

How to do

Market needs and emerging opportunities assessment in NUS value chains

Nutrition-sensitive agriculture - Note no. 2



How To Do Notes provide tools for good practice design based on best practices collected at the field level. They guide teams on how to implement specific recommendations of IFAD's operational policies, standard project requirements or financing tools. The How To Do Notes are "living" documents and will be updated periodically based on new experiences and on feedback. If you have any comments and suggestions, please contact the originators.

Originators

IFAD Nutrition Team and Bioversity International

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Contact

Antonella Cordone
Senior Technical Specialist Nutrition and Social Inclusion
Environment, Climate, Gender and Social Inclusion Division
E-mail: a.cordone@ifad.org

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Contents

LIST OF ACRONYMS	ii
1. INTRODUCTION	1
2. BACKGROUND AND CONTEXT	5
FEATURES AND IMPORTANCE OF NUS VALUE CHAINS	5
OPERATIONALIZATION OF HOLISTIC NUS-VC APPROACH FOR NUTRITION-SENSITIVE VC	5
SUPPORTING TOOLS TO ASSESS NEEDS, BOTTLENECKS & POTENTIAL OPPORTUNITIES FOR MARKETING NUS	6
3. HOW TO CONDUCT A NUS VC ASSESSMENT	9
RAPID MARKET APPRAISAL (RMA) STEP-BY-STEP FOR NUS-VCD	10
<i>Step 1. Participatory selection of priority NUS</i>	10
<i>Step 2. Literature review</i>	10
<i>Step 3. Semi-structured interviews with key informants</i>	10
<i>Step 4. Registering of collected data</i>	13
<i>Step 5. Analysis of collected data</i>	14
<i>Step 6. RMA report and sharing results with VC stakeholders</i>	15
4. KEY ISSUES	16
HOW TO HANDLE LACK OF DATA	16
HOW TO HARMONIZE TRADITIONAL KNOWLEDGE (TK) WITH SCIENCE'S PERSPECTIVES	16
MULTIPLE SCALES OF MARKETING	18
5. LESSON LEARNT	21
CASE STUDY OF RECENT IFAD PROJECT: NUS-VC & CLIMATE CHANGE	21
6. GUIDANCE FOR PROJECT DESIGN AND IMPLEMENTATION	23
7. FURTHER READING	25
REFERENCES	26
ANNEXES	27

List of Acronyms

CBO	Community Based Organizations
HTDN	How To Do Note
HVC	Holistic Value Chain
IP	Indigenous People
NSVC	Nutrition Sensitive Value Chains
RMA	Rapid Market Appraisal
NUS	Neglected and Underutilized Species
TK	Traditional Knowledge
VC	Value chain
VCA	Value Chain Analysis
VCD	Value Chain Development

1. Introduction

Agricultural biodiversity is a strategic asset to fight climate change vulnerability, poverty, as well as food and nutrition insecurity. The wealth of food crops is estimated at 5,000 species (Kew Royal Botanic Gardens 2016) but global food systems are increasingly dominated by just three crops—rice, maize, and wheat—which altogether make up more than 50% of human plant-based caloric intake and cover 40% of arable land globally (FAOSTAT 2013)¹. Modern agricultural practices, uniformity in agricultural markets, and changing lifestyles are causing the disappearance of crop diversity from production and food systems. The diversity of plant species gathered in the wild for food is also threatened due to degradation of natural habitats. Such a situation is having multiple impacts on peoples' livelihoods as cultivations are becoming more susceptible to climate change, farmer assets are being eroded, and consumers have fewer choices for nutritious and healthy diets.

Neglected and underutilized species, or NUS for short, are crops that have been left at the margins of research and development (Eyzaguirre, Padulosi and Hodgkin 1999). The word 'neglected' underlines the low level of research investments made on these species when compared with mainstream commodity crops and 'underutilized' alludes to their untapped livelihood potentials. NUS include wild, semi- or fully domesticated plants from various food groups (cereals, vegetables, legumes, roots and tubers, fruits, spices) with diverse growth forms (field crops, trees, shrubs, vines, etc.). NUS are an integral part of local cultures and food traditions, and they are increasingly in the spotlight of efforts for revitalizing local cuisine and celebrating the identity of the 'terroir'. Use enhancement of NUS has proved to be an invaluable means to improving the livelihoods of local populations as seen in IFAD-supported projects on Andean grains in Bolivia (Padulosi et al. 2014) and minor millets in India (Padulosi et al. 2015). Their importance in contributing to food and nutrition security has been receiving substantial coverage in recent years (Padulosi et al. 2011) and it is today increasingly recognized. In some cases, NUS have been found to have exceptionally high nutrient or nutraceutical values, which makes them called 'superfoods'.

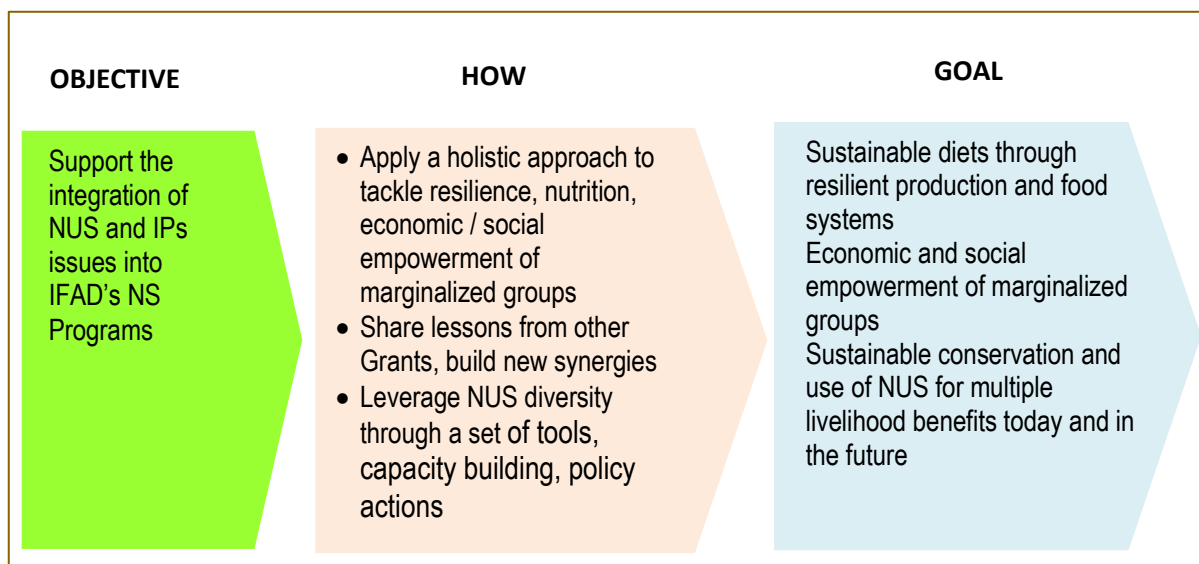
Hot spots of NUS diversity coincide with regions where Indigenous Peoples (IP) live—largely remote areas where standardization of agricultural practices has not been very intense and agro-ecological practices have prevailed. Many of these areas are characterized by challenging conditions for agriculture where NUS are central in traditional farming and risk management practices, owing to their early maturation, low water requirements, and capacity to thrive in marginal soils, among other characteristics. Indigenous women in particular are often the custodians and main knowledge holders of NUS because of the great relevance these crops have for household nutrition and other livelihood needs. But in spite of being so relevant in the lives of local communities around the world, NUS have been sidelined by the Green revolution and received very little investments for their research and development. Scarce attention has been directed to enhance their yields and overcome challenges in their cultivation, processing, and marketing. Such a trend needs to be reverted, as investing in these crops represents a strategic opportunity to unlock multiple livelihood benefits, especially for marginalized groups in both rural and urban settings.

A Holistic Value Chain Approach (HVCA) for the use-enhancement of NUS has been developed and tested by Bioversity International through IFAD-supported research grants (Padulosi et al. 2014). This approach involves interdisciplinary and participatory interventions at different stages of the value chain to overcome bottlenecks in the use of NUS and enable resilience, nutrition, and income generation outcomes to be reaped (figure 2). Evidence of sound impact, sustainability, and scalability of the "IFAD NUS" approach has been successfully gathered from more than 15 years of successful application of this work in numerous countries, including Bolivia, Peru, Guatemala, Mali, Nepal and India. The HVCA is outlined in the Operational Framework "Supporting Nutrition Sensitive Agriculture Through Neglected and Underutilized Species", which was developed to support IFAD Country Directors, CPMs and ICOs to integrate NUS and IP issues into their nutrition sensitive agricultural investment programmes, consistent with

¹ FAOSTAT. Production, Food Balance, and Land Use Data. Available online: <http://www.fao.org/faostat/en/?#home> (accessed on 18 May 2018).

IFAD's 2019-2025 Action Plan on Mainstreaming Nutrition Sensitive Agriculture². The figure below summarizes how Bioversity International proposes to leverage NUS to strengthen nutrition sensitive value chains (NSVC) and contribute towards nutrition sensitive food systems.

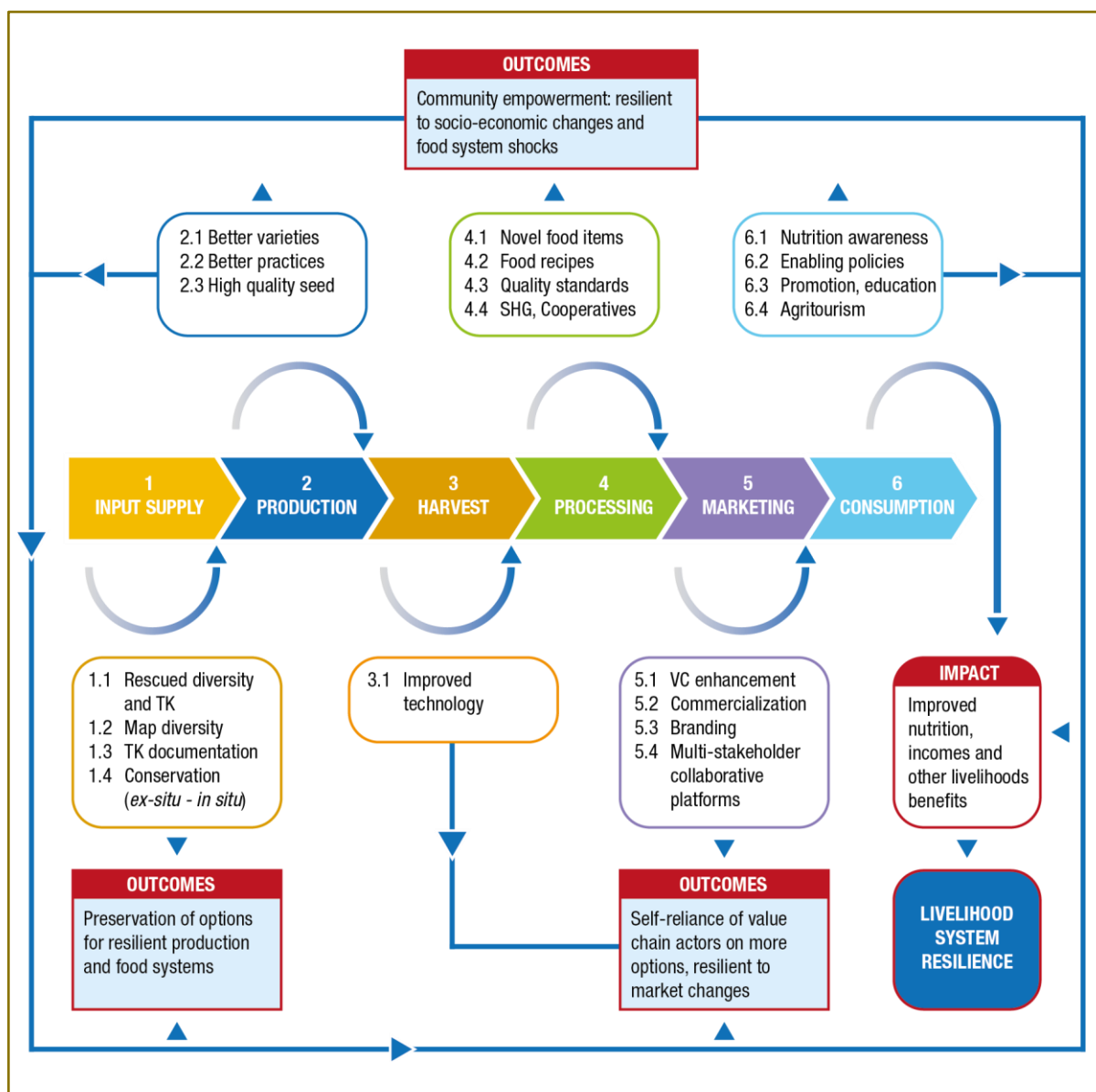
Figure 1. NUS Operational Framework



This *How to Do Note (HTDN)* is part of a series of five NUS-focused Notes, that build on lessons learned, drawing on evidence- and experience-based insights from a number of researches for development projects (including those financed by IFAD). They offer recommendations on practical methods, approaches, and tools for addressing use enhancement and mainstreaming of NUS in both design and implementation of an IFAD Project. Specific consideration is given for project design that can support the empowerment of IP, women, and youth. The five HTDN in the series are as follows:

1. Priority setting for nutrition and resilience
2. Assessing market needs and emerging opportunities in value chains
3. Interventions in support of NUS domestic markets
4. Interventions in support of NUS export market
5. Policy and mainstreaming of NUS

² <https://www.ifad.org/it/document-detail/asset/41237860>

Figure 2. Holistic value chain approach


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

The NUS Operational Framework is complementary to the IFAD's published volumes "Nutrition-sensitive value chains: A guide for project design" (De la Peña et al. 2018)³ and the How-to-do Note on Mainstreaming nutrition into COSOPs and investments projects (IFAD 2019)⁴. NUS are likely to stand out in the commodity selection (step 2) of the guide because of their great potential for nutrition-improvement. NUS HTDN 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 (step 1 NSVC guide) is a core element of the process for identifying high potential NUS. Value chain analysis (step 3 NSVC guide) is a key step in the nutrition-sensitive value chains operational framework, which identifies constraints and opportunities to guide the design of interventions (step 4 NSVC guide). As NUS value chains have some particularities compared to more established agricultural commodities, specific approaches and methods for value chain analysis of NUS are outlined in NUS HTDN 2, while NUS-

³ <https://www.ifad.org/en/web/knowledge/publication/asset/40805038>

⁴ <https://www.ifad.org/en/web/knowledge/publication/asset/41404848>

specific approaches for domestic and export market development are discussed in NUS HTDN 3 and 4, respectively. The nutrition-sensitive value chains framework is supported by an enabling environment that promotes the development and integration of the different stages of the value chain. NUS HTDN 5 discusses approaches for building an enabling environment for NUS value chain development.

