



Supporting Nutrition-Sensitive Agriculture through Neglected and Underutilized Species

Operational Framework

Stefano Padulosi, Phrang Roy and Francisco J. Rosado-May





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Acronyms

ALF	African Leafy Vegetables
AVRDC	World Vegetable Center
BFN	Biodiversity for Food and Nutrition
BMZ	German Ministry of Economic Cooperation and Development
CBOs	Community Based Organizations
COSOP	Country Strategic Opportunity Programme
CPM	Country Portfolio Manager
FAO	Food and Agricultural Organization of the United Nations
GEF	Global Environment Facility
GFU	Global Facilitation Unit for Underutilized Species
HTDN	How to Do Note
ICO	IFAD Country Offices
ICUC	International Centre for Underutilised Crops
IFAD	International Fund for Agricultural Development
IP	Indigenous People
IPGRI	International Plant Genetic Resources Institute
M&E	Monitoring and Evaluation
NARS	National Agricultural Research System
NGO	Non Governmental Organisation
NRM	Natural Resource Management
NSA	Nutrition Sensitive Agriculture
NUS	Neglected and Underutilized Species

PAA	Food Acquisition Program (Brazil)
PDS	Public Distribution System
PGRFA	Plant Genetic Resources for Food and Agriculture
PNAE	National School Feeding Programme (Brazil)
PVS	Plant Variety Selection
RAS	Reimbursable Advisory Services
RAS	Rural Advisory Services
R&D	Research and Development
SDG	Sustainable Development Goal
SHGs	Self-Help Groups
TIP	The Indigenous Partnership for Agrobiodiversity and Food Sovereignty
TK	Traditional Knowledge
UN	United Nations
UNSCN	United Nations Standing Committee on Nutrition

Key Messages

Agrobiodiversity is a resource that supports human and environmental well-being. IFAD's support for the better use of agrobiodiversity with specific reference to neglected and underutilized species (NUS)¹ and a greater recognition of the traditional knowledge of Indigenous Peoples associated with the use of NUS and wild edibles are important for fighting food and nutrition insecurity, especially in the context of climate change. Both factors have the potential to promote and enhance a sustainable and nutrition-sensitive agriculture (NSA) and associated livelihood outcomes.

Investing in NSA is not just a social good, it contributes to sound development and good economics.

Impact pathways include resilient production, income generation and healthy consumption. Key mediators of impact are women's empowerment and nutrition awareness among consumers.

There is ample scope to maximize the contribution of NUS and Indigenous Peoples to nutrition by applying a nutrition lens to IFAD design project interventions.

Project development teams, while formulating, appraising or negotiating agricultural investment programmes and projects can improve sustainable and nutrition sensitive outcomes by recognizing that:

- Of the 5,000 food crops estimated to exist worldwide (RBG 2016)², global food systems are currently dominated by only three crop species (rice, wheat and maize) which provide half of the world's plant-derived calories.³ This situation is in continuous deterioration and illustrates a gradual homogenization of global food production⁴ that has multiple negative repercussions on people's lives: production systems are more vulnerable to climate change and other shocks, farmer asset development and income generation options are reduced, and consumers have fewer choices for nutritious and healthy diets.
- Agrobiodiversity is a precious asset for supporting our life systems but it is highly vulnerable and susceptible to genetic erosion caused by widespread

¹ These are cereals, grains, legumes, fruits, vegetables, roots, seeds and nuts.

² RBG Kew. (2016). The State of the World's Plants Report – 2016. Royal Botanic Gardens, Kew, UK. <https://stateoftheworldsplants.org/2016/>

³ FAO (2010). The Second Report on the State of The World's Plant Genetic Resources for Food and Agriculture. FAO, Rome. Italy.

⁴ Khoury CK, et al. (2014). Increasing homogeneity in global food supplies and the implications for food security. *Proceedings of the National Academy of Sciences* 111(11):4001–4006. <https://www.pnas.org/content/111/11/4001>

monocropping, standardization of cultivation methods, uniform markets, lack of economic incentives for crop diversification and change in food habits. Traditional knowledge associated with the use of NUS and wild edibles is being similarly compromised, and is fast disappearing due to changes in life styles, lack of inter-generational knowledge transmission and marginalization of local food cultures.

- Enhancing agrobiodiversity use has proved to be an invaluable means of improving the livelihoods of local populations as demonstrated by the Andean grains project in Bolivia (2014)⁵ and minor millets work in India (2015)⁶, both supported by IFAD through its research grant portfolio.
- Hot spots of NUS diversity coincide with those regions where Indigenous Peoples live, largely remote areas not exposed to intensive agricultural practices and where agro-ecological practices have prevailed. Research on crops cultivated or foraged by Indigenous Peoples remains marginal.
- The second global meeting of the Indigenous Peoples' Forum at IFAD in 2015 agreed to address Indigenous Peoples' traditional food systems and the use of biodiversity for nutrition. As a result, the contributions of Indigenous Peoples – towards sustainably managing ecosystems and protecting biodiversity through traditional knowledge and methods – need to be properly analysed and supported in project design⁷.
- Nutrition education and behaviour change communication are key elements of project design.
- Wider use of NUS is consistent with several SDGs (2, 7, 12, 13, 15 and 17)⁸, the Aichi Biodiversity Targets (Target 13)⁹, the FAO Global Plan of Action on PGRFA¹⁰, and the Strategic Plan 2016-2020 of the United Nations System Standing Committee on Nutrition (UNSCN), which pays special attention to local production, crop diversification and sustainability.¹¹
- NUS have been ignored by policy makers and marginalized by the Green Revolution. Their exclusion from research and development investments until recently has left them behind in terms of advances regarding their conservation, cultivation,

⁵ Padulosi S, Amaya K, Jäger M, Gotor E, Rojas W, Valdivia R. A. (2014). Holistic Approach to Enhance the Use of Neglected and Underutilized Species: The Case of Andean Grains in Bolivia and Peru. *Sustainability* 2014, 6, 1283-1312. <https://bit.ly/2FftCpt>

⁶ Padulosi, S., Mal, B., King, O. I., & Gotor, E. (2015). Minor millets as a central element for sustainably enhanced incomes, empowerment, and nutrition in rural India. *Sustainability*, 7(7), 8904-8933 <https://bit.ly/2FbgDpE>

⁷ <https://www.ifad.org/en/web/latest/event/asset/39008834>

⁸ <http://bit.ly/2wTLI9J>

⁹ <https://www.cbd.int/sp/targets/default.shtml>

¹⁰ <http://www.fao.org/agriculture/crops/thematic-sitemap/theme/seeds-pgr/gpa/en/>

¹¹ See esp. Recommendations N. 9, 10, 21, 23, where the following needs are expressly recognized the need to: 1) "Strengthen local food production and processing, especially by smallholder and family farmers, giving special attention to women's empowerment, while recognizing that efficient and effective trade is key to achieving nutrition objectives" [Recommendation 9]; 2) "Promote the diversification of crops including underutilized traditional crops, more production of fruits and vegetables, and appropriate production of animal-source products as needed, applying sustainable food production and natural resource management practices" [Recommendation 10].

harvest, postharvest, marketability and studies related to their contribution to food and nutrition security, income and livelihoods, gender, and policies and legal frameworks to regulate their use.

- NUS, including wild edibles, are an integral part of local cultures, widely used in traditional food preparations, and increasingly in the spotlight of efforts for revitalizing local food cultures and celebrating the identity of the ‘terroir’.¹² Food festivals are important initiatives to attract the attention of youths.
- NUS and wild edibles are highly adapted to agro-ecological niches and marginal areas and are resilient to climate change. This is perhaps the most attractive trait to agricultural decision makers.
- Most NUS are cultivated relying on farmer-based knowledge, which is fast eroding due to the pervasive phenomenon of cultural erosion, which in turn contributes to the marginalization and loss of genetic diversity at inter- and intra-specific levels. This double impact should be stopped before it is too late.
- NUS are poorly represented in *ex situ* gene banks, which is a direct consequence of the low priority these crops have received in the past in national and international research programs. Most of their diversity is conserved on-farm. They are served by informal and weak seed systems.
- There is a lack of professional capacities within NARS for promoting NUS through an interdisciplinary, holistic and participatory approach. However, species and crop selection must be subject to the free, prior and informed consent of all to fully understand the environmental and gender impact. The selection of crops and species for nutritional value must meet the challenge of adaptation to climate change.
- There is a need to strengthen the evidence base on the contribution of NUS within nutrition-sensitive agriculture and at the same time reinforce capacities and generation of knowledge for design, implementation and monitoring for management, evaluation and advocacy.
- Developing a holistic and nutrition-sensitive approach involving NUS requires an unprecedented building of supportive structures, knowledge systems, cooperation and partnerships with communities such as Indigenous Peoples as well as women and Youth.

¹² ‘Terroir’ is a concept normally applied to wine production and is defined as the complete natural environment in which a particular wine is produced, including factors such as the soil, topography, and climate.

