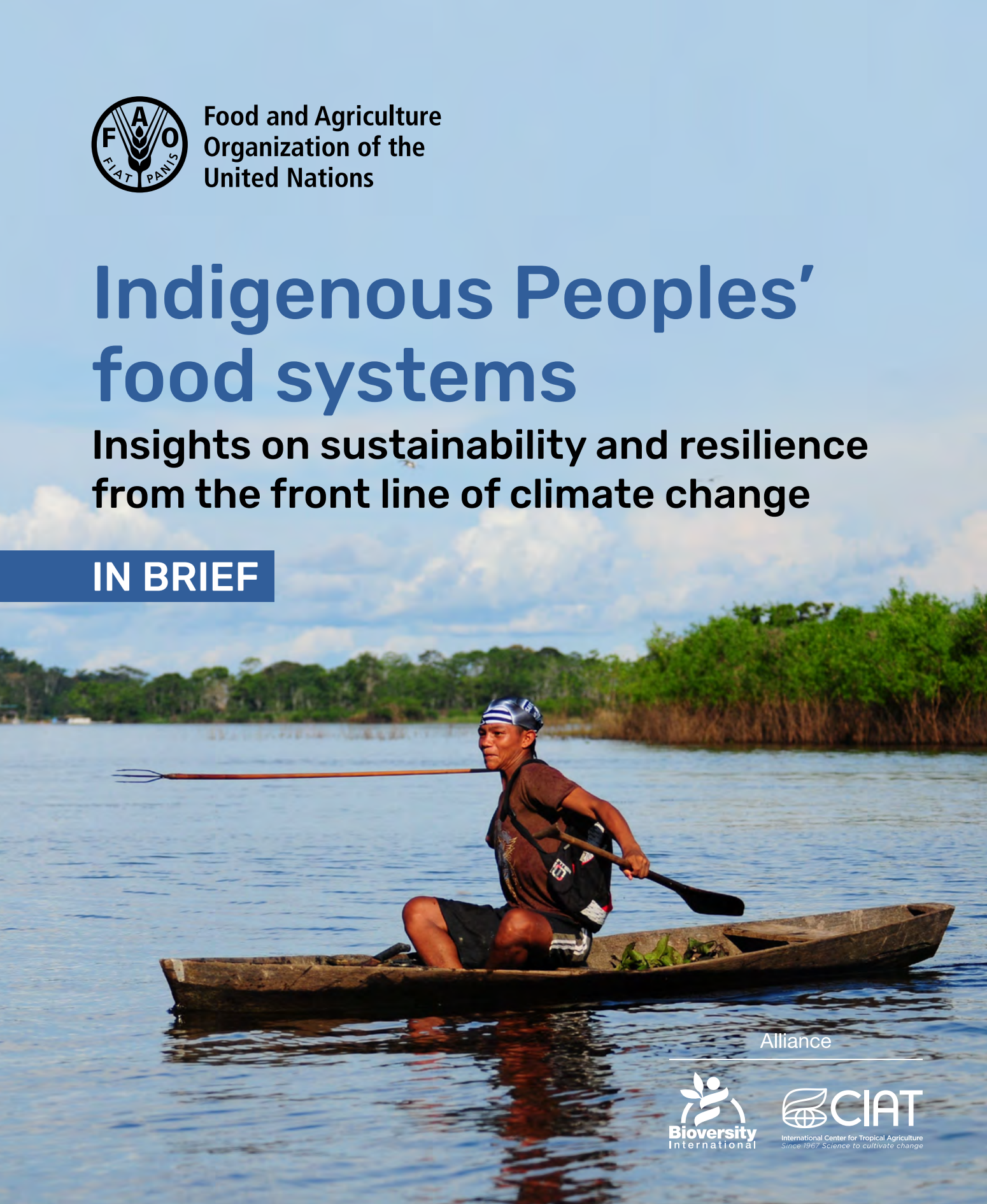
Food and Agriculture Organization of the United Nations

Indigenous Peoples' food systems

Insights on sustainability and resilience from the front line of climate change

IN BRIEF



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Bioversity International

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International Center for Tropical Agriculture
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Indigenous Peoples' food systems

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IN BRIEF

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Cover photo: Community member of the Tikuna-Cocama-Yagua reserve fishing on Lagos de Tarapoto Wetland Complex in Puerto Nariño, Colombia.

CONTENTS

KEY MESSAGES ORGANIZED AS PER THE FIVE FAO PRINCIPLES OF SUSTAINABLE FOOD SYSTEMS[1]

1. Indigenous Peoples' food systems have been providing food, livelihoods and well-being to Indigenous Peoples for centuries

Indigenous Peoples' food systems are multifunctional; generating food, medicines, shelter and energy, while supporting culture, social and spiritual manifestations. This multifunctionality is rooted in understanding and engagement with the food systems in their totality, giving special attention to the relationships between the different elements in the ecosystem. Those relationships are based on reciprocity, respect, and understood through the observation of the natural cycles.

Mobile and semi-mobile practices, such as gathering, hunting, fishing and farming are integral to Indigenous Peoples' food systems. Such activities are dependent upon their collective rights and access to communal resources including lakes, lands, forests and seas. Revitalizing and protecting this mobility is fundamental.

Indigenous Peoples' food systems are changing at an unprecedented rate. A major threat comes from external actors encroaching upon Indigenous Peoples' territories and reducing their lands' size. Markets are also one of the largest factors transforming them. The increasing monetization is leading many Indigenous communities to move away from barter, food sharing and communal works as traditional forms of solidarity and reciprocity. Engaging with the cash economy enables communities to access additional sources of food, inputs for food generation and health services. However, this tendency has also been seen to weaken sustainability and resilience of traditional practices of resource sharing and weaken ancestral forms of social cohesion.

Traditional foods are still preferred in the communities compared to highly processed and imported commercial foods. This preference ensures the maintenance of the genetic diversity of traditional seed varieties, as well as wild and semi-domesticated edible species. Therefore, knowledge on food composition is also fundamental to improve Indigenous Peoples' food and nutrition security and design policies to protect key foods that are being abandoned.

2. Indigenous Peoples' food systems rely primarily on renewable energy and resources within their territories

Indigenous Peoples' food systems maximize innate energy. With sunlight, water, fire, wind

[1] FAO. 2014. Building a Common Vision for Sustainable Food and Agriculture: Principles and Approaches. Rome, FAO. (also available at http://www.fao.org/3/i3940e/i3940e.pdf).

and other renewable energies, Indigenous Peoples process, build and consume the acquired natural materials and food items. Until recently, waste was an unknown concept in their systems. Indigenous Peoples have practices to use and regenerate resources efficiently, whilst effectively reintegrating waste materials.

External inputs are also increasingly required. In the Indigenous Peoples' food systems observed, dependency on fossil fuels increases exponentially for mobility (transport by boat, car) and cooking (gas stoves). There are good examples of solar panels for boreholes, home appliances and small hydroelectric schemes.

3. Indigenous Peoples have been conserving, protecting and enhancing biodiversity and natural resources for thousands of years

Currently, 80 percent of the world's remaining terrestrial biodiversity is located in Indigenous Peoples' territories, an undeniable testament of their ability to generate food whilst preserving and enhancing biodiversity. This highlights two important considerations:

• **Indigenous Peoples' approaches to conservation is key.** Indigenous Peoples conserve biodiversity through ancestral practices emanating from traditional knowledge passed on orally from generation to generation. They recognize the interdependent health of the food system, the local ecosystem and humans.

• **Indigenous Peoples depend on intact biodiversity for food security and nutritional diversity.** In particular, shifting cultivation within Indigenous Peoples' territories is crucial to ensure the preservation of the environment and biodiversity whilst also generating diverse food sources.

The loss of biodiversity in Indigenous Peoples' territories can be attributed to multiple factors, both human-induced and climate change. The economic drivers of globalization promote unsustainable practices and demands that exhaust environmental resources. In addition in the last 40-50 years, obstacles and rules against shifting practices have increased exponentially, diminishing Indigenous Peoples' food security and surrounding biodiversity. Finally, despite the wide scientific recognition, many Indigenous Peoples subjected to environmental protection laws and natural protected areas have experienced restrictions to their livelihoods.

4. Indigenous Peoples' governance mechanisms are integral to their home territories and livelihoods

The governance systems, cultures, languages, beliefs and cosmogonies in Indigenous Peoples' food systems are embedded in their connection with nature. The respect for elders and their leadership, generational transmission of traditional knowledge and their collective rights are pillars of their complex governance systems. The core values of solidarity, reciprocity and communal works serve to inform their societal organization and leadership. Conflicts are commonly resolved within the community as per widely understood and followed unwritten codes of conduct.

The lack of recognition of Indigenous Peoples is a direct threat to their rights, in particular their rights to land, natural resources and self-determination as per the widely adopted United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) in 2007, as well as their access to basic public services.

Indigenous governance practices should be recognized and strengthened at all levels. Indigenous Peoples have developed safety nets and solidarity mechanisms based on social organization and customary governance systems that they mobilize especially during times of food scarcity. Their traditional governance institutions strengthen social cohesion through collective decision-making processes.

Development programmes do not work without free, prior and informed consent

(FPIC). Positive impacts are more significant when the community is part of the initiative or consulted before the intervention. Whenever programmes, initiatives and social protection schemes were introduced in the communities without consultation, it resulted in a low level of success, sometimes creating new challenges for the communities. Given this, and considering that their approaches to conservation are key, natural resource management decisions and conservation strategies need to involve Indigenous Peoples following the principle of FPIC.

Indigenous languages must be sustained. About 4 000 of approximately 6 700 languages currently spoken in the world are Indigenous languages. Orality remains the predominent form of transmission of traditional knowledge. When an Indigenous language starts to deteriorate, so does the traditional knowledge of the community, resulting in community members forgetting the names of plants, herbs and practices. This can lead to Indigenous Peoples' food systems and associated territorial management practices vanishing.

Intercultural education is fundamental for Indigenous youth in academic curricula and in feeding programmes to preserve Indigenous Peoples' languages, food systems, nutritional health, cultural identities and traditional knowledge. In the majority of cases, schooling has had a detrimental impact on Indigenous Peoples' customary systems and transmission of traditional knowledge, further transforming prospects, roles, tastes, traditional knowledge and belief systems.

5. Indigenous Peoples and their food systems have prevailed for thousands of years, adapting to changes and developing new practices and techniques

Indigenous Peoples' beliefs, cosmogonies, value systems and principles constitute core elements of their cultural resiliency. Rather than exhaust the environment for their needs, Indigenous Peoples adapt their food generation and production to the seasonality and natural cycles observed in their surrounding ecosystems.

Climate change and natural disasters are negatively impacting Indigenous Peoples and their food systems. Despite their cultural resiliency, Indigenous Peoples' food systems are increasingly vulnerable to climate change. Historically, their food systems were resilient by aligning with the cycles of natural resources. As these cycles are disrupted by climate change, so too are their food systems and food security.

Indigenous Peoples are custodians of intergenerational traditional knowledge and their cultures depend on its preservation and transmission. Indigenous Peoples hold unique and rich traditional knowledge on local resources that support the communities' resilience and adaptive capacity. In particular, Indigenous women not only play a key role in Indigenous Peoples' food systems, they are also guardians of ancestral, dynamic and specific traditional knowledge that they, along with the elders, transmit to younger generations.

FOREWORD

Climate change has been an ongoing struggle for Indigenous Peoples. It is not a challenge that we are awaiting the consequences of, but one we are currently facing and have been facing every day. I come from a Sámi people fishing community in northern Finland. We are experiencing first hand the effects of climate change on Indigenous Peoples. Global warming is melting the ice and fish resources are diminishing, which is affecting our food system and, as a result, compromising our livelihoods. Finding solutions to climate change is not just a priority, it is an emergency.

Indigenous Peoples number 476 million persons worldwide, living in more than 90 countries and belonging to 5 000 different peoples and linguistic groups. We are amongst the most culturally diverse and traditionally unique societies on earth because of our rich history, culture, spirituality, unique ancestral links and tremendous traditional knowledge. Our ways of life, cultures and knowledge systems have been passed on for centuries.

Indigenous Peoples are amongst the longest living cultures in the world. Our land and territories are as diverse as our groups. Whilst some Indigenous Peoples live in the Amazon rainforest, others live in the Sahara Desert, and many others live in mountains, in the Arctic or on remote islands. Our territories encompass over a quarter of the world's land surface, and intersect about 35 percent of all terrestrial protected areas and ecologically intact landscapes in the world. We must assert and emphasize that Indigenous territories preserve and sustain 80 percent of the world's remaining biodiversity.

Researchers, academia and the international community have long investigated how and why Indigenous territories are home to the highest percentage of biodiversity on the planet. The answer is simple. It is because of our profound connection to our territories and our traditional knowledge. We have learned to preserve our territories and their natural resource bases and passed this knowledge from parents to children for centuries. Our survival is a testament to Indigenous Peoples' ability to observe, adapt and incorporate traditional knowledge to ever-changing ecosystems, and harmoniously reside within the biological diversity of Mother Earth.