The great diversity of NUS besides providing nutrition and resilience benefits, also represent important income generation opportunities and empowerment for marginalized community members who depend on these species for their livelihoods, such is the case for Indigenous Peoples and women, who are often the primary growers, and custodians of genetic diversity and knowledge of these crops. NUS can offer IFAD a real opportunity of development for local communities based on resilient and nutritious local resources, while valuing vanishing wisdom and cultures. However, key limitations in the use of NUS, such as those directly attributed to the peculiar characteristics of their value chains (VC)⁵, need to be addressed first if we want to unleash the potential of these resources. Among common bottlenecks are the lack of reliable data on NUS genetic diversity and their extent and status of cultivation, poor marketing and consumption levels, and their small market size involving few, dispersed and disconnected actors.

Box 1. Definition of nutrition-sensitive agriculture

Nutrition-sensitive agriculture is an approach to agricultural development that prioritize nutritionally rich foods, dietary diversity, and food fortification as the means to overcome malnutrition and micronutrient deficiencies. This approach stresses the multiple benefits derived from enjoying a variety of foods, recognizing the nutritional value of food for good nutrition, and the importance and social significance of the food and agricultural sector for supporting rural livelihoods (FAO 2014).

Nevertheless, many of the drivers for any NUS-VC, whether they constitute opportunities or challenges, apply as well to other commodity chains e.g. lack of economic incentives, consumer awareness, and low competitiveness. Yet, by virtue of their special characteristics, NUS may in many instances offer better opportunities than commodity crops, provided that a number of basic market requirements are addressed, such as quality of produce and its reliable supply. Based on our experience through previous Projects, we do believe that the promotion of NUS-VCs is doable, provided however that adequate methods, approaches and tools are made available to people.

This HTD-Note was conceived precisely to support this process. It will provide background information, examples and a methodology to conduct a rapid participatory assessment of bottlenecks and opportunities along any NUS-VC, with the objective to contribute to achieve more resilient and nutritious food systems and empower Indigenous Peoples, women, and youth. We are confident that this information will help IFAD interventions to achieve economically viable and socially inclusive business around NUS to benefit local communities, by guiding practitioners in carrying out analysis of market trends and bring about the right actions to seize emerging opportunities. Even though the methodology presented here has some similarities to other VC analysis (VCA), it differs in the way it stresses situations where due consideration has to be given to address NUS-specific characteristics and direct beneficiaries, especially Indigenous Peoples, women and youth.

⁵ Value Chain refers to the full range of activities and processes (functions) that are required to bring a product (or service) from production to its final consumption, emphasizing the value that is created along the chain, and highlighting the importance of increasing it and ensuring a fair distribution of benefits amongst chain participants (Kaplinsky and Morris 2001)

2. Background and Context

Features and importance of NUS Value Chains

In general, NUS-VC are short, composed of production, collection, primary processing (if any), and occasional marketing. Owing to their status of marginalization, their consumption is also decreasing. Because of their poor organization of these VCs, actors are often involved in more than just one activity (e.g. a producer can be transporting and also selling the produce to the market). NUS farming communities are typically poorly engaged in marketing of these species and their derived products due to a number of reasons, including their inadequate market skills, poor financial assets, lack of collective action, limited formal seed systems, inadequacy in being competitive with other vendors or difficulty in finding buyers that appreciate the commercial potential of NUS.

Although all these factors are very negative, some other features of NUS can be very helpful for their promotion, like the fact of being associated to rich cultures and traditional knowledge (TK) or having a long and well recognized history of use. Furthermore, the fact of being used for multiple purposes (e.g. medicinal properties, food ingredients, flavor agents, pro-health foods, etc.) makes them highly versatile in terms of market niche development. Unfortunately, for the majority of NUS, these market potentials have insofar been very marginally leveraged for VC development (VCD), with plenty of livelihood opportunities missed out for local communities.

Indeed, an increasing body of literature and years of accumulated experience (thanks also to IFAD-funded projects), confirm that these traditional resources possess features that can make them amenable for their marketability and unleash several livelihood benefits to people. An important consideration at this point, needs to be made on the fact that in many indigenous peoples' communities, marketing of NUS may not be considered as important, because other practices, such as bartering or shared use of resources from the wild or communal land under cultivation, are being followed by people. To that regard, we like to say that any marketing efforts for promoting NUS presented through this and other companion HTD Notes, have been developed in full respect of other ways of use enhancement that reflect peoples' diversity, culture and identity.

The development of markets and VC for NUS, that are participatory, cost-effective and culturally appropriate, can contribute to strengthen peoples' identity, support the conservation of their genetic resources and generate incomes for local producers and other VC actors, including marginalized groups. This is a strategic, legitimate and self-reliant way to contribute to food and nutrition security and better health in a fair and equitable way (Will 2008, Ebert 2014, Sthapit et al. 2016).

Operationalization of Holistic NUS-VC Approach for Nutrition-Sensitive VC

The HVC approach proposed by Bioversity International (figure 2) consists of addressing within one common framework the inter-linked bottlenecks encountered throughout the production-to-consumption stages of any NUS crop. Therefore, it can address all together several highly inter-linked interventions necessary to enhance the use of NUS and thus reaching a sustainable outcome and long-term impact beyond the life of any project. This approach can be deployed for making VC and food systems (including indigenous food systems), more resilient to change from a climatic, nutritional and economic perspective; and hence support IFAD's efforts for nutritious sensitive agriculture. Moreover, this holistic method is different to any other work on commodity crops because:

- Provides practitioners the opportunity to inject a note of novelty into agribusiness that can be leveraged to attract youth to become agents of productive transformation in rural areas and IFAD can champion this move.
- During Project design it creates empowerment opportunities for vulnerable groups to effectively promote NUS, deliver sustainable outcomes, and bring about a positive impact in peoples' livelihoods.

- Can leverage novelty traits found in NUS (e.g. very nutrition and healthy profiles, attractive flavors), combined with new technologies (e.g. internet, social media, mobile phones, novel market intelligence systems) to improve incomes of local communities and help keep youth engaged in agriculture (no longer attractive to them given the poorly remunerated work, and often precarious environmental conditions they would work within).
- Focuses on both the offer-and-demand side of NUS, which are both critical when dealing with the promotion of agrobiodiversity and its products, representing quite a change from the classical supply driven paradigm followed for marketing commodity crops.
- Include capacity building activities of stakeholders at 360° degrees, covering all aspects of use enhancement of target species, from surveying diversity to growing it effectively, to assessing its nutritional benefits and leveraging them for marketing and household consumption, processing, and all the aspects related to marketing and promotion incl. education of consumers and public awareness; and advocacy for enabling policy in support of mainstreaming NUS in agricultural, nutrition, environmental, commerce and educational sectors.

Figure 3 presents the overall IFAD NSVC framework⁶ showing its three main axes of intervention, viz. increasing supply, adding nutrition value and increasing demand. Such a diagram is helpful to also show the entry points to reinforce the nutrition outcomes by injecting NUS into the VC.

Supporting tools to assess needs, bottlenecks & potential opportunities for marketing NUS

The methodology offered through this Note to assess needs, bottlenecks and potential opportunities for marketing NUS is called Rapid Market Appraisal (RMA). This is based on the technique developed by Holtzman (2003), but with some adjustments to better meet the typical features of NUS. We have chosen this methodology out of a suite of several others (e.g. PMCA⁷, Link Methodology⁸ and ValueLinks⁹) because we believe it is the one that could best address the multiple and diverse issues related to marketing NUS. It has also the advantage of being simple, flexible, and friendly with regard to qualitative data collection. Moreover, it is a valuable means to comprehend the VC through participants' eyes, like local community members, too often marginalized by markets.

An important trait of the RMA applied to NUS, is that it shifts the focus of the attention from purely agricultural production increase and its marketing, to the role of business in the delivery of nutrient dense foods from local crops. This shift helps a lot to in capturing the needs of food insecure consumers, through the building of more resilient production systems and more participatory VC. Furthermore, in line with what has been stressed in the NUS Operational Framework, RMA is a good approach to allow practitioners trace the full impact pathway that from agrobiodiversity leads to the ultimate benefits, nutrition, resilience, income and empowerment of marginalized groups.

The objective of the RMA methodology presented here is to carry out a VCA that includes the mapping of the markets and the VC of NUS, in order to identify ways to make both more functional and sustainable, which is ultimately the purpose of this Note. Furthermore, this methodology aims to investigate and better understand the current status of a target NUS, including their market availability, as a basis for elaborating a viable VC upgrading and promotion strategies. RMA also helps to understand the cultural, social, traditional and gender context of the target NUS, which is fundamentally different from that of major crops. Such an appraisal will provide insights into and explanations behind production, consumption and marketing decisions taken by VC actors, as well as to comprehend factors responsible for the underuse status of the target species. Other benefits expected from this type of study include identification of existing

⁶ De la Peña I. and J. Garrett. 2018. Nutrition-sensitive value chains, A guide for project design (Vol II and II) . IFAD <https://bit.ly/2PWtTzV> and <https://bit.ly/2D8qoBf>.

⁷ <http://cipotato.org/wp-content/uploads/2014/09/003296.pdf>; <https://cgspace.cgiar.org/handle/10568/57027>

⁸ <https://cgspace.cgiar.org/handle/10568/49606>

⁹ <https://valuelinks.org/material/manual/>

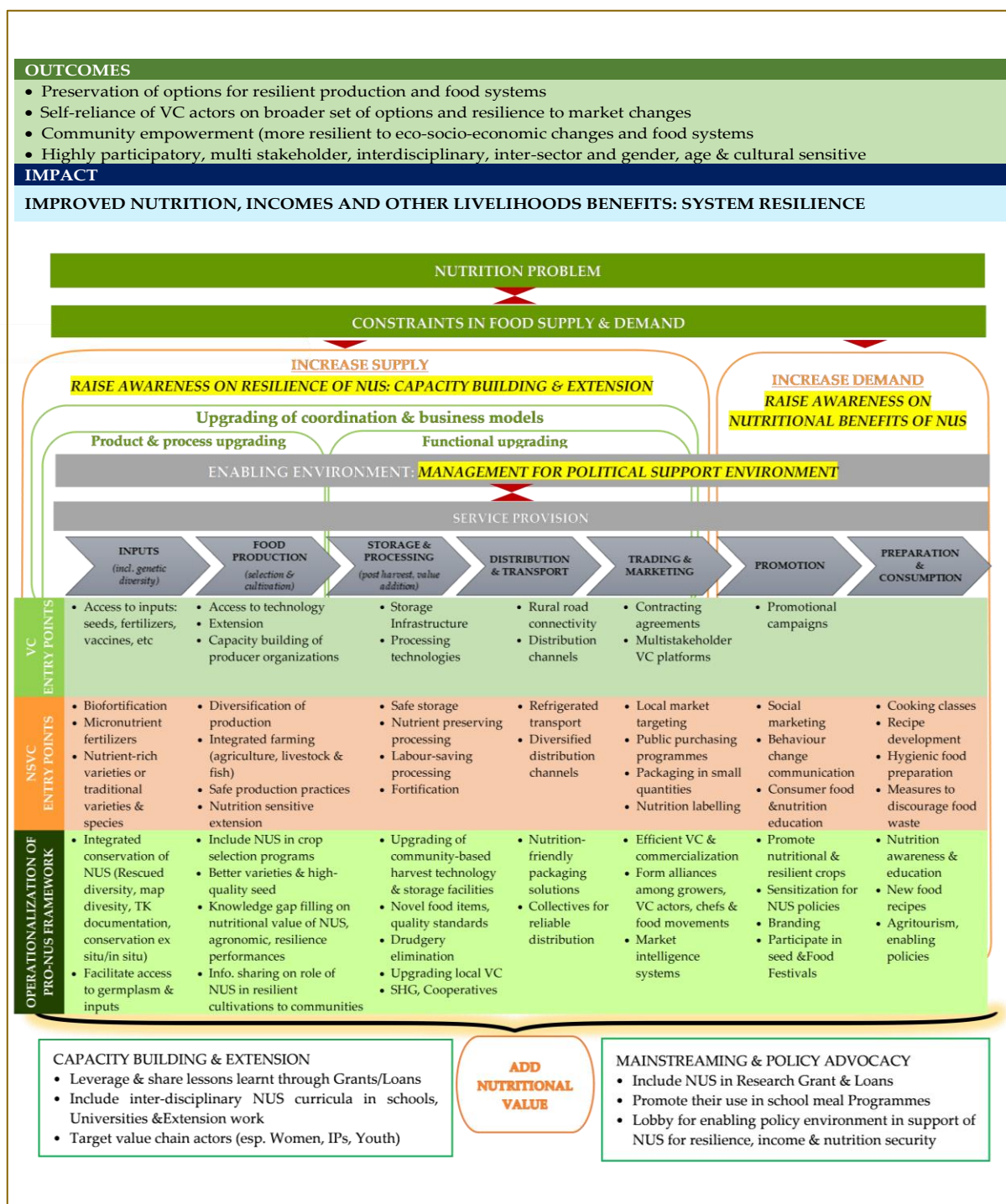
constraints hampering the NUS-VC and opportunities for its marketing expansion, as well as leveraging existing potentials and concrete solutions to be pursued by VC actors.

