



AR4D-PRUN SAR

# 2019 Consolidated Report

HIGHLIGHTS

## About the programme

With funding from the European Union and its own funds, IFAD provides grants to CGIAR research centres, as well as to national and regional institutions in the field of agricultural research for development (AR4D).

The goal of AR4D is to improve the resilience, livelihoods and food security of small-scale farmers, youth and women in rural communities through agricultural scientific research. Therefore, IFAD's AR4D portfolio supports:

- creation of pro-poor scientific technologies;
- facilitation of knowledge exchange and documentation for AR4D;
- establishment of partnerships between research and non-research development institutions;
- improvement of country-level synergies between agricultural scientific research and food security programmes;
- generation of evidence of effectiveness of new approaches for food and nutrition security and resilience in order to guide policies.

The Putting Research into Use for Nutrition, Sustainable Agriculture and Resilience (PRUNSAR) programme is currently one of the most significant ongoing AR4D programmes. It has a budget of almost US\$40 million, mainly from the European Union, of which US\$8 million is a contribution from IFAD.

There are 13 projects under this programme, most of which are implemented by CGIAR centres, while one is implemented by International Network for Bamboo and Rattan (INBAR). The objective of PRUNSAR is “to develop and test innovative approaches that impact positively on the livelihoods, nutrition or resilience of pilot rural communities and small-scale farmers and to generate lessons for scaling up”.

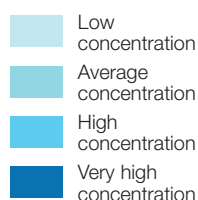
PRUNSAR started in 2015 and has to date yielded several results reaching about 308,015 reported beneficiaries, although the indirect impact is likely to be much higher. The distribution of projects around the world is depicted in the map below.

The following are summaries of achievements of the first 10 grants implemented between 2015 and 2018. For each of the summaries, the project name is given as well as the implementing institution, countries covered and achievements. Further details about the projects and implementing institutions can be found in the main PRUNSAR annual report for 2018 and respective individual reports of the projects.

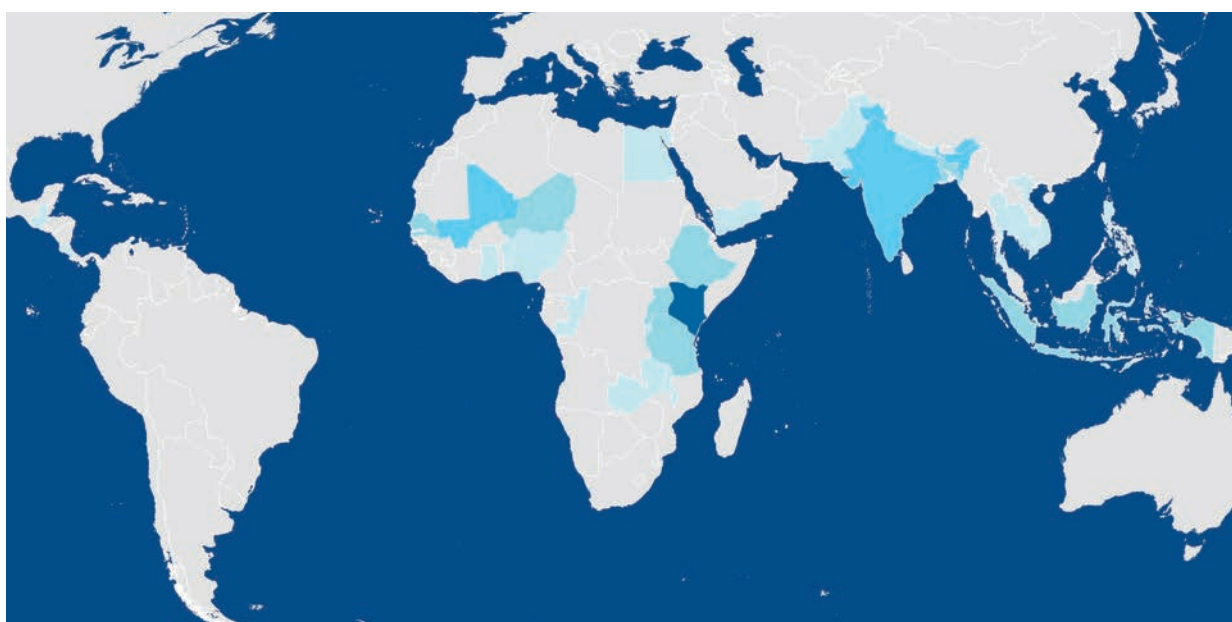
## Programme achievements by project

- i. **Africa to Asia: Testing Adaptation in Flood-Based Farming Systems –** International Water Management Institute (IWMI) – Ethiopia, Kenya, Malawi, Pakistan, Uganda and Yemen

### Project focus countries



The goal of the project is to support flood-based farming systems (FLBs), to contribute to food and nutrition security, and to build the resilience of local communities. It specifically explores: establishing and strengthening farmer and knowledge networks in Africa and Asia in FLB areas; undertaking capacity-building programmes for farmers and professionals, and supporting higher education programmes; and developing investment programmes and supporting policies in FLB.



**The project has funded the construction of a weir on Gash River, and excavation of a 3.5 km irrigation canal in GAS (Gash River Basin), Kassala, Sudan for water management**

The research work focused on measuring the flow of water before and after construction of the weir. Water flow into the canal and the pilot sites was monitored throughout the flood season. Soil measurements were made at 40 sample points and repeated six times (in 2015 and 2017), before flooding, immediately after flooding, and up to the end of the harvest season (refer to diagram on average soil moisture percentage below). The production yield of the main crops in the area – two varieties of sorghum (Tabatt and Aklamoy) – was also monitored. While the yield of Tabatt (grown in about 67 per cent of the area of pilot sites) remained the same at 11 tons/ha, that of Aklamoy almost doubled from 1,000 kg/ha to 2,000 kg/ha compared with the control scenario without interventions.

