Briefing note

Evidences on the use of Neglected and Underutilized Species (NUS) to cope with food scarcity and climate change in the Peruvian Andes

SOWING DIVERSITY= HARVESTING SECURITY

Asociación ANDES
ASOCIACIÓN PARA LA NATURALEZA Y EL DESARROLLO SOSTENIBLE

Oxfam Novib

Contents

Challenges of Climate change in the Andes

Smallholder farmers' food and seed systems in the Peruvian Andes confront a double challenge: on one hand climate change with its increasing temperatures, changing rainfall patterns and increases in frequency of extreme events and on the other hand, socioeconomic and political drivers, particularly extractive industries (e.g. mining), agro-industry, and land grabbing. Both have increased habitat destruction and fragmentation, biodiversity loss and genetic erosion of important food crops. This trend is compounded by the globalization of market forces, the promotion of industrial agriculture, migration, seed policy, and cultural change. Against this backdrop, the current agricultural policy on small farmers promotes the transformation of the traditional and diverse smallholder seed and food systems into systems dependent on corporate seed and chemical inputs and mechanization, endangering the food security and wellbeing of millions of marginalized indigenous small farmers.

This challenge is particularly acute in the Cusco region, a center of origin of important Andean food crops and an agro-biodiversity hotspot with a highly diverse food system and rich traditional knowledge; thus, a region of high conservation value for both wild and domesticated species and for its vibrant smallholder seed and food systems. The latter is critical for global food security as the large crop diversity maintained by local farmers contributes to sustaining the capacity of global agricultural and food systems. However, maintaining large crop diversity on-farm entails important costs to farmers, who have almost no official support and increasingly face strong incentives to abandon this diversity.

In this context, the Neglected and Underutilized Species (NUS) present high potentialities in terms of nutrition and adaptation to climate change. Smallholder farmers, especially women used to be the guardians of the traditional knowledge on the conservation and use of these species which used to be especially relevant during food scarcity periods. Global change is exerting direct pressures on these species. The substitution of traditional varieties of staple crops with commercial varieties and its effects on the dietary patterns (decrease of NUS consumption), the intensification of cattle practices on the NUS growing areas and changes on the local climatic conditions are threatening their conservation and use. Promoting innovative and gender-based nutrition programs including NUS and basing them on the Andean traditional reciprocity food strategies enables women empowerment to cope with food scarcity periods, adapt to climate change and enhance resilient and adaptive local food systems.

The CBD agenda on agrobiodiversity, climate change, traditional knowledge and gender

The project's framework is the CBD program of work on agricultural biodiversity (COP 5 decision V/5, annex) that recognizes the contribution of farmers, indigenous, local communities and women to the conservation and sustainable use of agricultural biodiversity. It emphasizes the importance of agricultural biodiversity to their livelihoods. This program aims to promote the positive effects and mitigate the negative impacts of agricultural systems and practices on biological diversity in agro-ecosystems and their interface with other ecosystems; and promote the conservation and sustainable use of genetic resources of actual and potential value for food and agriculture.

In implementing the program of work, the ecosystem approach adopted under the Convention on Biological Diversity has to be applied. The application of this approach implies decentralization of management to the lowest level appropriate, equitable distribution of benefits, protection of customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements (Article 10c of the Convention), and the use of adaptive management policies that can deal with uncertainties and are modified in the light of experience and changing conditions. The implementation processes builds upon the knowledge, innovations and practices of local communities and thus complement the Article 8(j) of the Convention. A multi-disciplinary approach taking into account scientific and local knowledge

has been used. As the CBD program of work on agricultural biodiversity, the project addresses the following four elements:

Trends	• Assessing the status and trends of the world's agricultural biodiversity, the underlying causes of change, and knowledge of management practices
Adaptive management	• Identifying adaptive management techniques, practices and policies
Capacities	• Building capacity, increasing awareness and promoting responsible action; and
Policies mainstreaming	• mainstreaming national plans and strategies for the conservation and sustainable use of agricultural biodiversity into relevant agriculture sectors.

The CBD acknowledges that exposing and understanding the gender-differentiated biodiversity practices and knowledge of women and men enhances biodiversity conservation. Research has proven that the negatives impacts of genetic erosion affect specially women who depend on genetic diversity for their livelihoods. Due to modern technologies and changes in perceptions, women have lost their influence over production they traditionally controlled. It recognizes that a women empowerment approach should be included into the outlook and approach to reversing biodiversity loss, reducing poverty and improving human wellbeing (2015-2020 Gender Plan of Action of the CBD).