RMA relies on a combination of secondary information, field observations and primary data collected through semi-structured in-depth interviews. These tools will assist researchers in designing and implementing the VCA for the target NUS, by providing them in a timely and cost-effective manner, detailed qualitative information to answer the following key questions:

- How does the VC under study works? How it is organized and how its potential can contribute to strengthen food and income security?
- What are the VC stakeholders' roles and responsibilities?
- How stakeholders interact with each other, and who else's behavior plays an important role in the success of the VC?
- What is the performance of existing market channels and what are the latest changes (price & consumption volumes), as well as substitutes and complementary products to the target NUS?
- What are customers' preferences, market trends (e.g. organic and ecological production) and unique selling features of NUS, helpful in determining its competitiveness?
- What are the major constraints and opportunities to improve the VC under study?

What are the key interventions needed to promote an effective NUS cultivation, consumption and marketing?

Figure 3. Operationalization of a pro-NUS Framework for Nutrition-Sensitive Value Chains

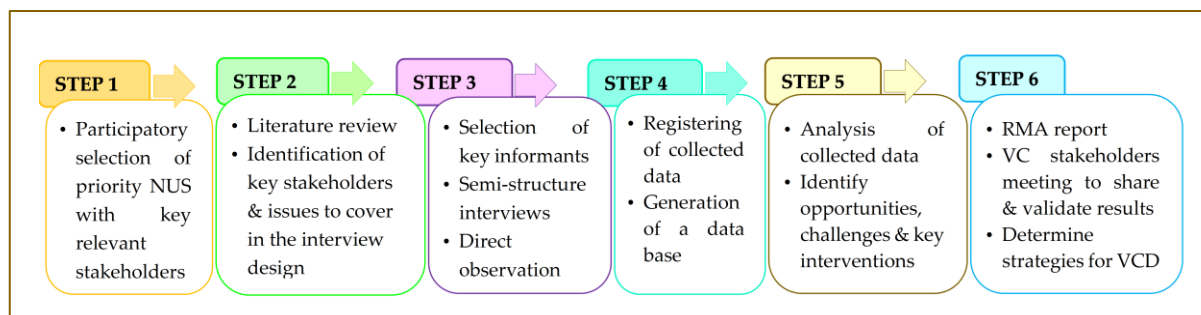


3. How to conduct a NUS VC assessment

The methodology presented draws upon lessons learnt and experiences from an IFAD-supported program on NUS which started some 20 years ago and in particular the on-going phase (IFAD-EU Grant)¹⁰ being currently implemented by Bioversity International and its partners in Guatemala, Mali and India. This section provides a step-by-step approach that provides a quick, flexible, and effective way of collecting, processing, and analyzing qualitative data for a VCA of a generic target NUS. The intention is to offer a practice-oriented guidance to direct and support market-driven initiatives and actions designed for those interested in the sue enhancement of these traditional species (wild or cultivated). The time needed to implement this approach depends on each case and is determined by the peculiarities of the target NUS, scope of the study, resources available, and level of commitment of VC stakeholders. Owing to the nature of this Note, the methodology presented is deliberately not too technical and comprehensive, as we aimed at only providing basic steps for the RMA, where we have flagged issues relevant for NUS and made references on how the VC participation of vulnerable groups like IPs, women and youth can be promoted.

Figure 4 illustrates the six main steps involved in the RMA aimed at developing the VC for a generic NUS. Due to the great diversity of NUS that can be found at local level, the first action of this approach - Step 1- consists in the participatory selection of those species holding most peculiar potentials (e.g. adaptation to climate change, nutritional values, peculiar traits for household consumption and/or marketing) and deserving thus to be selected as priority species for first interventions. Step 2 and step 3 consists of the VCA or VC mapping, which includes literature review and data collection using semi-structured interviews and direct observations. Then, the approach continues with step 4 and step 5, where the registration, organization and analysis of the data gathered is carried out, which will help identifying opportunities that may support the VCD and/or those constraints that may need to be tackled to facilitate that. Based on the data analyzed, a report on the results emerging from the research will follow along with the holding of a meeting with VC stakeholders to share outcome of study and seek final comments and validation on findings from the VCA (step 6). An articulation in more details of each of the six mentioned steps is given in Section 4.

Figure 4. Steps in the Rapid Market Assessment (RMA) for NUS Value Chain Development (VCD)



¹⁰ "Linking agrobiodiversity value chains, climate adaptation and nutrition: Empowering the poor to manage risk" 2016.

Rapid Market Appraisal (RMA) step-by-step for NUS-VCD

The RMA steps we shall present below, will help to easily detect the basic structure of any NUS-VC, how it works, its structural deficiencies, vulnerability factors, as well as the challenges it faces and the opportunities that may exist for its upgrading. Furthermore, the RMA is also a practical way to understand the causes behind the underutilization of NUS, as a basis for elaborating viable VC upgrading and promotion strategies. To conduct an RMA analysis, is important to put together an inter-disciplinary and inter-cultural team of people that will help address the many and multi-faceted inter-linked challenges encountered when marketing or developing the VC for NUS. *Such a team would allow to assess markets and VCs of NUS from different perspectives, identifying bottlenecks from various angles and foster the use of collective solutions under shared principles of sustainability, equity and social justice.*

Step 1. Participatory selection of priority NUS

The selection of NUS should be carried out in a participatory way, through the involvement of a representative number of key actors (ideally not more than 15-20 people) who should have a common understanding and relevant knowledge of NUS and their potentials. 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 representatives. Once the stakeholders have identified the target species to be considered by the project, it would be also strategic to seek their input as well to define the objectives of the project, desired outcomes, focused areas and some key outputs, leaving to the core project team the task of sorting out the details of activities. In such interactions with the stakeholders, the HVC approach can be also introduced to show to all participants how the various outcomes and outputs are closely linked to one another. The interaction will also help project staff to indicate to the stakeholders the type of information that will be needed and people likely to be interviewed during both step 1 and 3 of the RMA. More coverage on step 1 can be found in the companion NUS HTD Note no. 1 dedicated on “Priority setting for nutrition and resilience”.

Step 2. Literature review

Once the target NUS have been selected, practitioners would need to carry out a review of relevant literature related to these species to deepen the understanding on their production, consumption and marketing. A search of projects that might have been supported in the past by IFAD or implemented by other agencies on these or similar crops will be also helpful. Through this review, issues that have emerged during the stakeholder workshop might be better comprehended along with the possible identification of others worth as well of attention. Whereas, emphasis should be placed on searching for literature focusing on target NUS and their use in the focus area, articles covering target species possibly grown also in other regions of the world would be useful too, to further enrich the knowledge on the species under study and learn on methods, approaches and tools that might have been successfully developed by other agencies for their use enhancement. *A lot can be gained through both success and failures of past efforts!*

This step will allow practitioners to identify key issues to cover during the survey design, incl. which VC actors to interview, what type of data have to be gathered, and how to plan the fieldwork in an efficient and effective way.

Step 3. Semi-structured interviews with key informants

Individual semi-structured in-depth interviews with key actors (engaged directly and indirectly on the target NUS-VC) and knowledgeable informants (e.g. community-based organizations, institutions, local authorities and national bodies) will represent the core activities of the data collection within the RMA. These interviews, which will gather mainly qualitative data on NUS availability and accessibility, and will help shedding light on NUS-VC, dynamic factors such as trends, potential, market expansion, incentives and relationships across VC actors, as well as the role that indigenous communities, gender and TK play

along the chain. Based on our experience, effective semi-structured interviews should take the following elements in due consideration:

- a) **Selection of key informants and study sites:** This is essential to develop as sharper as possible map of core activities, processes and actors of the target NUS-VC. To facilitate this selection, it is recommended to first cluster actors by their main occupation, considering that very often, these might be engaged in more than one occupation. Knowing who the main actors of the target VC are, is also helpful to identify the spatial distribution of the species to find most relevant locations where target NUS are being grown, traded, and consumed. Thus, in order to gain initial insights on VC dynamics, it is recommended to interview first key, insightful and knowledgeable informants, who do not necessarily participate directly in the VC, but are nevertheless precious source of information and can offer broad and in some cases detailed perspective on the VC under study. These key actors might include policy-makers, researchers and staff from relevant government departments, donor agencies, universities and NGOs. Also, it will be much needed to engage women, IPs and youth as vital informants, given that these actors will allow us to gain the right perspectives of the roles played by NUS in their lives and how markets could promote their wider use in ways that are fair, and respectful of local culture, beliefs and identity.
- b) **Sample size and sampling procedure:** In most cases, there is no information available about possible structure of NUS-VC and often too little is known about the population of the VC actors that would help to draw a statistical sampling strategy. Thus, we recommend to use in this RMA purely random¹¹ and/or snowball¹² sampling methods. These methods will help to easily detect the basic structure of the VC and identify a small but purposely selected sample of stakeholders to interview. As a general rule, a minimum of three to five interviews should be conducted for each stage of the VC; however, would the actors identified happen to be very heterogeneous or very diverse, there might be a need to increase the sample size. A good indication of the right sample size for each stage of the VC is when the RMA team starts gathering a consistent set of responses during the interviews. In table 1, the type of actors that will be interviewed as well as the methods to be followed in each case are detailed.

Table 1. Type of actors interviewed and data collection methods used

Type of actor		Data collection method		# interviewees			Location	
Group	Actor	Interviews	Direct observation	Women	Men	Total	Country / City	Town / Village
Production	Local producers/ collector, farmers' & women's organizations	✓	✓					
Market actors	Vendors: retail sellers, producers	✓	✓					
	Final consumers	✓	✓					
	Supermarkets, organic markets,	✓	✓					
	Online internet sales	✓						
Processing	Gastronomy sector (schools, Restaurants), industry	✓	✓					
Key informants	Knowledgeable experts (Gov., universities, NGOs, donor agencies)	✓						
Total								

¹¹ Random sampling: interviewing people that are available.

¹² Snowball sampling: research participants recruit other actors who play a significant role in the VC being studied

- c) **Guidelines for lead questions:** Once the actors and study sites are identified, semi-structured in-depth interview guidelines should be developed per actor. These will help interviewers to keep in mind key issues and allow a natural flow of discussion with the interviewed actors. The guidelines should contain open questions adapted to the local socio-cultural context, language and type of informant to be interviewed. Questions should reflect the underlying scope of this RMA, which is enhancing the use of NUS for supporting sustainable and resilient production systems, nutrition and income generation in target communities. It would be thus very helpful to elicit views of the VC actors on these issues through the questions/discussions points to be covered. More specific guidance on the type of questions to be used during the semi-structured interviews can be found in the Annex section. Furthermore, with the purpose of developing successful NUS-VCs to benefit especially vulnerable groups and indigenous peoples, it is important to understand how these actors organize agribusiness activities, and how they measure and appreciate their success, growth, self-satisfaction and profitability. Rosado-May et al. (2018) stresses the use of cultural principles and parameters to develop leading questions for guiding the discussion involving IPs, women and youth. Table 1 lists some of these principles with regard to three basic domains, viz. cultural, operationalization and innovation, that should be considered when scaling up VCs. These principles are in line with the NUS Operational Framework regarding the importance that traditional production systems, marketing and the indigenous peoples' vision of well-being have within the community.

Table 2: Principles to consider when developing interviews for vulnerable groups

CULTURAL	OPERATIONALIZATION		INNOVATION
	Sales / marketing	Production system	
<ul style="list-style-type: none"> ▪ Cooperation and coexistence, rather than competition ▪ Strong community values and well-being (e.g. life-style, motivation & recognition) ▪ Role in the community & of observation (strong, holistic, comprehensive) ▪ Contributions to community development ▪ Trial & accumulation of experience ▪ Patience, long-term expectation for results; and agreements based on words 	<ul style="list-style-type: none"> ▪ Knowing personally customers ▪ Trust, confidence & community appreciation ▪ Incorporate direct customers opinion 	<ul style="list-style-type: none"> ▪ Rely on family & close friend ▪ No formal structure ▪ Mostly natural flow ▪ Community is the basis for the mission & vision 	<ul style="list-style-type: none"> ▪ Slow process ▪ Vision for the future ▪ Still small, family, community oriented
	<ul style="list-style-type: none"> ▪ Trial & accumulation of experience ▪ Patience for long-term results 		

It is a good practice to also validate the questionnaires before going to the field; and if possible, make appointments with key informants beforehand, especially with producers and knowledgeable actors. Given that market actors (e.g. vendors, consumers) are usually very busy, sometimes they might not be available or willing to spend time for the interviews. In those cases, it is advised first to respectfully request their participation and then mention few incentives to encourage their participation (e.g. sharing back the results of the study which would benefit them too).