This all-encompassing richness in culture and traditions allows Indigenous Peoples to develop and sustain diverse and unique food systems. From reindeer herding to gathering wild plants and berries, Indigenous Peoples generate and collect food in complex, holistic and resilient ways whilst always respecting the need to preserve the biological diversity that generates and maintains harmony in nature. Eating and feeding but without destroying. Eating and feeding but maintaining biodiversity. Eating and feeding thanks to Mother Earth's generosity that needs to be nurtured, protected and respected. In nature, everything is alive and has an ultimate purpose and reason of being. This purpose, often overlooked in scientific assessments, is unfortunately better grasped when the plant or animal or berry has disappeared, and the balance is gone.

Indigenous Peoples' wisdom, traditional knowledge and ability to adapt provide lessons from which other non-Indigenous societies can learn, especially when designing more sustainable food systems that mitigate climate change and environmental degradation. We are all in a race against time with the speed of events accelerating by the day. It is crucial to recognize Indigenous Peoples as key players in achieving the 2030 Agenda and to create larger spaces for more inclusive dialogues recognising the vast lessons to be learned from them.

Although Indigenous Peoples and their ecological based food systems have adapted and survived for centuries, pressures from extractive industries, intensive agricultural schemes, lack of access to natural resources, increasing environmental degradation, and drastic changes in climatic conditions are posing major threats to our livelihoods. Our food systems are not only relevant to us, but to the global community as well. This is why the global community must listen and join forces with Indigenous Peoples and advocate for the preservation and safeguarding of Indigenous Peoples'

food systems before it is too late and the knowledge we hold, accumulated over hundreds of years, is gone forever.

Many other challenges have the potential to devastate Indigenous Peoples' food systems. These include the migration of Indigenous Peoples away from Indigenous communities to urban centres, and the increased capitalization and monetization of their economies due to their increased connectivity to commercialized societies. Their traditional knowledge is also disappearing at an alarming rate. As Indigenous elders, who preserve and share this knowledge, gradually pass away, much of this traditional knowledge disappears with them.

Indigenous Peoples hold internationally recognized rights for the preservation of their food systems through the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), particularly through the inherent right to self-determination and their right to food. The right to food of Indigenous Peoples was also recognized in the 2004 Voluntary Guidelines on the Right to Food, indicating how these rights are strongly linked to Indigenous Peoples' lands, resources and culture. Therefore, human-rights-based dialogue is necessary to ensure the inclusion of Indigenous Peoples in global debates on ending hunger and ensuring food security for all.

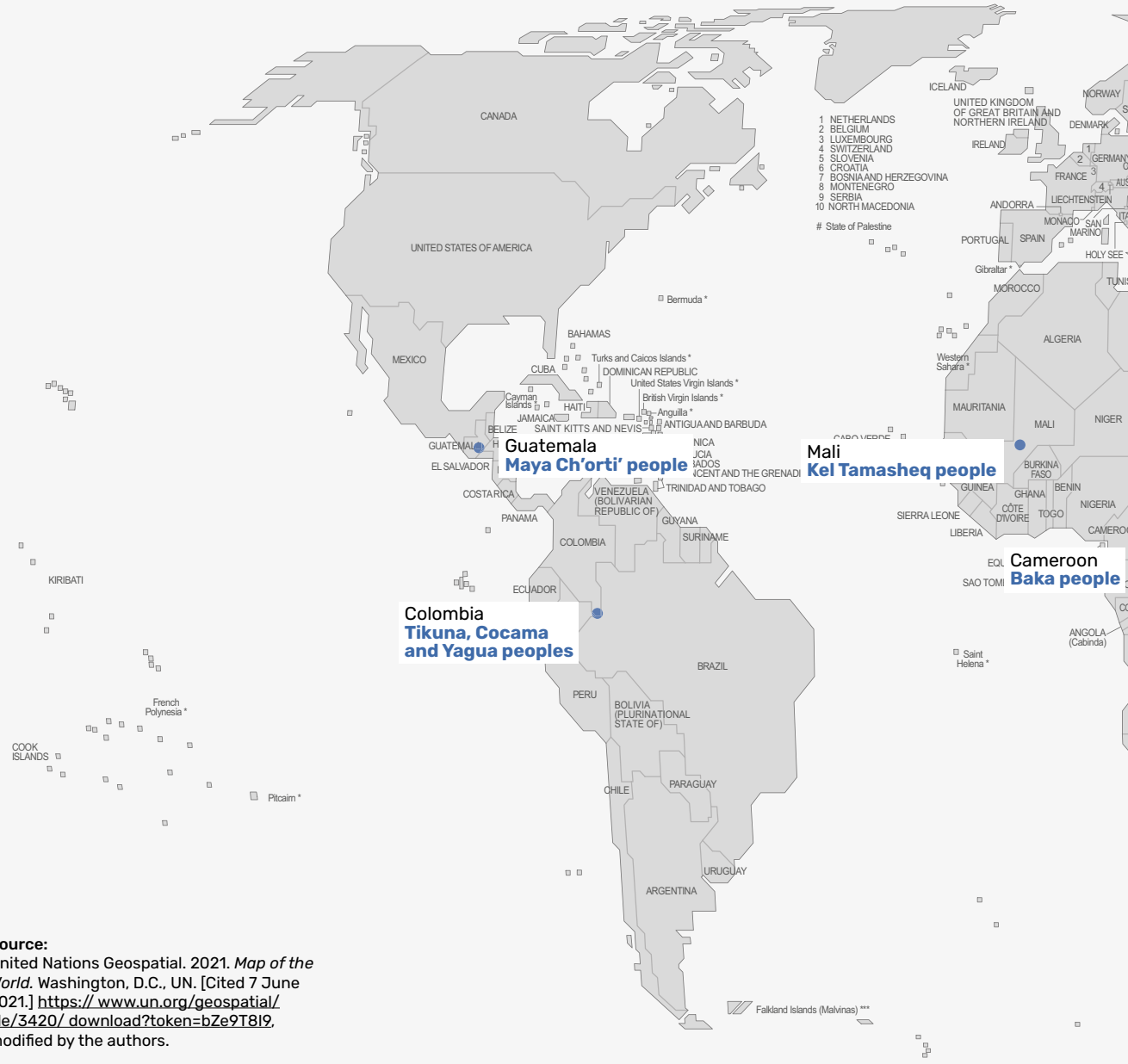
The United Nations Permanent Forum on Indigenous Issues (UNPFII) will take forth this dialogue in upcoming annual sessions. The UNPFII welcomes the recognition of Indigenous Peoples by the Food and Agriculture Organization of the United Nations (FAO) as allies in the fight against malnutrition and food insecurity. We have accompanied FAO in all relevant work for the implementation of its Policy on Indigenous and Tribal Peoples since 2010. The UNPFII also recognizes FAO's relevant work on Indigenous Peoples' food systems, specifically the two key publications that FAO and the Center for Indigenous Peoples' Nutrition and Environment (CINE) at McGill University released in 2009 and 2013. These publications provided much-needed insights into our traditional food systems, their utilization, and changes in the dietary patterns in our communities. In 2018, the High-Level Expert Seminar on Indigenous Food Systems in Rome organized by FAO brought together countries, Indigenous Peoples and academics to share traditional and scientific knowledge to identify research and policy gaps on Indigenous Peoples' food systems.

The UNPFII celebrates and welcomes this current publication, which combines research and case studies that delve into Indigenous Peoples' food systems. This publication is an important step in creating a deeper understanding of Indigenous Peoples' food systems. In this regard, this publication maps eight diverse Indigenous Peoples' food systems, providing insights and details into their unique elements of sustainability and resilience. FAO has conducted this participatory field research in collaboration with the Alliance of Bioversity International and CIAT, engaging with Indigenous Peoples and their communities. I would like to thank all the Indigenous Peoples and members of their communities, as well as the researchers, who have contributed to this work. We hope this publication motivates policymakers to integrate Indigenous Peoples' perspectives in the debates about sustainable food systems. We must align altogether on the path towards a more just and sustainable world, tackling climate change and accelerating solutions to humankind´s greatest challenges.

Anne Nuorgam,
Chair of the United Nations Permanent Forum on Indigenous Issues (UNPFII)

Milpa bordering a diverse multiuse forest in Jocotán.

DRIVERS OF SUSTAINABILITY FOR THE EIGHT INDIGENOUS PEOPLES' FOOD SYSTEMS



Source:
United Nations Geospatial. 2021. *Map of the World.* Washington, D.C., UN. [Cited 7 June 2021.] https:// www.un.org/geospatial/ file/3420/ download?token=bZe9T8I9, modified by the authors.

FIGURE 1. Location of the eight Indigenous Peoples' food systems

*A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas).
** Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.
*** Final boundary between Sudan and South Sudan has not yet been determined.

TABLE 1. Drivers of sustainability identified through the profiling of the eight Indigenous Peoples' food systems

Clusters	Drivers	
	Positive	Negative
Rights to land, territories, natural resources and nomadism	**+ Internal:** Collective rights over communal resources **+ Internal:** Nomadism and mobile livelihoods **+ External:** Involvement of Indigenous Peoples in governmental institutions	**- External:** Lack of security of access to the ancestral territories and use of natural resources
Biodiversity, multifunctionality of the systems, and self-sufficiency	**+ Internal:** Biodiversity conservation as the basis for the food system **+ Internal:** Multifunctionality of the food systems **+ Internal:** Governance informed by ancestral spiritual beliefs and cosmogony embedded in nature **+ Internal:** Food self-sufficiency from territorial management that integrates seasonality **+ Internal:** Low energy dependence from external sources and use of renewable energy	**- External:** Biodiversity reduction from external pressures
Continuity of traditional practices, adaptation and innovation	**+ Internal:** Adaptive capacity to change **+ Internal:** Continuity in the use of traditional practices and techniques **+ Internal:** Preference for traditional foods **+ External:** New techniques and innovations adopted	**- External:** Introduction of new seeds and breeds **- External:** Climate change and natural catastrophes
Governance, Free, Prior and Informed Consent, and development programmes	**+ Internal**: Traditional Indigenous Peoples' governance systems and strong social cohesion **+ External:** Development interventions supporting the communities	**- External:** Development programmes needing consultation and consent **- External:** Expansion of infrastructure bringing external actors
Youth, education systems, interculturality, Indigenous languages and traditional knowledge	**+ Internal**: Indigenous languages essential for traditional knowledge and food systems **+ Internal**: Preservation of traditional knowledge	**- Internal:** Globalization decreasing youth's interests in traditional practices and knowledge **- Internal:** Difficulties for intra- & intergenerational transmission of language and knowledge **- External:** School feeding changing tastes of Indigenous youth **- External:** Lack of access to education and the need for culturally appropriate education
Globalization, income, barter, trade, processed foods, waste	**+ Internal:** Indigenous Peoples' food systems and cash income **+ External:** Relevance of sharing, barter and trading practices **+ External:** Improved infrastructure and better access to markets and information	**- Internal:** Markets and cash-generation reshape food systems, affects biodiversity and health **- External:** Processed foods bring inorganic waste

SUMMARY TABLE OF THE DRIVERS OF SUSTAINABILITY FOR THE EIGHT INDIGENOUS PEOPLES' FOOD SYSTEMS

Community members in Baniata playing soccer.
© Massey University/Chris Vogliano.

Principles of sustainable food systems. . L: Provision of livelihoods, equity and social well-being; R1: Resource use efficiency; C: Conservation, protection and enhancement of natural resources; G: Responsible and effective governance mechanisms; R2: Resilience of people, communities and ecosystems. **Indicators of resilience** (Self-evaluation and Holistic Assessment of climate Resilience of farmers and Pastoralists - SHARP). 1. Exposed to disturbance; 2. Globally autonomous and locally interdependent; 3. Appropriately connected; 4. Socially self-organized; 5. Reflective and shared learning; 6. Honours legacy; 7. Builds human capital; 8. Coupled with local natural capital; 9. Ecologically self-regulated; 10. Functional diversity; 11. Optimally redundant; 12. Spatial and temporal heterogeneity; 13. Reasonably profitable.

TABLE 2. Identification, effects and future trends of the drivers identified for the eight Indigenous Peoples' food systems, organized by clusters and linked to the five principles of sustainable food systems and the SHARP indicators

Cluster	Driver	Main principles of sustainable food systems and resilience indicator affected by the driver					Baka	Inari Sámi	Khasi	Melane-sians[Sii]	Kel Tamasheq	Bhotia and Anwal	Tikuna, Cocama and Yagua	Maya Ch'orti'
		L	R1	C	G	R2								
Rights to land, territories, natural resources and nomadism	Collective rights over communal resources				■		Not recognized	Rights over the resources recognized	Rights of the resources recognized	Rights over the land and resources recognized	Rights over the resources recognized	Rights over the resources recognized	Rights over the land and resources recognized	Rights over the resources recognized
	Nomadism and mobile livelihoods	■				■ 8,9 12	Yes ↘	Yes, but under threat	Yes, but under threat	No	Yes, but under threat	Yes ↘	Yes	No
	Involvement of Indigenous Peoples in governmental institutions			■	■	■ 4	No ⟶	Yes ↗	Yes ↗	-	Yes	Yes ↗	Yes, but needs improve-ments	Yes ↗
	Lack of security of access to the ancestral territories and use of natural resources	■	■		■	■ 12	Yes ↗	Yes ↗	Yes ↘	No	Yes ↗ ↗	Yes	No	Yes
Biodi-versity, multifunc-tionality of the sys-tems, and self-suffi-ciency	Biodiversity conservation as the basis for the food system	■	■	■		■ 1,2 8,9 10 11	Yes ⟶	Yes	Yes ↗	Yes ↘	Yes ↗	Yes	Yes ↗	Yes
	Multifunc-tionality of the food systems		■			■ 8 10	Yes	Yes	Yes	Yes	Yes ↘	Yes ⟶	Yes ↘	Yes ↘

[i] Note from the editors: Melanesia region, inhabited by the Melanesian people, covers an important area that includes Papua New Guinea Island, Solomon Islands, Vanuatu and Fiji. There is hence an important cultural diversity amongst the Melanesians, who can locally belong to subgroups. The referencing to Melanesian Solomon Islands, noted afterwards Melanesian[SI], indicates that the authors are referring to the Melanesians inhabiting Solomon Islands, in absence of indication of any further specific identification.