The project "Sowing diversity= Harvesting Security. Nutrition, coping strategies, knowledge and use of neglected and underutilized species" and the baseline purpose

The project "Sowing diversity= Harvesting Security. Nutrition, coping strategies, knowledge and use of neglected and underutilized species" (SD=HS) aims to uphold, strengthen and mainstream the rights and technical capacities of indigenous peoples and smallholder farmers, and to influence local to global policies and institutions on the sustainable use of plant genetic resources for food security and nutrition under the conditions of climate change. The objective is to help link diverse realities on the ground and feed this information into complex national and global policy processes.

One of its objectives, related to Pillar 3, is to empower women to reclaim their right and role in food security through strengthening their capacity in seeds management and nutrition and in global policy engagement. It is expected that the project, through this pillar, will allow: 1) the women farmers empowerment to enhance their knowledge, access and use of biodiverse sources of nutrition, contributing to build stronger seed systems of important nutritional crops such as the Neglected and Underutilized Species (NUS), 2) the sharing of their acquired knowledge and innovative strategies on biodiverse nutrition concepts and tools with other communities and 3) the contribution of their knowledge and experiences to the international awareness of biodiversity based diets, and their participation in policy dialogues to claim the right to food.

This briefing note[1] assesses the role of Neglected and Underutilized Species (NUS) to with climatic and market stresses and shocks and in the Andean valley of Lares (Peru) through a gender and ecosystem approach[2]. It analyses the contribution of NUS in the food security strategies of households and their dietary diversity, describing how these species contribute to reduce social vulnerability. The evidences provided allow improving the relevance and effectiveness of gender-based nutrition programmes comprising NUS while informing public policies on biodiversity conservation, climate change adaptation and agri-food systems.

[1] This briefing note summarizes the results of the baseline research undertaken between February and November 2016.

Asociacion ANDES, 2016. Nutrition, Coping Strategies, Knowledge and Use of Neglected and Underutilized Species. Baseline study. Peru.

[2] See the Methodology and tools section.

Lares[1]

98%
Population working in agriculture.

89.2%
Households under extreme poverty line

73.8%
Children chronic malnutrition

1.5 hectares
Average farm plot size

Findings

Diversified agro-ecosystems and NUS conservation enable a higher household dietary diversity

The research shows that the household dietary diversity (HDDS) is higher in the communities with a more diversified agro-ecosystem.

These communities are located in the middle altitudinal range of the valley, where the favorable climate conditions and the higher soils fertility support a more diversified ecosystem (native forest and shrub ecosystem combined with crops). This enables a higher diversity of wild NUS and a wider food crop diversification (legumes such as beans, peas and andean grains such as *quinoa* and *kiwicha*; cereals such as corn and barley; and vegetables). Cattle and other small animals (guinea pigs, chickens, pigs, ducks) are bred here. Communities in the highest altitudinal range are located in a less diversified ecosystem (mainly native grass system that feed camelids and sheep's cattle) supporting a lower crop (mainly roots and tubers) and NUS diversity.

After the dry season, the number of neglected and underutilized species in the middle altitudinal range of the valley is twice the number of these species in the higher parts of the valley (Figure 1). Less species grow in the lower and higher communities. In this agro-ecological zone, the species variability between food abundance and scarcity periods is higher than in the puna zone. Looking at their uses, most of them concern children nutrition and their growth, being specifically valued for their high protein and vitamin content.

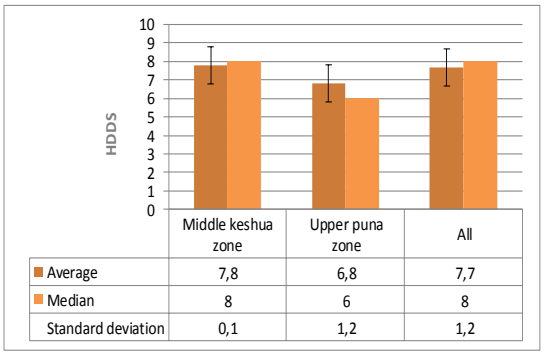
Figure 1. Average number of Neglected and underutilized species collected per community, 2016

[1] Source: 2014. INEI. Encuesta demográfica y de salud familiar. Departamento de Cusco. Peru.

The agro-ecosystem diversification enables a higher household dietary diversity (Figure 2). Most households have had a Vitamin A intake in the 24 hours preceding the survey (Figure 3). The most part of this intake came from vitamin A rich tubers and vegetables and less from milk and eggs. The consumption of green leafy vegetables is very low, and there is a low consumption of Vitamin A rich fruits. Protein intake from animal sources is also low. However, protein intake from food plant is higher as there is a high consumption of legumes, especially fava beans. Food diversity of the households with the highest HDDS is related to their capacities to cultivate (availability of land, capacities and knowledge) but also to their participation in reciprocity practices exchanging work, food and other resources at the household, community and regional scale. These practices, which constitute part of the social capital of the livelihoods, are stronger in the households presenting a high dietary diversity.