**The river floods from mid-July to late August, with maximum flow occurring in the first week of August.**



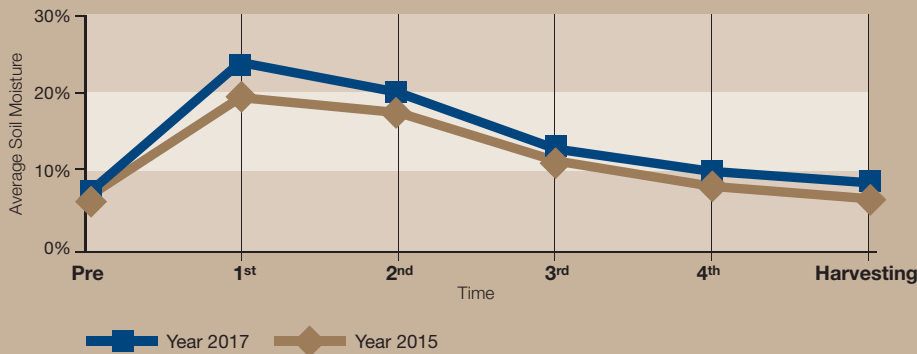
3/7/2015



15/7/2015



2/8/2015



The increase in productivity is attributed to better spatial distribution of soil moisture, which was 20 per cent higher than the control. The consumption of water was 30 per cent below standard irrigation supply conditions (15 days against 11 days in this experiment). The significance of this intervention is clear. It has proved that, scaled up to the whole of Gash arable land (80,000 ha), cropped area can be increased by 20–30 per cent with the same amount of water by instituting water management practices regardless of whether farmers grow Tabatt or Aklamoy sorghum varieties. In addition, the use of Aklamoy doubles the yield when compared with Tabatt. Aklamoy is the variety preferred by farmers due to its higher biomass. Hence, it is typically sold to livestock keepers.

## Achievements

The project has led to the following results:

- There has been a 25 per cent increase in the productivity of communities living in FLB areas. For example, the construction of a weir and excavation of an irrigation canal on Gash River, in Sudan, has led to an almost doubling of yields of Aklamoy, a variety of sorghum, i.e. from 1,000 kg/ha to 2,000 kg/ha (see diagram and description on page 3).
- Farmer and knowledge networks have noticeably increased – more than 50 networks with over 500 members per network have been established in Afghanistan, Kenya, Malawi and Myanmar. Knowledge has also been generated and managed in the form of research, covering 10 thematic areas, including soil fertility management and road-water harvesting.
- Four investment proposals have been developed; three in Pakistan -- submitted to potential donors, and one for eastern Sudan. In Afghanistan and Malawi, the project has developed a road-water harvesting system from roads, which has been endorsed by local authorities and will probably be scaled up in the near future.
- The project has also developed a number of training modules, reaching more than 4,000 farmers and hundreds of professionals and young professionals in capacity-building programmes.

### ii. Food Resilience through Root and Tuber of the Asia-Pacific

(FoodSTART+) – International Potato Centre (CIP) – ended 2018 – India, Indonesia, Philippines and Viet Nam

The goal of the project was to enhance food resilience among poor households in upland and coastal communities of the Asia-Pacific region by introducing root and tuber crops (RTC) in IFAD-supported investments projects. It focused on: identifying household needs that are gender-sensitive by conducting vulnerability assessments among the food-insecure RTC-producing and -consuming households; designing and implementing, with partners and local stakeholders, innovations that enhance food resilience; and developing effective partnership strategies with IFAD investment projects in promoting RTCs for food security at a larger scale. The satisfactory implementation progress of the project can thus largely be attributed to partnership arrangements and its relationship with IFAD investment projects.

IFAD-supported projects partnered with include: Indonesia's Smallholder Livelihood Development project (SOLID, ended in 2018), Viet Nam's Sustainable Rural Development for the Poor in Quang Binh (SRDP, ended in 2018), Philippines' Fisheries Coastal Resources and Livelihoods (FishCORAL), Philippines' Integrated Natural Resources and Management project (INREMP), and India's Megha-LAMP.

## Achievements

Specific highlights of the achievements include:

- Working with IFAD investment partners, the project prepared scoping studies in all target countries and developed collaborative work plans for high-potential sites. This resulted in better targeting of sustainable rural development, natural resource management and livelihood improvement.
- CIP and IFAD investments further innovated the "partnership health check-up" tool to monitor the various contributions to, and support within, partnerships as well as their transparency, accountability and overall efficiency, which is also gender-sensitive. Results were shared with all partners to further improve implementation.

- Other achievements included the introduction, testing and promotion of new technologies to improve productivity and post-harvest management, in particular: introduction of nutrient-rich varieties of orange-fleshed sweet potato and yellow-fleshed cassava; introduction and multiplication of “dual-purpose” sweet potato seed for food and animal feed; and the processing of cassava for food and animal feed.
- FoodSTART+ also published a range of training materials and communication products designed to share knowledge and lessons learned.
- Scaling up was inculcated in the project implementation with the introduction of the dual-purpose sweet potato through the “farmer business school” approach.
- The grant project reached about 2,860 end-users (of which 1,900 were female).

### iii. Improving the Technological Foundations for Sustainable Aquaculture – WorldFish – Bangladesh, Egypt, Malaysia and Timor-Leste

The goal of the project is to develop, multiply and disseminate quality seed of key aquaculture species that increase productivity and profitability for farmers, while at the same time conserving the genetic resources of aquatic animals (i.e. fish) in anticipation of future needs. The objective is to improve fish strains and associated fish farming technologies through the production of genetically superior fish strains to increase fish production at minimum cost. This is being done in two main ways: (i) by maintaining and continuously improving fish strains for the purpose of multiplication and distribution to farmers, and by developing and supporting regional and national breeding programmes in programme countries; and (ii) by minimizing the risk of long-term loss of genetic variability of aquaculture species, by ensuring that national breeding programmes adequately manage the population size and control inbreeding.