- d) **Direct observation:** They should be also conducted during field visits (i.e. communities, markets, plots) to gain a better understanding of the context and local conditions in which the VC actors operate, and complement the information collected through the interviews. This method will enable also the research team to compare what key informants are saying with how they actually are organized and behave. It will also help to estimate the number of suppliers and buyers present in particular markets and the volume of NUS traded or processed. Thus, it is also imperative to include a checklist of aspects to consider during the direct observations.
- e) **Data collection:** The information to be collected during the interviews will be related to current practices for production, consumption, marketing and processing of the target NUS. These data will also include stakeholder's roles, production costs, prices, limitations, opportunities, market competitiveness, product attributes and uses, consumer's preferences and expectations, as well as gender roles. Before starting any of the interviews it is imperative to

properly present to participants the purpose of the study, explain their rights, and obtain their oral and/or written consent (i.e. Participant Interview Consent-PIC). It is also suggested to carefully take GPS points to pinpoint location of every actor who participated in the survey. This information will be useful for instance, to calculate the travel time from the communities to the market producers attend as a measure of cost of transportation for each household. Interviews should not last more than 25 minutes, however some interviewees might need more time (on average 60 minutes), which is mostly the case for producers and knowledgeable experts. All qualitative data gathered should be recorded on note books and preferably also in audio recordings. It is also suggested, to work in pairs so as to allow one person to ask questions and keep the dialogue going, while the other observes and takes proper notes. A checklist of aspects to consider during the direct observations should also be included in the guidelines. An example of such checklist is provided in table 3.

Table 3. Example of checklist for direct observations

PRODUCTION CHARACTERIZATION		MARKET CHARACTERIZATION	
<u>Location of NUS</u>		<u>Quantity of vendors</u>	
Home garden close to the house	<input type="checkbox"/>	# of vendors in the market	<input type="checkbox"/>
Around the garden	<input type="checkbox"/>	# of vendors of NUS	<input type="checkbox"/>
Between crops	<input type="checkbox"/>	# of vendor who sell similar products to NUS	<input type="checkbox"/>
<u>Distance from household to:</u>		<u>Type and quantity of products sold</u>	
NUS plots, access to water	<input type="checkbox"/>	Products found in the market	<input type="checkbox"/>
Markets, main road	<input type="checkbox"/>	NUS & Similar products to NUS	<input type="checkbox"/>
<u>Quantity and condition of NUS</u>		<u>Location of vendors in the market</u>	
# plants and size, quantity of leaves/fruits	<input type="checkbox"/>	Established stalls inside/outside	<input type="checkbox"/>
Kind of care (e.g. good, bad, excellent)	<input type="checkbox"/>	In the middle; around the market	<input type="checkbox"/>
<u>Features of the producing area</u>		<u>Type of vendors (by gender and age)</u>	
Dry with little vegetation, Rainy region	<input type="checkbox"/>	Vendors of NUS and similar products	<input type="checkbox"/>
Few available lands usable for agricultural	<input type="checkbox"/>	Farmers who sell own produce, retailers	<input type="checkbox"/>

In order to get a good dataset from the survey, it is important to keep in mind the following basic issues that will greatly influence the robustness of the information collected, their proper organization and ultimately their effective analysis:

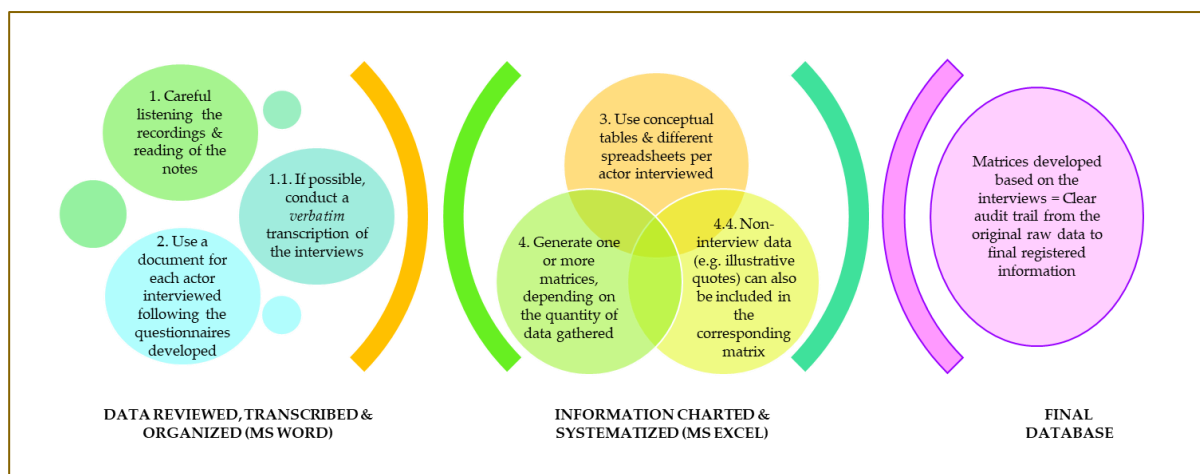
- Critically consider if the information is needed, available and useful. Find the right balance in the number of questions to be asked i.e. not too few and not too many.
- Every additional question adds extra costs e.g. time, budget, respondent fatigue & data quality
- Gathering too many data could difficult its handling, analysis and hence its use.
- Always register information that identifies the source and context of every interview e.g. age, gender, name, indigenous group, location (GPS)

Step 4. Registering of collected data

Both quality of collected data and their analysis is decisive for developing a sound and realistic strategy for the NUS-VCD. In order to facilitate a smooth analysis of the qualitative data gathered, and strengthen its reliability, a proper database should be created to provide an intuitively overview of the summarized data. Building the database is a good opportunity to become fully immersed in the information collected, which is a vital stage in the data interpretation process. This database has to be visually straightforward and facilitate recognition of patterns, meaningful sections and categories, including contradictory data, which in fact can help in making stronger analyses. The database will also help to identify how these elements relate to each other and with respect to the propositions of the research, and hence provide detailed explanations of the phenomenon under analysis. Worth noting, the importance of striking a balance between reducing the data on the one hand, and retaining the original meanings and ‘feel’ of the

interviewees' words on the other (Gale et al. 2013). The following figure shows the steps and recommendations to follow in order to build the mentioned database.

Figure 5. Steps and recommendations to generate a database to conduct NUS VCA



Step 5. Analysis of collected data

The general analysis strategy recommended is a pattern-matching approach, which is an appropriate method for the type of data gathered. First, individual case descriptions (i.e. actors interviewed) should be made, then the data from each case can be compared and contrasted to the other cases (cross-case analysis) by themes (e.g. access to market) to help identify patterns (traits and relationships) among them, for which pivot tables and frequency analysis could be used. If the data are rich enough, the findings generated can go beyond description of particular cases to explanation of, for example, reasons for the underutilization of the target species, and even predicting how a VC actor is likely to respond to a situation. Furthermore, the cross-case analysis supports the same theory (e.g. learning new recipes will increase its consumption), it can be considered that the empirical basis of it is correct and that it is possible to replicate the experience.

Other aspects of the VCA to be studied in depth, include costs, margins and revenues from different marketing channels. This information should be compared and considered to determine the potential for efficiency gains and find out whether a VC is a good source of income and how easy is to enter it. It is important to realize that certain costs and/or market prices may vary significantly throughout the year, per marketing channel, quality and/or quantity sold. Thus, it is vital to explore why certain actors in the chain have higher margins and lower costs than others. Nevertheless, it should be kept in mind that for resource poor collectors or small-scale farmers, return on investment not only refers to monetary income but also has to reflect the benefit of NUS for their livelihood support. Such an analysis is particularly relevant when dealing with IPs and women who are typically marginalized groups in VCD, a condition which should be removed through the use of NUS and their VC, as emphasized by the Operational Framework.

The information analyzed can also be used to map or represent graphically the basic structure of the target NUS-VC, i.e. showing all channels from producers to consumers, including actors (gendered differentiated if possible), linkages, service providers and enabling institutional environment. A VC map is very helpful to understand how the chain of the target NUS works, performs and can be improved; it does also visualise networks of key, processes and services, and helps identifying constraints at different levels in the VC. Finally, is important to keep in mind that data analysis often takes longer than anticipated, thus any project plan should ensure enough time to conduct interpretation and writing up of the findings. Thus, it is advisable to continuously review and analyze the data collected i.e. fieldwork and data analysis could be conducted in parallel at the end of each day in the field.

Step 6. RMA report and sharing results with VC stakeholders

The basic structure for the RMA report should include:

- 1) Summary & Introduction: objectives, focus of the appraisal and target clients for the study
- 2) Description of the methodology
- 3) Results, where key findings should consist of:
 - Description and map of the VC, market structure, trends, trade volumes and prices;
 - Actors' roles, responsibilities and relationships; including assessment of IP, youth and women's involvement in the VC
 - Customer preferences and potential consumer segments (e.g. age, gender, income, geographically location)
 - Characterization of bottlenecks and opportunities, including important areas for intervention to improve and upgrade the VC
- 4) Recommendations and conclusions
- 5) Annex including the list of VC actors interviewed.

Once the report has been completed, the RMA team should organize a meeting with community members, key NUS-VC stakeholders, experts, relevant NUS researchers and also other actors that might be interested in the target species (e.g. potential traders or entrepreneurs). The objective of this meeting is to present the outcome of the RMA, highlight and validate main findings, share new knowledge generated, identify critical leverage points (constraints and opportunities) that affect the effectiveness of any intervention; and jointly developed a functional and effective VC upgrading strategy.

An important outcome of this meeting is the collective identification of what NUS products would have more potential (e.g. fresh, processed), which market channels should be used and what would be the roles and responsibilities of key stakeholders in the strategy implementation within the given project. Ideally the developed strategy should be agreed upon by key stakeholders, be sustainable, engage policy makers and promote key partnerships, as proposed in the NUS operational framework.

Furthermore, the proposed strategy has to include realistic and feasible interventions that should include the vision for the VCD, leverage points to be addressed, solutions proposed (e.g. campaigns to raise NUS awareness), indicators measuring progress; and stakeholders' responsibilities and participation, especially for IPs, women and youth. To this extent, field experience has shown that it is strategic to implement first some short-term actions in order to produce success stories that would illustrate the benefits of the VCD and encourage broader stakeholders' commitment in such an endeavor. Furthermore, from an environmental sustainability angle, it is important that any NUS-VC strategy emerging from this analysis, considers not only its impact on poverty and livelihoods within the focus communities/region, but also the community-based conservation strategies that should be deployed for target NUS, using both *in situ* and *ex situ* conservation methods.

4. Key Issues

How to handle lack of data

Research insofar has focused only marginally on NUS and contributed very little to understand how their VCs work and how they can be successfully marketed. This had to do with the poor attention paid by R&D to local, traditional crops by the Green Revolution, whose paradigm has been focusing on few crops to feed a hungry growing world population. The result of such a vision (which is still influencing many agriculturalists today), is that information on NUS (e.g. geographical distribution, level of cultivation, availability of genetic diversity, marketing and consumption), is very scarce. Evidently, research focusing on NUS is very limited and many articles dealing with these species are often published only in grey literature. To make things worse, data sharing among scientists is also very limited owing to insufficient knowledge sharing platforms or lack of collaborative efforts. This poses a great challenge to practitioners interested in deepening their knowledge on these species for promoting their better use. Actions to tackle such a situation include to systematically document, characterize, collect, safeguarded, and share any information available on NUS, as well as to strengthen and design adequate tools to enable people to carry out these tasks most effectively. Websites worth mentioning as good source of experiences, methods, approaches and tools related to NUS include the one maintained by Bioversity International (with ample reporting on IFAD-NUS programs)¹³, that managed by the BFN GEF Project “Biodiversity for food and nutrition”¹⁴ and the one belonging to Crop for the Future Research Center¹⁵.

Because of the need to fill a large gap in knowledge regarding the sustainable conservation and use of NUS around the world, we strongly recommend, –when initiating a new project on NUS- to systematically document, disseminate and safeguard any information that is being generated on the target NUS. Such information, will foster knowledge gap-filling to improve cultivation practices for NUS, which coupled with description of tools deployed in the course of a project implementation should be also properly shared for the benefit of other workers and for building a robust knowledge base for the use enhancement of NUS. Ideally, those researchers who generate and collect information – from conservation, genetics and agronomy to VC, nutrition and policies– would engage in knowledge sharing networks and build open access data repositories which would be extremely relevant for evidence building on the economic, nutritional and social benefits associated to NUS. IFAD’s investment programs have a good potential to provide a significant contribution in supporting such a knowledge base platform.