TABLE 2. Identification, effects and future trends of the drivers identified for the eight Indigenous Peoples' food systems, organized by clusters and linked to the five principles of sustainable food systems and the SHARP indicators

Cluster	Driver	Main principles of sustainable food systems and resilience indicator affected by the driver					Baka	Inari Sámi	Khasi	Melanesians[SI]	Kel Tamasheq	Bhotia and Anwal	Tikuna, Cocama and Yagua	Maya Ch'orti'
		L	R1	C	G	R2								
Biodiversity, multifunctionality of the systems, and self-sufficiency	Governance informed by ancestral spiritual beliefs and cosmogony embedded in nature	■		■	■		Yes →	Yes ↘	No	Yes ↘	No	Yes →	Yes	Yes
	Food self-sufficiency from territorial management that integrates seasonality	■		■		■ 1,2 8,9 10 11 12	Yes ↘	Yes, but under threat	Yes ↘	Yes ↘ ↘	Yes ↘	Yes ↘	Yes ↘	Yes ↘
	Low energy dependence from external sources and use of renewable energy		■	■		■ 8	Yes	Yes	Yes	Yes ↘	Yes ↘	Yes →	No ↘	Yes ↘
	Biodiversity reduction from external pressures	■		■		■ 1,8 11	Yes ↗	Yes ↗	Yes ↘	Yes ↗	Yes ↗	-	Yes	Yes
Continuity of traditional practices, adaptation and innovation	Adaptive capacity to change		■	■		■ 5 6	Yes	Yes ↗	Yes ↗	Yes, but more is needed	Yes ↗	Yes	Yes →	Yes ↗
	Continuity in the use of traditional practices and techniques	■	■	■		■ 1 6	Yes	Yes, but more is needed	Yes →	Yes ↘	Yes →	Yes ↘	Yes, but hybrid system and under threat	Yes ↘
	Preference for traditional foods	■					Yes ↘	Yes, but under threats	Yes	Yes ↘	Yes ↘	Yes ↘	Yes ↘	Yes

TABLE 2. Identification, effects and future trends of the drivers identified for the eight Indigenous Peoples' food systems, organized by clusters and linked to the five principles of sustainable food systems and the SHARP indicators

Cluster	Driver	Main principles of sustainable food systems and resilience indicator affected by the driver					Baka	Inari Sámi	Khasi	Melanesians[SI]	Kel Tamasheq	Bhotia and Anwal	Tikuna, Cocama and Yagua	Maya Ch'orti'
		L	R1	C	G	R2								
Continuity of traditional practices, adaptation and innovation	New techniques and innovations adopted		■			■ 5	Yes	Yes	Yes	Yes ↘	Yes	-	Yes	Yes
	Introduction of new seeds and breeds	■		■			No	-	Yes – pros and cons	Yes ↗	-	Yes – pros and cons	Yes	-
	Climate change and natural catastrophes	■	■			■ 1 8	Little threat perceived	Yes ↗ ↗	Yes	Yes ↗ ↗	Yes ↗ ↗	Yes ↗	Yes ↗	Yes ↗ ↗
Governance, Free, Prior and Informed Consent, and development programmes	Traditional Indigenous Peoples' governance systems and strong social cohesion	■	■	■	■	■ 4	Yes ⟶	Yes ⟶	Yes ↗	Yes ↘	Yes ⟶	Yes	Yes, but challenges	Yes ↗
	Development interventions supporting the communities	■	■	■	■	■ 7	Yes	-	Yes ↗	Yes	Yes	Yes	Yes, but challenges	Yes ↘
	Development programmes needing consultation and consent	■	■	■	■		Yes ⟶	Yes ↗ ↗	-	Yes	Yes	-	Yes	Yes ↗
	Expansion of infrastructure bringing external actors			■		■ 3	Yes ↗	Yes ↗	-	-	-	-	-	-
Youth, education systems, interculturality, Indigenous languages and traditional knowledge	Indigenous languages essential for traditional knowledge and food systems				■	■ 6	Yes ⟶	Yes, but challenges	Yes ↘	Yes ↘	Yes	-	Yes, but under threat	Yes ↘ ↘
	Preservation of traditional knowledge			■		■ 6 7	Yes ⟶	Yes, but challenges	Yes	Yes ↘	Yes, but under threat	Yes	Yes, but under threat	Yes, but under threat

TABLE 2. Identification, effects and future trends of the drivers identified for the eight Indigenous Peoples' food systems, organized by clusters and linked to the five principles of sustainable food systems and the SHARP indicators

Cluster	Driver	Main principles of sustainable food systems and resilience indicator affected by the driver					Baka	Inari Sámi	Khasi	Melanesians[SI]	Kel Tamasheq	Bhotia and Anwal	Tikuna, Cocama and Yagua	Maya Ch'orti'
		L	R1	C	G	R2								
Youth, education systems, interculturality, Indigenous languages and traditional knowledge	Globalization decreasing youth's interests in traditional practices and knowledge					■ 6	Yes ↗	Yes ↗ ↗	-	Yes ↗	Yes ↗	Yes ↗	Yes ↗	-
	Difficulties for intra- & intergenerational transmission of language and knowledge				■	■ 7	No ↗	No	Yes	Yes	-	-	Yes	-
	School feeding changing tastes of Indigenous youth	■					-	-	-	-	-	-	Yes	-
	Lack of access to education and the need for culturally appropriate education				■		Yes	Yes ↘	Yes	Yes	-	Yes	Yes	Yes
Globalization, income, barter, trade, processed foods, waste	Indigenous Peoples' food systems and cash income	■	■			■ 13	Yes	Yes	Yes ↗	Yes ↗	Yes ↗	Yes ↗	Yes	Yes
	Relevance of sharing, barter and trading practices	■				■ 2,4	Yes →	No - Disappeared	No - Disappeared	Yes ↘	Yes →	Yes ↘	-	Yes →

TABLE 2. Identification, effects and future trends of the drivers identified for the eight Indigenous Peoples' food systems, organized by clusters and linked to the five principles of sustainable food systems and the SHARP indicators

Cluster	Driver	Main principles of sustainable food systems and resilience indicator affected by the driver					Baka	Inari Sámi	Khasi	Melanesians[SI]	Kel Tamasheq	Bhotia and Anwal	Tikuna, Cocama and Yagua	Maya Ch'orti'
		L	R1	C	G	R2								
Globalization, income, barter, trade, processed foods, waste	Improved infrastructure and better access to markets and information	■				■ 3	No	Yes	-	Yes ↗	Yes ↗	Yes	-	No
	Markets and cash generation reshape food systems, affects biodiversity and health	■	■	■		■ 7 10	Yes ↗	Yes ↗	Yes, but trade-offs	Yes ↗	-	Yes, but trade-offs	Yes ↗	Yes ↗
	Processed food bring inorganic waste		■	■			Yes ↗	Yes	Yes ↗	Yes ↗	Yes ↗	Yes ↗	Yes ↗	Yes ↗

Legend:

- The driver has a strong positive effect on the sustainability of the food system
- The driver has a slight to moderate positive effect on the sustainability of the food system
- The driver has a slight to moderate negative effect on the sustainability of the food system
- The driver has a strong negative effect on the sustainability of the food system
- \- No information available

- ↗ ↗ Important increase of the effect of the driver on the sustainability and climate resilience of the food system in future trends
- ↗ Slight to moderate increase of the effect of the driver on the sustainability and climate resilience of the food system in future trends
- → Effect of the driver on the sustainability and climate resilience of the food system is perceived as constant in future trends
- ↘ Slight to moderate decrease of the effect of the driver on the sustainability and climate resilience of the food system in future trends
- ↘ ↘ Important decrease of the effect of the driver on the sustainability and climate resilience of the food system in future trends

POLICY RECOMMENDATIONS

Policy recommendations are given for governments, the United Nations, research centres, academic institutions and Indigenous Peoples for each cluster of drivers (see Table 1). They seek to provide responses to address these drivers, indicating institutions and groups that could play a key role in improving the situation. All policy recommendations are made under the overall framework of the UNDRIP, and the right to FPIC. Their aim is to advance the learning, preservation and promotion of Indigenous Peoples' food systems within the framework of the United Nations Decade of Action on Nutrition (2016-2025) and the Agenda 2030 for the Sustainable Development Goals (SDGs).

FOR GOVERNMENTS, THE UNITED NATIONS, RESEARCH CENTRES, ACADEMIC INSTITUTIONS AND INDIGENOUS PEOPLES

• **Ensure that Indigenous Peoples in their country are informed about FPIC,** and on how they can request its application.

• **Respect the principle of FPIC.** The respect of the process of principle of FPIC is a guarantee of respect of the right to self-determined development of Indigenous Peoples, which contributes directly to the success of any proposed development interventions.

FOR GOVERNMENTS

Rights to land, territories, natural resources and nomadism

• **Implement the Voluntary Guidelines on the Responsible Governance of Tenure of land, fisheries and forests in the context of National Food Security (VGGT)** and sector-specific guidelines such as the **Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries (SFF Guidelines)** whilst continuing to involve Indigenous Peoples and their representatives in institutions and legislative settings.

• **Set up multi-actor committees at the national level to look at biodiversity conservation** that involves Indigenous leaders and that come up with National Plans that guarantee customary rights of Indigenous Peoples and promote nomadism and mobile livelihoods.

• Follow the recommendations of these multi-actor committees **by legislative legitimacy at the parliamentary level.** In particular, land titling or schemes that guarantee the exercising of collective rights by Indigenous Peoples would be key activities to follow.

• **Issue a specific permit or identification to Indigenous Peoples that are nomadic/ mobile to enable them to move freely in their territories, ensuring that their ancestral rights to movement and their associated livelihoods can be exercised.**

• **Together with the United Nations and non-governmental organizations (NGOs), rethink their approach to biodiversity conservation when considering the creation of national parks and natural reserves in territories previously belonging to Indigenous Peoples.** Governments should collaborate with Indigenous Peoples in protected areas, benefiting from their knowledge to manage and restore biodiversity whilst they can still practise their traditional livelihoods.

Biodiversity, multifunctionality of the systems and self-sufficiency

• **Create an inter-ministerial body with representatives from Indigenous Peoples and**

the Ministries of Agriculture, Fisheries, Forestry, Environment and Culture that could have an integrated look at food systems.

• **At the global level, together with the UN, recognize that as of today, Indigenous Peoples across the world are amongst the best experts in preserving biodiversity.**

• **Design at the national level, and in agreement with Indigenous representatives, mechanisms of retribution for Indigenous Peoples** under the United Nations Framework Convention on Climate Change (UNFCCC) discussions for the payment of carbon dioxide sequestration and for ecosystem services.

• **Recruit Indigenous Peoples as parks personnel** to allow them to continue with their ancestral practices whenever parks and protected areas overlap with their territories.

• **Start a dialogue process with Indigenous Peoples with the aim of issuing legislation that protects wild foods in their territories,** restricting consumption and illegal harvesting by external actors.

• **Through ministries of energy, increase access to renewable energy technologies for Indigenous Peoples** whilst respecting FPIC principles.

• **Consider biodiversity conservation and schemes for ecosystem services that build upon Indigenous Peoples' governance and traditional knowledge systems** to support their inclusion as main actors in the management of natural resources and biodiversity conservation.

Continuity of traditional practices, adaptation and innovation

• **Enact legislation that protects Indigenous Peoples' food systems legacy and traditional crops,** ensuring that Indigenous Peoples and their knowledge is respected and taken into account as part of the cultural and environmental heritage of the countries.

• **Have a section of extensionists dedicated to Indigenous Peoples' food systems within the ministries of agriculture.** They will speak the Indigenous languages, understand the food systems, and be able to provide technical advice to the Indigenous Peoples on how to improve their production as well as incorporate some new techniques, varieties and practices.

Governance, free, prior and informed consent, and development programmes

• In respect of the UNDRIP, through the different ministries, **stop any development and interventions in Indigenous territories that have not received the consent of Indigenous Peoples** following the process of FPIC.