Figure 2. Households dietary diversity score, 2016

During food scarcity periods



During food abundance periods

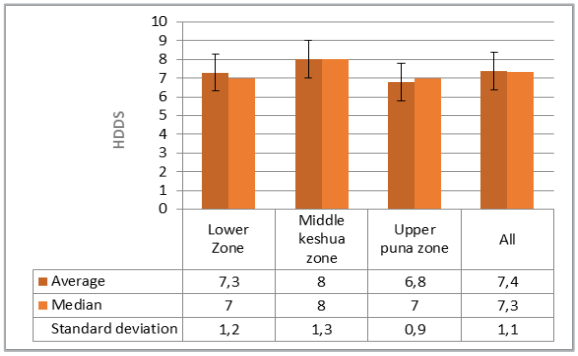
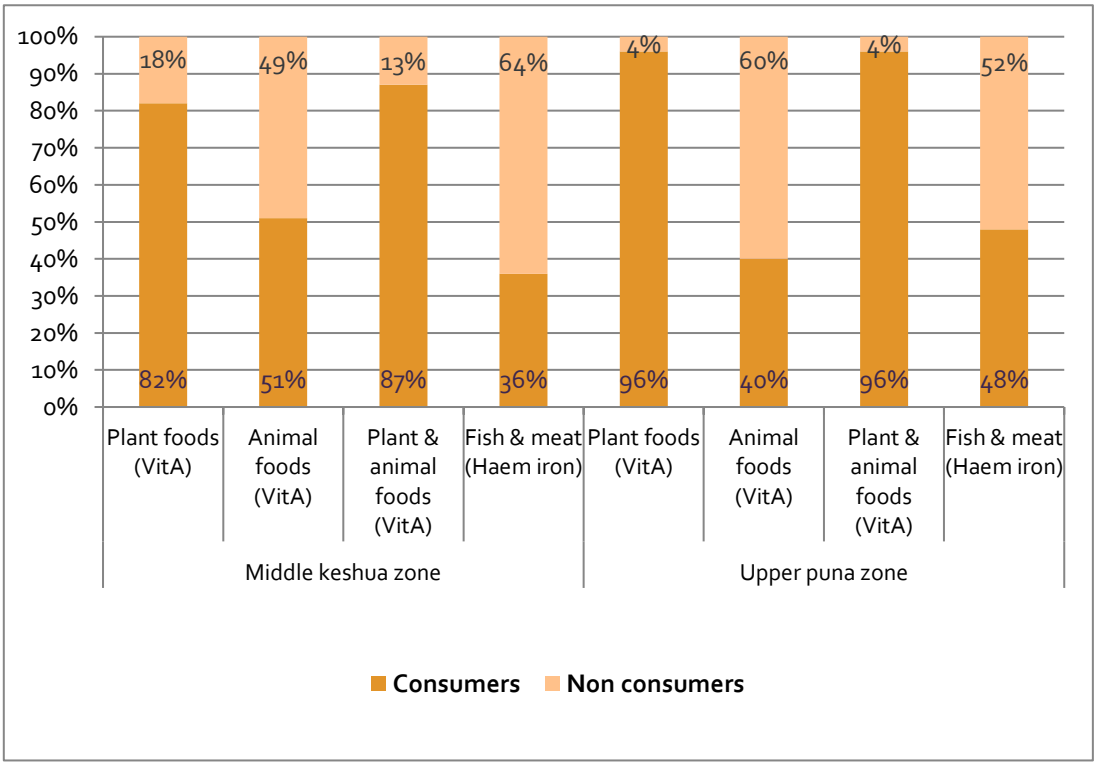


Figure 3. Households consuming foods rich in VitA in scarcity periods (% of surveyed HH), 2016

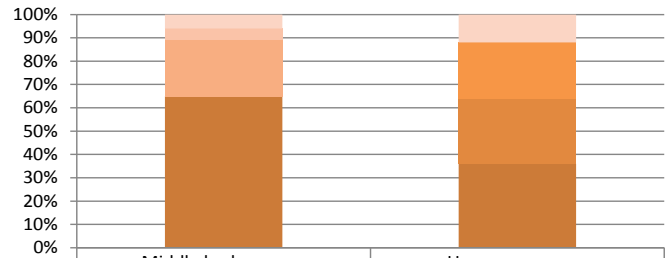


Climate change, market pressures and land use intensification exert acute stresses on the remote communities' agro-ecosystems increasing the sensitivity of vulnerable people to food scarcity and the NUS erosion.