Background

The term NUS was developed by IPGRI (predecessor of Bioversity International) in 1999¹³ to refer to plant species (wild, or semi- or fully domesticated) left at the margins of R&D. The word ‘*neglected*’ underlines the low level of research investments made on them when compared with mainstream commodity crops, whereas the word ‘underutilized’ alludes to their untapped livelihood potentials. IFAD has been championing a global NUS programme aimed at enhancing their sustainable conservation and use since 2001. The programme, consisting of five grants (latest still active) being implemented by Bioversity in cooperation with national partners, is the first UN-supported effort specifically focusing on these species. Often defined as the ‘*The IFAD NUS Project*’ this initiative has been implemented in Latin America, North and West Africa, and West and South Asia (see Annex I).

In 2000, IFAD together with IPGRI, the International Centre for Underutilised Crops (ICUC), and the German Ministry of Economic Cooperation and Development (BMZ) recommended the establishment of a Global Facilitating Unit for Underutilized Species (GFU), “*to pursue the goal of drawing attention to the potential contribution hitherto underutilized species could make to food security and livelihoods of marginalized and poor communities, so that an increasing number of research institutions, extension services, policy makers and donors include the development of underutilized species in their programmes and plans*”.¹⁴

The Unit was established in 2002 and was housed at IPGRI Headquarters in Rome. In 2009 it was merged with ICUC to become “Crops for the Future”.¹⁵ Today, IFAD is called upon to further expand this important endeavour in support of NUS. The mounting scientific evidence for the role NUS can play in strengthening nutrition security in the face of climate change makes the contribution of IFAD in support of NUS an ever more strategic endeavour.

Approximately 70% of the world’s remaining biodiversity is estimated to be in the territories of indigenous communities and indigenous women continue to play a critical role in the conservation of NUS crop diversity and traditional knowledge and in upholding nutrition security at the household level. Unfortunately, the beneficial role of Indigenous Peoples in maintaining genetic and cultural diversity is often ignored.

¹³ Eyzaguirre P., S. Padulosi and T. Hodgkin (1999). IPGRI’s strategy for neglected and underutilized species and the human dimension of agrobiodiversity. In Padulosi S. (Editor). Priority setting for underutilized and neglected plant species of the Mediterranean region. Report of the IPGRI Conference, 9-11 February 1998, ICARDA, Aleppo. Syria. International Plant Genetic Resources Institute, Rome, Italy.

¹⁴ <http://bit.ly/2vVYS8R>

¹⁵ CFF is now headquartered in Malaysia – more information on CFF at <http://www.cffresearch.org/>

Focus on NUS and Indigenous Peoples' food communities will therefore support the implementation of IFAD Policy on Engagement with Indigenous Peoples.¹⁶ It is consistent also with IFAD Strategic Framework 2016-2025,¹⁷ IFAD's Policy on Gender Equality and Women's Empowerment,¹⁸ IFAD's Action Plans on Mainstreaming Nutrition¹⁹ 2019-2025, Gender-transformative Approaches 2019-2025,²⁰ IFAD Rural Youth Action Plan 2019-2021²¹ and IFAD Strategy and Action Plan on Environment and Climate Change 2019-2025.²²

The purpose of this Operational Framework and the five companion HTD Notes, is to support Country Directors, CPMs and ICOs to integrate NUS and Indigenous Peoples issues into the Loans and support the implementation of IFAD Nutrition Sensitive Agriculture Action Plan 2016-18²³ and capacity building efforts in that direction.²⁴

It highlights some of the lessons and outcomes arising from IFAD research grants to Bioversity for the NUS programme and allied Indigenous Peoples. Box 1 provides some reflections on the use of the term NUS with local communities whereas Box 2 indicates five best practices to make a NUS project more nutrition sensitive. Boxes 3 to 9 are intended to encourage IFAD funded projects and programmes to spontaneously search and document more of such transforming methods. Figure 1 shows the Holistic Value Chain Approach²⁵ for enhancing the use of NUS, developed thanks to IFAD-supported grants; the graph shows the various interdisciplinary and participatory interventions leading to resilience outcomes in nutrition, markets and peoples' livelihoods in general. Figure 2 illustrates suggested entry points for programmes and projects on ways to reinforce the contribution of NUS value chains for more nutrition-linked outcomes. Figures 3 and 4 provide some overviews of ways to maximize nutrition in typical food value chains. Box 10 provides suggestions on how to strengthen the role of extension agents and practitioners in promoting NUS.

¹⁶ https://www.ifad.org/documents/38711624/39417924/ip_policy_e.pdf/a7cd3bc3-8622-4302-afdf-6db216ad5feb

¹⁷ <https://bit.ly/2R6rmHo>

¹⁸ <https://www.ifad.org/en/web/knowledge/publication/asset/39406502>

¹⁹ <https://webapps.ifad.org/members/eb/126/docs/EB-2019-126-INF-5.pdf>

²⁰ <https://webapps.ifad.org/members/eb/126/docs/EB-2019-126-INF-6.pdf>

²¹ <https://webapps.ifad.org/members/eb/125/docs/EB-2018-125-R-11.pdf>

²² <https://webapps.ifad.org/members/eb/125/docs/EB-2018-125-R-12.pdf>

²³ <https://bit.ly/2SYUCgn>

²⁴ De la Peña I. and J. Garrett (2018). Nutrition-sensitive value chains, A guide for project design (Vol I and Vol II). IFAD <https://bit.ly/2PWtTzV> and <https://bit.ly/2D8qoBf>

²⁵ Padulosi et al. (2014). Sustainability 2014, 6, 1283-1312. <https://bit.ly/2FftCpt>

Box 1: NUS terminology

Many are the synonyms which have been used since the mid-1980s to refer to NUS, including minor, under-used, under-exploited, under-developed, orphan, promising, lost, alternative, traditional, niche crops, crops of the future, future smart food. In reality, all these terms are often context-specific and loaded with heavy cultural meanings and not easily understood in the same way by everybody. The term “Neglected and Underutilized Species” might not be the ideal expression and may not be appealing to people. As a matter of fact, local communities often dislike it. Its use in this Operational Framework and the five companion How to Do Notes is retained for practical reasons, owing to the fact that NUS is now a term increasingly used in scientific literature, R&D project narratives and discourses addressing nutritious food systems. IFAD staff should be free to use any other suitable term when working with communities that may resonate more meaningfully and be more appropriate to the cultural context and other sensitivities of those people they will be working with.

The NUS Operational Framework is complementary to the recently published volumes on “Nutrition-sensitive value chains: A guide for project design” (NSVC guide).²⁶ NUS are likely to stand out in the commodity selection (NSVC guide STEP 2) of the latter framework because of their great potential to improve nutrition. HTD Note no. 1 outlines approaches and methods for ensuring that NUS are considered in such crop selection processes, as they are easily overlooked as a result of being poorly known. Situation analysis (NSVC guide STEP 1) is a core element of the process for identifying high potential NUS. Value chain analysis (NSVC guide STEP 3) is a key step in the nutrition-sensitive value chains operational framework, which identifies constraints and opportunities to guide the design of interventions (NSVC guide STEP 4). As NUS value chains have some peculiarities compared to well-established agricultural commodities, specific approaches and methods for value chain analysis of NUS are outlined in the HTD Note no. 2, while NUS-specific approaches for domestic and export market development are discussed in the HTD Notes 3 and 4, respectively. The nutrition-sensitive value chains guide is supported by an enabling environment that promotes the development and integration of the different stages of the value chain. HTDN 5 discusses approaches for building an enabling environment for NUS value chain development.

²⁶ De la Peña I. and J. Garrett (2018). Nutrition-sensitive value chains, A guide for project design (Vol I and Vol II). IFAD <https://bit.ly/2PWtZv> and <https://bit.ly/2D8qoBf>

Box 2: How an NUS project can be made more nutrition sensitive

Step 1. Explicitly incorporate improved nutrition into the project's outcomes and integrate nutrition-relevant indicators in the project logical framework.

Step 2. Include a situation analysis on the nutrition context addressing nutrient gaps of the targeted beneficiaries.