• **On a local level, together with Indigenous leaders, create mixed committees to analyze the proposed Central Government interventions** from Line Ministries, ensuring that those proposals clashing with the views and cosmogony of the Indigenous Peoples can either be adapted or rejected.

• **Both nationally and locally, have the Principle of FPIC inform all programmes, decisions and policies affecting Indigenous Peoples and their communities,** including development and conservation policies.

• In this context, **include Indigenous Peoples in the steering committees implementing these programmes,** decisions and policies.

Youth, education systems, interculturality, Indigenous languages and traditional knowledge

• **Set up national committees composed of experts from ministries of education and Indigenous leaders who can discuss and design intercultural education plans in Indigenous Peoples' territories.**

• **Through this national committee on intercultural education, analyse the time and**

frequency of the classes and the schooling. It should not collide with the traditional calendar for livelihood activities that follows nature's seasonality and cycles.

• Through the ministries of education and the governmental agencies responsible for the school feeding programmes, **set up a mixed committee with the Indigenous elders, women and representatives to jointly decide which foods will be part of the school menus.**

• Together with universities and Indigenous organizations, **within the overall context of the International Decade of Indigenous Languages (2022-2032), undertake a mapping of the Indigenous languages spoken and characterize their importance to maintain Indigenous Peoples' food systems,** identifying centres that can document and support these languages to avoid their disappearance.

Globalization, income, barter, trade, processed foods, waste

• **Discuss with Indigenous leaders about environmental legislation hampering or restricting the use of by-products from the forest in their areas.** Their suggestions should be incorporated to allow Indigenous Peoples to exercise their livelihoods whilst protecting the environment.

• **Through the Ministries of Health, Agriculture, Environment, Commerce and Development, jointly analyze in specific commissions the importance of reducing or eliminating inorganic materials in the bottling, wrapping and packaging of processed and commercial foods.**

FOR THE UNITED NATIONS

Rights to land, territories, natural resources and nomadism

• Together with governments and research institutions, **host a routine technical seminar followed by a statement about the need to protect rights to customary land and natural resources, collective rights, and nomadic livelihoods.**

• **Mediate between Indigenous Peoples and the states, through the UN country teams and at the global level, to reach moratoriums about interventions on Indigenous and nomadic territories** that have not followed the principles and process of FPIC.

• **Issue a statement recommending an international moratorium about displacing Indigenous Peoples from their ancestral lands to have conservation areas set up.**

Biodiversity, multifunctionality of the systems and self-sufficiency

• **Issue a statement that recognizes** that, as of today, Indigenous Peoples across the world are amongst the best experts in preserving biodiversity, **through a UN declaration supporting Indigenous Peoples, their livelihoods and territorial management practices.**

• **Issue a statement to request the end of violence and displacement of Indigenous Peoples from their ancestral lands, territories and natural resources.**

• **Recognize Indigenous Peoples' traditional knowledge and their customary governance** in relation to biodiversity conservation as the world´s intangible heritage.

• **Together with research institutions and governments, increase their analysis of the use of renewable and non-renewable sources of energy in Indigenous Peoples' communities,** making recommendations under Sustainable Development Goal 7 and 13.

• **Together with foundations and NGOs, consider funding and supporting renewable and community-managed energy supply schemes,** particularly for Indigenous communities living in isolated areas.

Continuity of traditional practices, adaptation and innovation

• **Discuss with the member countries, through the UN country teams, the policy and scientific recommendations made at the global level** by the UNFCCC and the Intergovernmental Panel of Experts on Climate Change (IPCC) and how they can be implemented locally in relation to Indigenous Peoples and climate change.

• **Establish voluntary guidelines to protect native local seeds and recommend that the introduction of new seeds should be decided by the Indigenous Peoples' communities.**

Youth, education systems, interculturality, Indigenous languages and traditional knowledge

• **Promote that interculturality informs all educational plans and curricula** in more than 90 countries where Indigenous Peoples live in the world.

• **Through the United Nations Permanent Forum on Indigenous Issues (UNPFII), take up the issue of school feeding and analyse the impact** it is having on Indigenous Peoples' health, food taste, habits and culture.

• **Through FAO, together with research institutions, undertake a study on the impact of school feeding programmes** on the nutrition status of Indigenous youth, and develop guidelines with Indigenous organizations that can inform governments on how to preserve food and traditional knowledge systems.

• **Together with governments, support initiatives driven by Indigenous Peoples on documenting traditional knowledge,** ensuring that the traditional knowledge and languages are not lost.

Globalization, income, barter, trade, processed foods, waste

• **Within the UNPFII establish dedicated expert sessions to discuss how to facilitate the development of labelling and certification schemes for Indigenous Peoples' foods** generated by healthy and sustainable food systems that protect the environment.

• **Undertake a coordinated effort through several of its main agencies to issue a statement that can help governments tackle the problem of highly processed and imported commercial foods with regards to Indigenous Peoples' health and environment.**

FOR RESEARCH CENTRES AND ACADEMIC INSTITUTIONS

Rights to land, territories, natural resources and nomadism

• **Undertake further dedicated research on:** the linkages between ecosystem services and collective management of the environment and nomadic livelihoods; the impact of resettlement policies on the environment and biodiversity for those areas previously subjected to nomadic or mobile livelihoods; and an environmental impact analysis for nomadic livelihoods that have shortened their cycles or reduced their areas.

• It is recommended that the **Global-Hub on Indigenous Peoples' Food Systems,** hosted by FAO, UN specialized agencies and Indigenous organizations, **undertake dedicated work about certifying Indigenous Peoples' foods generated through nomadic and mobile livelihoods,** highlighting the ecosystem services they provide and analysing mobile territorial management practices such as shifting cultivation, nomadism and transhumance.

Biodiversity, multifunctionality of the systems and self-sufficiency

• **Undertake dedicated work to understand the multifunctionality of Indigenous Peoples' food systems,** in particular: the complex territorial management systems sustaining and enhancing biodiversity and Indigenous Peoples' food systems, the linkages between Indigenous cosmogony and environmental and biodiversity conservation, and the capacity to generate by-products that are organic in nature and therefore biodegradable.

• Upon agreement with Indigenous Peoples, **undertake micro- and macro-nutrient analysis of their traditional food items** to understand nutrient composition of food items.

Youth, education systems, interculturality, Indigenous languages and traditional knowledge

• **Engage with documentation of Indigenous languages** to ensure their survival.

• **Co-create curricula for protecting and preserving traditional knowledge, together with Indigenous organizations.**

Globalization, income, barter, trade, processed foods, waste

• **Together with the UN undertake studies on the thresholds of wild edibles in response to market demand.** It is questionable that without domestication, wild edibles, dependent on the health of the ecosystem in which they thrive, can sustain the markets' demand without being depleted. More dedicated research is needed.

FOR INDIGENOUS PEOPLES

Youth, education systems, interculturality, Indigenous languages and traditional knowledge

• At the national level, through the national commission of Indigenous Peoples and Indigenous leaders, **create a working committee that analyses how to preserve Indigenous languages and traditional knowledge** both inter- and intra-generational.

• **Blend oral traditional knowledge with written codified guidelines.** The new forms of technology and data management can assist but should be assessed by Indigenous youth to ensure the respect of FPIC and guarantee the safety and restricted access, in some cases, of the codified information and knowledge.

Globalization, income, barter, trade, processed foods, waste

• Through Indigenous organizations, together with NGOs and research centres, **train communities on how to market their produce without losing their culture and values along the process.**

• **Through Indigenous youth, carry out an analysis on how new technologies could help Indigenous Peoples access urban markets, bypassing intermediaries.**

EXECUTIVE SUMMARY

TABLE 3. Overview of the main characteristics of the eight Indigenous Peoples' food systems

Chapter	1. Hunting, gathering and food sharing in Africa's rainforests	2. Voices from Arctic nomads: an ancestral food system facing global warming	3. Treasures from shifting cultivation in the Himalayan's evergreen forest	4. From the oceans to the mountains: storytelling in the Pacific Islands
Indigenous Peoples	Baka	Inari Sámi	Khasi	Melanesians[SI]
Biome and natural elements in the land- and seascape	Tropical rainforest, rivers	Sub-boreal forest, fells and wetland	Subtropical evergreen forest, water streams	Tropical rainforest, mountain, inland water, ocean
Main activities and livelihoods in the food system	Hunting, gathering, fishing, cultivation, exchange of Non-Timber Forest Products (NTFPs)	Hunting, gathering, livestock, cultivation	Cultivation, gathering, hunting, fishing, cash crops	Fishing, gathering, agroforestry, hunting, fishing, cash crops
Mobile practices: Nomadic/ semi-nomadic/ transhumant /shifting/ hunting/fishing	Shifting cultivation and mobile hunting	Semi-nomadic/ transhumant	Shifting cultivation	Traditional shifting gardens, now evolved into agro-forestry
Origin of the food in percentages: Food produced and generated in territories/ Food obtained from the market	81%/19%	70%/30%	55%/45%	75%/25%
Number of species provided by the food system and used as edibles, food, medicines, spiritual, construction, etc.	179 foods, 5 construction, 23 cosmetic, accessories, lighting and other non-food uses, 4 stimulants, 3 cash crops	26 foods, 1 medicine	150 foods 2 cash crops, 2 construction, 10 medicine, 5 other non-food uses	132 foods, 2 cash crops, 7 construction, 1 stimulant, 4 medicine
Barter exchange in the food system	Yes →	-	No, Disappeared	Yes ↘

TABLE 3. Overview of the main characteristics of the eight Indigenous Peoples' food systems

Chapter	5. Surviving in the desert: the resilience of the nomadic herders	6. Ancestral nomadism and farming in the mountains	7. Following the flooding cycles in the Amazon rainforest	8. The maize people in the Mesoamerican dry corridor
Indigenous Peoples	Kel Tamasheq	Bhotia and Anwal	Tikuna, Cocama and Yagua	Maya Ch'orti'
Biome and natural elements in the land- and seascape	Desert, shrubs and thorn bushes, lacustrine plain	Forest, mountain	Tropical rainforest, lakes, rivers	Tropical temperate rainforest, subtropical humid forest, subtropical dry forest, and subtropical thorn bush, water pools
Main activities and livelihoods in the food system	Livestock, gathering, cultivation	Cultivation, livestock, gathering	Fishing, cultivation, hunting	Cultivation, gathering, fishing, hunting
Mobile practices: Nomadic/ semi-nomadic/ transhumant /shifting/ hunting/fishing	Nomadic/ transhumant	Semi-nomadic/ transhumant	Shifting cultivation, mobile fishing and mobile hunting	Traditional shifting *milpa* system, now evolved into settle non-mobile *milpa*
Origin of the food in percentages: Food produced and generated in territories/ Food obtained from the market	65%/35%	70%/30%	75%/25%	55% /45%
Number of species provided by the food system and used as edibles, food, medicines, spiritual, construction, etc.	25 foods, 3 medicine, 1 fodder	29 foods, 7 fodder, 2 construction, 6 medicine, 6 other non-food uses	153 foods[ii] 2 cash crops, 5 medicine, 14 construction, 16 cosmetic, accessories, lighting, utensils and other uses	143 foods, 1 construction, 7 dye, poison medicine, and other uses, 6 fodder, 1 stimulant
Barter exchange in the food system	Yes	Yes ↘	-	Yes →

[ii] Includes data from literature.

Legend:

→ Trend maintained over time

↘ Decreasing trend over time

\- No information available

CHAPTER 1

Hunting, gathering and food sharing in Africa's rainforests

Baka people from Gribe village collecting forest resources.
©Kyoto University/ Masaaki Hirai.

The Baka living in the tropical rainforest of South-eastern Cameroon are one of a dozen groups of Congo Basin hunter-gatherers often referred to as "Pygmies". The food system of the Baka is entirely dependent on the forest. An estimated 81 percent of their food is obtained through hunting, gathering and fishing activities, practised during incursions and movements in the forest, combined with shifting cultivation. Exchanges with other communities and the market provide about 19 percent of their diet. In total, the Baka use around 179 species for food. Outstandingly, the Baka are renowned for their knowledge of about 500 species of wild or ruderal plants they use for medicinal, material, and spiritual purposes.

The livelihood of the Baka primarily consists of an alternation between seasonal excursions into the forest and sedentary activities carried out in permanent villages along the road. In Gribe, where the study was carried out, the Baka are engaged in a transitional post-forager lifestyle affected by their increasingly constrained access to the forest. Long-distance stays in the forest in search for food items (bushmeat, freshwater resources, insects, wild tubers, honey, leaves, fruits, nuts and all sorts of spices) and non-food products (medicinal plants, various materials for building and carving) are becoming increasingly challenging and diminishing, whilst sedentary activities in the village are increasing. Shifting cultivation to produce starches and NTFPs, home gardening, and agroforest plantations to produce cash crops (cocoa, coffee), as well as off-farm activities (labouring in exchange for crops, and salaried jobs in logging and safari companies) are all important activities.