The food scarcity frequency at the household level is higher in the communities located in the altitudes, where the agro-ecosystem is less diversified (Figure 4). Participants reported that the food scarcity frequency has increased in the last years despite there is a main food scarcity period corresponding to the season before crops harvesting. The production of food for self-consumption has been affected by the substitution of traditional varieties by market varieties that are more sensitive to the volatility of the seeds and inputs market prices; but also by extreme weather phenomena related to climate change that have exerted acute impacts on the ecosystems. In the higher communities the food scarcity affects all the households reducing their food intake, while in the communities of the mid altitudinal range, food stress is mainly absorbed by adults (both men and women).

The research results show how the NUS conservation areas are threatened by the climatic conditions change (Figure 5). Figure 1 point out that the share of NUS species that have been extinct is higher in the communities located in the altitudes. Additionally, as these species are less used, the traditional knowledge associated is lost; entailing that more NUS are becoming unknown for the younger generations.

Figure 4. Food scarcity frequency during the last year (% of households reporting each item), 2016



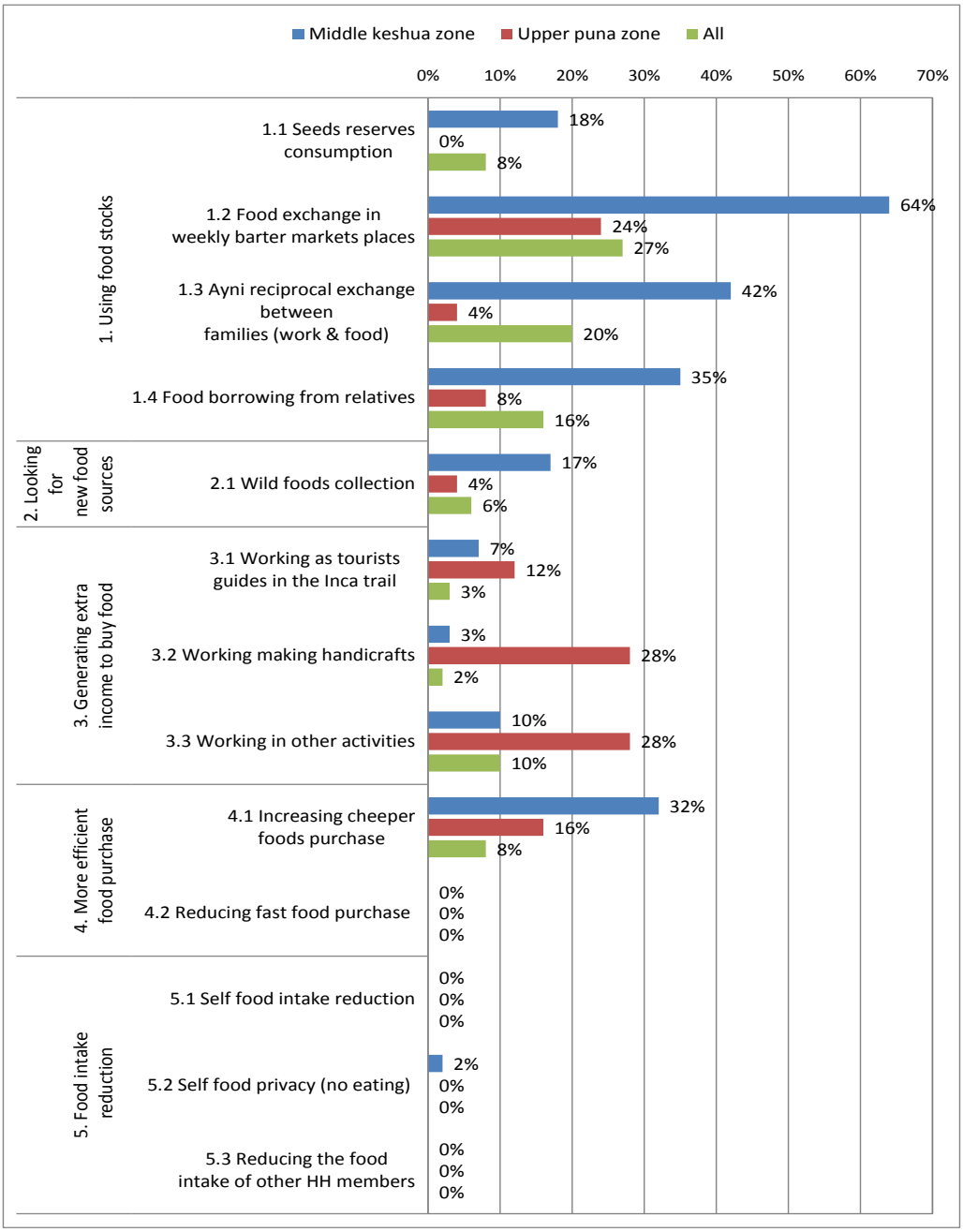
	Middle keshua zone	Upper puna zone
Six	6%	12%
Five	5%	0%
Four	24%	0%
Three	0%	24%
Two	0%	28%
One	65%	36%
Never	0%	0%