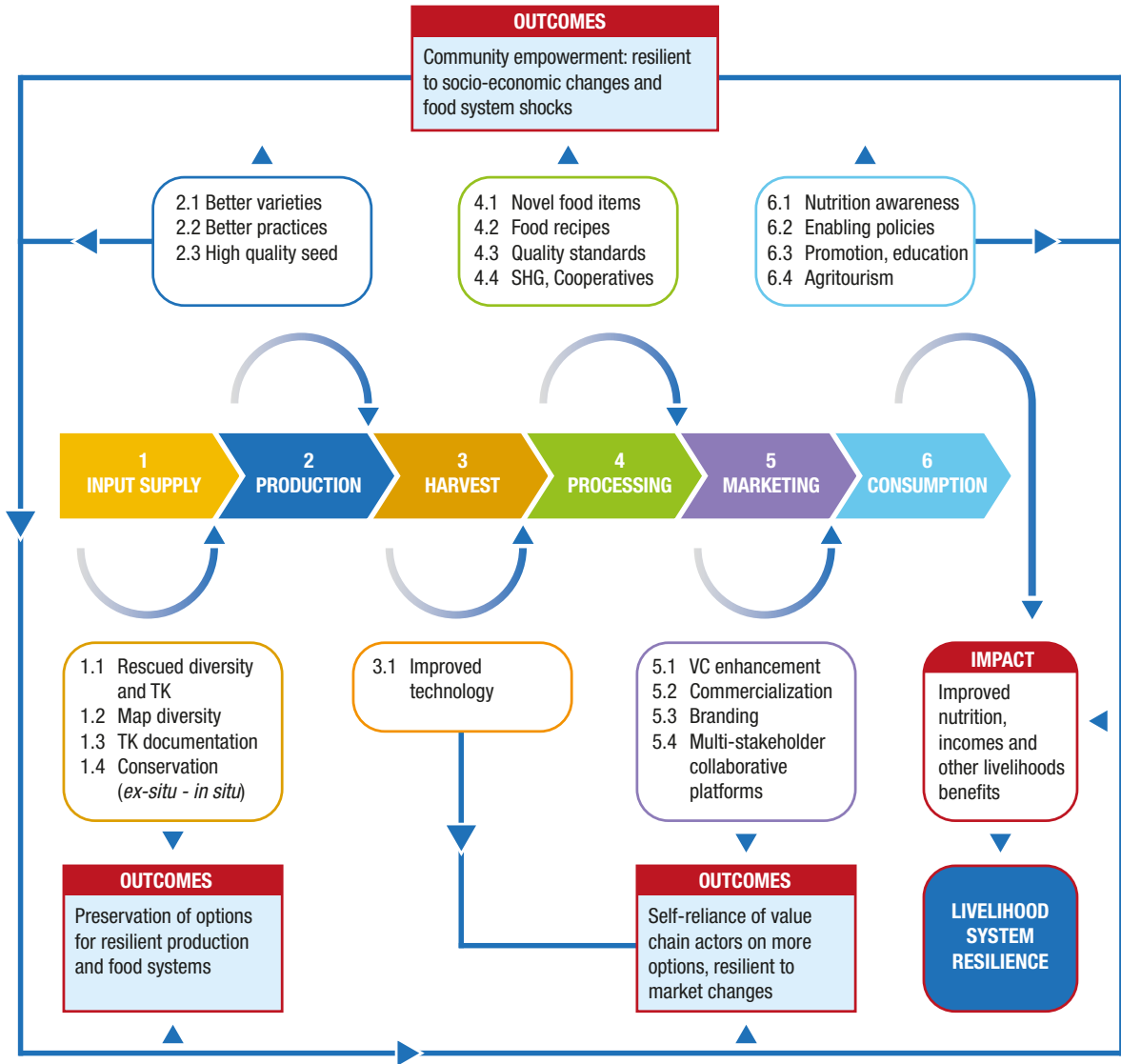
Step 3. Include nutrient-dense NUS in agricultural development interventions to complement the nutritional role played by staple crops guided by a diversity-based sustainable diet approach.

Step 4. Trace the impact pathway, i.e. the steps from breeding, production to seed systems, consumption needed for the intervention to improve nutrition along the NUS value chain. Design and implement project actions that will affect that pathway in a systematic way. For example, determine if a change in dietary habits is needed to encourage the consumption of some wild edibles and, if so, implement actions to promote change. Allocate dedicated financial resources to implement nutrition-sensitive activities.

Step 5. Through policy engagement and partnerships, address opportunities and constraints that affect the pathway and the effectiveness of the intervention, such as the institutional environment, gender or environmental sustainability, and define implementing arrangements for the delivery of nutrition-sensitive activities.

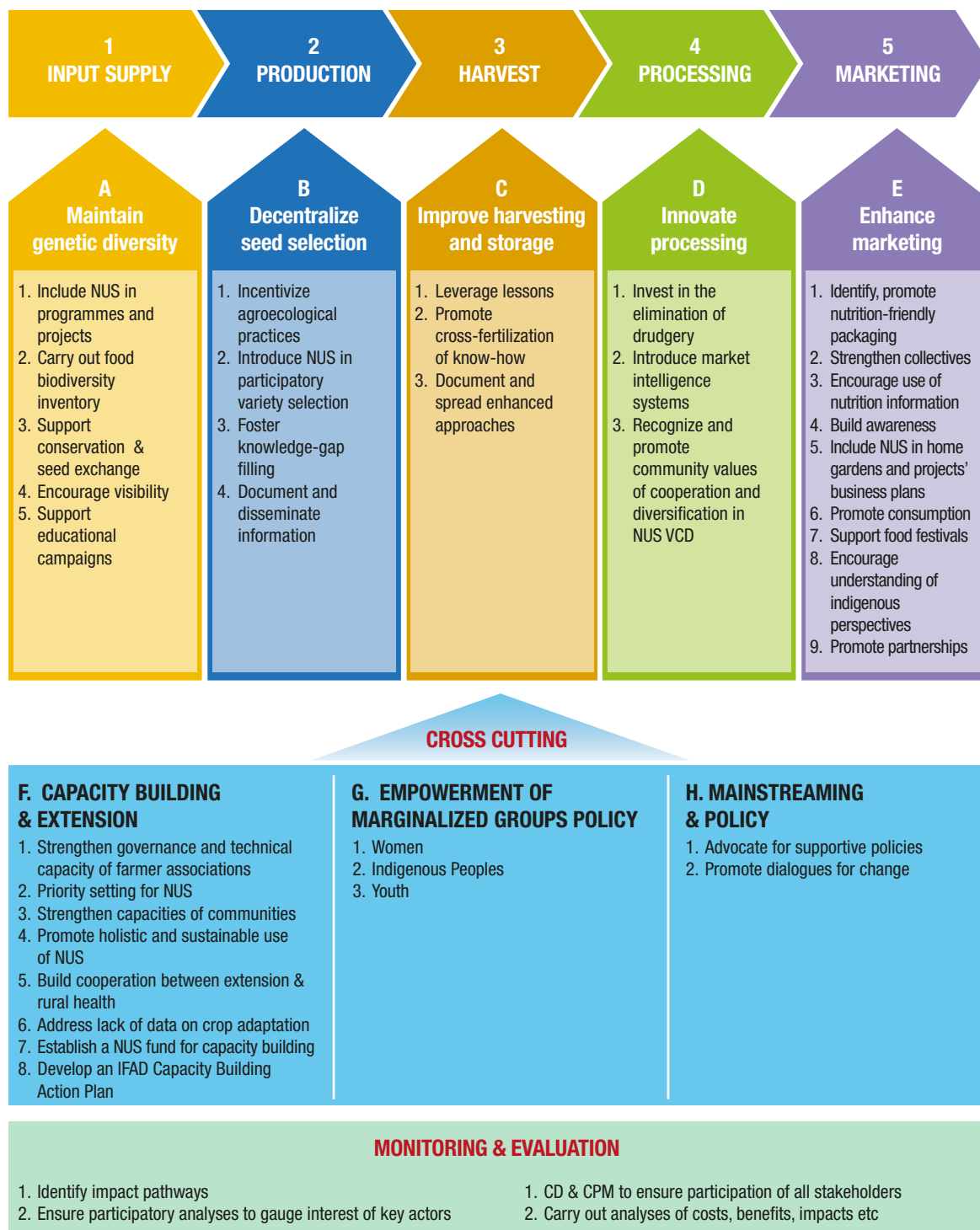
Source: Adapted from IFAD. 2014. Improving nutrition through agriculture, IFAD, Rome <https://bit.ly/2XgwgAZ>

Figure 1. Holistic value chain approach



Source: Padulosi et al. (2014). *Sustainability* 2014, 6, 1283-1312. <https://bit.ly/2FftCpt>

Figure 2. Entry points for IFAD to reinforce nutritional outcomes in NUS value chains



Strategic importance of nutrition sensitive NUS value chains

Resilient and nutritious NUS require a viable market that creates incentives for local value chain actors to secure their continued cultivation, processing and marketing. Establishing and upgrading NUS value chains should therefore be part of an overall strategy of IFAD country programmes with the aim of making production and different food systems, including Indigenous Peoples' food systems, more resilient from a climatic, nutrition, and economic perspective. Such a work should be initiated in the early stages of a COSOP as it will allow to build a timely dialogue with decision makers for advocating NUS. A common challenge that is usually encountered in such a process is the strong competition with well-established staple crops. A good strategy to attract government attention to NUS is to present a robust narrative on the multiple benefits associated with them, which should be as much as possible tailored to the specific local economic, social and cultural contexts.