How to harmonize Traditional Knowledge (TK) with science’s perspectives

TK plays an important role in shaping food cultures, production, consumption and marketing of foods, and it is an incredible source of wisdom for fighting climate change in agriculture. The custodians of this unique wealth of information are IPs, specially women, whose contribution to the continued use of NUS is very valuable; given that men tend to favor more cash-oriented monocultures. Sadly enough, cultural erosion is widespread in many indigenous peoples’ communities and this is affecting TK to the extent of bringing it to its complete extinction, which contributes to the marginalization and loss of genetic diversity at inter- and intra-specific levels. Such a situation is having dramatic repercussions on the ability of IPs of adapting to climate change, maintaining sustainable and healthy food habits, and conserving genetic diversity for future generations; situations that reduce today’s consumers and NUS markets appeal.

It is thus imperative the proper understanding of the reasons behind cultural erosion affecting TK and how such process can be halted. To that end, an important first step is the recognition that TK and scientific knowledge are complementary systems and not substitutes. Linkages across these systems are necessary when promoting NUS and should be strongly encouraged. This is consistent within the NUS Operational Framework, where the lack of information and blending knowledge have been indicated as a major

¹³ www.nuscommunity.org

¹⁴ www.b4fn.org

¹⁵ www.cffresearch.org

obstacle. Besides the appreciation of both systems, there is also the need to establish suitable and cultural-sensitive mechanisms aimed at fostering and blending seamlessly formal (scientific findings) and informal knowledge (indigenous technology and local wisdom). Indeed, local cultures and their diverse forms of expression should be appreciated and recognized as much as scientific products and should be equally leveraged in projects' design and intervention phases.

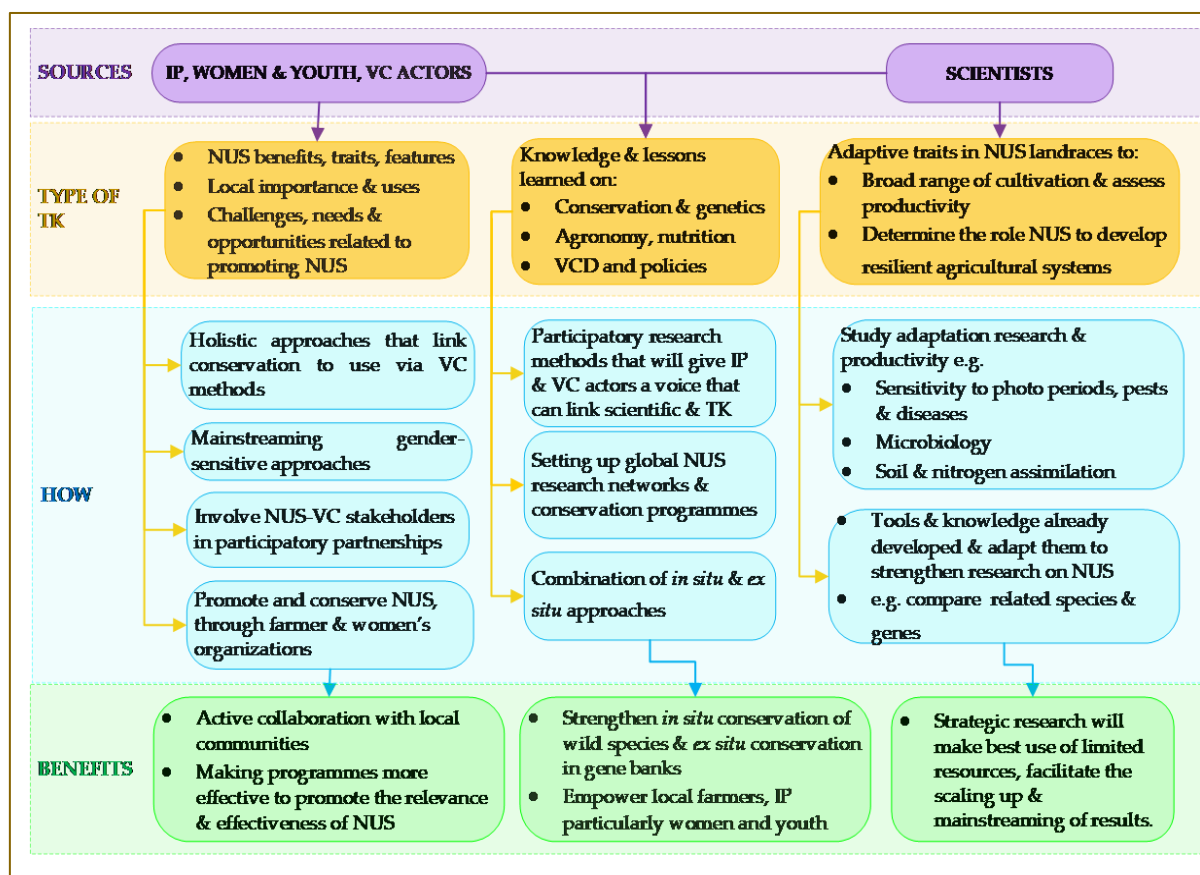
To successfully harness TK and scientific knowledge in support of VCD for NUS it is critical to properly carry out participatory documentation and characterization of priority species together with the local community members aiming at compiling and gaining a first assessment of:

- NUS levels of productivity, perceived marketability, value addition opportunities and constraints that limit the full expression of their potential and competitiveness.
- How economic activities are conducted by IP (women and youth), how local cultural cognitive processes work and which functions are key drivers of any decision making.
- TK regarding NUS at a local, regional and national level in respect of local norms and intellectual property rights.

This information can be leveraged in support of small-scale and viable business opportunities for local communities. Such an inter-cultural dialogue focusing on VCD requires however expertise that is not so easily found in practitioners, thus it is highly recommended to build capacity, develop and strengthen expert's business skills and market orientation.

Biodiversity International holistic approach connects both TK and scientific knowledge through inter-disciplinary and participatory interventions aimed at improving peoples' livelihood through the untapped potentials of local biodiversity. A way to leverage, blend and share TK with science, as suggested in the NUS Operational Framework, include the introduction of marketing intelligence systems (e.g. via mobile phones and apps) that would provide information about where to find NUS in the community, and how to use, buy and sell them. This approach also increases the possibilities to design equitable VCD for NUS and implement successful strategies in indigenous areas, through focused discussions with community members to elicit IPs rich knowledge related to NUS. In figure 6, the type of TK required to consider while conducting a NUS VCA is presented, along with methods to elicit this valuable information.

Figure 6. Type of TK to take into consideration during a NUS Value Chain Assessment



Multiple scales of marketing

Besides understanding the direct context of the NUS-VC under study, it is also important to look at the distinctive and wider environment and markets in which the target species may gain relevance, with regard to local, national and international levels. Typically, many NUS can be found in local markets where they are sold in small amounts, in precarious hygienic conditions, poor packaging and with almost no value addition being applied to it. Nevertheless, in our work, we have seen that many of such species have ample opportunities for wider marketing, including international markets, in view of peculiar nutritional qualities or unique flavor that they possess. And indeed, there is a growing global interest and demand in natural (and exotic) ingredients, organic farming, dietary trends and revival of native, ancestral and traditional products that can be also leveraged. These trends present great opportunities for communities that cultivate NUS that could improve the ways in which these species are used and sold for better incomes; including efforts that could include community-friendly eco-labelling or denomination of origin branding.

Consequently, it is important to assess NUS opportunities and risks with different markets, especially in local domestic markets where they are typically appreciated, owing that their use is closely linked with local food cultures and values. Although, local markets may be the most attractive option to pursue for the profitability or empowerment of women and IPs, the possibility to explore the wider marketing of NUS in other regions of the country or even at the international level cannot be ruled out, and should be possibly pursued. Attention should also be oriented first to identify factors that can affect NUS potential and competitiveness at national, regional and/or international level, such as unmet market demand, substitute and complementary species, and unused competitive advantages (e.g. exotic product). Furthermore, a researcher can learn a lot from comparing the situation of the same crop in different countries. For

instance, we learned that *chaya*¹⁶, an edible plant almost forgotten in Guatemala, is also an emblematic species with great roots in the traditional local cuisine in different Mexican states of Yucatan.

VC operators interested in expanding the marketing of NUS need to familiarize, understand and comply with different markets provisions and external environment conditions involved in the growth potential, competitiveness and promotion of target species that may exist in different markets. Other key issues that can limit the commercialization of NUS in regional and international markets¹⁷ include the presence of trade barriers, increasing market access requirements (food quality and safety standards), international agreements, and legal and private industry standards (certification, accreditation). This knowledge will guide the development of proper VC upgrading strategies that may involve building structures to improve farmers' access to markets, processing operations, or the development of VC actors' skills. These preliminary assessments need to also consider important indicators for the proper management of VC, such as investment return in labor or capital, market access (e.g. enhancement in access to information and infrastructure), potential share in export markets or employment creation (e.g. labor-intensive processing). Furthermore, to design inclusive business model strategies is important to gain a better understanding of the types of well-established agricultural VC, as well as how these may differ from poorly organized NUS-VC. To that regard, we include below (table 4) a comparison among key VCs (for staple foods, cash crops and high value crops) and NUS-VC.

¹⁶ See section 5.1

¹⁷ More detail information on issues related to NUS supply and demand at national, regional and/ or international level, can be found in HTDN no. 3 and no. 4.

Table 4. Characteristics of main agricultural value chains compared with those dealing with NUS

TYPES OF MAIN AGRICULTURAL VALUE CHAIN (VC)			NUS-VC (LOCAL, DISTRICT)
Staple food VC	Cash crop VC	High-value food crop VC	
OVERALL GENERAL FEATURES			
<ul style="list-style-type: none"> ▪ Complex but important 4 food & nutrition security ▪ Large # of semiformal small fragmented & unorganized actors ▪ Trade mainly made on an individual basis 	<ul style="list-style-type: none"> ▪ Comparatively formal ▪ Shorter chains & fewer key actors ▪ Higher level of vertical coordination 	<ul style="list-style-type: none"> ▪ Comparatively formal, ▪ Actors typically operate in well-coordinated markets ▪ Clear VC drivers e.g. exporter, or large processor ▪ Higher level of vertical coordination 	<ul style="list-style-type: none"> ▪ Short & simple, mostly used for food ▪ Poorly organized ▪ Few VC actors, involving in more than 1 activity ▪ Associated with a rich TK
TYPES OF AGRICULTURAL PRODUCTS			
<ul style="list-style-type: none"> ▪ Traditional grown for food & medicine ▪ Less competitive in the marketplace 	<ul style="list-style-type: none"> ▪ Primarily grown for cash ▪ Sold within out-grower schemes or formal contract farming arrangements ▪ Important source of foreign income earnings 	<ul style="list-style-type: none"> ▪ Commercial ▪ Not highly perishable ▪ Competitive in the marketplace 	<ul style="list-style-type: none"> ▪ Traditional produced for multiple uses: nutrition, medicine, animal feed ▪ Mostly unknown ▪ No competitive in the marketplace
SUPPLY			
<ul style="list-style-type: none"> ▪ Inconsistent & seasonal variable ▪ Quality & quantity of supply to side-selling ▪ Do not meet modern standards for uniformity 	<ul style="list-style-type: none"> ▪ Consistent & fewer problems with side-selling ▪ Production often supported by government subsidy programmes e.g. fertilizer 	<ul style="list-style-type: none"> ▪ Consistent ▪ Larger buyers have more competition from local buyers, causing problems in the form of side-selling 	<ul style="list-style-type: none"> ▪ Week & constantly decreasing ▪ Do not meet modern standards for uniformity
DEMAND			
<ul style="list-style-type: none"> ▪ Erratic, ▪ No high-quality standards ▪ Business generally done on the spot with little formality 	<ul style="list-style-type: none"> ▪ Strict food quality & food safety standards ▪ More formal business 	<ul style="list-style-type: none"> ▪ High quality & safety standards ▪ Buyers usually medium to large sized & well organized, with competent level of managerial & technical skills 	<ul style="list-style-type: none"> ▪ Consumption is decreasing. Few buyers ▪ Unknown for most ▪ Lack of awareness about benefits ▪ "Food of the poor"
MARKET & PRICES			
<ul style="list-style-type: none"> ▪ Farmgate, local spot, urban or cross-border markets ▪ Lack of reliable market info. & erratic prices ▪ Liable to gov. interventions e.g. min. floor prices for farmers, import & export bans 	<ul style="list-style-type: none"> ▪ Consolidated market outlets, that could give rise to overdependence on few buyers ▪ Target local informal markets ▪ Pricing mechanisms highly dependent on international volatile market prices, causing scarcities, gluts & price spikes 	<ul style="list-style-type: none"> ▪ Highly integrated & well-coordinated markets ▪ Typically target the export sector or domestic & regional high-end consumers ▪ Less fluctuating market prices 	<ul style="list-style-type: none"> ▪ Poorly engaged in marketing activities ▪ Lack of markets ▪ Farmgate, community ▪ Low prices
PROCESSING			
<ul style="list-style-type: none"> ▪ Mostly at cottage level or artisanal with little adherence to food safety standards & with limited business acumen 	<ul style="list-style-type: none"> ▪ Primary processing carried out by small & medium sized enterprises ▪ Very little value added in the country of origin 	<ul style="list-style-type: none"> ▪ Have more opportunities than cash crops for in-country value addition such as drying, cleaning & packaging ▪ Costly certification processes 	<ul style="list-style-type: none"> ▪ Primary processing (if any) ▪ Mostly no processing
KEY ACTIONS			
<ul style="list-style-type: none"> ▪ Carefully selected promising crops & varieties with wide adaptation, commercial potential & industrial processing uses (e.g. biofuels) 	<ul style="list-style-type: none"> ▪ Offer smallholders & processing enterprises new opportunities in export markets 	<ul style="list-style-type: none"> ▪ Increasing local markets for high-value crops domestically & regionally in developing countries ▪ Offer smallholders & processing enterprises new opportunities in export markets 	<ul style="list-style-type: none"> ▪ Highly versatile in terms of market niche development ▪ Ample opportunities for wider marketing