Figure 5. Trends affecting the conservation of NUS in Lares. 2016

	Middle keshua zone	Upper puna zone
Negative drivers		
Availability		
Scarcity by land uses changes (cattle pasturage in growing areas)	Yes	--
Scarcity by climate changes (increase of extreme temperatures)	Yes	Yes
Extinction of some species	Yes	Yes
Time allocation		
Longer distances to collect them	Yes	Yes
Use and knowledge		
Less use of NUS (medicinal and nutritional uses)	Yes	Yes
Loss of knowledge on their use and collection	Yes	Yes
Opportunities		
Emerging local interest for their nutritional and medicinal benefits	Yes	Yes
Elder people gathering local knowledge on their collection and use are alive	Yes	Yes

Households have been able to protect their assets and adapt to the stresses and shocks exerted by climate change and the market pressures by means of basing their food procurement strategies in the social reciprocity and the altitudinal productive complementarity (Figure 6). Local complementarity and exchange practices such as *ayni*, *minka* or the participation to the *chalayplasa* (barter food marketplaces) still being practiced and strongly linked to the andean traditional well-being concept *sumaq kawsay* (which means good living in kechua) in which the holly, the ecosystem services and the human dimensions are interlinked. Another important coping strategy is wild food collection (Figure 6), which is practiced in food scarcity periods by more than 80% of the households. The wild plants collected (NUS), which may also be exchanged in the barter markets, have a high nutritional content. Women are the

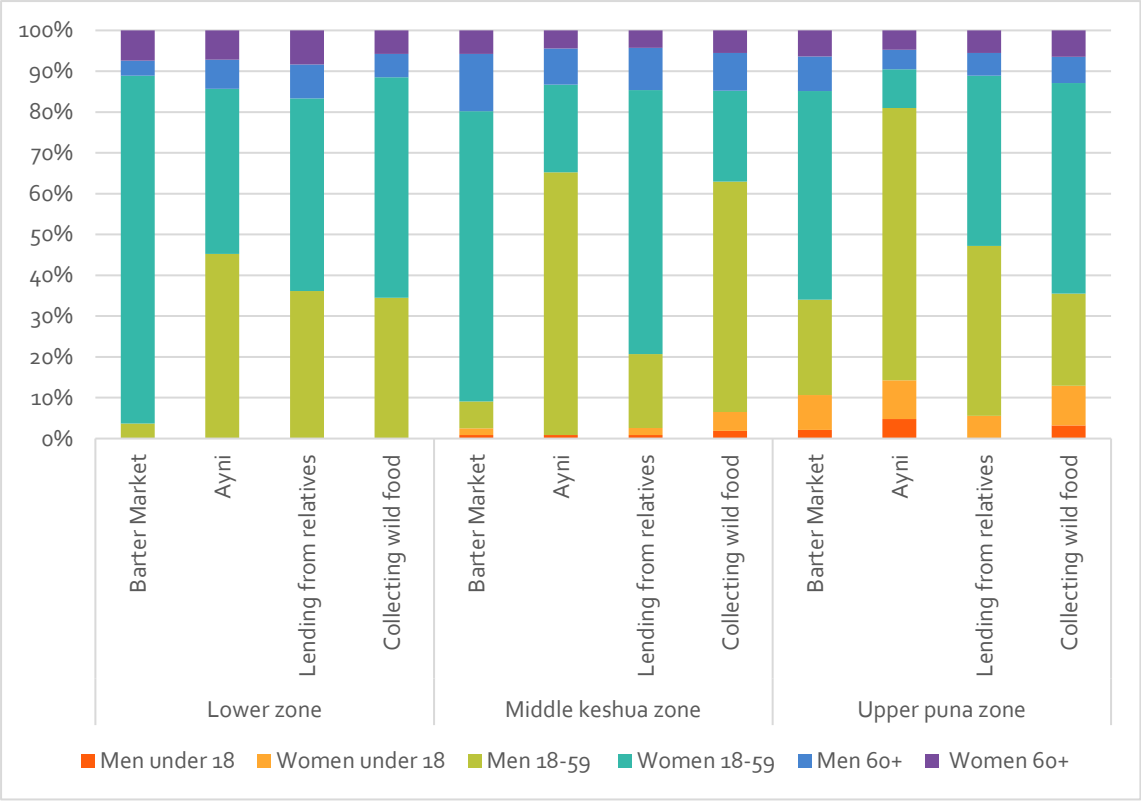
Figure 6. Main households coping strategy during food scarcity periods*