#### Achievements

Some specific achievements to date include:

- Three tilapia multiplication and dissemination systems have been developed and are operational in Bangladesh, Malaysia and Timor-Leste.
- The Egyptian genetic improvement programme for African catfish has been reviewed and a strategy prepared for future improvement. The assessment of the catfish programme has been partially completed, and a new strategy is in development.
- Breeding programmes for genetically improved fish in Asia are in progress. GIFT Tilapia is under development (generation 14 has been completed and generation 15 is under way), while red tilapia in Malaysia have also been developed (i.e. generations 7, 8 and 17).
- A new genetic improvement programme for carp fish in Bangladesh has been established (first generation produced for rohu carp, and base populations assembled for catla carp).
- Guidance on fish and prawn genetic improvement programmes previously developed with WorldFish has been disseminated, and advice provided to Ghana, India, Malawi and Viet Nam.
- Molecular characterization programmes for improved stocks (broodstock from core breeding programmes in Bangladesh, Egypt and Malaysia) have all been typed using single-nucleotide polymorphism markers.

#### iv. Managing Aquatic Agricultural Systems to Improve Nutrition and Livelihoods in Selected Asian and African Countries: Scaling Learning from IFAD-WorldFish – Cambodia, Indonesia, Thailand and Zambia

The goal of the project is to improve nutrition and livelihoods of poor rural households, in aquatic agricultural systems, through increased intakes of micronutrient-rich small fish and vegetables, from own production as well as through increased household income. The objective is to scale up the fisheries/agriculture-nutrition linkages approach developed and practised in Bangladesh in targeted communities in the target countries. This is achieved through:

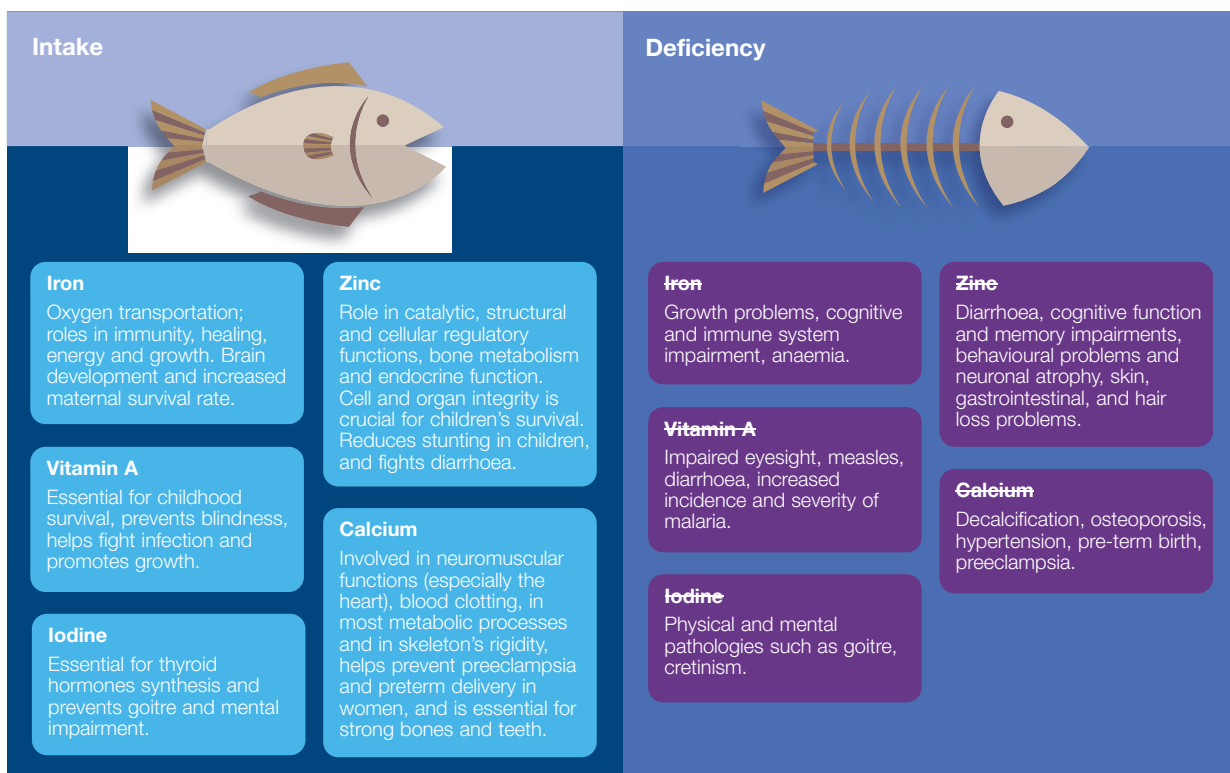
- increasing availability, access and consumption of micronutrient-rich small fish and vegetables;
- improving gender equity and women’s empowerment vis-à-vis intrahousehold food intake, agricultural practices and workload;
- increasing knowledge, awareness and training implementation partners to influence policies and implement interventions for scaling up;
- strengthening regional and national partnerships and collaboration for adoption and dissemination of the aquaculture and fisheries/agriculture-nutrition linkages approach.

#### Achievements

Achievements are as follows:

To begin with, an analysis of nutritive value of small fish and aquaculture species was carried out, and the results clearly show that small fish have higher nutritive value than large fish because they are consumed whole. It has been proved that micronutrients in fish are contained not only in the muscle but also in the bones, head and viscera. They are a rich source of animal protein, essential fats and vitamins, and enhance the absorption of iron and zinc.

#### A simplistic way of presenting fish as a source of micronutrients



Furthermore, in partnership with the Department of Fisheries in Zambia, WorldFish initiated activities to test the suitability of small fish species in pond polyculture. Promotion of pond polyculture has been done with special attention being paid to the engagement of women in households.

The project has also introduced fish and orange-fleshed sweet potato into fish-vegetable food systems, and developed suitable and accessible recipes to maximize nutritional value, reaching 725 farmers (about 65 per cent of them women).

In addition, partnership- and capacity-building, crucial for success of nutrition-sensitive fish production, has been supported under the project. Self Help Africa has worked with about 240 households engaged in pond aquaculture, developed training materials in collaboration with WorldFish staff and provided training on nutrition-sensitive fish food systems – a new area of training in Zambia.

In Indonesia, WorldFish has developed a close partnership with the Ministry of Marine Affairs and Fisheries. It is building on several governmental initiatives such as the Gemarikan initiative Eating Fish Campaign, designed to increase national fish consumption, and the Scaling Up Nutrition campaign. In addition, it is liaising with 1,000 Days and building on the Post-harvest Loss Alliance for Nutrition project, which is led by the Global Alliance for Improved Nutrition (which focuses on fish loss and food safety).

