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Non-wood forest products for healthy diets, nutrition for all, and bioeconomies for sustainable food and agriculture

Executive Summary

With growing recognition of the socio-economic benefits of sustainably using biodiversity among Latin American and Caribbean (LAC) countries, non-wood forest products (NWFP) derived from forests, trees and wild species are gaining traction across agri-economic activities. Their untapped potential to contribute to agri-food system transformation creates unique opportunities to enhance agriculture and forestry linkages. This document discusses policy options for optimizing the benefits of NWFP for healthy diets, nutrition for all, and the growth of bioeconomies for sustainable food and agriculture.

Suggested action by the Commission

The Commission may wish to invite countries to:

- Enhance collaboration across sectors such as forestry, water, crop, livestock, fisheries and health to promote inclusive policy coherence that can contribute to simultaneously addressing nutritional challenges as well as the biodiversity loss and climate crises;
- Increase regional collaboration to improve data collection and monitoring of plant and animal-based non-wood forest products (NWFP), forest ecosystem services, and other forest-related aspects contributing to nutrition to provide the evidence base for effective policy, decision-making and development interventions; and
- Promote the sustainable development of nutritious and biodiverse NWFP-based value chains to improve physical and economic access to healthy diets and resilient livelihoods, while contributing to the transformation to sustainable agri-food systems and bioeconomies.

The Commission may wish to request FAO to:

- Support countries to better coordinate policy responses in LAC that aim to strengthen agriculture and forestry linkages, recognizing the key role of forests, trees and associated ecosystems in providing NWFP and thus contributing to agri-food systems transformation and the transition to a bioeconomy for sustainable food and agriculture;
- Facilitate inter-sectoral dialogues and exchange of knowledge and good practices in the region to further identify opportunities to improve linkages between agriculture and forestry sectors, including by supporting resource mobilization to maximize the contributions of forest, trees and NWFP to healthy diets, nutrition for all, and the growth of sustainable bioeconomies for food and agriculture; and
- Pursue efforts to establish a multi-country initiative on forests foods in LAC that aims to promote the sustainable use and consumption of forest foods, and contribute to safeguarding biodiversity while improving nutrition, food security, and livelihoods.

Queries on the content of this document may be addressed to:

LACFC Secretariat
Regional Office for Latin America and the Caribbean (RLC)
Pieter.VanLierop@fao.org

I. INTRODUCTION

1. Against a climate crisis, accelerated biodiversity loss¹ and the largest setback in global poverty, hunger and inequality in decades, the world is navigating multiple, cascading and intersecting challenges.² Latin American and Caribbean (LAC) countries face rising hunger, food insecurity, childhood overweight and adult obesity, and rising prices for healthy foods.³ Desertification, land and habitat degradation and the disappearance of numerous plant and animal species in the LAC region threaten ecosystems that provide vital functions and services such as pollination, carbon sequestration and climate regulation, essential for human and ecological health, including sustainable agricultural production. Between 1990 and 2020, the deforestation rate in the region was not fully matched by afforestation and natural forest expansion, with the highest deforestation occurring in South America, driven mainly by land conversion for agriculture.⁴

2. A holistic response to the above-mentioned challenges depends to a large extent on accelerating the transformation to MORE efficient, inclusive, resilient and sustainable agri-food systems.⁵ FAO's Strategic Framework 2022-2031⁶ provides comprehensive guidance for achieving healthy diets for all and nutrition for the most vulnerable, while leveraging bioeconomies for sustainable food and agriculture. With growing recognition of the socio-economic benefits of sustainably using biodiversity among (LAC) countries, non-wood forest products (NWFP) derived from forests, trees and wild species are gaining traction across agri-economic activities. Their untapped potential to contribute to agri-food system transformation creates unique opportunities to enhance agriculture and forestry linkages, while addressing interconnected societal challenges such as food and nutrition security, fossil fuel-based resource dependence, natural resource scarcity, biodiversity loss and climate change.