*Expressed as % of households that have reported each item

Chalayplasas (barter markets) take place once a week allowing social and productive complementarities between communities of the different altitudinal ranges. Women are the main households' members participating in these markets (Figure 7). One of the main effects of this economic integration network is the improvement of the households' diets through the intake of foods (wild and cultivated) from other communities.

Figure 7. Household members participating in coping strategies in the food abundance period



Women may generate adaptive and innovative responses that enhance the resilience of the local food systems through NUS conservation practices

Despite women have lower rates of education and literacy than men; they have a strategic role in the local food systems as they undertake both food production and provision activities (farming, trade and barter). In the highest communities, women vulnerability is higher than in the communities located in the middle altitude of the valley. The research shows that their educational attainment, access to health services and formal power (being recognized as household heads) are lower (Figures 8 and 9). However, women in both altitudinal zones (puna and keshua) hold a wide knowledge on the effects and systemic underlying causes of malnutrition (Figures 10 and 11).

Figure 8. Head of Households by gender and agro-ecological zone

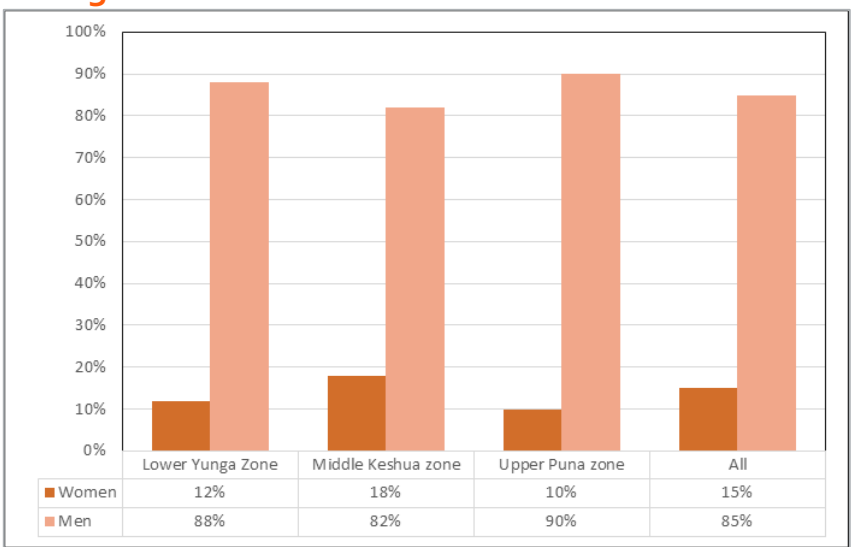


Figure 9. Education attainment of the households' heads

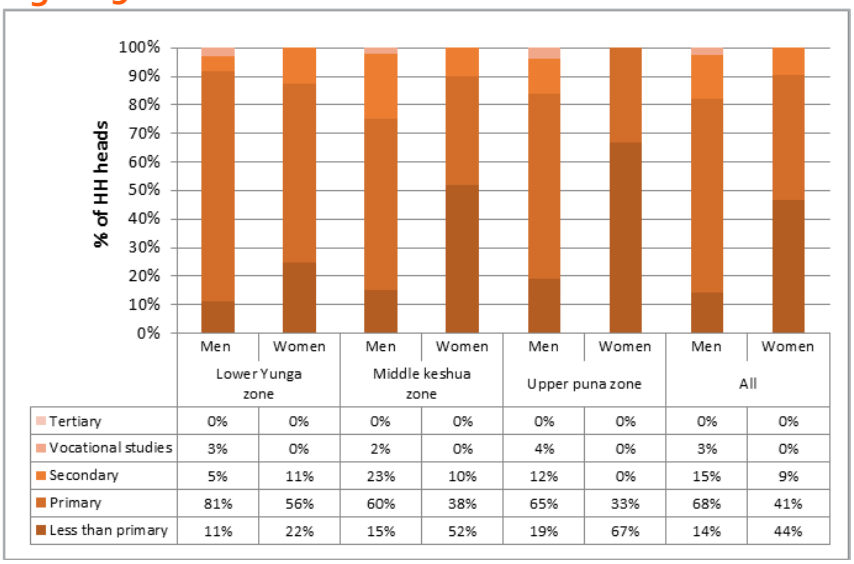


Figure 10. Perceived effects of malnutrition *

Puna zone	Keshua zone
Acute undernutrition (kwashorkior)	Acute undernutrition (kwashorkior)
Death	Constant sickness
Leanness	Death
Over-weight	Diarrhea
Stunted	Drieness of the body
Sickness	Lack of attention
Sickness (measles outbreak)	Leanness
Sickness from worms	Poor development
Sleepiness	Poor performance at school
Tiredness	Poor performance at work
undernirshment	Sadness
	Sleepiness
	Tiredness
	Thirst

Figure 11. Perceived underlying causes of malnutrition *

Categories	Puna zone	Keshua zone
Climate Change		Diseases in cultivars
		Diseases in animals
		Plagues and diseases in cultivars
Lack of education	Lack of time to cook	Lack of information on wild foods
	Lack of information	Increase of junk food
	Increase of Junk food	Lack of information adressed to women
Lack of public services	Lack of training for women on hygiene	Lack of information on hygiene
	Lack of health infrastructure	Lack of government help
Loss of traditionnal knowledge	Lack of consumption of local wild foods	
Pollution of the environment	Chemical inputs in agriculture	Water contamination
	Loss of diversity esp. Wild plants	Pollution from industries