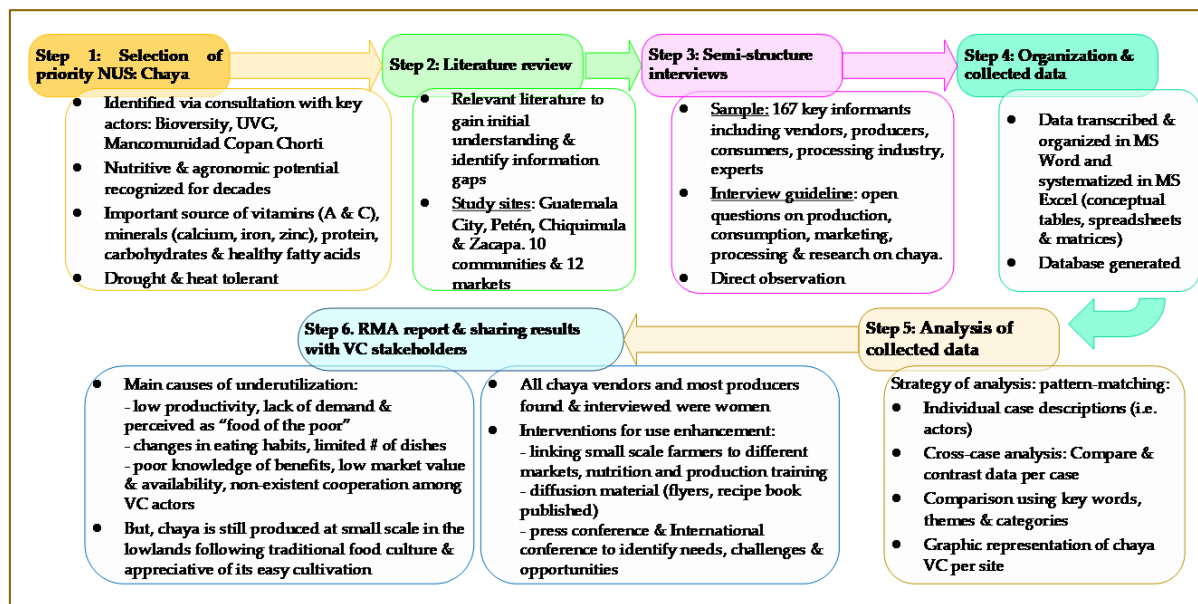
5. Lesson Learnt

Case study of recent IFAD project: NUS-VC & climate change

The IFAD and EU funded project implemented in Guatemala by Bioversity International focused on vulnerable communities in the Department of Chiquimula, which is a semi-arid zone with long periods of drought, poor soil and low agricultural performance; that faces high burden of malnutrition, poverty and climate risk. In the study area, it was promoted the cultivation, consumption and marketing of a nutritious indigenous leafy vegetable well adapted to drought-prone areas known as chaya (*Cnidioscolus aconitifolius*) or “Mayan Spinach”. Even though this plant has great potential to support climate change adaptation, strengthen food and nutrition security (due to the nutritive and medicinal value of its leaves), and increase livelihood resilience and incomes of resource-poor farmers, it is yet largely underutilized in Guatemala due to limited research and low policy investments insofar. Therefore, in order to fill this gap of knowledge and make possible for Guatemalans to benefit from this plant significant nutritional and health contributions, a VC assessment and marketing consultation for chaya was conducted as part of the project.

This study, the first of its kind applied to chaya in Guatemala, deployed RMA tools between March and September 2017. A total of 167 key informants were interviewed, including producers of leafy vegetables (20), vendors (54), consumers (34), restaurants (16), processing industry (4) and knowledgeable experts (39). Also, literature review, direct observation and internet surveys were conducted to complement the interview results and increased our understanding of chaya marketing in Guatemala and beyond. In figure 7, the implementation of the RMA used to analyze the chaya VC in Guatemala is provided, where the six step-by-step approach presented previously (figure 4, above) is shown.

Figure 7. RMA applied on chaya VC in Guatemala



While conducting the VCA of chaya, a main challenge encountered was related to the limited availability of this edible plant in the local markets and communities visited, where only few people still know, produce and consume it, which is clearly the result of changes in food preferences and cultural erosion of the local TK. Another limitation was regarding access to information about this plant generated by different organizations in Guatemala, because most of them work independently and do not share their research and findings with key stakeholders, resulting in duplication of efforts.

Based on the chaya VCA conducted in 2017, key interventions to seize its potential and revitalize its use in Guatemala were implemented throughout 2018. These interventions had a special focus on local traditions, knowledge, culture, IPs and in women in particular, given the important role they play in achieving food security and nutrition at the household level. The actions implemented sought to connect small-scale chaya producers to different markets to enhance and multiply impacts on environmental and biodiversity conservation, as well as women's economic empowerment through income generation. Main activities included:

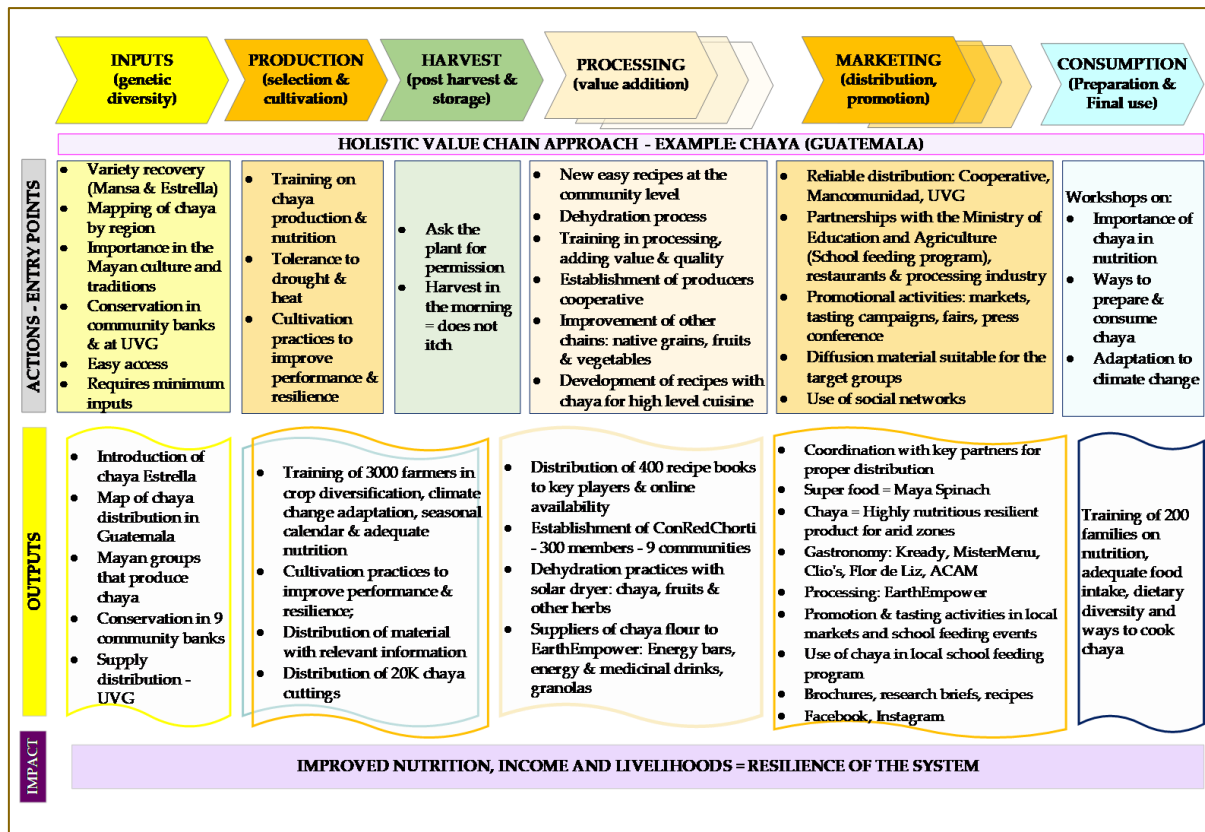
- Establishment and linking of a women's collective to different markets, processing industry, restaurants and local school feeding programs
- Marketing campaigns to promote chaya as a superfood
- Develop interesting recipes through community cooking sessions, where people learn how to incorporate chaya into their diet considering local eating habits and cooking practices
- Distribution of chaya cuttings to develop a robust marketing channel
- Forming alliances between growers, VC actors, chefs and food movements to help raise awareness about the role that chaya play within the country's cuisine. This action helped to best celebrate and document the relationship between local gastronomy and biological diversity

Additionally, within the framework of the IFAD-EU Grant, in 2018 three stakeholder workshops were organized by Bioversity International in Guatemala, India and Mali. During these events, the results from different NUS-VCA conducted in each country were presented to increase awareness and promote participatory consultations on needs, challenges, and opportunities for enhancing the use of these species. Some important lessons observed across these conferences include:

- Even though participants agreed on the nutritional potential that NUS have, they also recognized that these species alone are not the solution to the problem of malnutrition in the mentioned countries, but in combination with other foods that complement each other;
- Importance to share information, both at the research and practical level, regarding the current situation of the target NUS in each country;
- The supply and demand from the target NUS are still relatively low and face a major impediment because they are often associated with poverty and backwardness;
- A major challenge that significantly affects the proper functioning of the studied NUS-VCs is the lack of coordination between the different actors that participate in these chains (e.g. producers, vendors, consumers, processing industry, consumers, service and input providers, research organizations)
- Encourage great adoption by VC actors through the promotion of nutrition, medicinal and agronomic useful traits present in NUS (including resilience).

Figure 8 below shows the interdisciplinary and participatory interventions pursued along with key outputs, which altogether contributed to strengthen the resilience outcomes in nutrition (i.e. greater access to nutritious foods during or after difficult periods), markets, as well as livelihoods of IP's - particularly women's - and from the system as a whole. The figure also illustrates the complementarity between Bioversity International holistic VC approach and IFAD's framework for NSVC.

Figure 8: Operationalization of a NUS Framework for NSVC applied to chaya in Guatemala

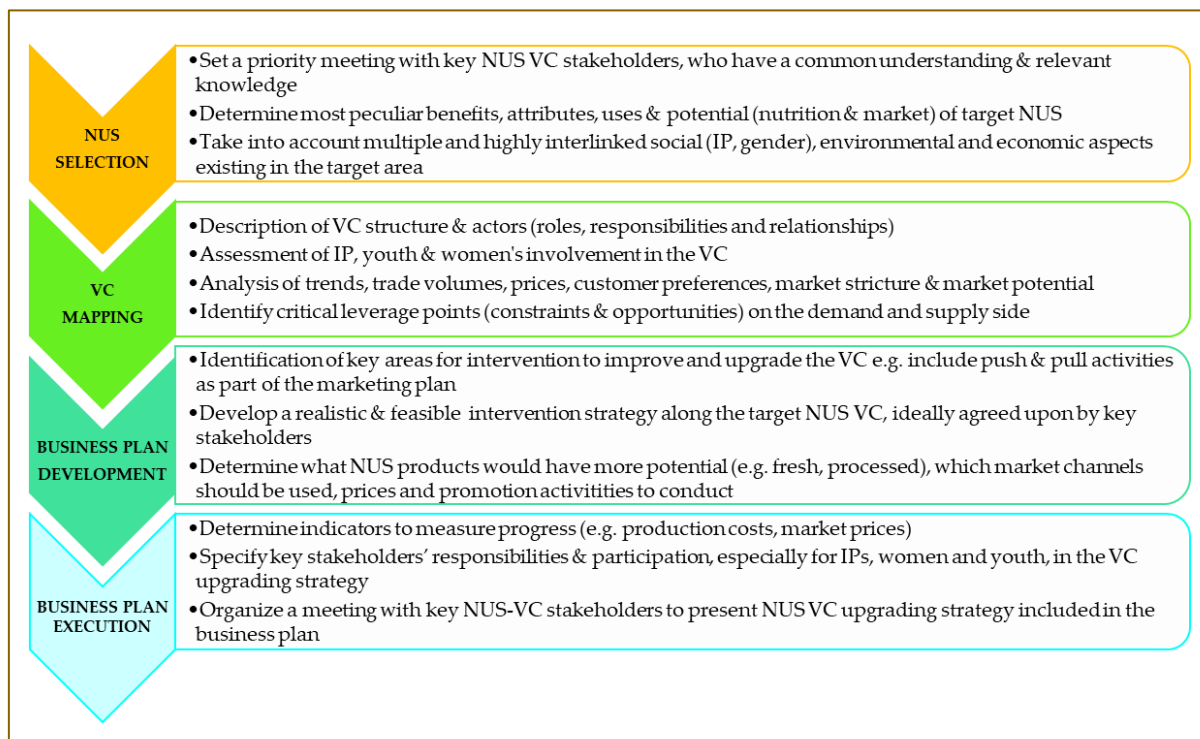


6. Guidance for project design and implementation

VCs for NUS need to be developed so as to yield commercial products with competitive value added, that can be traded not only at the local markets, but also nationally and internationally. However, introducing NUS into new markets or promoting them where they already exist but go unnoticed, could be very challenging. Thus, in order to translate small-scale NUS initiatives into viable and profitable business opportunities it is important to understand first what the markets want, identify substitute and complementary species, varieties and products that can compete with the promoted NUS; and also determine how the supply can satisfy the identified demand. For example, knowing if a change in dietary habits is needed to encourage the consumption of NUS will help to design and implement proper actions within the project. Such a work would be a key element in support of the NUS Operational Framework where harvesting, processing, marketing (locally or regional) and advocacy, are part of the impact pathways of any NUS nutrition sensitive agricultural project.