#### **v. Improved Productivity through Crop-Livestock Interventions in Eastern DR Congo and Burundi (CLiP) – International Livestock Research Institute (ILRI)**

The project's goal is to enable poor rural people to improve their food security and nutrition, raise their incomes, and strengthen their resilience. The specific objective is to improve income, nutrition and food security through sustainable intensification of crop-livestock systems linked to markets, with a particular focus on gender and youth. This is being done through:

- embedding the project within the humid tropics programme and fully integrating it in other AR4D platforms and activities primarily to facilitate scaling of project outputs;
- increasing farm-level productivity of crop-livestock systems while optimizing natural-resource-use efficiency and minimizing negative environmental externalities;
- engaging farmers, especially women and young people, in profitable crop and/or livestock value chains for fresh and processed products in target field sites;
- improving access of women and young people to assets and decision-making in relation to crop-livestock system management, and improving the nutritional status of women and children.

### **Achievements**

#### **Experiments regarding intercropping and animal feed growing**

- Evaluation of "best-bet integrated soil fertility management" (ISFM) has been done in the Democratic Republic of the Congo. Maize has been intercropped with beans, soybeans and lablab. Positive results have been obtained. For example, maize intercropped with soybeans has led to a yield of 500 kg/ha. Total income per hectare has risen to US\$1,700, compared with US\$1,200 for farmer practices. In Giheta (Burundi), on-farm ISFM demonstration trials advancing the use of biofortified climbing bean have shown that variety MAC 44 yields 316 per cent more (i.e. 2,375 kg/ha) compared with non-biofortified varieties.

- In the Democratic Republic of the Congo, forage grasses and legumes have given the highest yield when planted along the edges of fields compared with those planted on specific plots; for example, the grasses *Pennisetum*, *Brachiaria* and *Purpureus* yielded 1.04 kg/m<sup>2</sup> compared with 0.3 kg/m<sup>2</sup>. Moreover, the legume *Mucuna pruriens*, when grown under a banana plantation, yielded 4.98 kg/m<sup>2</sup>, compared with 0.76 kg/m<sup>2</sup> in a specific plot, and 2.04 kg/m<sup>2</sup> along a fence.

#### **Livestock integration into cropping**

Evidence shows that 39 farmers from five subregions of Giheta who received rabbits from the project have improved household income from sales of rabbit breeding stock (to date, average household income is BIF 10,000 per annum). Through rabbit droppings, they are also increasing manure application to vegetables and reducing the input cost to vegetable production. The farmers from Giheta have also provided 120 rabbits to 24 farmers in Cibitok under an agreed pass-on programme.

#### **Processing options for livestock and crop products – Democratic Republic of the Congo**

- The processing options for high-quality cassava flour, maize and soybean pursued by youth agripreneurs have been validated by a survey that has confirmed consumers' preferences for the products compared with products from traditional methods. The value chain for cassava flour is under development.
- Samples of cassava, maize and groundnut collected from farmers' households in the east of the Democratic Republic of the Congo have been analysed for incidence of total aflatoxins. The farmers' level of knowledge of the causes and consequences of aflatoxin contamination and the measures for prevention were also assessed. Thus, two papers have been published in the *Journal of Food Science and Nutrition*: (i) Occurrence of Aflatoxin in Agricultural Produce from Local Markets in Burundi and Eastern Democratic Republic of Congo; and (ii) Incidence and Farmers' Knowledge of Aflatoxin Contamination and Control in Eastern Democratic Republic of Congo.

#### **Projects for women and youth agripreneurs**

- In the Democratic Republic of the Congo, for example, two centres for agri-enterprises and agriservices have been established at two field sites (Miti and Kamanyola) to provide space for individual and group-based enterprises in the community. Two training courses have been conducted in group governance, and marketing and business profitability.
- In Burundi, a pilot business learning centre has been established in Rugombo Commune; twenty-seven young people have been trained on cassava and maize enterprise establishment and management, and participated in the development of maize and cassava business plans. Equipment support has been provided for starting up cassava and maize meal processing. CLIP obtained government infrastructural support for the construction of the facility.

**vi. Improved Crop Management and Strengthened Seed Supply System for Drought-prone Rainfed Lowlands in South Asia – International Rice Research Institute (IRRI) – Bangladesh, India and Nepal**

The project's goal is enhanced and stable rice productivity in the drought-prone rainfed lowlands of South Asia, leading to improved household food security and reduced poverty.



The objective is to alleviate poverty levels of farmers in rainfed drought and drought- and flood-prone areas by enhancing and stabilizing rice productivity through the combination of drought-tolerant rice varieties, adoption of improved management technologies, efficient seed supply system and accelerated outscaling.

**Project components include:**

- improved crop and natural resource management technologies and diversification;
- identification of drought- and flood-prone rice areas in South Asia for technology targeting;
- awareness generation and outscaling of promising technologies, and promotion of seed production;
- capacity-building of stakeholders in developing options for improved livelihood and food security.