The relationships between the Baka and their farming neighbours are based on complementarity. Through the adoption of a lifestyle that mimics that of their neighbours and under constant incentives by governmental agencies to abandon their age-old forager way of life, the Baka are now exposed to an acute risk of losing their expertise of the forest and their rich animist culture based on a connivance with the supra-natural forces who are the masters of forest resources. At the same time, Baka interest in NTFPs for the market is developing a new relationship with neighbours that goes beyond the traditional exchanges and barter. Despite this, the Baka are increasingly ostracized since they rarely have a voice in negotiations with the various stakeholders (authorities, private companies, protected areas managers) who meet and discuss which in the end results in progressively reducing the Baka's access to their ancestral forests.

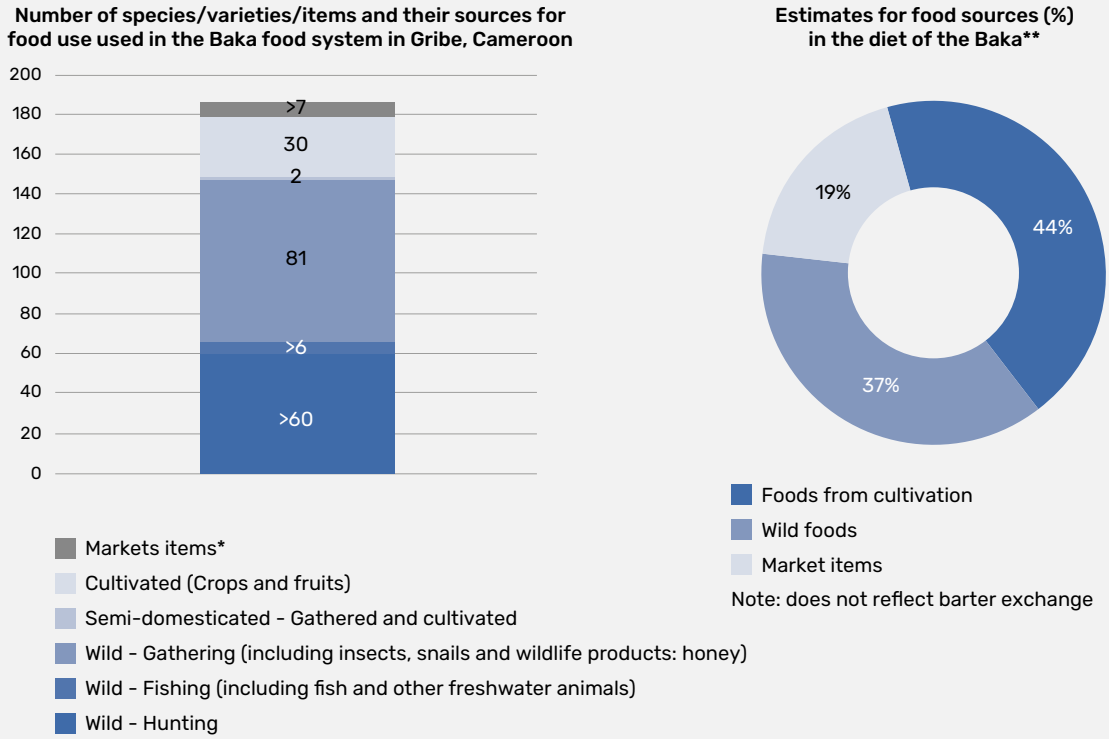
Major changes occurring in recent years

- Increased constraints in accessing the forest (creation of a national park, presence of logging and safari companies);
- Progressive abandonment of hunter-gatherer mobile lifestyle and shift into more sedentary lifestyle with only seasonal expeditions in the forest;
- Adoption of agriculture;
- Improved road infrastructures and development of local markets with merchants coming from outside;
- Increased demand for NTFPs, becoming a source of cash income.

Trends expected by the Baka in future years

- Balanced livelihood between seasonal incursions into the forest and shifting cultivation in permanent settlements along the road;
- Reduced dependence on the forest products and greater reliance on food and agroforestry products;
- Loss of traditional knowledge regarding the forest and rising concerns about health implications (degradation of diet quality and loss of traditional healing practices);
- Marginalization and no voice in the negotiations with other forest users (farmers groups, conservation NGOs, logging companies, safari owners);
- Youth manifesting contradictory aspirations.

FIGURE 2. Estimates for food sources (%) and number of species/varieties/items for food use used in the Baka food system in Gribe, Cameroon



Species count does not include stimulants. *Includes plant and animal species, condiments, seasonings, and processed foods. **Estimates based on data available.

CHAPTER 2

Voices from Arctic nomads: an ancestral system facing global warming

Traditional fishing in Nellim village.

© Sámi Parliament in Finland/ Elle Maarit Arttijeff.

This food system is practised by the Inari Sámi, the smallest group of the Sámi people, who inhabit the northern part of the Fennoscandia peninsula. The Inari Sámi live in the extreme North of Finland and the community that took part in this study is located in Nellim village. What characterizes the Inari Sámi of this Arctic region is their lifestyle as traditional mobile reindeer herders, governed by seasonal transhumance to grazing lands. The food system of the Inari Sámi traditionally relies on fishing, hunting and wild edibles gathering. The reindeer is a keystone species central to the culture of the Sámi. Fishing, hunting and wild berry picking for sale are other salient traits of the Inari Sámi food system. Depending on the season, these activities are more or less prominent throughout the year. There are 26 species in their food system used for food, and one species has been identified for medicinal uses. Additionally, 30 percent of the food consumed by Inari Sámi comes from the market.

As revealed by their transitioning food system, the Inari Sámi community has experienced drastic historical episodes and regulations that have profoundly modified their daily life. Some of the drivers modifying their livelihoods and territorial management are state laws regulating reindeer herding, the changing sources of feed and forage for reindeer, decreasing demography in Inari Sámi villages, the encroachment of processed food items, and new extractive activities in the region that are impacting wildlife habitats. These drivers are weakening the food systems and traditional lifestyles of the Inari Sámi. Furthermore, the dramatic impacts of climate change on the Arctic region are significantly affecting seasons, natural cycles, icepack, forage and the related herding activities.

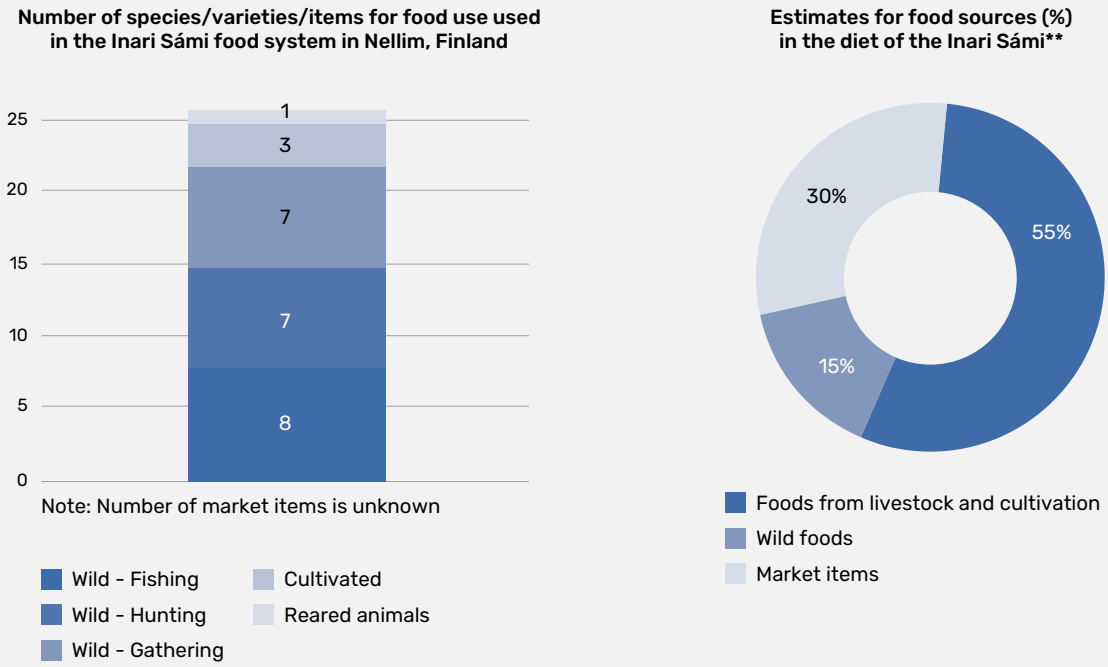
Major changes occurring in recent years

- Increased sourcing of food from the market in their diet, especially processed meat;
- Visible effect of climate change on the diet (new wild mushrooms);
- Reduced and limited access to land and pastures;
- Youth migration to cities;
- Damaging policies of acculturation and assimilation

Trends expected by the Inari Sámi in future years

- Expected increase of forest exploitation leading to drop in reindeer herding and rarefaction of wild edibles (berries, mushrooms, etc.);
- Increasing soil degradation and lake eutrophication;
- Reducing populations of wild game and fish;
- Youth losing interest in reindeer herding;
- Persistence of traditional activities, but less prevalent;
- Increased dependency on the market for their diet.

FIGURE 3. Estimates for food sources (%) and number of species/varieties/items for food use used in the Inari Sámi food system in Nellim, Finland



Species count does not include stimulants. *Includes plant and animal species, condiments, seasonings, and processed food. ** Estimates based on data available. No practice of barter exchange has been reported.

CHAPTER 3

Treasures from shifting cultivation in the Himalayan's evergreen forest

Khasi women from Nongtraw descending stairs with handmade baskets.

© Lyngdoh NESFAS/ Alethea Kordor.

The Khasi are a group of Indigenous Peoples that predominate in the eastern part of the hilly State of Meghalaya in northeastern India. Meghalaya is known to be the wettest region of India, and it is also recognized as a singular subtropical forest ecoregion that hosts a remarkable biodiversity. The village of Nongtraw, where the research took place, is inhabited solely by Khasi people. The food system of this matrilineal and Christian society relies on shifting cultivation in jhum fields, home gardening, livestock rearing (poultry and pigs), beekeeping and, to a lesser extent, on fishing, trapping and the gathering of wild edibles from the forest. In spite of its remoteness, the village of Nongtraw for a long time has taken part in the weekly market in the adjoining villages. These markets allow for important social interactions and are places where local produce, goods and services are bartered and traded. The Khasi have been traditionally open to contacts and marriage with other groups. This interdependent and open socioeconomic approach is one of the reasons why the Nongtraw inhabitants obtain an important share of their diet from the market. In total, the food system of the Khasi people is based on 150 species and varieties of plants and animals used for food. In addition, there are at least 17 prominent species used for construction and materials, and medicinal purposes.

Daily wage labour and artisanal activities (especially basketry) are the main sources of cash income along with broom grass cultivation as a cash crop. Since the 1970s, the accession of Meghalaya to statehood and the related improvements in governmental facilities (electricity, pipes and storage tanks for water supply) and services (public transport, market, waste management) have improved the livelihoods of the Khasi, easing access to the cash economy and reducing uncertainty in the food supply, without damaging the traditional diet of the Khasi. Increased conservation initiatives have come up with regulations and responsible awareness to mitigate the pressure on agricultural lands and natural resources. The resilience of the Khasi food system has gotten stronger over time and this positive observation seems to stem from the strength of the self-governance and customary institutions in the community.

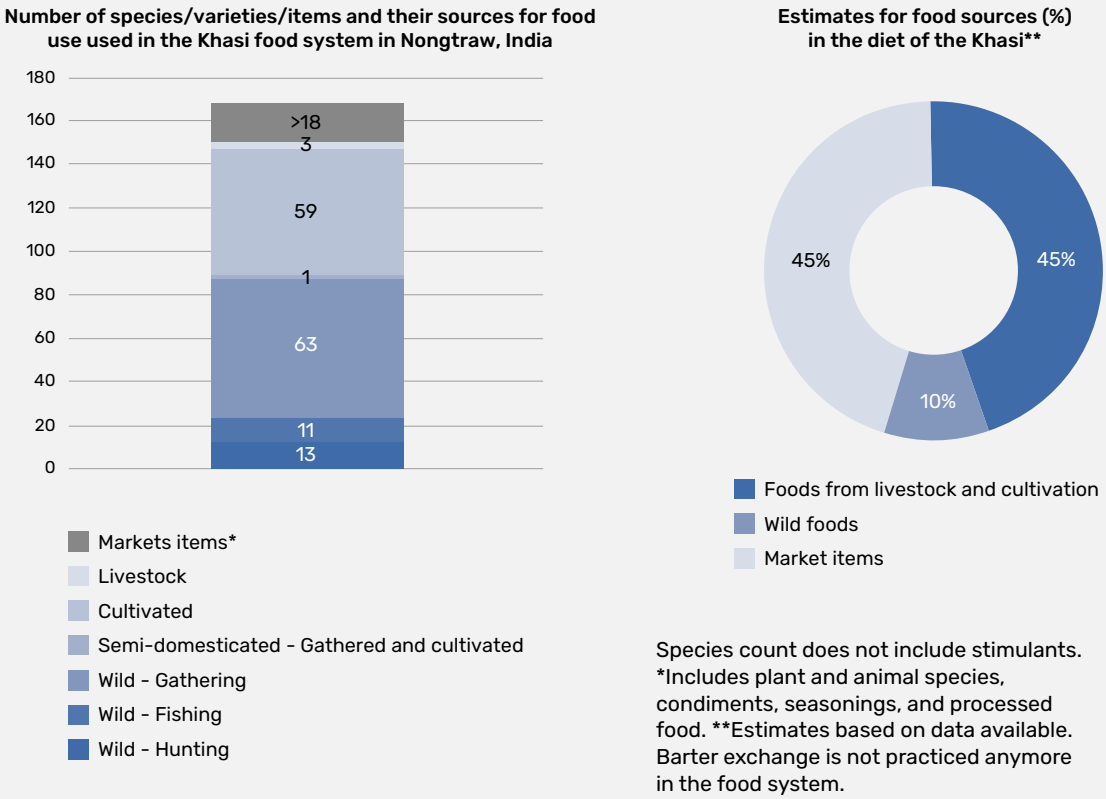
Major changes occurring in recent years

- India's overall public distribution system has changed the local subsistence system;
- Rice has supplanted local staples (millet and pulses);
- Reduced presence of wild foods in the diet;
- Increased cash income economy;
- Loss of food sharing and barter practices;
- Emergence of cash crop production (broom grass).