Therefore, in order to incorporate, design, and implement NUS-VC in IFAD financed projects, as well as to show how to seize opportunities through more effective marketing and VC interventions, it is recommended to follow the steps presented in figure 9. Each step includes key information that needs to be collected, as well as recommendations for deriving intervention and promotion strategies to map and develop the selected VC. When planning a NUS-VC initiative, it is important to define the nutritional outcome, factor in adequate resources (budget, expertise, and time frame), carefully analyse challenges, opportunities and risks, and identify indicators to measure the nutrition outcomes. For instance, in the IFAD and EU funded project in Guatemala the VCA of chaya took about one year to organize, plan, and conduct the field work, which included map actors, collect and analyze data, and write the final report that included recommendations of key interventions).

Figure 9. Project Design and implementation process



Enhancing the use and marketing of NUS is a powerful opportunity to strengthen the identity and raise the visibility of vulnerable groups, whose livelihoods depend on the conservation of these species. Therefore, any intervention that encourages the development of a NUS-VC should raise awareness about the benefits of these crops to develop their demand and market them using labelling and denomination of origin (branding), addressing key constraints that have been preventing their marketing (e.g. adequate packaging, processing, collective action). In that regard, vulnerable groups can be empowered through incentives and training programs, that consider culture sensitive lens and equity aspects, aiming at enhancing and strengthening their skills and capacities. These actions should be related to sustainably and resilient management (e.g. production efficiency, entrepreneurship skills), conservation, nutrition and marketing of NUS in new and/or improved ways to reinforce their economic status in the face of climate change. Training and developing capacity are particularly important to protect and conserve wealth of NUS and TK for future generations. One way to build hands-on capacity is by promoting inter-generational transfer of knowledge from elders to younger generations; and by developing and supporting farmer associations, cooperatives and traditional seed systems, to provide actors with tools to create effective and relevant endeavors for NUS. Also, it is important to identify initiatives to make NUS attractive to young people who are important agents of conservation and continuity use of NUS. Some of these initiatives can include innovative cultivating and processing technologies (e.g. solar panels to dehydrate native leaves), as well as the use of new technologies (e.g. cell phone, Internet) and social media (e.g. Facebook, Twitter, YouTube or Instagram) to market NUS products.

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Annexes

Note: all questions included in these 5 Annexes, should be adapted to the local context where the research will take place. The target NUS will be referred just as "NUS", but enumerators should use other terms that would be better perceived/ understood by people. All surveys should include the following identification section:

Name of interviewee: _____ Age: _____ Sex: _____ No. _____ GPS: _____
City: _____ Community: _____ Village: _____ Date: _____

Annex I. Producers and collectors

PRODUCTION

1. What crops do you produce? Which ones is the most important? Why?
2. Besides agriculture, what other economic activities do you perform?
3. Do you produce NUS?
 - If he/she does not, ask: Why? would you like to produce it? yes/no, why? What other crops do you prefer to produce over NUS? Why?
 - If he/she does, proceed with the following questions

GENERAL FEATURES	PRODUCTION
<ul style="list-style-type: none"> <input type="checkbox"/> How long have you been engaged in NUS production? <input type="checkbox"/> Where did you learn about this crop? <input type="checkbox"/> Is the knowledge on its production passed from generation to generation (parents/grandparents), from other people in the community, by extension services, media (TV, radio), formal education? Explain <input type="checkbox"/> Why did you decide to keep producing it? or why did you decide start producing it? <input type="checkbox"/> Why do you produce NUS (consumption, income, market, other)? <input type="checkbox"/> How important is its production for you and family (e.g. subsistence)? <input type="checkbox"/> Do you think NUS production has changed in the last years? Yes/no, why? How? (e.g. increased, decreased) <input type="checkbox"/> How many plants of NUS do you have? Where do you plant them? (e.g. close to your house, between crops, as hedges) <input type="checkbox"/> How long does a plant of NUS live? How often do you plant a new one? Why? <input type="checkbox"/> What variety of NUS do you produce? Why? <input type="checkbox"/> What types of relationships and linkages exist with other producers of NUS? (e.g. collaboration with other farmers, market access) <p><u>INDIRECT ACTORS</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Which organizations work in the area? What services do they offer? Do you interact with them? Yes/no, why? Which ones? In what activities are you involved? <input type="checkbox"/> Which household members interact with these institutions? Who decides this participation? Why? <input type="checkbox"/> Do these institutions help you with NUS production? What kind of support do they provide? What services would you like to receive from them? <input type="checkbox"/> Where do you have access to credit, market info, technical expertise about NUS? Is it easy to have access to them? Yes/no, why? 	<p><u>INPUTS</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> From whom have you got the NUS seed/cuttings (e.g. relatives, friends or extension workers)? Who paid for the initial cost? <input type="checkbox"/> What inputs do you need to produce NUS? (e.g. seed, cuttings, water, fertilizer, pesticides, labor, tools/machinery, etc.). <input type="checkbox"/> It is easy to have access to these inputs? Yes/no, why? Which ones? Where do you have access to them? How much do you spend in these inputs? Do the prices of these inputs change? Yes/no, why? When? <input type="checkbox"/> Does the cultivation of NUS require a lot of labor compared to other crops? Yes/no, why? What crops? In what activities? <p><u>LABOR</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Which family members are involved in the production of NUS? Who does what? Who decides what? (Purchase of inputs, care of the plot, harvest, uses, etc.) Why? <input type="checkbox"/> How much time is spent in the various stages of the production of this crop (preparing land, seeding, weeding, harvest, threshing, sorting, etc.) <input type="checkbox"/> Is family labor sufficient or do you need to hire extra labor? <input type="checkbox"/> How much does it cost to hire labor in your community? (differentiate the payment by gender) <p><u>HARVEST/YIELD</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> When and how often do you harvest NUS? How much do you harvest every time? <input type="checkbox"/> Does this quantity vary by season? When? in what quantity and why? <input type="checkbox"/> When do you have the highest production? When the lowest? Why? <input type="checkbox"/> Do you think the production of NUS has changed? Yes/no, why? How? (increased, diminished) <input type="checkbox"/> How do you think NUS production can improve? <input type="checkbox"/> If you were given more NUS plants/seeds, would you be interested in growing them? Yes/no, why? How would you use your extra production? (e.g. consumption, market) <input type="checkbox"/> How do you use the NUS that you harvest? e.g. household consumption, market, distribute to social network (relatives, neighbors), animal feed, food preparation for sale? <input type="checkbox"/> Do you use everything you harvest? What do you do with the leftovers? <p><u>PROBLEMS</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> What cultivation problems do you have when producing NUS? Drought? Pests? Limited access to water? Others? How do you address these problems? <input type="checkbox"/> How much does it help watering the plant? Do the plants produce more? <input type="checkbox"/> What happens to the plant when there is drought? <input type="checkbox"/> Is the plant more resistant to drought than others grown in the farm? Yes/no, why? Is there another plant that is more resistant? Which one?

CONSUMPTION: Do you consume NUS?

- If the interviewee does not consume NUS, ask: Why? Did he/she used to consume it before? Yes/no, why? Why did he/she stop?
- If the interviewee does consume NUS, continue with the next questions

CONSUMPTION
<input type="checkbox"/> Why do you consume NUS? Do you like the taste? Yes/no, why? <input type="checkbox"/> What variety of NUS do you prefer to consume? Why? <input type="checkbox"/> How many times per week do you consume it? How much do you consume every time? <input type="checkbox"/> Does your consumption level vary during the year? When? Why? (e.g., dry season versus rainy season)? How does it vary? How do you consume it? What is your favourite dish? Why? <input type="checkbox"/> Would you like to have more recipes to prepare/cook NUS? Yes/no, why? <input type="checkbox"/> Do you think your family would consume more NUS if they could produce more? Yes/no, why? <input type="checkbox"/> Do you consider that your NUS production is sufficient to meet the needs of your home? Yes/no, why? <input type="checkbox"/> What do you do when you do not have enough? <input type="checkbox"/> Have you ever searched for NUS in the market? Yes/no, why? Or have you bought it in your community? Yes/no, why? <input type="checkbox"/> Do you think NUS consumption has changed? Yes/no, why? How? (increased, diminished) <input type="checkbox"/> Are there other crops similar to NUS that you and your family consume? Which ones? <input type="checkbox"/> Do you prefer any of these crops over NUS? Which ones? Why? Which one is more delicious? <input type="checkbox"/> How does the production of these crops compare to NUS? Do you produce more or less of these products compared to NUS? Yes/no, Why?

MARKETING: Do you sell NUS?

- If the interviewee does not sell NUS, ask: Why? If you could produce more NUS, would you like to sell it? Yes/No, why? Have you ever sold NUS? If they did, ask why did they stop?
- If producers sell NUS continue with the following questions:

GENERAL FEATURES	MARKETING DETAILS
<input type="checkbox"/> Where do you sell your NUS? Directly to wholesalers/traders in the markets, in your community or traders buy it from your communities? <input type="checkbox"/> What type of clients buy the NUS you sell? (retailer/consumer/processor, other)? <input type="checkbox"/> What kind of NUS product do you sell i.e. fresh or a processed product (identify the product)? <input type="checkbox"/> If they sell a process product, ask how do they process it and where did they learn about this process? Which product do they prefer to sell? Why? <input type="checkbox"/> If producers sell NUS in the markets ask: <ul style="list-style-type: none"> ▪ How often do you go to the market? What days do you attend? ▪ How long do you stay? Why do you go to this market? ▪ Do you have to make any payment in order to have a space in the market to sell your produce? ▪ How much? How often? How much does it cost you to go to the market? ▪ What kind of transportation do you use? ▪ Is it easy to access to the market and transportation? Yes/no, why? <input type="checkbox"/> What variety of NUS do you sell? Why? <input type="checkbox"/> How often do you sell NUS? Why?	<p><u>PRICES AND QUANTITIES</u></p> <input type="checkbox"/> How much do you charge for NUS you sell? <input type="checkbox"/> Do your selling prices change a lot throughout the year? In which months? <input type="checkbox"/> When do you charge the highest price? Lowest? Why is there such variation? <input type="checkbox"/> How do you get market price information? <input type="checkbox"/> Are there sometimes large price differences between markets at a given time? Who determines the price/ how is the price determined? <input type="checkbox"/> What quantity of NUS do you sell each time you go to the market? When do you sell more/sell less NUS? In which months? Why is there such variation? <input type="checkbox"/> Do you sell everything you take to the market? What do you do with what you have left over? <input type="checkbox"/> Do you apply grading and sorting? Do better grades fetch higher prices? Which price levels per quality grade?
	<p><u>QUALITY</u></p> <input type="checkbox"/> Are there any product standards or market regulations you have to obey to be able to sell your products (e.g. regulations on product safety, labelling or packaging)? If yes, which ones? <input type="checkbox"/> What standards/quality do your clients require (e.g. freshness, prices, chemical use, appreciation of damages, knowledge of origin)? which product attributes are most important for them? <input type="checkbox"/> What do you do to make the product last longer while in the market?
	<p><u>GENDER ROLES IN THE MARKETS</u></p> <input type="checkbox"/> Are you the one who normally comes to the market? Yes/no, Why? <input type="checkbox"/> Other family member comes with you/ instead of you? Why? Who? <input type="checkbox"/> Who is charge to make the sales? Why? <input type="checkbox"/> Who handles the money from the sale? Why? <input type="checkbox"/> Who decides how to use the money from the sales? Why? <input type="checkbox"/> Do you sell to more men or women? Why?