**Achievements**

- Research work on improved crop and natural resource management technologies and diversification has revealed positive results. The use of drought-tolerant varieties along with best-bet crop and nutrient-management practices has shown an increase in rice productivity of 1–2 tons/ha in rainfed uplands. For example, DTV variety have out-yielded local cultivars and hybrids under drought stress. Cost-effective management options have also been employed for new stress-tolerant rice varieties (STRVs) under stress-prone environments and have shown high potential for enhancing the yields. For example, 21- to 25-day-old seedlings were transplanted with two to three seedlings at closer spacing, while 30–40 kg of seeds/ha were sufficient for direct-seeded rice.
- The project has used GIS to successfully identify drought- and flood-prone rice areas in South Asia in order to target the distribution of locally suited rice varieties. Using GIS and satellite images, drought- and flood-prone areas have been characterized in Nepal. For example, 917 wards in 8 districts of Terai have been identified as suitable for dissemination of drought-tolerant varieties (Sukhadhan 1 to 5). Moreover, 14 hill districts have been identified as suitable for dissemination of drought-tolerant Sukhadhan 1 to 5. Apart from these, 36 village development committees are both submergence- and drought-prone, thus suited to Sukhadhan 6, Bahuguni 1 and Bahuguni 2.
- In terms of generating awareness and outscaling of promising technologies and the promotion of seed production, several short-duration, drought-tolerant rice varieties have been promoted under the project and have shown excellent performance in farmers' fields. They yield more than other high-yielding varieties under both stress and normal conditions. They can withstand drought stress and stabilize the yield. They offer yield advantages of up to 45 per cent over other popular varieties. In addition, different strategies have been adopted to create awareness and to ensure local availability of quality seeds, including seed multiplication and demonstration, head-to-head trials, seed minikit distribution, and a crop cafeteria. Through these approaches, 84,436 farming households have directly benefited from drought-tolerant rice varieties during the project.
- To strengthen the local seed supply system, farmer groups and non-governmental organizations (NGOs) operating in remote areas are encouraged to produce STRVs. To generate significant direct economic gain to the poor farmers, along with climate resilience, the focus has been to develop "seed enterprise models." In Bangladesh, for example, a seed producers group in Cox's Bazar Sadar has taken up seed production of climate-resilient rice, and linked breeder-seed sources to producers groups and provided training to the producers in quality and seed marketing aspects.

- Various capacity-building measures have been conducted to strengthen formal and informal seed supply systems for STRVs and to promote seed entrepreneurship among stakeholders. These have included training of trainers, training sessions on quality seed production and storage, and training in quality seed production in Rae Bareli (India).

**vii. South-South Knowledge Transfer Strategies for Scaling up Pro-poor Bamboo Livelihoods, Income Generation and Employment Creation, and Environmental Management in Africa – INBAR – Ethiopia, Madagascar and United Republic of Tanzania**

The project's goal is to mainstream technologies and innovations based on bamboo for improved food, nutrition, energy and environmental security for reduced rural household poverty and improved natural resources management. The main objective is to scale up the benefits of bamboo, namely: reversing deforestation; reducing soil erosion; protecting riverbanks; substituting fodder and feed in farming systems; increasing power availability to poor rural households (in the shape of fuelwood and charcoal); and developing inclusive enterprise models for energy products and bamboo products. The project has four specific objectives:

1. Promote bamboo for environmental management to reverse deforestation, reduce soil erosion and protect riverbanks through large-scale planting actions.
2. Integrate bamboo in farming systems to increase the resilience of poor rural households without competing for land used for food crops.
3. Develop inclusive NGO-community-private partnership (NCPP) enterprise models for organized household charcoal and small-scale farmer waste biomass aggregation.
4. Develop inclusive enterprise models producing bamboo commodities and products for diverse markets.

### **Achievements**

- To contribute to managing the environment, the project has introduced 12 bamboo species, produced 555,700 quality planting materials, established 25 village nurseries, and planted bamboo on 360 ha of degraded land. Some knowledge products have also been developed, including: manuals on allometric and environmental data collection and on bamboo micropropagation; two scientific research papers on allometric and environmental metrics; and technical bulletins.
- In developing farming systems, micro nurseries have been set up in 3,390 households, 540 bamboo plants for self-use and sale have been produced; 220 farmers have been mobilized to plant 130,540 quality planting materials in homesteads and farm boundaries; 22 farmer field schools have been established; and 2,690 households have been trained on managing bamboo as animal feed and fodder.
- NCPP model enterprises have been established to produce household charcoal and biomass energy, engaging 5,070 small-scale farmers. In Madagascar, an NCPP has been established under the IFAD country programme (PROSPERER) – this is a good example of loan-grant cooperation.
- In line with the inclusive enterprise models for bamboo and products approach, the project has established seven community production-cum-training centres (CPTCs). Nineteen CPTC-linked enterprises have been promoted to engage 180 young people. In addition, 1,280 young people have been trained on

diversified bamboo enterprises and product ranges (furniture, bamboo charcoal, bamboo beehives, bamboo crafts, bamboo housing, etc.).

- Finally, three bamboo policy and strategy workshops have been successfully completed, and Madagascar's bamboo policy was validated in July 2018. Policy and strategy validation in Ethiopia and the United Republic of Tanzania were under development at the time of reporting.

**viii. Restoration of Degraded Land for Food Security and Poverty Reduction in East Africa and the Sahel: Taking Successes in Land Restoration to Scale – World Agroforestry (ICRAF) – Ethiopia, Kenya, Mali, Niger and United Republic of Tanzania**

The project's goal is to reduce food insecurity and improve the livelihoods of poor people living in African drylands by restoring degraded land and returning it to effective and sustainable tree, crop and livestock production, thereby increasing land profitability and landscape and livelihood resilience. The project's main objective is to develop and test tools and guidelines for scaling proven land restoration approaches up and out, to suit local circumstances, based on past experience and contemporary action research in four African countries, and to embed the approaches in current practice through capacity development in those countries and global dissemination. This is being done through:

- identifying and articulating lessons learned through a review of experiences at five contrasting sites in Africa;
- obtaining detailed information on the impacts of land restoration on ecosystem services and livelihoods through action research;
- developing and testing a set of tools, methods and guidelines for scaling up successes in land restoration;
- identifying areas suitable for outscaling based on lessons learned;
- converting the empirical knowledge generated by the programme into knowledge products.