Trends expected by the Khasi in future years

- No expected changes by the Khasi, who trust the resilience of their food system supported by the solid self-governance of their community.

FIGURE 4. Estimates for food sources (%) and number of species/varieties/items for food use used in the Khasi food system in Nongtraw, India



Species count does not include stimulants. *Includes plant and animal species, condiments, seasonings, and processed food. **Estimates based on data available. Barter exchange is not practiced anymore in the food system.

CHAPTER 4

From the oceans to the mountains: storytelling in the Pacific Islands

Indigenous People's food system profiling in Baniata community, Solomon Islands.

The term Melanesian[SI] federates a diversity of tribes that are now organized according to their followed Christian movements. The Melanesians[SI] inhabiting the Baniata village live in remote conditions in Rendova Island located in the Solomon Islands archipelago in the Pacific Ocean. Their food system relies primarily on the cultivation of tuber crops and banana in fields and home gardens. Inland agroforests of fruit trees and ***ngali*** nut trees as well as coconut plantations along the shoreline for the production of copra are prominent components of the food system generating cash income. In addition, the food system relies on bushmeat and fish. Hunting and fishing are fundamental activities embedded with cultural and traditional importance, though they are becoming less prominent within the food system. One quarter of the food resources are sourced from markets and local stores, where handicrafts and garden products are sold and highly processed and imported foods purchased. The Melanesian food system in Baniata consists of 132 species used as food, out of which 51 are aquatic species. In addition, multiple other species are used for non-food purposes, such as for clothing, construction and materials, medicine, or fuel.

Excessive logging and reliance on the market have been the major drivers of change for the Melanesian's food system in Baniata over the past fifty years, resulting in natural resource degradation and a greater dependency and consumption of imported and highly processed foods. The reduction of the period for land fallowing and the intensification of agriculture have reached their limits. Increased pests and diseases along with climate change have impaired the health of their food system, further accentuating their dependency of imported highly processed foods. All of these factors are severely impairing the Melanesians[SI], food system in Baniata village.

Major changes occurring in recent years

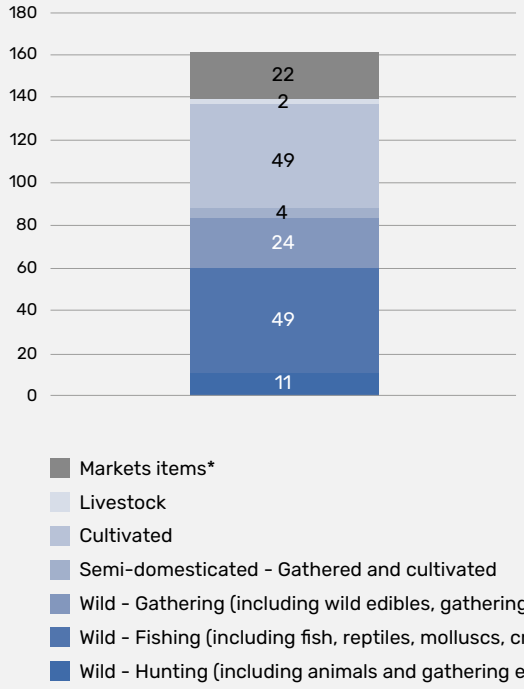
- Colonization has impacted cultural and religious beliefs and encouraged introduction of new foods and crops;
- Monetization of the local economy and abandonment of traditional barter and exchange practices;
- Increased import of highly processed foods and health deterioration with increase of non-communicable diseases;
- Reduced yields for crops and increased crop damage by pests;
- Loss of traditional knowledge, in particular regarding hunting;
- Declining stock of marine fish.

Trends expected by the Melanesians[SI] in future years

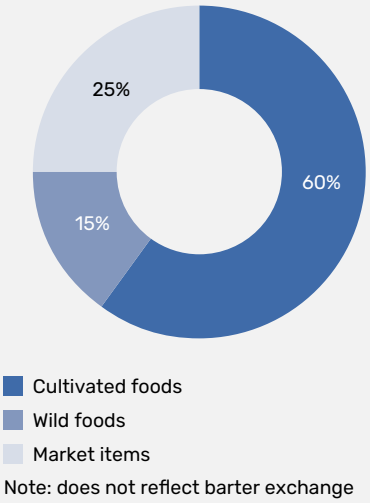
- Concerns about their increased demography in a context of limited land resources and damaged natural resources;
- Imported rice anticipated to replace traditional tuber staple foods;
- Climate change is feared to negatively impact agricultural yields;
- Dependence on the market is expected to increase.

FIGURE 5. Estimates for food sources (%) and number of species/varieties/items for food use used in the Melanesians[SI] food system, Baniata, Solomon Islands

Number of species/varieties/items and their sources for food use used in the Melanesians[SI] food system in Baniata, Solomon Islands



Estimates for food sources (%) in the diet of the Melanesians[SI]



Note: does not reflect barter exchange

Species count does not include stimulants. *Includes plant and animal species, condiments, seasonings, and processed food.

CHAPTER 5

Surviving in the desert: the resilience of the nomadic herders

Discussion group with community participants in Aratène.

©RPPS.

The Kel Tamasheq are traditionally nomadic and Muslim pastoralists, part of an extensive ethnic confederation known as Tuareg people who inhabit vast arid areas of the Sahara and surrounding Sahel. The research for the analysis of the Kel Tamasheq food system was carried out in the village of Aratène, located in the region of Goundam Circle in the northern part of Mali. Besides the activities of rearing livestock, the Kel Tamasheq in Aratène also gather wild edibles from the surrounding dry vegetation and at least four species are used for fodder, medicine or construction. To a lesser extent, they also practise small-scale cultivation and vegetable gardening for food uses. The Kel Tamasheq source 35 percent of their food needs from the market.

The Sahelo-Saharian climate imposes strong ecological constraints and guides the seasonal activities in the food system, which alternates between moving with the livestock during the dry season, and dedicating the rainy season to sales, stocking of cereals and gardening for the market. Mobile pastoralism is the fundamental activity of the Kel Tamasheq. It shapes their culture and their way of perceiving and interacting with the natural surrounding environment. Livestock is diversified and aggregates sheep, goats, bovids, donkeys, camels and poultry. Their overall economy depends on the management and sale of livestock. Whilst men manage and sell the animals, women take care of the processing and selling of livestock-derived products such as dairy products, meat and leather. Recent political unrest, including the rebellion in the 1990s, has affected the daily life of the Kel Tamasheq, causing massive migration abroad, crumbling the economy, and creating insecurity and cattle rustling. The frequency of droughts, mass flooding and sandstorms has increased, indicating more climate variability and uncertainty, in turn affecting the availability of water as the most critical resource. These compounding climate factors are translating into recurrent and severe losses of livestock. The hydro-climatic fluctuations and scarcity are the main threat to the resilience of the Kel Tamasheq food system. The diminishing emblematic flora and fauna are clear indicators of dramatic climatic trends in the Sahelo-Saharian ecosystems, affecting arable and pasture lands alike.

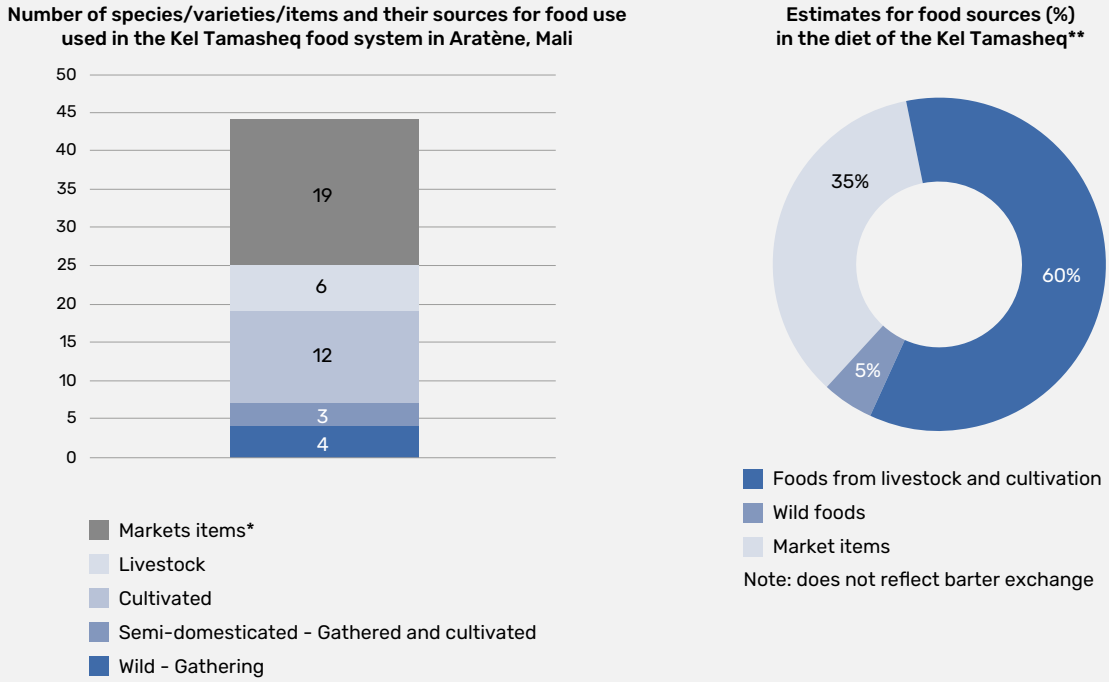
Major changes occurring in recent years

- Drying up of water bodies, ponds, lakes and aquifers, causing severe water scarcity;
- Significant depletion of wild plants and wild game from successive climate shocks and decimation by armed groups;
- Land grabbing and land tenure insecurity;
- Increased reliance on markets for food and cash income.

Trends expected by the Kel Tamasheq in future years

- Increased uncertainty caused by climate change, droughts and political instability;
- Intensified exploitation of land for agriculture: concern about soil degradation and competing use of water sources and reserves;
- Increased reliance on "new foods" and gradual abandonment of certain traditional foods;
- Youth aspirations not to pursue the pastoralist lifestyle and induced loss of traditional knowledge.

FIGURE 6. Estimates for food sources (%) and number of species/varieties/items for food use used in the food system of the Kel Tamasheq, Aratène, Mali



Species count does not include stimulants. *Includes plant and animal species, condiments, seasonings, and processed food. **Estimates based on data available.

CHAPTER 6

Ancestral nomadism and farming in the mountains

Indigenous woman from Namik village carrying dry leaves from the forest for cowshed bedding and manuring.

© CHINAR/Ghanshyam Kalki.

The Bhotia and Anwal are two native Hindu tribes co-inhabiting the Namik Valley of Uttarakhand, a state in northern India crossed by the Himalayas. The Bhotia are greater in number and are distributed over the Trans-Himalayan belt, whilst the Anwal are solely found in the hilly forested and remote area of Uttarakhand. Traditionally, the Anwal are mobile migrating shepherds, whilst the Bhotia were primarily involved in the IndoTibet trading route. Currently, the two groups collaborate through an integrated agro-pastoral food system in which the Anwal continue being migrating shepherds amongst Bhotia cultivators. Traditionally, the Bhotia and Anwal have always practised hunting and gathering of wild game and edibles. However, conservation policies have prohibited hunting activities and progressively restricted their access to forests, thus reducing their access to wild edibles species. In total, the food system relies on 29 species used for food. An additional 20 species are dedicated to non-food uses for fodder, construction, materials, and medicine. Today, the market covers an estimated 30 percent of the food needs.

Pulses, in association with maize and potato, are the major staples cultivated by the Bhotia, who also keep bees, poultry, cattle and buffalo. The Anwal take care of sheep and goat herds. Whereas fishing and hunting have always remained marginal activities, the inhabitants of Namik still devote great importance to the gathering of wild plants used as foods, medicines and raw materials for craft. Women are the main actors in the food system, as they carry most of the farming and gathering activities. The natural ecosystems provide fodder and grazing lands for livestock whose dejections serve as manure for the traditional cropping system. In this diverse system based on complementarity, barter is a relevant mode of exchange for the resilient circulation of goods. Yet the market remains necessary for enabling access to food items not generated within the system, especially rice, wheat, salt, sugar and cooking oils. Activities are paced along five distinct seasons, including the monsoon, which heavily affects the activities during the annual cycle. Road construction, protection of wildlife and access to markets have been the major drivers of change. The abandonment of foraging in the wild has accompanied a greater demand for marketed goods and a slow dismissal of lesser-used crops, reducing the diversity of the local dietary regime. As high-altitude ecosystems are more exposed to climate change, remote villages are increasingly sensitive to more frequent natural calamities, which now bring about stress and uncertainty.

