influence on district and national financial allocations.



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Can diversified crop and food production systems help add animal proteins and more food to Krishna Kumari's kitchen in Salyan district?

In terms of food production, the project expects to finance a number of practices in addition to those mentioned above, such as water conservation ponds and rainwater harvesting as well as various measures to tackle erosion. These measures are essential to ensure adequate water availability and quality for both production and domestic use, given the high levels of water stress and problems associated with erosion. Reforestation and renewable energy technology, including biogas, solar heating, wind energy and improved cooking stoves, will also contribute to ASHA's targets for CO₂e reductions and thereby climate change mitigation as well as adaptation.



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Conclusions and way forward

The case studies in this review offer a glimpse of how IFAD is trying to improve nutrition co-benefits as it works to increase climate resilience and tackle environmental degradation. It is indeed possible to ensure that projects which seek to enhance climate resilience and improve environmental sustainability deliver co-benefits for nutrition. However, to maximize such benefits, a more integrated approach to planning is needed wherein such co-benefits are envisaged at the design stage itself. The entry points which have been identified for integrating nutrition and climate benefits (see Table 1) offer a resource for project planners to do this.

In addition to climate and nutrition synergies, the case studies also identify synergies with gender and environmental sustainability goals, with many of the projects delivering multiple benefits. For example, smallholder farming practices that are becoming increasingly challenging in the face of floods, drought and other stresses in a changing climate often make a woman's already heavy workloads even heavier – this can further increase her need for a nutritious diet, which may not always be easy in many cultural contexts. This can also reduce her time for caring activities, including preparing nutritious meals. The nexus between climate change, nutrition and gender is therefore a key one.

Knowledge-based approaches to project design and implementation appear key to delivering multiple co-benefits. This includes the use of indigenous knowledge, as shown in the Bolivian case study, but also the use of scientific knowledge-based approaches to planning and implementation, such as in the Malawi and Nepal case studies where detailed baseline surveys on knowledge, attitudes and practices of beneficiaries inform design and implementation. Partnerships with relevant scientific and research organizations can help improve knowledge-based approaches.

A way forward for harnessing nutrition benefits of climate-resilient agriculture

While the case studies give context-specific examples, which suit regional priorities, a broader approach that integrates these lessons to support rural transformation is needed. The new development paradigm set out in Agenda 2030 stresses the importance of an integrated approach, and shaking off silos represents a fundamentally different and more integrated way of working. In moving towards an integrated approach, the priorities include:

Increase policy engagement efforts: While it is evident that multiple co-benefits can be realized from investments in climate-resilient agriculture, an enabling environment that recognizes and supports an integrated approach is needed to scale up such efforts. Therefore, an area that could be strengthened is in engaging with policymakers to ensure that national policies (both sectoral and on climate change) support projects that deliver multiple benefits.

Improve indicators: In order to measure progress towards multiple goals, sound indicators are needed and these need to be incorporated into the project design. For example, new indicators which are being introduced in IFAD's Results and Impacts Monitoring System concerned women's dietary quality and the number of people or households provided with targeted support to improve their nutrition offer sound insights into nutrition benefits delivered.

Build the knowledge base: A better understanding of linkages is needed in some areas in order to act on them holistically. For example, practical research on the links between marine ecosystems, fish catch and the fisheries industry with nutrition outcomes could assess assumptions about greater fish availability and better nutrition and open up more robust impact pathways to inform investments. IFAD's Learning Alliance with CCAFS and, through it, the broader CGIAR including the CGIAR Research Program on Agriculture for Nutrition and Health, is an example of forming strategic knowledge partnerships to inform actions.

Build capacity: A new generation of experts is needed, who are able to understand the links between agriculture, environmental sustainability, climate change, nutrition and gender dimensions in order to move forward with a truly integrated "sustainable food systems" approach. Building capacity, particularly among a new generation of professionals in agricultural development, should be a priority.

Communicate strategically to change behaviour: Behaviour change communications can be an effective mechanism to strengthen co-benefits. Household coping strategies under a changing climate can entail cutting food quality and intake, especially for women, or earlier marriages for girls. Nutrition education can help sensitize communities to the negative impacts of these strategies and promote alternatives. For example, in Mauritania, the increase in household incomes was backed up by nutrition education, so as to explicitly connect increases in incomes with intended improvements in nutritional outcomes. Without this, there is a break in the impact pathway, as increases in incomes may not necessarily be used to improve food consumption or non-food dimensions of nutrition.

An integrated approach to climate, environmental sustainability, gender and nutrition: While the focus of this review was on linkages between nutrition and climate change, it is evident that such investments can leverage other outcomes too, particularly related to gender and environmental sustainability. For example, better access to clean water can lead to easing of women's workloads and more time for caring practices. Similarly, climate-resilient infrastructure can offer better sanitation and access to health facilities as well as schools. These experiences call for an integrated approach to project design which takes into account holistic benefits towards development goals.