### **Achievements**

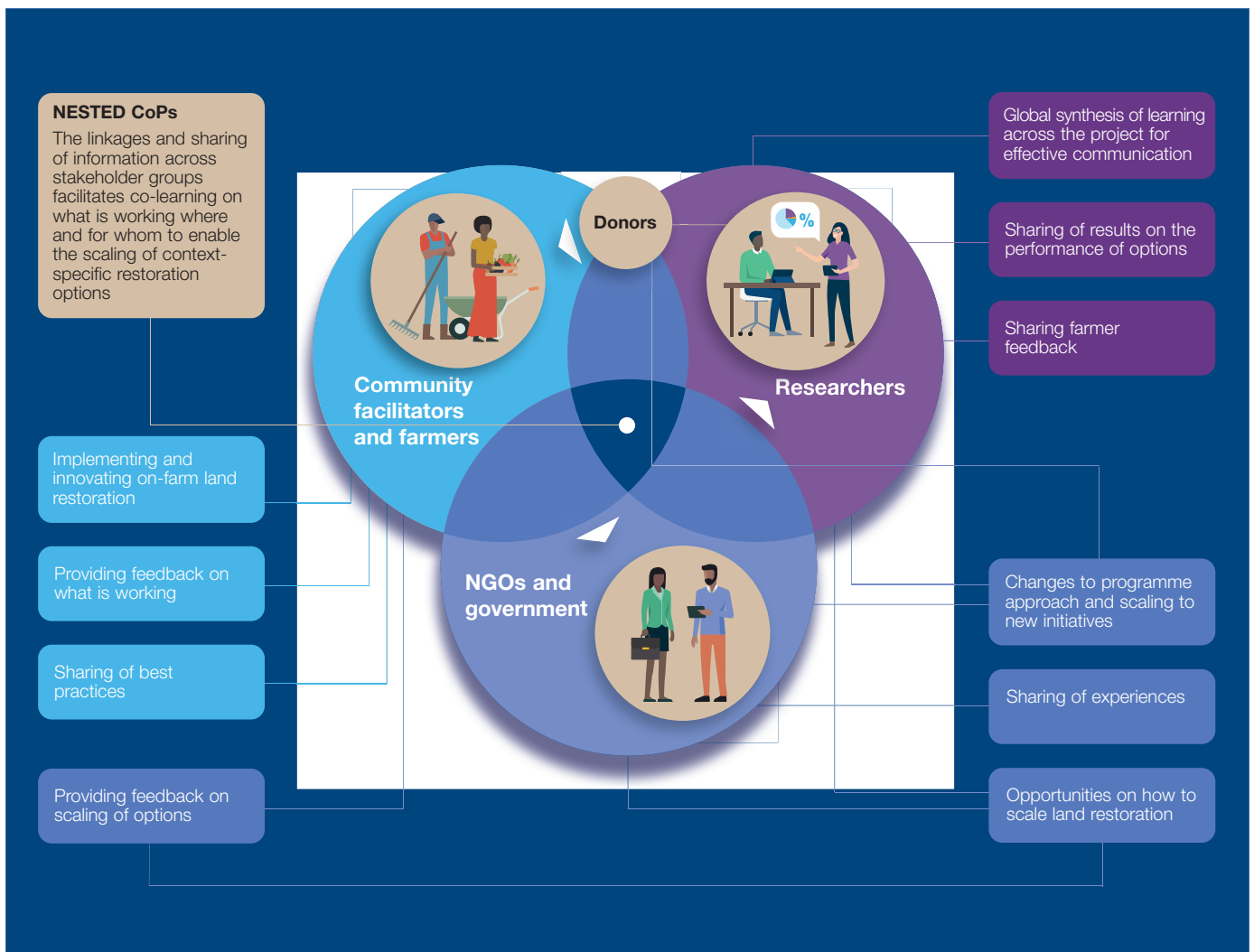
In understanding which land-use options are appropriate in different sites and circumstances to enable promotion of locally adoptable options, the following results have been achieved. Country-specific reports compiling and analysing lessons learned from restoration initiatives and projects have been completed. Land restoration options have been documented and catalogued for different sites and circumstances to allow the promotion of locally adaptable options. An additional review of *The Role of Women in Land Restoration: Identifying Gaps and Opportunities for Inclusion of Gender Aspects for Land Restoration Initiatives* has been conducted and published.

In order to scale restoration successes up and out, communities of practice (CoPs) and tools, methods and guidelines have been successfully established. The goal of CoPs is to reduce food insecurity and improve livelihoods by restoring degraded land and returning it to effective and sustainable tree, crop and livestock production. The objective is to foster relationships, develop learning, and create and share new knowledge to restore degraded land. In Kenya, for example, CoP workshops are held with community facilitators on a regular basis to share experience in the field. They are key to linking farmers, development partners and research institutions. Such workshops have been held with over 400 farmers. Moreover, more than 350 farmers have participated in workshops on experiences on tree-planting activities. Twice a year, NGO-government meetings are held to share lessons learned from the farmers and researchers.

Local capacity is being built and research conducted on what restoration strategies work in different contexts (65 per cent), and some achievements are:

- increased understanding of the effectiveness of land restoration options through the field testing and implementation of planned comparisons in 6,000 farming households;
- testing of integrated management options have been implemented in Niger by over 1,790 farmers in 156 villages.
- household food security has improved; for example, millet gain yields have increased 2.5 times with intercropping, manure and microdosing of NPK within farmer-managed natural regeneration fields.
- on-farm water and soil conservation: analysis of a number of basins required for a five-head household to reduce food insecurity (i.e. shorten the hunger gap) across three counties in Kenya (Makueni, Kitui and Machakos) has been completed and documented;
- analysis of the preference and performance of the basins shows that farmers prefer 2 × 2 × 1.5 ft basins over 1 × 1 × 1.5 ft basins. Basins have increased crop yields, e.g. common bean by up to 5 times and cowpea by up to 4 times.

### Nested communities of practice, facilitating co-learning across multiple stakeholders



Last, in line with knowledge management, guides and approaches for the acquisition of local knowledge have been documented and implemented. Local knowledge has been documented and incorporated into project activities and shared in CoPs. Country-specific reports, compiling and analysing lessons learned from restoration initiatives and projects, have been completed. Land restoration options have been documented and catalogued for different sites and circumstances to allow the promotion of locally adaptable options. An additional review of The Role of Women in Land Restoration: Identifying Gaps and Opportunities for Inclusion of Gender Aspects for Land Restoration Initiatives is also available online.