IFAD will use its local partners such as Indigenous Peoples' food communities, community-based organizations, including farmers' and women's organizations and institutions such as NGOs, local authorities and national bodies to map the use of NUS over a specific area and explore the availability, accessibility and diverse nutritious options of their genetic resources when exploring their potential and market expansion. Project staff will use participatory approaches for seeking the free, prior and informed consent of participating communities, and before any activity is initiated in Indigenous Peoples' communities. In all priority setting exercises, they will use criteria related to nutrition, climate adaptation, income generation, cultural diversity, and ecosystem health and the urgency of the intervention due to ongoing genetic erosion. Women, youth and Indigenous Peoples must be active participants in all these exercises. Particular attention will be paid to the maintenance of genetic diversity, decentralized NUS seeds selection and production systems, harvesting, cottage processing, local or regional marketing, and promotional advocacy. These are the impact pathways of a NUS nutrition-sensitive agricultural programme or project.

IFAD role

Opportunities and entry points for programmes and projects are described in the following sections and graphically captured also in figure 2 (page 17).



A

To ***maintain genetic diversity*** in a given project or programme area necessary to strengthen nutrition-sensitive agriculture, the following actions should be pursued:

1. **Include NUS in programmes and projects:** to improve food and nutrition security through enhanced natural resource management (NRM) and rural livelihoods. Supportive measures include development of improved planting patterns and best practices leveraging science and traditional knowledge and provision of technologies and processes to mobilize NUS in coping with extreme climate variations.
2. **Carry out an inventory of locally available food species (wild and cultivated):** to use for filling nutrient gaps existing within the target area. This work should focus on local livelihoods, with special attention for women and Indigenous Peoples, and on locally available NUS from under-consumed food groups. Nutrition needs and seasonal dynamics of hunger in the focal communities should be considered.
3. **Support conservation and seed exchange:** to strengthen conservation of genetic diversity and traditional knowledge by including integrated *ex situ* and on-farm conservation actions in Grants and Loans financed projects; establish demonstration plots involving interested farmers; foster seed exchange among farmers by supporting their seed networks, and recognize communities for their invaluable role in safeguarding such diversity by granting certificates from local or international organizations.
4. **Encourage visibility of NUS:** in local and regional media (newspapers, radio/ TV programs, and social media), in cooperation with local and international organizations and endeavour to challenge the poor image of NUS associated with poverty and backwardness.
5. **Support educational campaigns:** by including in basic to higher education curricula of local schools, activities and information about NUS and their importance for the livelihoods and well-being of local communities.

Box 3: Tips to promote participation of stakeholders in priority setting

The participation of different stakeholder groups is fundamental to explore collectively the potential of NUS in a given environmental, economic, social and cultural context, in which Indigenous Peoples (IPs) and other vulnerable groups can actively participate. The selection of target NUS is one of the first activities to be pursued in setting a NUS project. In practice, this is done by involving a representative number of key actors (ideally not totalling more than 15-20 people) who should have a common understanding and relevant knowledge of NUS and their potential. Participants should include a cross section of all relevant stakeholders so as to provide different and complementary views on issues surrounding the use enhancement of NUS, and of course such a team should be well balanced in terms of gender, age and IPs representativeness. Stakeholders should be sought among NGOs and Community Based Organizations (CBOs), farmers, traders, local authorities, researchers able to cover the different aspects of NUS promotion (including ethnobotany, nutrition, marketing, social science, policy), private sector, extension agents and agribusiness services providers. Involving such a variety of actors will help in ensuring that a review of existing NUS of potential interest to the Project will be based on collective knowledge, and be consistent with challenging issues related to today's agribusiness. It will also allow a fair, objective and robust selection of priority species. Criteria for the selection of target NUS should be handled in a flexible way, taking into account the multiple and highly interlinked aspects of social, environmental and economic nature existing in the target area.²⁷

²⁷ More on priority setting process is provided with the companion HTD Note no. 1 under finalization.

Decentralize
Seed Selection

PRODUCTION

B

Because of their high adaptive capacity to local environments, NUS call for highly **decentralized seed selection and production systems** where their resilience can be harnessed (e.g. by using Plant Variety Selection-PVS, such as crowdsourcing) through direct evaluation of farmers in their own fields. Common bottlenecks encountered in the NUS cultivation include unavailability of seeds, poor agronomic practices, poor yields, and drudgery in harvest operations. Community-based weather stations and indigenous weather forecasting approaches to help farmers monitor climate fluctuations are some of the approaches that could be also supported.

To enhance these **decentralized seed selection and production systems**, the following actions should be pursued:

- 1. Incentivize agro-ecological practices:** by promoting the use of NUS in its operations aimed at reducing external inputs and taking maximum advantage of their hardiness in vulnerable, drought-prone areas where NUS are able to exploit residual soil moisture and scarce rainfall regimes; promote NUS cultivations interspersed within commercial cropping programmes.

2. **Introduce NUS in PVS programs of Grants and Loans financed projects:** and build up a knowledge base on agronomic performance, including climate-change adaptation of these species to use for comparisons with staple crops. Such a process should involve all value-chain actors and encourage active participation of women, Indigenous Peoples and youth. Evaluations activities should go hand-in-hand with characterization of genetic resources for nutritional content to support selection of resilient, nutritious and economically interesting species.
3. **Foster knowledge-gap filling:** to improve cultivation practices for NUS, aiming at elimination of drudgery in the field and introduction of innovative cultivation approaches based on the blending of traditional knowledge and scientific findings.
4. **Document and disseminate information:** regarding seed selection, management and conservation of NUS among local communities.

Box 4: Tips to promote participation of marginalized groups

It is important to strategically choose a meaningful entry point from the point of view of a marginalized community for any community-based promotion of NSA. For example, The Indigenous Partnership for Agrobiodiversity and Food Sovereignty (TIP) found that food festivals and taste workshops are very useful events to connect Indigenous Peoples' communities to nutrition sensitive agriculture. It is not always easy to ensure the active participation of marginalized groups such as women or certain ethnic groups. A situation of marginalization of some groups is often encountered in implementing a rural development project, including those focusing on NUS, and this causes tensions in the community. Experience has taught that activities in which certain groups are the loser and others the sole winner ('zero-sum game') are not helpful at all. In fact, social inclusion is best achieved when we are able to show that all groups will be benefiting of an inclusive approach, i.e. putting in a simple way, when working all together we can get a *'bigger cake' for everybody, instead of redistributing tiny slices of that to each participant*. Enhancing NUS use is a domain of work where participation of all groups is extremely relevant and not just because of ethical principles. Inclusiveness embraces greater benefits arising from harnessing the sparse but rich traditional knowledge held by each group on multiple uses associated with these traditional resources. Leveraging this shared knowledge, safeguarded by women and Indigenous Peoples over generations, will allow developing more successful value chains, by drawing on innovative ideas, and perspectives which will ultimately help address problems encountered in the cultivation, processing or marketing of NUS. It is also important that this sharing of knowledge acknowledges an intercultural framework where different types of traditional knowledge and contemporary science can and should be mutually reinforcing and respectfully treat each other as equal partners.



**Improve
harvesting and
storage** → **HARVEST**

C

Improved **harvesting methods and storage** are both relevant aspects for NUS in view of the scarce attention paid to them by earlier research and development. Projects activities should:

1. **Leverage lessons** accumulated on harvesting methods through earlier IFAD funded projects for upgrading community-based storage facilities for priority nutritious and resilient NUS. Build capacities of value chain actors on food safety. Translating lessons learned in one country to be applied in another will need to be properly contextualised.
2. **Promote cross-fertilization of know-how:** from commodity crops acquired by IFAD research grants and CGIAR Centres- to promote NUS. Such an approach will be moreover valuable as a vehicle for meeting the increasing demand for a system approach in CGIAR research.
3. **Document and spread enhanced approaches on harvesting and storage:** of NUS among local communities.



**Innovate
processing** → **PROCESSING**

D

Innovative processing is needed to improve the convenience of NUS foods, increase shelf life and facilitate transportation and storage. However, processing enhancement should be done in ways that respect the nutritional value of NUS, as in the case of fonio and minor millets whose grain polishing operations have been shown to eliminate important micro-nutrients. Such processing should leverage indigenous technology and local wisdom and blend that with science.

To promote improved cottage processing, the following actions should be carried out:

1. **Invest in the elimination of drudgery in NUS processing:** This will tap into enormous nutritional and income generation potential from agrobiodiversity currently unexploited. Community-based processing units will support both income generation from value addition, and a more effective use of nutritious NUS, and contribute to the social empowerment of women and Indigenous Peoples. Special attention should be given to the deployment of innovative technologies such as the use of locally available renewable energy.
2. **Introduce market intelligence systems:** and leverage platforms that may exist for sharing information on offer and demand for cottage products via mobile phones, as successfully practiced in Kenya and other African countries. Such

work, beneficial to all marketing efforts, should be complemented through the development of mobile apps for local communities that would provide information about where to find NUS in the community, how to use, buy and sell them.

- 3. Recognize and promote community values of cooperation and diversification in NUS value chain development:** It is important to acknowledge that the major motivation of the marketing activities is not simply to increase wealth but to have a significant role to play in the community. In Indigenous Peoples' areas, scaling up value chains must be done slowly and without the unnecessary disruption of traditional production systems and the indigenous vision of well-being. It is important to recognize the cultural aspects of value chains in indigenous areas is not competition but co-existence and cooperation.