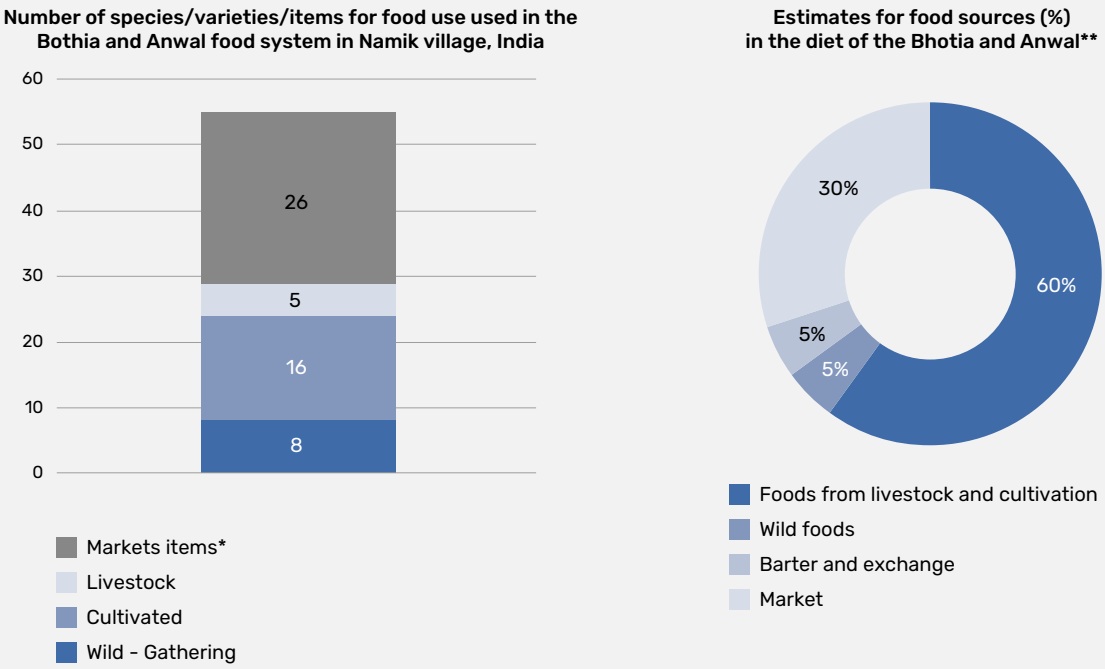
Major changes occurring in recent years

- Reduced access to wild edibles imposed by national conservation laws;
- Diminished reliance on traditional medicine;
- Land degradation induced by climate change;
- Road construction increased connectivity that has been associated with migration to urban areas, introduction of new crops, and easier access to markets.

Trends expected by the Bothia and Anwal in future years

- Increasing aspirations by youth to leave the villages;
- Concern about maintaining the transmission of traditional knowledge;
- Awareness of pros and cons of adopting new practices from modern agriculture: opportunities to test new crops along with concerns about increased utilization of chemical inputs;
- Progressive disinterest in livestock rearing;
- Increased consumption of highly processed food, meat and eggs in the diet.

FIGURE 7. Estimates for food sources (%) and number of species/varieties/items for food use used in the food system of the Bhotia and Anwal, Namik, India



Species count does not include stimulants. *Includes plant and animal species, condiments, seasonings, and processed food. **Estimates based on data available.

CHAPTER 7

Following the flooding cycles in the Amazon rainforest

Family members of the Ticoya reserve fishing together.

© Fundación Omacha/ Fernando Trujillo.

The Tikuna, the Cocama and the Yagua are three Indigenous People fishers-groups living in the Colombian part of the Amazon Basin who are also live in other countries of the region. The three groups are not equally represented: the Tikuna are by far more numerous than the Cocama and the Yagua. The research took place in Puerto Nariño, the second largest municipality of the department of Amazonas situated at the confluence of the Loretoyacu and Amazon rivers. A major political feature in the Amazonian Colombia is the organization of the villagers into administrative Indigenous communities, which retain legal collective property rights over their land. In this tropical rainforest ecosystem, seasons are delineated according to the flooding cycles, which are determined by the fluvial water level, flux and quality. The territorial management system that informs this food system is extremely elaborate and adapts to the flooding patterns and uniqueness of the environment. Fishing is a prominent activity in this food system and is practised in close articulation with the use — through cultivation, hunting and foraging activities — of forest lands that are not exposed to flooding (***terra firma***) and floodplain forests that are seasonally inundated (***varzéa***). To complement fish catches, these fishers seasonally hunt a great diversity of mammals, birds and reptiles.

The ***chagra*** is their fundamental cropping and shifting cultivation system, which combines a great diversity of crops with maize and cassava as staples, along with other cereals, tubers, vegetables, spices, fruits and cash crops. The knowledge system related to the ***chagra*** is maintained and transmitted by the women. The food system of the Tikuna, Cocama and Yagua peoples counts at least 153 species used for food, of which 68 are species of fish. Plantations of several multipurpose palm tree species (28 identified) provide a wide range of products used as foods and drinks, medicines, construction materials, and handicraft. Markets are essential for selling produce and buying goods, ensuring a good balance between the preservation of traditional dietary habits and the adoption of new exotic food products, many of them highly processed and imported foods. Today, the market caters to an estimated 25 percent of food needs. The standardization of formal schooling exclusively in Spanish seems to be inducing a regression of the Indigenous maternal languages and creating a perception of threat through acculturation.

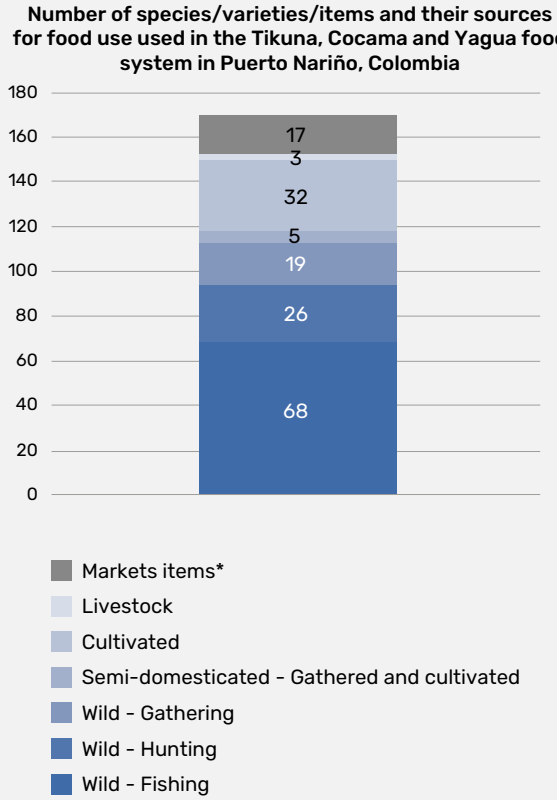
Major changes occurring in recent years

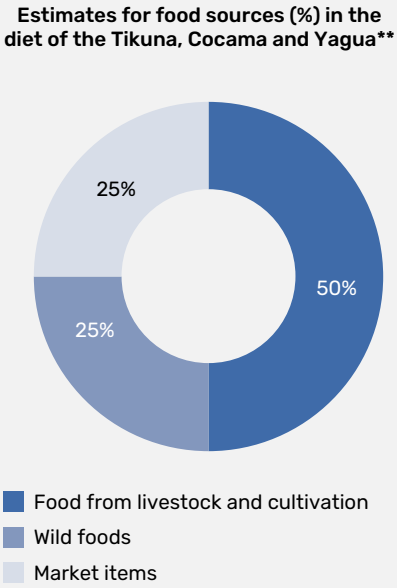
- Increased presence and consumption of highly processed and imported foods fuelled by the development of urban areas;
- Adoption of new, modern and less sustainable hunting and fishing techniques;
- Failed successive agricultural governmental development programmes based on new crops;
- Education and schooling have generated damaging policies of acculturation and assimilation;
- Children and youth now prefer processed foods, with the school feeding programme having played a role in this change of dietary habits.

Trends expected by the Tikuna, Cocama and Yagua in future years

- Reviving the production and consumption of traditional foods;
- Involving children in food production activities, especially fishing;
- Being proactive in rehabilitating government programmes;
- Making school meals more adequate and including Indigenous Peoples' foods and traditional diets.

FIGURE 8. Estimates for food sources (%) and number of species/varieties/items for food use used in the food system of the Tikuna, Cocama and Yagua peoples, Puerto Nariño, Colombia





Species count does not include stimulants. *Includes plant and animal species, condiments, seasonings, and processed food. **Estimates based on data available.

CHAPTER 8

The maize people in the Mesoamerican dry corridor

Maya Ch'orti' women prepare for the thematic discussion in La Ceiba.

The food system profile of the Maya Ch'orti' involved the communities in six villages in the department of Chiquimula, in the dry corridor in Guatemala, in the eastern part of the country. The Ch'orti' are part of the ancestral Maya civilization whose cosmogony remains vivid amid their adoption of Christianity. Their diet is primarily ensured by a mix of agricultural production, an agroforestry system, home gardens, and the ***milpa***, a cropping system emblematic of Mesoamerica that combines the production of maize, beans and squash. Livestock rearing, stingless beekeeping, aquaculture (a combination of fish, gastropod and aquatic edible plant production), and the gathering of a broad range of wild edible plants efficiently complement the food system. Bushmeat and insects, which were non-negligible resources in the past, are eaten only occasionally today. As a result of limited land access and productivity issues, food production does not fulfil all the basic food needs and the market provides the missing goods, an estimated 45 percent of the food needs. In total, the food system of the Ch'orti' is based on 143 species used for food of plants, mostly cultivated, and animal species. Fourteen species were additionally mentioned as having prominent uses for construction, fodder, dye, poison or medicinal remedies.

Their weather is characterized by contrasting wet and dry seasons with a small dry season in the middle of the rainy season, which constitutes a factor of climatic uncertainty and recurrent stress. The country's chaotic political history throughout the 20th century and its associated episodes of violence, often targeting Indigenous Peoples, have heavily reduced access to land, degraded the natural resources, and impaired the self-sufficiency of the Maya Ch'orti' food system. The rise of industrial production and export markets has decreased income opportunities based on local produce and value chains. The replacement of handicrafts by manufactured goods, and the abandonment of natural dyes by industrial chemical dyes, have deprived the community of their usual sources of incomes, reducing their purchasing power.

Major changes occurring in recent years

- Cheap and low-quality highly processed and imported foods have flooded markets;

- Agrochemicals introduced into the ancestral milpa cropping system;

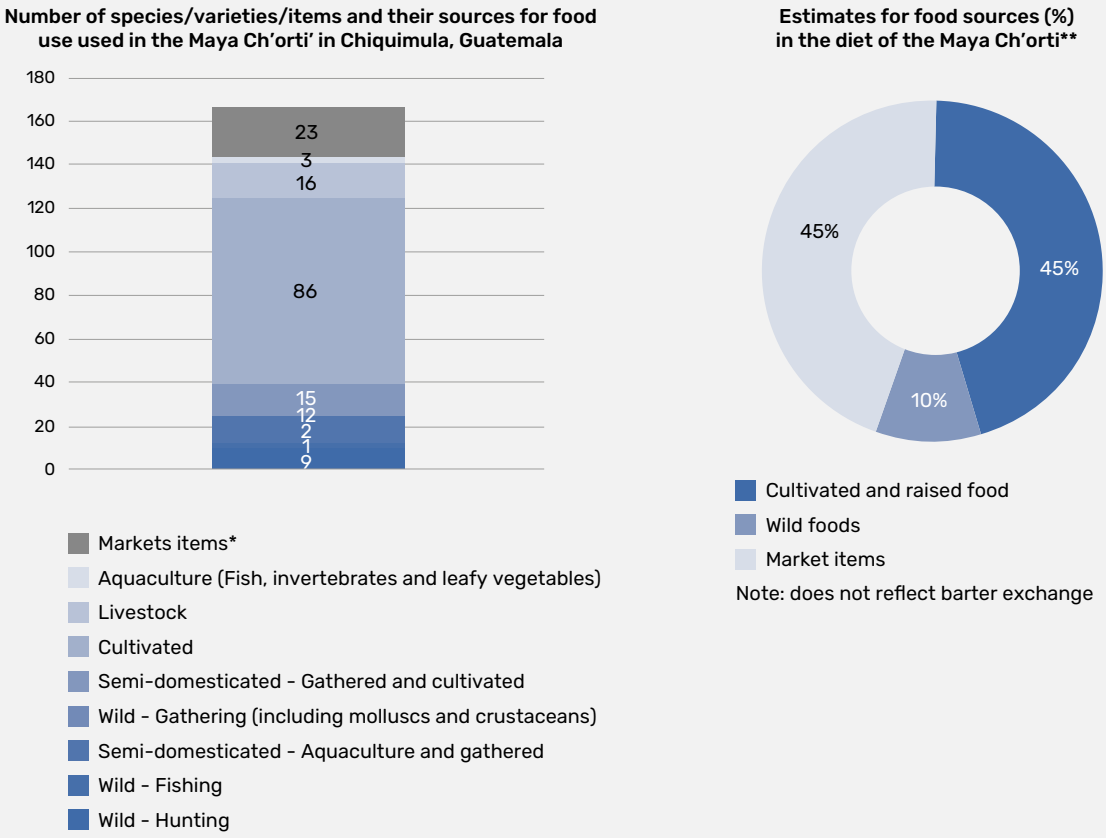
- Decrease of animal-sourced foods (bushmeat, molluscs and crustaceans, insects), resulting in a less diversified diet.