#### **ix. Food Trees for Diversified Diets, Improved Nutrition and Better Livelihoods for Smallholders in East Africa under the Programme – ICRAF – Kenya and Uganda**

The goal of this project is to harness the role and contribution of agroforestry and food trees for improving nutrition directly through increased availability and consumption of nutrient-rich foods and indirectly through the diversification of livelihood opportunities for small-scale farmers. The objective is to diversify diet and livelihood options for improved nutrition for small-scale farmer communities in East Africa by effectively implementing a climate-smart agroforestry approach by integrating food trees that provide nutrient-dense foods into the existing mixed-crop farming systems. This is being achieved through:

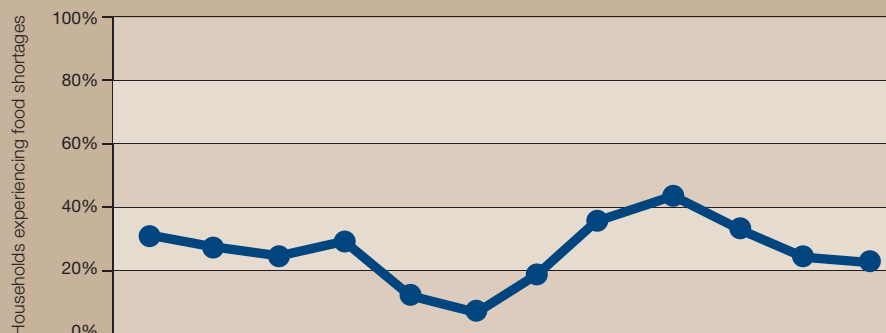
- documenting and identifying bottlenecks in short and long nutrition-sensitive food-tree value chains;
- an empowering implemented future farmers school and community programme;
- establishing agroforestry-nutrition innovation hubs and developing information, education and communication tools training, and dissemination of agroforestry and nutrition information;
- developing value-added novel food-tree products, and capacitating national partner agents, strengthened via advanced training in nutrition-sensitive food-product value chains.

#### **Achievements**

A participatory priority setting methodology with community representatives has assisted in identifying suitable food crops according to local preferences. ICRAF has collated food composition data and developed a food composition database of priority food trees and crops. This approach has supported the mainstreaming of food trees and crops rich in micronutrients overlooked in agriculture and nutrition development planning, projects and policies.

Furthermore, food tree portfolios have been developed in Ethiopia, Kenya and Uganda. The aim of the portfolios is to ensure year-round availability of key micronutrients while promoting greater local diversity of foods to address malnutrition and diet-related chronic diseases. The foods have been evaluated for their nutritional composition for key micronutrients with the aim of linking agriculture, nutrition and health, and to inform policies. The portfolios are being promoted through community entry points such as agroforestry innovation hubs and schools for distributing and disseminating information and planting material based on the portfolios.

## Example of a food portfolio



### Periods of food insecurity

Food-insecure months - Quantitative baseline data



Food-insecure months - Qualitative FDG data



Food name	Food description	Scientific name	Jan	Feb	Mar	Apr	May
<b>Fruits</b>							
Mango	pulp, ripe, raw	mangifera indica**1, *1	■	■			
Pawpaw	pulp, raw	carica papaya**2, *2	■	■	■	■	■
Orange	pulp, raw	citrus sinnensis**3, *3					■
Desert date	fresh, raw	Balanites aegyptiaca		■	■	■	
Desert date	dried, raw	Balanites aegyptiaca		■	■	■	
Lemon	pulp, raw	citrus lemon					■
Avocado	pulp, raw	persea americana					■
Banana	pulp, raw	musa sapp	■	■	■	■	■
White sapote	fruit, raw	casimiroa edulis		■	■	■	
Tamarind	pulp, ripe, raw	tamarindus indica					
Guava	pulp, raw	psidium guajava					■
Grewia/mallow raisin	fruit, raw	grewia spp					■
Common wild Madlar	raw	vangueria madagascariensis					
Java plum/Eugenia/Jamuan	Fruit, raw	syzygium cumini					
Kithaala/kithaalwa	raw	lannea					
<b>Vegetables</b>							
Cowpea leaves	leaves, boiled	vigna unguiculata		■	■		
Amaranth	leaves, boiled	Amaranthus spp				■	■
Pumpkin leaves	leaves, boiled	cucurbita maxima	■	■	■	■	■
<b>Staples</b>							
Maize	sweet, yellow boiled	zea mays**1		■	■		
Millet	Pear millet, whole grain, boiled	pennisetum glaucum			■	■	
Sorghum	whole grain boiled	sorghum bicolor			■	■	
Potatoes	boiled	solanum tuberosum	■				
<b>Pulse</b>							
Beans	mature, whole, water-soaked, biled	phaseolus vulgaris**2	■	■			
Pigeon pea	mature, whole, water-soaked, biled	cajanus cajan**3, +2	■	■			
Cowpea	mature, whole, water-soaked, biled	vigna unguiculata*1	■	■	■		
Green gram/mung beans	mature, whole, water-soaked, biled	vinga radiata*3	■	■			
Groundnuts/peanuts	raw	Arachis hypogaea	■	■			

**Notes:**





















































70% of HH had experienced food scarcity in the last 12 months

\*Vitamin A (calculations based on Vitamin A retinol equivalent = retinal+1/6 beta-caroten+1/12 alpha-carotene+1/12 beta cryptoxanthin). Data are expressed per 100g fresh weight of edible portion.

\*\* = most consumed; \* = most sold; 1, 2, 3 = as prioritised by farmers

+++ = high source ++ = source ∞ = present, but low

 = no source  = no data currently available

	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Iron	Vitamin A+	Folate	Vitamin C
								∞	+++	∞	++
								∞	++	∞	+++
										∞	+++
								∞			+++
								+++		∞	
											+++
										∞	∞
										∞	∞
											++
								++			
								∞	∞		+++
								∞		∞	∞
											
								∞			++
											
								++	+++	++	++
								+++	+++	∞	++
								++	++	∞	
								∞	∞		
								++			
								∞			
								∞			∞
								∞		++	
								++		++	
								∞		++	
								∞		++	
								+++		+++	

Specific achievements include:

- 8 site-specific food tree and crop portfolios developed for 4 arid and semi-arid land counties in Kenya;
- 1 pilot school programme successfully established, engaging 570 children and their families and providing them with access to food tree and crop portfolios – quality planting material, technical agroforestry training, and targeted nutrition messaging and awareness;
- 2 agroforestry innovation hubs established, and 6 community nurseries established;
- 8 information, education and communication tools developed based on site-specific portfolios for wide dissemination and training;
- 6 agroforestry training sessions delivered to 280 participants;
- 7 targeted nutrition messaging and awareness training completed with 266 project beneficiaries (264 women and 2 men);
- 4 training sessions on enterprise development completed for 185 participants;
- 7 species suitability maps (current and future climates) developed for priority food tree species;
- 90 food tree and crop species identified across these sites as important food sources from local food systems; local harvest calendars developed for each of the foods and mapped with food composition data – these data play a key role in linking agriculture to nutrition.