Box 5: Processing machine for minor millets in India

The first example of a best practice is the introduction of a suitable processing machine for minor millets in India. It brought about important changes for poor rural women. Whereas it took women about two hours to process sufficient millet for the daily needs of their families using traditional methods, the new micro-mills introduced by the IFAD-NUS grant in India perform the same task in 5 to 7 minutes. Eliminating the drudgery and reducing the processing time has significantly contributed to increasing the household use of these nutritious foods, contributing to greater availability of important nutrients, especially Calcium (Ca) and Iron (Fe), whose content is notably high in millets (e.g. in foxtail millet Ca is 37 mg/100 g and Fe 6.2 compared with averages of 28 and 0.8 mg/100 g respectively in rice).²⁸ Moreover, many women reported greater social status and self-esteem and the time available opened up opportunities for them to earn extra income, and strengthen their independence and financial security. Training women on production of value-added products gave them also additional confidence and skills to discern which of the value-added products are appropriate for domestic use and which for commercial development. All these factors contributed to their empowerment and their transformation from housewives and farm labourers to market-based product developers and entrepreneurs.²⁹

²⁸ Brink M. and G. Belay. 2006. Cereals and Pulses. Plant Resources of Tropical Africa 1. 297 p.

²⁹ Padulosi S. et al. (2015). *Sustainability*, 7(7), 8904-8933. <https://bit.ly/2FbgDpE>

Box 6: Wild mango pickles in India

Mangoes are deeply ingrained into the Indian culture where pickles, predominantly from mango or *Citrus* species, are widely used. In the mountainous Western Ghats of Karnataka, farming families still gather wild mangoes called '*appe midl*'. Local farmers identified superior types and trees in the forest that produce *appe mangoes* with a pleasant 'camphor' or 'cumin' aroma and that stay crispy without losing their taste over time. The '*appe midl*' are part of the vast NUS portfolio present in India that can be better used for improving incomes of local populations, especially Indigenous Peoples who are custodians of vast knowledge related to the harvesting and processing of these wild fruits. Local pickle brands in Karnataka are fast growing, and fetching substantially higher prices than the established industrial brands. In consideration of this growing market opportunity, the GEF Project on Tropical Fruits Tree Diversity³⁰ (2009-2015), included in its work also capacity building of local communities for the development of the value chains of pickles from wild mangoes. These activities helped women's Self-Help Groups (SHGs) to establish farmer cooperatives, improve processing operations, develop maps of value chains of wild mangoes and other NUS, and gather market intelligence data to guide business plans and ultimately expand pickles sales to large cities like Bangalore and Dharwad. Notably, the project built competence of women on packaging, improving the quality of produce, choosing best natural ingredients and leveraging the much appreciated home-made recipes for greater impact on the market. All these interventions contributed to raising women's self-esteem and their own empowerment. Thanks to this work, in just 4 years, one collective women's group which started the production of wild mangoes reached a total business turnover of US\$2,000 per annum and others are following suit. More on the GEF Project at <https://www.biodiversityinternational.org/e-library/publications/detail/tropical-fruit-tree-diversity/>

³⁰ <https://bit.ly/2G1jS3r>



Based on the recommendations from the sections above, the **marketing and promotion** efforts should include:³¹

1. **Identify and promote nutrition-friendly packaging solutions:** including ways accessible to local vendors and small markets.
2. **Strengthen collectives:** (e.g. cooperatives, farmer-producer companies, confederations of producers): to build reliable distribution systems. These interventions should be done in ways that are inclusive of women and Indigenous Peoples.
3. **Encourage use of nutrition information:** as well as any other information on useful traits present in NUS (including resilience) for promoting their greater adoption by value-chain actors.
4. **Build awareness:** among consumers on the importance of NUS; sensitize decision makers for supportive policies and mainstreaming NUS in agricultural development programmes aiming at more resilient production systems and their inclusion in procurement programmes (e.g. targeting school feeding programs); include NUS in school curricula at all levels to support their popularization and appreciation by young and adult consumers.
5. **Include NUS:** in home gardens and projects' business plans developed at national level to strengthen home consumption and marketing of these nutritious species.
6. **Promote the consumption:** of NUS by advertising the nutritional outcomes and providing recipes with community cooking sessions, and form alliances between growers, chefs, other value-chain actors, and food movements seizing the momentum of current trends for healthy foods.
7. **Support food festivals:** and use them to recognize the invaluable work done by custodian farmers, Indigenous Peoples, women and some youth organizations for safeguarding the wealth of NUS and traditional knowledge.
8. **Support a better understanding of the indigenous perspective to marketing:** by facilitating their participation and sharing of views in meetings attended by stakeholders engaged in developing NUS value chains and markets.
9. **Promote partnerships:** with movements and organizations advocating greater use of biodiversity in food systems (like Slow Food).

³¹ For more on mapping out NUS value chains and markets see HTD Note no. 2, whereas for the promotion of domestic and export markets see HTD Notes no. 3 and 4, respectively.

Box 7: Boosting Mayan spinach consumption in Guatemala

Chaya (*Cnidoscolus aconitifolius*), also known as Mayan spinach, is an evergreen hardy shrub, domesticated by the Mesoamerican peoples in pre-Columbian times. It is typically cultivated on a small scale in gardens and field margins for household use. Compared to other dark green leafy vegetables, chaya contains much higher amounts of several macro- and micronutrients, including protein (60 g per 1 kg of leaves!), vitamin A, niacin, and vitamin C and has great potential to help fight widespread malnutrition in Guatemala. Within the framework of the IFAD-EU Project on NUS³² the chaya value chain was mapped out to identify bottlenecks hindering its wider use in Guatemala. The study revealed *inter alia* that: 1) small-scale chaya marketing exists in target areas (the Dry Corridor) where farmers sell the crop directly to consumers, or vendors; 2) a company is producing Chaya-linked nutraceutical products for export, with few sales points in the country targeting affluent consumers; 3) a few more companies are marketing chaya in other countries, especially in Mexico, where the crop is more popular; 4) low demand is a major limiting factor in chaya marketing and this is due to; i) poor awareness among consumers of either the existence of the crop or its nutritional benefits; ii) perception of the crop as “food of the poor”; iii) peoples’ reluctance to change their eating habits; iv) the limited number of recipes, and v) householders usually picking the chaya leaves from their own garden instead of buying them in the market. Low market value, low profitability, and inconsistent availability of produce were other challenges emerging from the value-chain assessment. Several interventions were realized by the Project to promote chaya in the Dry Corridor of Guatemala, where farming communities face severe food insecurity and malnutrition, both exacerbated by climate change. More than 16,700 cuttings of chaya were disseminated to farmers for planting in home gardens and in communal nurseries, along with training on best cultivation and propagation methods. Out of the four varieties cultivated in the country, the variety ‘Estrella’ was promoted for its high content in protein, fat, copper, manganese and calcium. A women-led cooperative (‘Integral Marketing Cooperative Chorti’) was also established for marketing chaya, linking up local producers with small businesses, chefs and restaurants in Guatemala city. Women were trained on various processing techniques, including protein extraction, leaf drying using solar ovens (equipment provided by the project), and novel recipes developed by chefs specializing in Guatemalan cuisine. Another success of the project is related to mainstreaming of chaya. Active engagement with local government led to the successful introduction of this food into the meals of local school feeding programmes in Chiquimula, and the provisioning by local farmers of the leaves directly to the schools’ canteens. Recipe books, samples and information on the nutritional value of chaya were disseminated in local markets in Chiquimula to help popularizing this crop. National-level campaigns and efforts to promote wider use of chaya by the gastronomic sector were also highly successful. More on Bioversity’s work on chaya at <https://www.bioversityinternational.org/news/detail/uniting-efforts-to-enhance-the-use-of-neglected-mayan-superfood-chaya/>

³² “Linking agrobiodiversity value chains, climate adaptation and nutrition: Empowering the poor to manage risk” (2015-2020); more at <http://www.nuscommunity.org/initiatives/ifad-eu-ccafs-nus/>

Box 8: Bringing back to the table African leafy vegetables in Kenya and Tanzania

African leafy vegetables (ALV) like amaranth, spider plant, jute mallow, pumpkin leaves, African nightshade, nettles and cowpea, have been for long considered food of the poor, in spite of their excellent nutritional values and their high vitamin A and iron content. Researchers have neglected them in favour of commercial vegetable species, and consumers found them unappealing, not least because of the poor hygienic conditions in which they were sold at roadsides. Marketing ALV represented a major challenge for local farmers due to the presence of several intermediary traders diminishing producers' income. Thanks to the contribution of several players, including Bioversity International and the World Vegetable Centre (AVRDC) the situation for these NUS vegetables has improved. In Kenya, activities included nutritional assessments and better cultivation practices (covering more than 100 species of local vegetables); training of value-chain actors on produce quality; building consistency of supply; linking farmers directly to markets and supermarkets; building capacities of value-chain actors in developing successful advertising campaigns involving also highly visible politicians and making those crops more appealing through dissemination of more attractive recipes. These activities built marketing skills in women, which by raising their confidence and self-esteem, contributed to their greater participation in the value chains. In Tanzania, AVRDC established demonstration plots, where male and female farmers were trained on improved cultivation practices and learnt about the nutritional values of ALV. Packages containing improved seeds of various species were also provided to farmers who normally can only access a few low-yielding varieties. More recently the GEF-funded Biodiversity for Food and Nutrition (BFN) project, executed by Bioversity International with implementation support from UN Environment and FAO (2011-2019), capitalizing on these previous efforts, has also supported the promotion of ALV by focusing on more extensive composition analysis of those species of significantly higher micronutrient contents (e.g. Ethiopian kale, jute mallow and spider plant) and helping foster inter-sector and inter-disciplinary cooperation involving local communities. More on Bioversity's work on ALV at <https://www.bioversityinternational.org/research-portfolio/markets-for-diverse-species/african-leafy-vegetables/> and on BFN work in Kenya at www.b4fn.org/countries/kenya/.