Trends expected by the Maya Ch'orti' in future years

- Optimism that the community will foster traditional food production and slow down the reliance on imported goods;

- Reinforcement of trade and barter within communities through local markets and to reset a virtuous local and self-sufficient economy.

FIGURE 9. Estimates for food sources (%) and number of species/varieties/items for food use used in the food system of the Maya Ch'orti', Chiquimula, Guatemala



Species count does not include stimulants. *Includes plant and animal species, condiments, seasonings, and processed food. **Estimates based on data available.

CONCLUSION: WHAT IS AT STAKE?

Indigenous Peoples' food systems are probably amongst the best placed to provide insights, lessons and empirical evidence that could facilitate the transition towards more sustainable and resilient food systems. The analysis of the eight food[2] provides nine salient insights whilst identifying obstacles that need to be considered.

1. The recognition of Indigenous Peoples within the countries they inhabit is important and enables them access to basic public services. Furthermore, interculturality in public services and social protection measures are still needed for them to be effective and benefit Indigenous Peoples.

2. Indigenous Peoples have valid and tested contributions to make to sustainability. Scientists are starting to acknowledge this whilst policymakers have not yet been able to translate this growing awareness into effective policy measures that protect Indigenous Peoples' practices. There is potential to draw lessons on sustainability from Indigenous Peoples that can be extrapolated to other contexts and communities.

3. Indigenous Peoples hold the best known knowledge about wild and semi-domesticated plants in humankind. In some cases, pharmaceutical companies, in collaborative agreements with Indigenous Peoples, have developed new medicines that today are sold over the counter throughout the world. In other instances, Indigenous Peoples denounced biopiracy and lack of respect of their intellectual rights over their knowledge of plants used for medicines and foods. This lack of respect has been one of the major barriers for Indigenous Peoples to share their knowledge about sustainability with non-Indigenous scientists. The international community needs to guarantee Indigenous Peoples' rights.

4. The importance of nomadism, mobile livelihoods and shifting practices to maintain biodiversity. Often not well understood by practitioners and policymakers, the relationship between nomadic livelihoods and biodiversity conservation is an area of research that merits more dedicated analysis. Practices like shifting cultivation have been criticized for years as responsible for deforestation. However, areas subjected to shifting cultivation practices are still forested today whilst surrounding areas have been logged and the forest eliminated. Relatively recent new drivers related to globalization, monetization, markets, migration, climate change and extractive pressures over the natural resources are either impairing, limiting or forbidding mobile and nomadic practices. It is important to have more dedicated research to inform policies that today either do not support mobility or go against it altogether.

5. Indigenous Peoples' food systems are dynamic in time and subject to changes but today they are changing at an unprecedented speed. Whilst in the past, the dynamism of their territorial management techniques allowed them to adjust to changing migratory patterns and climate variations, the current situation and pressures are placing Indigenous Peoples in difficult conditions to counteract. Their territories and livelihoods are suffering a profound impact from migrants in and out of the communities, extractive industries, commercial agriculture schemes, youth's changing habits and tastes, and climate change.

6. The acceleration in the adoption of market-oriented activities for cash is profoundly transforming Indigenous Peoples' food systems. In the context of ongoing globalization, the improved access to markets is having a direct impact on the socio-economy of the Indigenous communities, which in turn affects the environment, the social

[2] Note from the editors: All references to the Indigenous Peoples in this section refer to the communities that took part in the fieldwork unless otherwise specified. These are: Baka in Gribe; Inari Sámi in Nellim; Khasi in Nongtraw; MelanesiansSI in Baniata; Kel Tamasheq in Aratène; Botia and Anwal in Namik; Tikuna, Cocama and Yagua in Puerto Nariño; and Maya Ch'orti' in Chiquimula.

fabric, and the transmission of traditional knowledge. The traditional accumulation of capital in the environment and ecosystems is now shifting more and more towards cash accumulation to access a new plethora of available goods and services that are no longer transacted by barter exchange but through cash. This is having an impact on many of the ancestral collective forms of reciprocity and circular solidarity that have constituted their safety nets for centuries. In addition, the growing interest in selling foods and handicrafts in markets to acquire cash, are rapidly introducing new habits and tastes, and reshaping the Indigenous Peoples' food systems from within.

7. Indigenous Peoples' food systems risk disappearance or full assimilation by the dominant cultures mainstreamed in the globalization process, unless properly analyzed and supported by the right policy interventions. The adoption of market-oriented activities creates a real risk that some Indigenous Peoples' food systems will disappear and become unsustainable by being detached from their natural resource base and the cosmogony and traditional knowledge that informed them.

8. The future of Indigenous Peoples' food systems depends largely on the decisions Indigenous youth are making. The future will largely depend on Indigenous youths' ability to reconcile traditionally sustainable and self-consumption food systems with the growing preference towards market-oriented food systems whilst maintaining elements of ancestral knowledge and sustainability. This reconciliation remains an open question and is directly linked to the preservation of ancestral languages and traditions, whose disappearance will hamper the survival and continuation of these ancestral food systems.

9. Free Prior and Informed Consent is more than a principle – it brings success. Free, prior and informed Consent is not only a right that Indigenous Peoples have in the UNDRIP, it is actually **essential to ensure the success and performance** of different governmental development and social protection programmes aimed at improving the well-being of Indigenous Peoples.

Way forward

Further research is required to undertake a more complete and systematic inventory of the diversity of strategies and territorial management techniques elaborated by culturally diverse Indigenous Peoples in their relations with the diverse ecosystems they live in across the world.

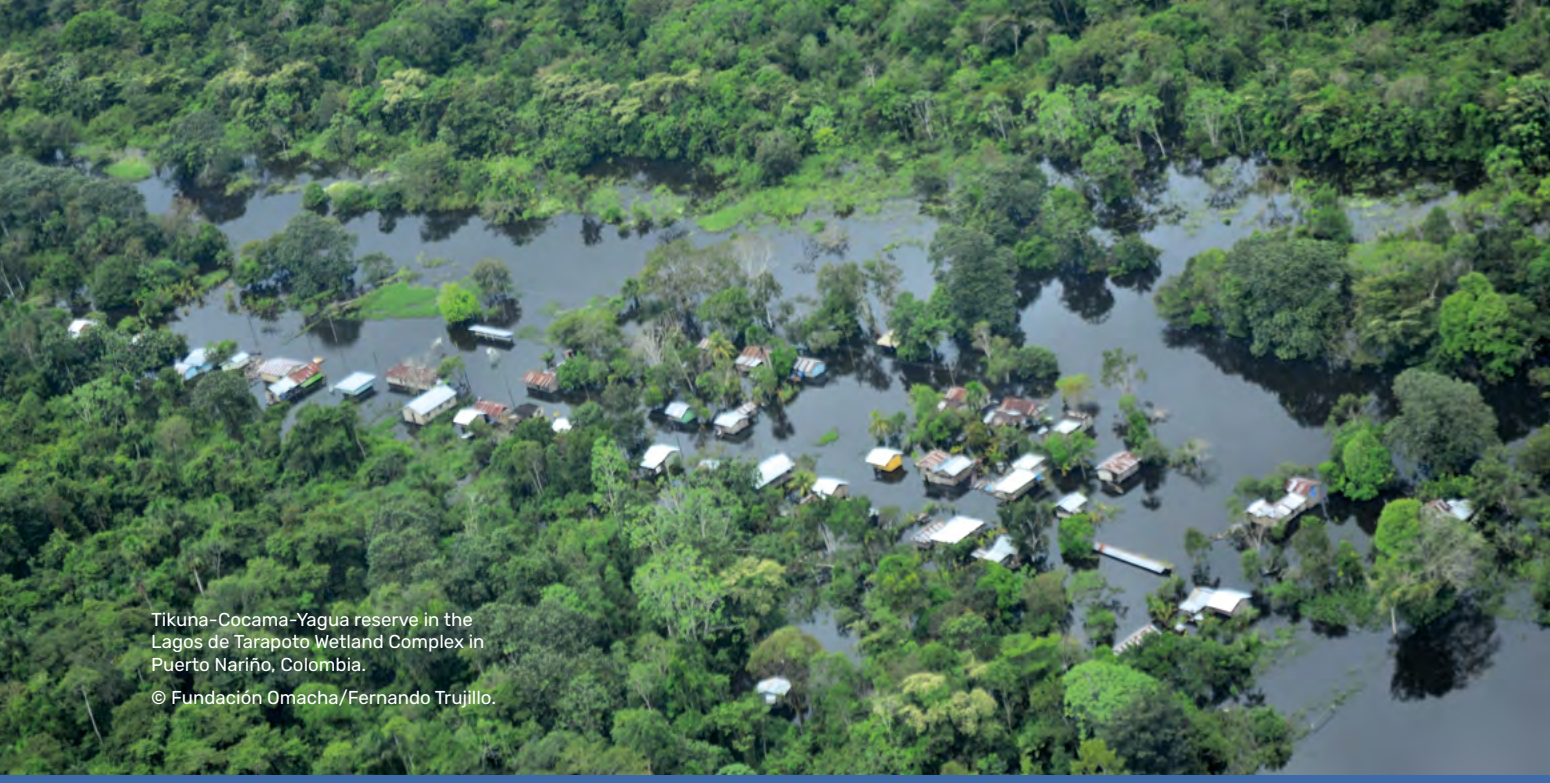
There is an urgent need to develop **new collaborative research frameworks** that bring together experts from different scientific disciplines but also from different cultures to co-create knowledge. This equates to promoting transdisciplinary, transcultural and co-constructed knowledge between scientists and key actors in society, with Indigenous Peoples at the centre of these efforts.

Further research is needed to highlight the role that Indigenous Peoples' food systems can play in ensuring food and nutritional security; mobilizing political support, sharing knowledge and good practices, discussing successes and challenges, and working to promote and preserve Indigenous Peoples' food systems and the foods and services generated by them, with the ultimate objective of improving food systems, diets and nutrition for all. **These interrelated interventions require the setting of a dedicated body** that would carry them forward in a coordinated manner.

In this regard, a major outcome of the High-Level Expert Seminar on Indigenous Food Systems held in November 2018 at FAO was the creation in 2020 of a **Global-Hub on Indigenous Peoples' Food Systems.**

Launched at the 27th session of the Technical Committee on Agriculture (COAG) of FAO, the Global-Hub brings together universities, research centres, Indigenous Peoples, UN agencies and other interested stakeholders to co-create evidence that builds on scientific and traditional knowledge systems of Indigenous Peoples, in order to influence policy discussions on sustainable and climate-resilient food systems in the context of the UN Decade of Action on Nutrition (2016-2025) and the 2030 Agenda for the Sustainable Development Goals (SDGs).

The overarching objective of the Global-Hub is to facilitate an exchange of evidence that aligns research and Indigenous agendas for a more concerted implication in the food systems debate.



Tikuna-Cocama-Yagua reserve in the Lagos de Tarapoto Wetland Complex in Puerto Nariño, Colombia.

© Fundación Omacha/Fernando Trujillo.

Considered as some of the most sustainable on the planet, Indigenous Peoples' food systems are about the future of food. They can play a significant role in informing the transformation of food systems, making them more sustainable and respectful of nature.

The publication *Indigenous Peoples' food systems: Insights on sustainability and resilience from the front line of climate change*, from which the current brief highlights the salient findings and recommendations, seeks to provide scientific insights into the global debate on sustainable food systems, and to highlight the unique and common characteristics of sustainability and climate resilience of eight Indigenous Peoples' food systems from different parts of the world. It acknowledges the contributions that Indigenous Peoples can make to achieve the 2030 Sustainable Development Goals (SDGs), and advocates for these contributions and associated food systems to be taken into consideration in ongoing discussions about sustainable food systems.

Co-published together with the Alliance of Bioversity International and CIAT, the publication is the third volume of books on Indigenous Peoples' food systems released by FAO. It comes after the books (1) "Indigenous Peoples' Food Systems: The many dimensions of culture, diversity and environment for nutrition and health" (2009), and, (2) "Indigenous Peoples' food systems & well-being: interventions & policies for healthy communities" (2013) co-published with the Centre for Indigenous Peoples' Nutrition and Environment (CINE) at McGill University.

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