**x. Linking Agrobiodiversity Value Chains, Climate Adaptation and Nutrition. Empowering the Poor to Manage Risk – Bioversity International – Benin, Costa Rica, Guatemala, India and Mali**

The goal of the project is to contribute to achieving food and nutrition security and economic empowerment in local communities facing climate risks. The project's objective is to strengthen the capacities of vulnerable women and men, farmers, value chain actors and national agricultural research systems (NARS) to deal with climate change through participatory research focusing on underutilized stress-tolerant varieties and associated management practices, for improved climate adaptation, nutrition and marketing opportunities. The project's subobjectives are:

- strengthen capacities to assess, document, monitor, conserve and manage stress-tolerant varieties of traditional crops;
- strengthen community-based organizations, mechanisms and processes managed by local communities to share best agrobiodiversity practices with peers and partners;
- strengthen capacities of NARS to deal with climate risks and promote scaling up of successful approaches;
- enhance the scientific understanding of the role played by agricultural biodiversity in resilient and nutrition-sensitive production and food systems, and advocate a policy change.

The project is developing and refining prioritization approaches to identify neglected and underutilized crop (NUS) species to address nutrition gaps in local populations and improve resilience and adaptation of production and livelihood systems to climate change. This framework enables capacity-building for producers and practitioners to devise solutions to enhance resilience by leveraging local agrobiodiversity. It supports the formation of producers associations and places a particular emphasis on female participation and leadership both at the farm level and along the value chain.



In addition, the project has produced policy recommendations based on project findings on the role of agrobiodiversity in nutrition, income and adaptation to climate change.

## Achievements

Some particular achievements include:

- The availability of quality seed of stress-tolerant varieties has been strengthened in Guatemala with the dissemination of 13,000 chaya cuttings to 6 communities, and 8 lines of tepary beans to 136 bean growers in 8 villages. In India, the Farmer Producer Company (FPC) acquired 106 ha of land for boosting the certified seed production of kodo and kutki millets (expected harvest of not less than 600 quintals [1 quintal is equal to 100 kg]). Millet grain production is also predicted to be very high, of the order of 7,000–8,000 quintals (to be sold by farmers directly to India's main millet market in Nasik).
- The promotion of the use of nutritious crops and of products of stress-tolerant crops in local markets has been most productive for chaya in Guatemala, where successful agreements have been made with the companies Earth-Empower and Kreadi to purchase chaya products directly from the women's cooperative created by the grant, media and influential members of the Guatemalan gastronomic sector. Chefs, restaurants and culinary schools have been engaged to popularize chaya, and policy dialogue with the local government has successfully led to the inclusion of chaya in feeding programmes at Chiquimula School. Also in Guatemala, the seasonal calendars produced by the grant have been disseminated to 3,368 community members to help farmers build more resilient and nutritious cultivations. Similar dissemination of calendars and posters is also being carried out in India and Mali. The wider consumption of nutritious millets by households has been further promoted with the installation in target communities of millet de-hullers, furnished with all accessories and training on their operation and how to best use the products for preparing local food products.
- With regard to improving access to information on climate change for better management of agricultural production, in Mali the project has leveraged two major rural radios to cover climate change and resilient practices, including cultivation of NUS. It is estimated that, in the four prefectures covered by the radios, the total audience has been almost 1.5 million people (about 7 per cent of Mali's population). The radio programmes have been broadcast in French and four local languages, all widely spoken in the regions and in the neighbouring countries. In addition, a major effort in strengthening and building indigenous peoples networks has been made through a collaboration between the project team and FAO, which has involved the profiling of indigenous peoples' food systems in 12 parts of the world and a major conference held in November 2018 in Rome. Another component of the initiative has involved a review of marketing strategies used by indigenous peoples to strengthen income generation while preserving indigenous values.
- With regard to policy recommendations for promoting NUS, Bioversity International was able to successfully influence the ministerial committee (Ministry of Education, Ministry of Agriculture, Ministry of Public Health and Social Assistance) to include chaya in the 2019 list of healthy foods to use in preparation of state schools meals in the Department of Chiquimula.

## Lessons learned

Overall, the funding provided by the European Union and IFAD has generated broad-based solutions to complex poverty reduction, food security, and integrative, economic growth goal challenges.

However, an analysis of programme impacts has highlighted one specific weakness: the lack of systematic coordination delivery of CGIAR research products generated from the IFAD-European Commission-CGIAR programme. Projects have been implemented independently, resulting in failure to utilize synergies between and within CGIAR centres.






Instead of individual centres implementing projects, this should be done by strategically allied centres. This programming will lead to the development of interdisciplinary research, built around development challenges and underpinned by complementary partnerships incorporated within the programmes. Inclusion of national partners, especially NARS and development practitioners, will help ensure scaling up as well as sustainability. Moreover, the programme design should place particular emphasis on learning and, rather than superficially attributing outcomes to the funding, the new design should encourage the measurement and assessment of both qualitative and quantitative contributions to outcomes. In practice, this will be expressed in a shift from broadly numerical reporting (allowing for increased importance to be ascribed) to the qualitative impact of individual projects.



©IFAD/Neil Palmer  
Africa Rice Centre – Crop Trust



International Fund for Agricultural Development  
Via Paolo di Dono, 44 - 00142 Rome, Italy  
Tel: +39 06 54591 - Fax: +39 06 5043463  
Email: [ifad@ifad.org](mailto:ifad@ifad.org)  
[www.ifad.org](http://www.ifad.org)

-  [facebook.com/ifad](https://facebook.com/ifad)
-  [instagram.com/ifadnews](https://instagram.com/ifadnews)
-  [linkedin.com/company/ifad](https://linkedin.com/company/ifad)
-  [twitter.com/ifad](https://twitter.com/ifad)
-  [youtube.com/user/ifadTV](https://youtube.com/user/ifadTV)

ISBN 978-92-9266-026-0