	Littering	Littering
	Burning litter	Burning litter
	Diseases in cultivars	Animal feaces
		Wild fires
Population flows		Conflict in an expending community
		Migration/ immigration
Poverty	Lack of economic resources	Lack of economic resources
		Unemployment
		Distance to main cities
		Abandon of agriculture

*The frequency of items in orange during the workshops has been higher.

Additionally women have a prominent role in the strategies to cope food scarcity, and especially in the NUS management. Knowledge on NUS is traditionally held by women (especially illiterate elder women). They collect these wild species during their pastoralist activities further away from the villages, where most of them are located. Traditional knowledge and cultural values play an important role in this practice. Elder women undertake rituals when collecting NUS as they consider them sacred foods provided by the *Pachamama* (mother earth). Their sacredness and scarcity has kept off their monetary trading. Despite elder women keep traditional knowledge on NUS, adult and young women show a growing interest in their collection and uses.

Policy recommendations

The evidences generated point out the vulnerability of the households of the Lares valley to the food scarcity stress generated by market trends and climatic change. The underlying causes of malnutrition in the participant communities are systemic, including environmental and productive stresses that brings agrobiodiversity loss, intensive subsistence practices, new food patterns, knowledge and know-how lost and lack of collective learning opportunities. Understanding the gender-differentiated food systems and agro-biodiversity practices of women and men has allowed understanding their specific contribution to the NUS conservation.

The local concept of well-being still links to the traditional Andean concept of *sumaq kawsay* in which the holly, the ecosystem services' and the human dimensions are integrated by means of the social reciprocity strategies along the altitudinal agro-ecological complementarities.

Households' heads and women identified new opportunities to develop adaptive strategies to face the identified stresses and shocks, by means of NUS conservation and complementary strategies oriented to address the underlying causes of malnutrition; i.e, loss of agro-biodiversity, loss of traditional knowledge concerning wild foods, women vulnerability increase, nutritional patterns change and others. The establishment of future collaborative strategies to enhance the use and conservation of NUS for nutrition purposes requires partnerships bringing together the individual and institutional know-how required to increase the impacts of the collective efforts.