Market needs and emerging opportunities assessment in NUS value chains

<ul style="list-style-type: none"><input type="checkbox"/> How important is the marketing of NUS for you? Why?<input type="checkbox"/> In which language do you sell? is this language your native language?<input type="checkbox"/> Who sells the product in the market/community? Why? Who decides who sells? Why?<input type="checkbox"/> What types of relationships and linkages exist with other producers who sell NUS and traders in the market?<input type="checkbox"/> Do you think there is market potential for NUS grow? Yes/no, why? Where?	<ul style="list-style-type: none"><input type="checkbox"/> Do you think men and women get a different price for the same products? Yes/no, why?<input type="checkbox"/> Who has more bargaining power? Why?<input type="checkbox"/> According to your perception, is the market dominated by men or women? Why? In what activities?<input type="checkbox"/> Have you noticed any changes in the roles of men and women in recent years in the markets you attend? Yes/no Why? What types of changes?
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Annex II. Vendors & retailers

1. What crops do you sell? Which ones are the most important? Why?
2. Type of business (e.g. wholesaler, small market stall with direct sale to consumer, small producer, etc.)
3. Do you sell NUS?
 - If he/she does not, ask: Why? would you like to sell it? yes/no, why? What other crops do you prefer to sell? Why? Have you ever heard about NUS? Where?
 - If he/she does, proceed with the following questions

NUS SALES	DEMAND & SUPPLY
<ul style="list-style-type: none"> <input type="checkbox"/> How long have you been selling NUS? How did you decide to sell this product? <input type="checkbox"/> What variety of NUS do you sell? Why? <input type="checkbox"/> How much do you charge for NUS you sell? <input type="checkbox"/> Do your selling prices change a lot throughout the year? In which months? <input type="checkbox"/> When do you charge the highest price? Lowest? Why is there such variation? <input type="checkbox"/> How do you get market price information? <input type="checkbox"/> Are there sometimes large price differences between markets at a given time? <input type="checkbox"/> Who determines the price/ how is the price determined? <input type="checkbox"/> How often do you sell NUS? Why? <input type="checkbox"/> What quantity of NUS do you sell each time you go to the market? When do you sell more/sell less NUS? In which months? Why is there such variation? <input type="checkbox"/> Do you sell everything you take to the market? What do you do with what you have left over? <input type="checkbox"/> What do you do to make the product last longer while in the market? <input type="checkbox"/> Do you apply grading and sorting? Do better grades fetch higher prices? Which price levels per quality grade? <input type="checkbox"/> How important is the marketing of NUS in the activity that you carry out? Why? <input type="checkbox"/> What are key problems in selling NUS? How do you address these problems? <input type="checkbox"/> In which language do you sell? is this language your native language? <p>GENDER ROLES</p> <ul style="list-style-type: none"> <input type="checkbox"/> Are you the one who normally comes to the market? Yes/no, Why? Or other family member comes with you or instead of you? Why? Who? <input type="checkbox"/> Who is charge to make the sales? Why? Who handles the money from the sale? Why? <input type="checkbox"/> Do you sell to more men or women? Why? <input type="checkbox"/> Do you think men and women get a different price for the same products? Yes/no, why? <input type="checkbox"/> Who has more bargaining power? Why? 	<p>CONSUMERS DEMANDS</p> <ul style="list-style-type: none"> <input type="checkbox"/> What type of clients buy the NUS you sell? (retailer/consumer/processor, other)? <input type="checkbox"/> Do consumers request for NUS? Yes/no, why? How often? <input type="checkbox"/> Do customers ask for specific varieties, and if so, which ones? why? <input type="checkbox"/> Which taste, shape, color or flavor do customers like the most? <input type="checkbox"/> What standards/quality do your clients require (e.g. freshness, prices, chemical use, appreciation of damages, knowledge of origin)? which product attributes are most important for them? <input type="checkbox"/> Do you think that consumers would buy NUS, if there were more available in the markets? Yes/no, why? <input type="checkbox"/> Would you sell more NUS if there were more consumers demanding it in the market? Yes/no, why? <input type="checkbox"/> What types of relationships and linkages exist between you and your consumers? (e.g. loyal consumers) <p>SUPPLY OF NUS</p> <ul style="list-style-type: none"> <input type="checkbox"/> Where are the NUS you sell sourced from (they produce it and/or buy it direct from farmers)? Which type of transport do you use/prefer to bring your produce to the market? <input type="checkbox"/> If you buy it: <ul style="list-style-type: none"> ▪ From whom do you buy it? How many different suppliers do you have? What are your geographical supply areas? ▪ How often do you buy it and in what quantities? how much do you pay for it? ▪ How much does it cost you to transport what you buy to the market? What are key problems in purchasing your products? ▪ Do purchasing prices change? Yes/no, why? How do they change? <input type="checkbox"/> If you produce it: <ul style="list-style-type: none"> ▪ Where do you produce the NUS you sell? ▪ How much of your NUS production is intended for sale? ▪ How often do you bring the product to the market? In what quantities? How much does it cost you to produce NUS? <input type="checkbox"/> Which product attributes are important for proper storage and transportation when you bring your product to the market?
MARKET FEATURES	SALE OF OTHER CROPS SIMILAR TO NUS
<ul style="list-style-type: none"> <input type="checkbox"/> How often do you come to the market? What days do you attend the market? How long do you stay? <input type="checkbox"/> Do you have to make any payment in order to have a space in the market to sell your produce? How much? How often? <input type="checkbox"/> Where do you come from to sell your products in this market? Is it easy to access this market? Yes/no, why? <input type="checkbox"/> How much does it cost you to come to the market? <input type="checkbox"/> What kind of transportation do you use? 	<p>COMPETITION</p> <ul style="list-style-type: none"> <input type="checkbox"/> Do you think other vendors sell NUS in this market? Yes/no, why? How many? Where are they located? <input type="checkbox"/> How do you perceive the marketing of NUS in general? How do you think it can improve? <input type="checkbox"/> Why do you think that more NUS is not sold in the market? <input type="checkbox"/> What types of relationships and linkages exist between you and your suppliers? Other vendors of NUS?

NUS SALES	DEMAND & SUPPLY
<ul style="list-style-type: none"> <input type="checkbox"/> Do you sell your produce in other markets? Yes/no, why? Which ones? <input type="checkbox"/> When do you go to those markets? Which market do you prefer? <input type="checkbox"/> When talking to other consumers, traders, processors, or retailers; did you notice any changes in the market in recent years? Yes/no, what kind of changes? <input type="checkbox"/> Did you see new market channels emerge or becoming popular, if yes which channels? <input type="checkbox"/> Are there any product standards or market regulations you have to obey to be able to sell your products (e.g. regulations on product safety, labelling or packaging)? <input type="checkbox"/> Did you notice any new type of products, packaging or product requirements becoming popular in the market? Yes/no, what kind of products? 	<ul style="list-style-type: none"> <input type="checkbox"/> Do you think there is market potential for NUS grow? Yes/no, why? Where? How? <p>SIMILAR PRODUCTS</p> <ul style="list-style-type: none"> <input type="checkbox"/> What other crops similar to NUS do you sell? Do you prefer to sell them over NUS? Yes/No, Why? <input type="checkbox"/> Which products are best substitutes for NUS? <input type="checkbox"/> How much do you charge for these crops? <input type="checkbox"/> Do your selling prices change a lot throughout the year? In which months? <input type="checkbox"/> When do you charge the highest price? Lowest? (Per crop) why is there such variation? <input type="checkbox"/> When do you sell more/sell less of these crops? Why is there such variation? In which months? What quantities? <input type="checkbox"/> How often do you sell these other products? Why? <input type="checkbox"/> What quantity do you sell each time you go to the market? <input type="checkbox"/> When do you sell more/sell less? In which months? Why is there such variation? <input type="checkbox"/> Do you sell everything you take to the market? What do you do with what you have left over? <input type="checkbox"/> Are these crops prefer by consumers over NUS? Why? Which ones? Where do you buy the produce you sell? From who? How often do you buy them? In what quantities? At what prices? Or do you produce these crops? How much does it cost you to produce them?
<p>GENDER ROLES IN THE MARKETS</p>	
<ul style="list-style-type: none"> <input type="checkbox"/> According to your perception, is the market dominated by men or women? Why? In what activities? <input type="checkbox"/> Have you noticed any changes in the roles of men and women in recent years in the markets you attend? Yes/no Why? What types of changes? 	

Annex III. Consumers

1. Type of consumer (urban and rural consumers)

IF CONSUMERS BUY NUS	IF CONSUMERS DO NOT BUY NUS
<ul style="list-style-type: none"> <input type="checkbox"/> Where do you normally buy NUS? Why? <input type="checkbox"/> From which type of vendor do you buy NUS? <input type="checkbox"/> Why do you buy NUS? Where did you learn about NUS the first time? <input type="checkbox"/> How much do you pay for NUS? Do these prices change throughout the year? Yes/no, why? How? <input type="checkbox"/> When do you buy NUS? How often do you buy it (e.g. once a week)? In what quantities? <input type="checkbox"/> Do these quantities change throughout the year? Yes/no, why? How? <input type="checkbox"/> How do you consume/use NUS? (e.g. type of dishes) <input type="checkbox"/> Do you ask for specific varieties, and if so, why? Which ones? <input type="checkbox"/> Which taste, shape, color or flavor do you like most? <input type="checkbox"/> What do you consider important when you buy NUS? (price, health, freshness, damages etc.) <input type="checkbox"/> Would you be interested to buy/use NUS more often or in larger volumes? Yes/no, why? <input type="checkbox"/> How do you perceive the commercialization and use of NUS? <input type="checkbox"/> How do you think it can improve? <input type="checkbox"/> Do you consume other crops similar to NUS? Do you prefer them over NUS? Yes/no, Why? 	<ul style="list-style-type: none"> <input type="checkbox"/> Have you ever heard about NUS? <ul style="list-style-type: none"> <input type="checkbox"/> If the consumer does not know NUS, explain its main properties. Then, ask: given all its properties, would you like to consume it? Yes/no, why? <input type="checkbox"/> If the consumer does know NUS, ask: Where/how do you know about NUS? Why do not you buy NUS? <input type="checkbox"/> What crops similar to NUS do you prefer to buy and consume? Why? <input type="checkbox"/> From which type of vendor do you buy these other crops? At what Price? <input type="checkbox"/> When do you buy these crops? How often do you buy these crops (e.g. once per week)? In what quantities? <input type="checkbox"/> How do you consume these crops? (e.g. type of dishes) <input type="checkbox"/> Do you prefer these crops over NUS? Yes/no, why? <input type="checkbox"/> What do you consider important when you buy these products? (price, health, freshness, damages)

Annex IV. Restaurants

Restaurants located in the markets, traditional restaurants and others that the research team believe use NUS, should be interviewed.

1. Type of restaurant (e.g. located in the market, traditional)
2. When observing your customers; which product attributes are most important for them? (price, flavor, presentation)
3. What standards/quality does your restaurant require from their suppliers (e.g. freshness, prices, chemical use, appreciation of damages, knowledge of origin)?

IF RESTAURANTS BUY NUS	IF RESTAURANTS DO NOT BUY NUS
<ul style="list-style-type: none"> <input type="checkbox"/> What kind of dishes do you prepare with NUS? What prices do they have? Which one is the most demanded? Why? <input type="checkbox"/> Are these dishes in high demand? Yes/no, why? Which one? <input type="checkbox"/> How often do you prepare/sell them? Why? When? <input type="checkbox"/> Why or how did you decide to use NUS in the preparation of your dishes? <input type="checkbox"/> How long have you been using NUS in the preparation of your dishes? <input type="checkbox"/> How did you know about NUS? Where did you learn about it? <input type="checkbox"/> Why did you decided to use NUS in your dishes? <input type="checkbox"/> Where do you buy the NUS your restaurant uses? from what type of vendor do you buy NUS? In what quantities? <input type="checkbox"/> How often do you buy them? At what Price? Do prices change throughout the year? When? Why? 	<ul style="list-style-type: none"> <input type="checkbox"/> Have you ever heard about NUS? <ul style="list-style-type: none"> <input type="checkbox"/> If the interviewee does not know NUS, explain its main properties. Then, ask: given all its properties, would you like to buy them for your restaurant? Yes/no, why? <input type="checkbox"/> If the interviewee does know NUS, ask: where/how do you know about NUS? Why do not you buy NUS for your restaurant? <input type="checkbox"/> What crops similar to NUS do you prefer to buy for your restaurant? Why? <input type="checkbox"/> What other crops similar to NUS do you use to prepare your dishes? Do you prefer these crops over NUS? Yes/no, why? <input type="checkbox"/> What kind of dishes do you prepare with these crops? What prices do they have? Which one is the most demanded? Why? <input type="checkbox"/> Where do you buy these crops? from which type of vendor do you buy them? At what Price? In what quantities? How often? <input type="checkbox"/> Have your consumers ever requested NUS? Yes/no, why? How often?

Annex V. Knowledgeable experts

Name of organization: _____ No: _____ Date: _____






1. What are the main activities your institution and you perform?
2. What crops does your institution and you work with or have worked with?

KNOWLEDGE ABOUT NUS

- Have you worked with NUS?
 - If he/she has not, ask: why? What kind of knowledge do you have about NUS? How did you have access to it?
 - If he/she has: What kind of work do you do (have you done) with NUS? How long have you been working with it?
 - Do you consider that NUS is an important crop? Yes/no, why?
 - In what regions of the country is NUS produced? What indigenous groups produce it?
 - What varieties of NUS are produced in the country? In what regions? Why is there this difference?
 - Where is the highest production and consumption of NUS in the country? Why in those areas?
 - Do you know what kind of volume is produced and traded? Where? What prices are obtained?
 - How do you perceive the production, marketing and consumption of NUS in the country? (strengths, weaknesses, threats, opportunities, business situation, role changes).
 - If NUS has so many benefits (e.g. nutritious), why do you think its production and consumption is not higher?
 - What do you think needs to happen to increase NUS production, marketing and consumption?
 - Which interventions can really make a change in the NUS-VC context?
 - Is there market potential for growth for NUS? Yes/no, why? Where?
 - Do you know if NUS is produced and consumed in other countries? If yes, where? What regions?
 - Can you recommend other people who work and know about NUS?
-



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
www.ifad.org

-  facebook.com/ifad
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