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Annex 1. References and documents consulted

All case studies are based on project documentation.

Alexandratos N., and J. Bruinsma. 2012. *World Agriculture Towards 2030/2050: The 2012 Revision*. ESA Working Paper No. 12-03, p. 4. Rome, FAO.

Appelquist L.R., and T. Balstrøm. 2014. Application of the Coastal Hazard Wheel Methodology for Coastal Multi-Hazard Assessment and Management in the State of Djibouti. *Climate Risk Management*, 3: 79-95.

CCAFS. 2015. *Recipes for Change validation report: Papas a la Huancaína in Bolivia*.

Committee on World Food Security. 2014. High Level Panel of Experts on Food Security and Nutrition. *Sustainable Fisheries and Aquaculture for Food Security and Nutrition*.

Dinesh D., ed. 2016. *Agricultural Practices and Technologies to Enhance Food Security, Resilience and Productivity in a Sustainable Manner: Messages for SBSTA 44 Agriculture Workshops*. CCAFS Working Paper No. 146. Copenhagen, Denmark: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

FAO. 2014. *State of World Fisheries and Aquaculture*. Rome.

FAO, IFAD, WFP, with Bioversity and IFPRI. *How Can Value Chains Be Shaped to Improve Nutrition?* E-discussion March-April 2017, Food and Food Security Forum.

- Global Panel on Agriculture and Food Systems for Nutrition. 2015. *Climate-Smart Food Systems for Enhanced Nutrition*.
- Government of Malawi, IFAD. 2015. *Baseline Report on Food Knowledge, Attitude and Practice (KAP)*.
- Government of Nepal, Planning Commission. 2012. *Multi-Sector Nutrition Plan*.
- IFAD. 2017. *The Economic Advantage. Assessing the Value of Climate*.
- _____. 2015a. *Mainstreaming Nutrition-Sensitive Agriculture at IFAD: Action Plan 2016-2018*.
- _____. 2015b. *Lessons Learned: Integrated Homestead Food Production (IHFP)*.
- _____. 2015c. *How To Do Fisheries, Aquaculture and Climate Change Guidance for Adaptation and Mitigation*.
- _____. 2015d. *How To Do Climate Change Risk Assessments in Value Chain Projects*.
- _____. 2015e. *Nutrition-Sensitive Agriculture and Rural Development Scaling Up Note*.
- _____. 2015f. *The Policy Advantage. Enabling Smallholders' Adaptation Priorities To Be Realized*.
- _____. 2014. *Web article: Nutrition-Sensitive Agriculture: Connecting the Dots*.
- _____. 2014a. *Improving Nutrition through Agriculture*.
- IFPRI. 2015a. *Value Chains and Nutrition. A Framework to Support the Identification, Design, and Evaluation of Interventions*. Discussion Paper No. 01413.
- _____. 2015b. *Global Nutrition Report*.
- López Noriega I., I.K. Dawson, R. Vernooy, I. Köhler-Rollefson, and M. Halewood. 2017. Agricultural Diversification as an Adaptation Strategy. *Agriculture for Development*, 30: 25-28.
- Porter J.R., L. Xie, A.J. Challinor, K. Cochrane, S.M. Howden, M.M. Iqbal et al. *Chapter 7: Food Security and Food Production Systems*. Cambridge University Press; 2014.
- Second International Conference on Nutrition. 2014. *Conference Outcome Document: Rome Declaration on Nutrition*.
- Tebtebba Foundation. 2009. *Guide on Climate Change and Indigenous Peoples*.
- UNICEF. 2013. *Nutrition Survey for Djibouti Using Standardized Monitoring and Assessment of Relief and Transitions (SMART) Approach*.
- UNICEF. 2008. *The State of the World's Children*.
- United Nations. 2015. *Transforming Our World: The 2030 Agenda for Sustainable Development*.

UNW-DPAC. 2011. *Water and Agriculture in the Green Economy*. UN-Water Decade Programme on Advocacy and Communication. Zaragoza, Spain: United Nations.

Vermeulen S.J. 2015. *Climate Change Risk Assessments in Value Chain Projects*. An IFAD "How to do" note. Rome, Italy: IFAD.

Vermeulen S.J., B.M. Campbell, and J.S. Ingram. 2012. Climate Change and Food Systems. *Annual Review of Environment and Resources*, 37: 195-222.

Wollenberg E., M. Richards, P. Smith, P. Havlík, M. Obersteiner, F.N. Tubiello, M. Herold, P. Gerber, S. Carter, A. Reisinger, and D.P. Vuuren. 2016. Reducing Emissions from Agriculture to Meet the 2 C Target. *Global Change Biology*, 22(12): 3859-64.

World Bank. 2006. *Nutrition in Nepal*.

World Food Programme. 2015. *Food Security Monitoring Survey for Mauritania*.




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