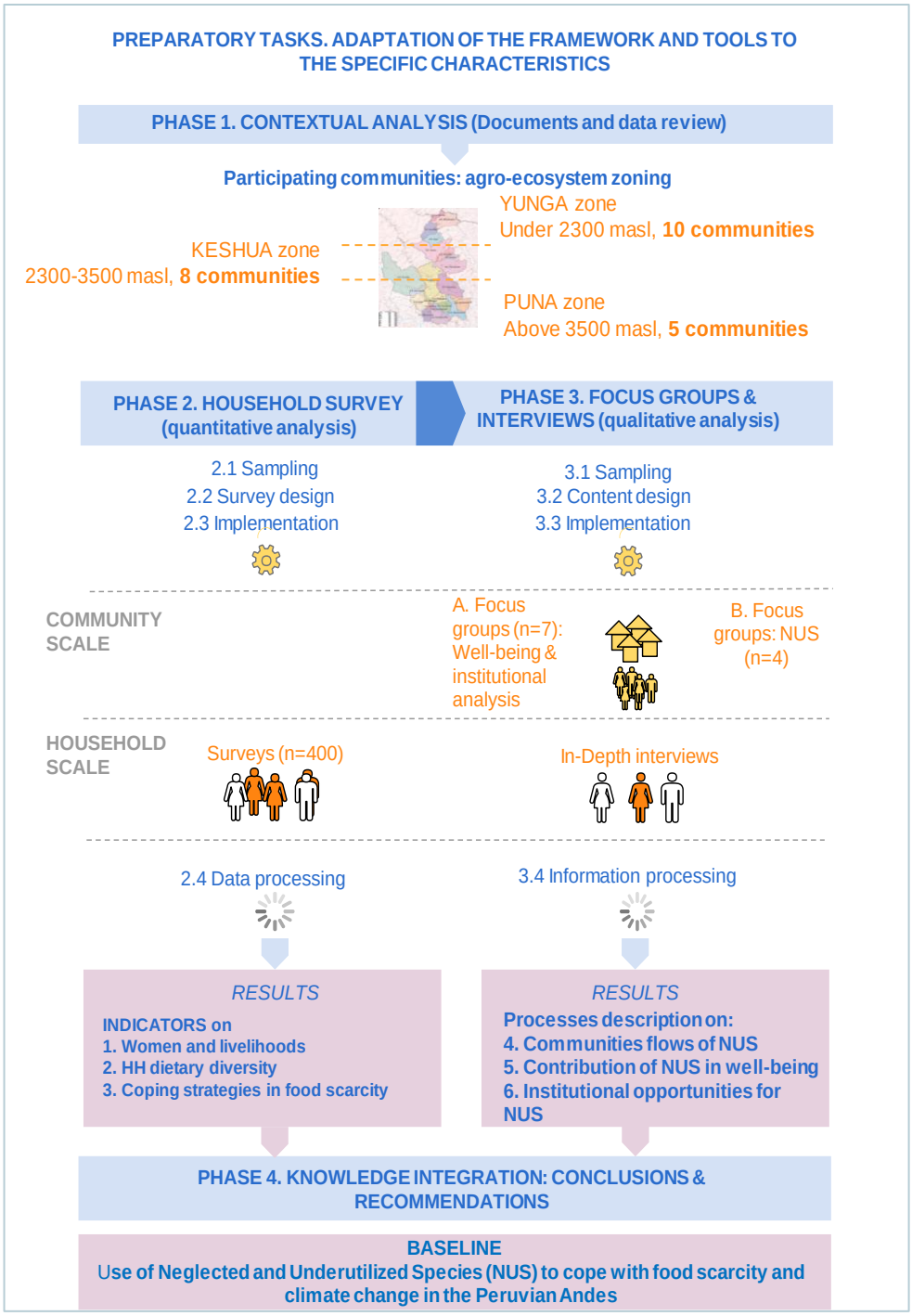
Following the CBD programme of work on agricultural biodiversity, it is necessary to maintain the multi-disciplinary approach used in this baseline, integrating scientific and local knowledge to generated significant learnings along the process. This will enable a biodiversity conservation strategy building upon the knowledge, innovations and practices of local communities and thus complementing the Article 8(j) of the Convention.

RECOMMENDATIONS FROM THE BASELINE RESEARCH:

a) To promote a local policy protecting the economic strategies/ practices (such as barter markets) which are based on the traditional solidarity and reciprocal principles, reinforcing the women's role in food and nutrition security.
b) To co-create an exchange space to empower the communities, and women specially, enabling to raise their voice to local, regional and global processes (i.e, Farmers Field School platform)
c) To facilitate community-based initiatives to promote the use of NUS for nutrition purposes (i.e, photos exhibits).
d) To build, following a gender approach, women's capacities on production, conservation and knowledge management of NUS plant species within the framework of the Farmers Fields Schools.
e) To continue the horizontal learning process inviting experts from other communities (eg. Potato Park) on NUS conservation and nutritional uses.
f) To maintain the capacity building process of the local technicians team allowing the improvement of their analytical skills within the project.
g) To undertake trainings sessions on NUS within the Farmers Fields Schools.
h) To undertake training sessions on NUS with local staff from the public education and health services.
i) To design nutrition guidelines on NUS for women.

ANNEX 1. METHODOLOGY OUTLOOK

The research included the 13 farming communities of the district of Lares for the scarcity period and 23 farming communities for the abundance period. The district of Lares comprises a wide range of altitudes from 2,000 masl to 4,500 masl. The existence of three main agro-ecological areas (puna, keshua and yunga) has required following an ecosystem approach and structure the analysis in these three areas. The research process and methodological tools has been the following:



Find out more at:

Asociación ANDES