Cross-cutting actions

Capacity building
and Extension

WHOLE VALUE
CHAIN

F

Scaling best practices for a more effective use of NUS will need a robust investment in capacity building that cuts across target groups, a number of highly interlinked themes, including adaptation to climate change of agricultural production, food and nutrition security, value chains and marketing issues, raising public awareness and policy advocacy.³³

- 1. Strengthen governance and technical capacity of farmer associations:** especially Indigenous Peoples' food community associations, will need to be pursued as part of a broader public-private partnerships initiative and investment goal in agricultural marketing of NUS.
- 2. Priority setting for NUS:** As part of efforts to support nutrition-sensitive investment programmes, a mechanism to strengthen capacities of actors in making informed and fair decisions regarding species and priority activities should be embedded in the project design process. Dealing with NUS calls for a broad inter-disciplinary understanding of their roles, which is often not available among research and development experts. Opportunities for an interdisciplinary dialogue among stakeholders should therefore be part and parcel of the project design, whereby knowledge about NUS is provided and shared. These meetings should be preferably held in the country to be targeted by the programme. They would allow all stakeholders to become acquainted with the role(s) of NUS, especially regarding resilience, nutrition, and income generation in the target region or country. Such participatory reviews can be supported also through *ex ante* analyses to capture existing values of NUS in the socio-economic context of the target areas through available data and food-system modelling.
- 3. Strengthen capacities of community members:** including women, youth and Indigenous Peoples, is needed for boosting production efficiency, improved post-production, technologies, business and entrepreneurship skills, markets and

³³ They are consistent with the Strategic Plan for Biodiversity (ref to the Programme of Work on Agricultural Biodiversity decision X/34 in which the COP acknowledged the importance of agrobiodiversity including underutilized crops for food security and nutrition, especially in the face of climate change and limited natural resources); the FAO Global Plan of Action for PGRFA (Activity 18), the International Treaty (Article 6 on Sustainable Use of PGRFA). Furthering the use of NUS for a food-secure future has been reiterated in numerous international deliberations, including the Chennai Platform for Action to reduce hunger and poverty through plant genetic resources (2005), the Cordoba Declaration on Promising Crops for the XXI Century (2012) and the Paris Declaration on Agricultural Diversification (2015).

market information, sustainable investments in physical infrastructure and access to produce.

- 4. Strengthen market access:** networks of local weekly markets already present in most countries can be leveraged to sell NUS. This will be sustainable only if a number of limitations for NUS marketing are addressed, such as isolation of production areas, poor infrastructure for storage, processing and packaging. Specialized technical assistance for NUS products and market development, along with agri-business capacity building and mentoring of producer groups, should be pursued. Innovative technologies for NUS processing and their commercial viability need to be tested in a commercial context to promote scalability.
- 5. Promote holistic and sustainable use of NUS biodiversity for nutrition:** the judicious promotion of wild species will avoid overharvesting, and domestication can be promoted to overcome that risk. Locally available biodiversity may not be able to address all issues related to poor diet quality and nutrition. A combination with other approaches, including introduction of nutritious species from elsewhere, may be required to fill some nutrition gaps.
- 6. Cooperation between extension & rural health services:** can be effective for promoting resilient and nutritious NUS in diets and production systems. Training extension agents on agronomy, marketing and nutrition aspects of NUS is a strategic way to leverage their role for the promotion of NUS (see also Box 9). Strengthening their familiarity with wild and semi-domesticated plants from the local environment will support their role in assisting communities in the identification of priority species. Understanding local diets and nutrition issues in target populations supports the prioritization process. Sensitization regarding local consumption preferences and perceptions, and how to engage with farmers to collect this type of information, is important to understand demand-side issues. A capacity to recognize important actors in the value chain and a proactive attitude to reach out to engage these actors to overcome bottlenecks will help advance the use-enhancement of these nutritious species.
- 7. Support methods to address lack of data on crop adaptation:** this constraint can be addressed through the use of participatory varietal selection done in farmers' fields. Crowdsourcing, can be a highly effective way to select best varieties whose performance is assessed right in the farmers' field where it is needed, and not in research stations.
- 8. Establish a NUS fund:** specifically dedicated to supporting the development of capacities of local actors for the use enhancement of these species.
- 9. Develop an IFAD Capacity Building Action Plan:** for advancing the Agenda of NUS at global level through the Loans.



Empowerment
of marginalized
groups

WHOLE VALUE
CHAIN

G

Enhancing NUS use is a robust way to empower women, Indigenous Peoples, youth and other marginalized groups who depend on these species for their livelihoods. Economic empowerment should be at the core of all the actions highlighted above. This will include interventions that strengthen community institutions and farmer groups to support activities to leverage local agrobiodiversity, market access, agro-processing and value addition and paying particular attention to business skill development and market orientation. All these actions should be designed through a culturally-sensitive lens. Enhancing NUS use along the value chain should be driven by equity considerations and inclusion of vulnerable groups. In particular, loans funded projects should consider the following:

1. **Women:** they are noted as generally experiencing higher levels of extreme poverty compared to men and are disproportionately affected by shocks such as natural disasters and conflict. In addition, women in many socio-cultural contexts are deprived of their basic rights and agency, a situation that is intensified if they identify as indigenous. In communities, many activities rely on women for their key roles in cultivating, gathering, preparing and storing foods as well as in managing the family diet. Migration of other household members can often intensify this burden and increase the responsibilities of women to support the household. In the cases of food shortages, women's diets are often sacrificed to maintain the well-being and nutrition of men and children. The marginalization of women has consequences for childhood nutrition, growth, and general wellbeing. To improve participation of women in nutrition-sensitive NUS value chains, it is important to understand the limitations that they may face such as not being able to leave the households due to child caring, cooking, or household chores or travelling restrictions. When organizing activities meant to engage women, extra measures should be taken, such as providing child-care options or ensuring appropriate timing or transportation services to overcome such socio-cultural barriers. Worth stressing is that any facilitator should never provide his/her own opinion about norms and values of the community regarding women and their work, but endeavour instead to facilitate discussions between villagers themselves during which issues can be addressed in ways that are respectful of local customs and try as much as possible to support the process of social learning.
2. **Indigenous Peoples:** In its Policy on Engagement with Indigenous Peoples, IFAD stresses the participation of Indigenous Peoples in decision-making processes regarding development, use of natural resources, and participation in value chains. Owing to the abundance of NUS in areas inhabited by Indigenous Peoples, leveraging their knowledge on the use of these resources and equipping them with skills and infrastructural capacities, is a powerful way to contribute to their empowerment and to realize sustainable flows of economic benefits from NUS. NUS can offer a real opportunity to pursue a holistic approach to development for ethnic minorities based on resilient and nutritious local resources, while valorising vanishing wisdom

and cultures. Trainings aimed at indigenous youth on marketing NUS through more investments in Reimbursable Advisory Services (RAS) should be supported, as well as scholarship programs for promoting technical education, greater access to social, productive and commercialization programmes and investment funds tailored to suite micro-entrepreneurship of young Indigenous Peoples.

- 3. Youth:** Agriculture is losing its appeal among young people, increasingly migrating to the cities in search of better paying jobs. NUS offer the opportunity to inject a note of novelty into agribusiness and this can be leveraged to attract youth to stay engaged. Projects can capitalize on mainstreaming nutrition-sensitive agriculture and leverage the untapped potential of NUS for innovating, adding value, and boosting competitiveness, sustainability and profitability out of nutrient-rich crops. To make this work attractive to young people, new technologies can be injected (e.g. Internet marketing), new collaborative platforms (e.g. using social media), and new markets (e.g. delivery of produce directly to consumers as done already in many European countries). Youth could become agents of productive transformation in rural areas and IFAD can champion this move. Such an effort will require joint efforts of government and non-governmental institutions, the private sector and international organizations to provide training, develop organizational solutions and innovative technologies, open new market channels, and fund mobilization for business start-ups.



Mainstreaming
and Policy

WHOLE VALUE
CHAIN

H

NUS have been typically left at the margins of R&D. Policies to bring them back to the table for more nutritious and healthy diets are needed on different fronts. Projects should in particular:

- 1. Advocate for supportive policies:** IFAD could play a significant role in stressing the need for supportive regional, national and local policies that recognize the value of these species for improving nutrition and resilient livelihoods. These policies ideally should allocate specific funding, incentives and programmatic support for their development and cultivation expansion. Opportunities exist through links with school feeding programmes, tourism and other national procurement programmes to include nutritious NUS, assisting with creating demand for these resources. IFAD investment programs represent a huge opportunity to leverage countries' interest in crop diversification for more resilient and nutritious livelihood systems through the NUS portfolio.
- 2. Promote dialogues for change:** Programmes and projects can promote policy dialogues for the development of policy reforms which can trigger positive changes for the NUS value chains, such as facilitated access to germplasm, production of high quality seed, support for standardization of processing for competitive exports, provisioning of sustainable incentives for inputs, procurement of produce from farmers, and facilitation/ development of information sharing mechanisms for NUS marketing (as done already for commodity crops).³⁴

³⁴ More on policy and mainstreaming is provided in the HTD Note no. 5 under finalization.

Box 9: Impact of enabling policy in Brazil

In many regions of Brazil, the “modernization of agriculture” has led farmers to specialize in the production of a limited number of commodity crops and adopt unsustainable agricultural practices based on the intensive use of pesticides and other chemical inputs, which, in turn, has exposed their families to economic, social and health risks. The Food Acquisition Program (PAA) launched in Brazil in 2003 helped to change all that. This program has been encouraging the diversification of crop production, thus connecting agricultural supply to a diversified demand, and working actively to rescue, recover, and commercially promote NUS and their products, some of which had never been marketed before. Public procurement schemes supported through this Program are helping to also strengthen polyculture, historically a traditional feature of a “farmer’s way of life” in Brazil and successfully connecting agricultural supply to a diversified demand. In addition to providing incentives for diversification, the PAA is also supporting communities in rescuing, recovering and promoting NUS along with the revitalization of traditional knowledge, and local food cultures associated with them. Foods such as babassu palm (*Attalea speciosa*) flour, pine nuts, baru nut (*Dipteryx alata*) flour, cupuaçu (*Theobroma grandiflora*), palm hearts, umbu (*Spondias* sp.), maxixe (*Cucumis anguria*) and jambú (*Syzygium* sp.), among others, are now increasingly seen in the markets and help supporting more nutritious diets. Another successful example of mainstreaming NUS in Brazilian society, has to do with school feeding schemes. From 2011 to 2019, the BFN project has been leveraging existing frameworks, such as the PAA, put in place under the Zero Hunger Strategy), as entry points for its interventions in support of NUS. Working in close collaboration with Brazilian partners, the project focused in particular on the National School Feeding Program (PNAE), which reaches more than 40 million Brazilian students every day. The project has characterized some 43 fruit species of high nutritional content (e.g. camu camu which has x2 Vit A and x35 Vit C content found in oranges!) Through this work, PNAE is now bringing more nutritious-rich indigenous fruits sourced from smallholder farmers to pupils across the country. Interestingly, under this scheme, indigenous communities and ‘quilombolas’ farming communities, are receiving priority attention in the procurement of the fruits, networks among local associations are being strengthened and 30% additional income margins is given to farmers producing under organic and agro-ecological conditions. BFN has also contributed to influence the National Dietary Guidelines which are now recommending to eat a high diversity of foods made particularly of native, local and seasonal species grown through sustainable practices. More on the PNAE at <https://bit.ly/2tbglRS> and the BFN Project in Brazil at <http://www.b4fn.org/countries/brazil/>.

Monitoring and evaluation

The goal of integrating NUS in IFAD's nutrition-sensitive agricultural projects is to address the problems of food and nutrition insecurity, and biodiversity erosion and climate change that indigenous communities, the rural poor, and smallholders face in developing countries. In line with this overall goal, this framework seeks to increase the nutritional impact and to maintain genetic diversity through nutrition-sensitive agriculture and food-based projects that will increasingly aim to improve dietary adequacy (both quality and quantity) and livelihood opportunities of vulnerable rural communities including indigenous communities. The proposed operational framework described below is aligned with ways to maximize nutrition in agricultural value chains as described by Fanzo *et al.* 2017 (Figure 3) and by the High Level Panel of Experts on Food Security 2017 (Figure 4).

To reach this overall objective, IFAD seeks to achieve the following strategic outcomes at country and global levels:

- Nutrition sensitive agricultural projects shape local food systems in ways that contribute to improved diets.
- Projects promote behaviour change communication and related effective nutrition education and information to improve food choices and related preparation and postharvest practices (storage and processing), and so contribute to healthy, nutritious diets for persons of all ages.
- Projects promote the equality and empowerment of women and other vulnerable groups in ways that improve nutrition and NUS for themselves, their children, and their families across generations.
- Activities in policy engagement, advocacy, and partnerships, and research and knowledge management contribute to better governance, a supportive enabling environment for projects, and consequently more effective projects at global and country level.

To carry out an effective M&E for NUS, design teams and technical experts should in particular:

1. **Identify impact pathways:** linking activities and select outputs and outcome indicators and implementation milestones that will indicate how the impact process is progressing.
2. **Ensure that participatory analyses and studies should gauge the interest:** of key actors and assess progress in each of the spaces described above.

3. **Country Directors and CPM:** to closely monitor implementation milestones to ensure institutional partners in agriculture, education, health, water and sanitation, the private sector and civil society are engaged and incentivized, and that multi-sectoral coordination mechanisms are established and working.
4. **Carry out analyses of costs, benefits, impacts,** implementation, operational constraints and solutions to ensure initiatives are feasible.

This M&E process should allow for adjustments, collaborations and corrections as needed over time as the project is implemented.

Evidence of impact, sustainability, and scalability

NUS can support better diet quality of local communities and help building resilient production and food systems. The impact of NUS can be seen in terms of improved sustainability, low external inputs, diversified and higher value farming systems and greater resilience of food systems in periods of price or climate shock. NUS may not become multi-million dollar commodity crops but they can realistically establish themselves as niche crops at district, national or even at international level, improving direct access to nutritious foods for community consumption and generating sustainable income to support local farmers and other value-chain actors involved in their promotion.³⁵

While large-scale studies to assess impacts are still lacking, examples of how NUS can be leveraged to enhance local livelihoods do exist. The Indian Government, for example, has included minor millets in the national public distribution system (PDS) in recognition of their strategic role in nutrition security, creating an unprecedented opportunity for their wider consumption across the country.³⁶

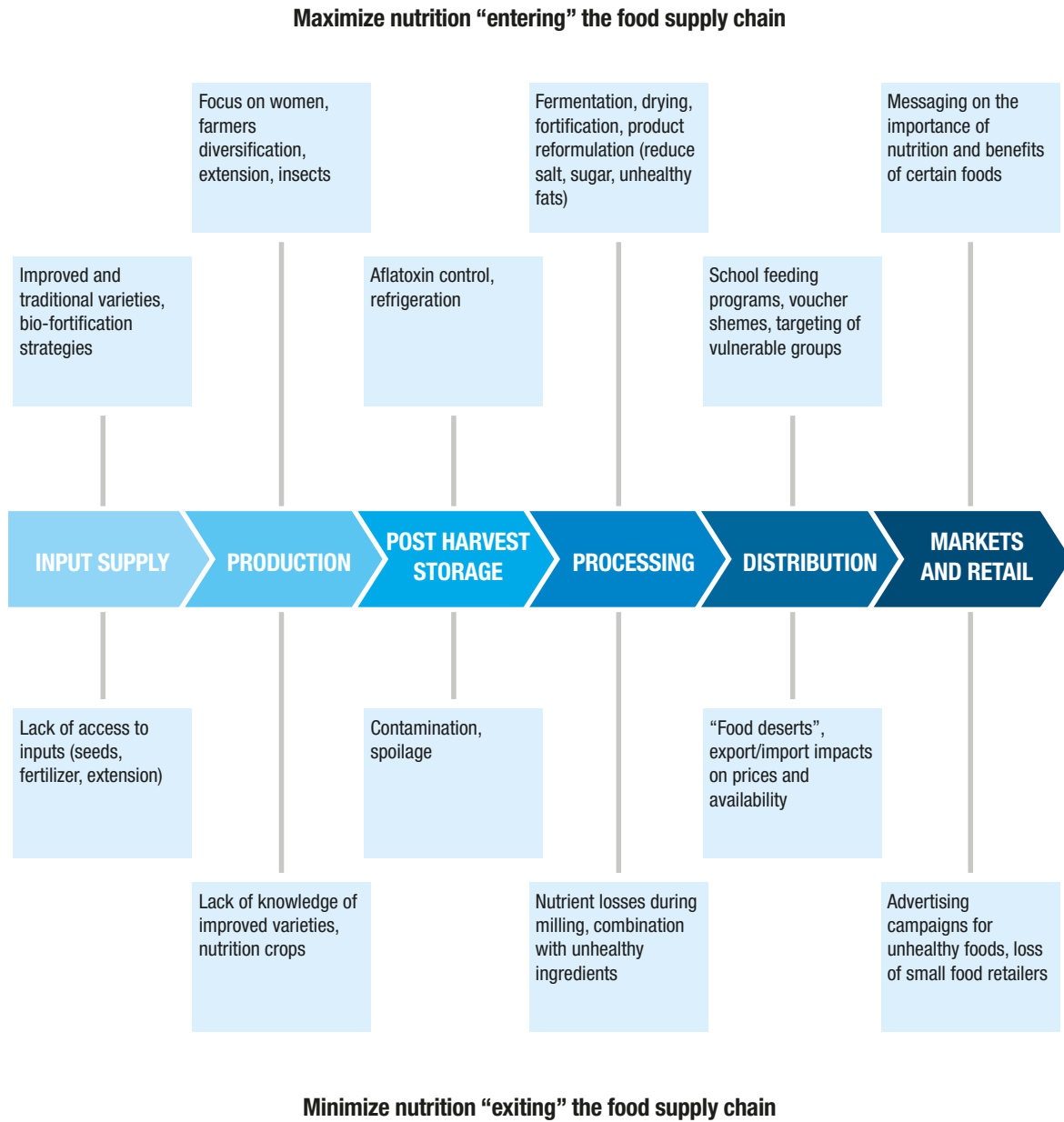
³⁵ <http://bit.ly/2uY4pYD>

³⁶ <http://bit.ly/2uY2mDI>

Box 10: Extension & NUS work

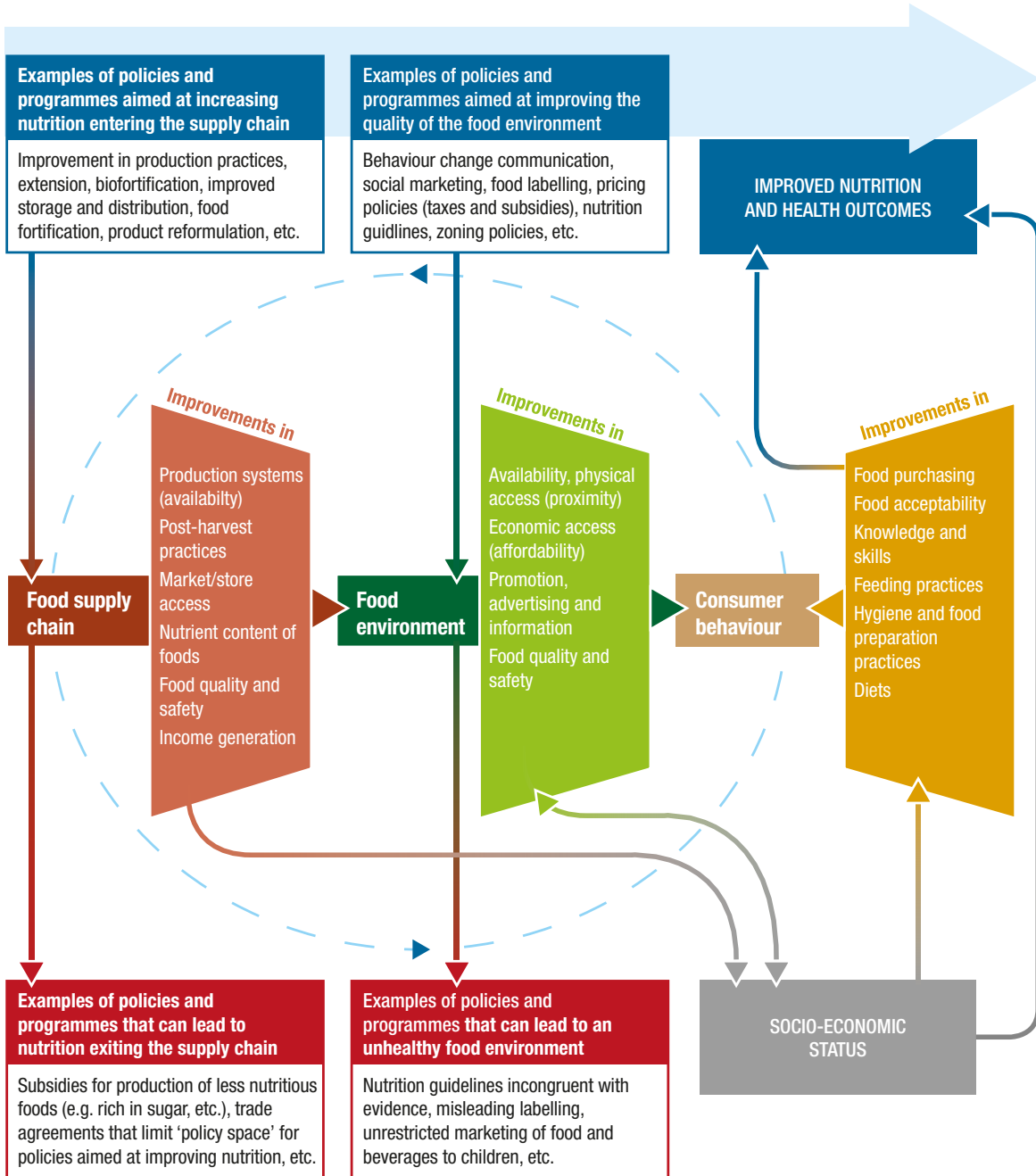
Enhancing NUS use can be a cost-effective and culturally appropriate means of improving resilience of local food systems and boosting farming household incomes and nutrition. NUS are typically poorly addressed by extension programmes (rural advisory services(RAS)) that have been focusing typically only commodity crops. This is a shortcoming in RAS that needs to be addressed if we want to take full advantage of any country's extension efforts to promote NUS for more nutritious agricultural outcomes and long-term livelihood impacts. RAS require a broad set of skills and knowledge to promote cultivation, commercialization and consumption of nutritious NUS. Cross collaboration between agricultural extension and rural health services can be most effective for promoting these crops in diets and production systems. Training in agronomy is a good base from which extension agents can assess main constraints to production, processing, and marketing of these species. Familiarity with the wild and semi-domesticated plants in the local environment will support identification of priority species. RAS staff should also leverage both local and scientific knowledge associated with NUS for various reasons, including the fact that some of these species may have toxic or anti-nutrient properties, and must be consumed in small amounts or processed in special ways to reduce toxin content and thus proper sharing of knowledge should be thus always followed. Understanding of local diets and nutrition issues in target populations also supports the prioritization process for NUS value chains. Sensitization on local consumption preferences and perceptions, and how to engage with farmers to collect this type of information, is important to understand demand-side issues. The capacity of RAS staff to recognize important actors in the value chains and reach out to them for overcoming marketing bottlenecks, will be also very helpful to advance the use of NUS.

Figure 3. Exit and entry points along the nutrition value chain



Source: adapted from Fanzo, J.C. Downs, S., Marshall, Q.E., de Pee, S. & Bloem, M.W. (2017). Value Chain Focus on Food and Nutrition Security. In Nutrition and Health in a Developing World 2017, pp. 753-770. Springer International Publishing.

Figure 4. Maximize nutrition entering the food supply chain: improved food systems for better diets and nutrition



Source: adapted from HLPE. 2017. Nutrition and food systems. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security. Rome. <http://www.fao.org/3/a-i7846e.pdf>

Annex I

IFAD-supported programme on NUS 2001-ongoing

Phase	Years	IFAD Grant Title	IFAD Grant No.	Amount of Grant (x 1,000 USD)	Target Regions	Target Countries
I	2001-2005	Enhancing the contribution of neglected and underutilized species to food security and to incomes of the rural poor	533	1,410	North Africa, West and South Asia, Latin America	Egypt, Yemen, Nepal, India, Peru, Bolivia, Ecuador
II	2007-2010	Empowering the rural poor by strengthening their identity, income opportunities and nutritional security through the improved use and marketing of neglected and underutilized species	899	1,400	West Asia and South Asia, Latin America	Yemen, India, Peru, Bolivia
III	2011-2015	Reinforcing the resilience of poor rural communities in the face of food insecurity, poverty and climate change through on-farm conservation of local agrobiodiversity	1241	975	South Asia and Latin America	India, Bolivia, Nepal
IV	2013-2015	Improving smallholder farmers' food and nutrition security through sustainable use and conservation of agrobiodiversity	1434	500	South Asia and Latin America	India, Bolivia, Nepal
V	2015-2020	Linking agrobiodiversity value chains, climate adaptation and nutrition: empowering the poor to manage risk	200000526	1,000	West and South Asia, Latin America	Mali, Guatemala, India

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