3. At its 26th Session, held on 3-7 October 2022, the Committee on Forestry (COFO) invited FAO "to support Members, upon request, to further identify opportunities and implement actions to improve complementarity between the agriculture and forestry sectors and strengthen coordinated policy responses towards the realization of the 2030 Agenda for Sustainable Development, recommending that these initiatives do not create unnecessary barriers to trade and benefit the situation for small-scale producers who are key for global food production". It also invited Members "to promote greater and inclusive policy coherence between the agriculture and forestry sectors, including through integrated land use planning, landscape approaches and secured access to land, as well as support to small-scale producers, family farmers, women, youth, Indigenous Peoples and local communities", "to accelerate sustainable use of NWFP and their value chains, including better access to technology, markets and data, for improved food security, nutrition, health, and livelihoods", and "to continue raising awareness about the socio-economic role of forests... as an essential element in the development of a bioeconomy".⁷

4. The LAC FAO Regional Conference in its thirty-seventh session, held on 28 March-1 April 2022 recommended FAO "to continue supporting Members in implementing national policies to reduce all forms of malnutrition and promote the consumption of healthy and adequate food and increase awareness of the importance of promoting healthy diets for all". The LAC Forestry Commission in its thirty-second session requested FAO "to further strengthen its intersectoral work through activities

¹ FAO. 2022. *The State of the World's Forests. 2022. Forest pathways for green recovery and building inclusive, resilient and sustainable economies*. Rome, FAO. <https://doi.org/10.4060/cb9360en>

² United Nations. 2022. *The Sustainable Development Goals Report*. New York. <https://unstats.un.org/sdgs/report/2022/The-Sustainable-Development-Goals-Report-2022.pdf>

³ FAO, IFAD, PAHO, UNICEF and WFP. 2023. *Regional Overview of Food Security and Nutrition – Latin America and the Caribbean 2022: towards improving affordability of healthy diets*. Santiago. <https://doi.org/10.4060/cc3859en>

⁴ FAO. 2020. *Global Forest Resources Assessment 2020 – Key findings*. Rome. <https://doi.org/10.4060/ca8753en>

⁵ <https://www.un.org/sustainabledevelopment/decade-of-action/>

⁶ <https://www.fao.org/3/cb7099en/cb7099en.pdf>

⁷ COFO/2022/REP

aimed at reducing deforestation and promoting sustainable agriculture and forest management in ways that would lead to more efficient, inclusive, resilient, and sustainable agrifood systems”.⁸

5. On 10-12 May 2023, FAO organized a workshop on “Forest food systems and their contribution to food security and nutrition in LAC”. The workshop aimed at defining priorities for the sustainable use of forest plants, fungi and insects in LAC while contributing to safeguard biodiversity, fight climate change and simultaneously improve nutrition, food security, and livelihoods. The workshop i) facilitated knowledge exchange on enabling contributions from forest plants, fungi and insects to sustainable food systems; ii) identified opportunities and challenges based on four thematic areas (i.e. food security and nutrition; conservation and sustainable management; innovative and sustainable value chains; and enabling environment); iii) defined a prioritized agenda of action for each thematic area; and iv) identified potential partners in support of a possible initiative on NWFP with focus on forest foods derived from forest plants, fungi and insects.

II. The contribution of NWFP to sustainable bioeconomies

6. Hosting most of the terrestrial biodiversity in LAC and providing a range of ecosystem services, forests and bioeconomy are strongly interrelated. Forests and trees outside forests provide substantial contributions to the bioeconomy through the provision services for the remediation of soils, air and water, pollination and biological control, and goods such as biomaterials for medicines, cosmetics, food, fodder, energy, construction, among others.⁹

7. NWFP that are collected from forest, trees and associated ecosystems provide substantial contributions to the bioeconomy. They are nutrient-dense and used as biomaterials for numerous valuable products derived from plants and animals and sold for cash and found in local, regional and global trade. Uses rates of NWFP reach up to 90 percent of the population across LAC.¹⁰, being of particular importance for the poorest and more vulnerable populations.¹¹ Many NWFP moreover are increasingly forming the basis of multiple, billion-dollar industries, from food to health and well-being sectors.¹²

8. Although NWFP-related statistics remain a challenge in the region, available data from selected countries provide evidence of the important contribution of NWFP to the bioeconomy. The export value of Brazil nuts (*Bertholletia excelsa*), for example, which grows mainly through Bolivia, Brazil and Peru, amounted to USD 373 million in 2019. In Bolivia, Brazil nuts are the second most important “agricultural” export, employing some 14,000 harvesters and 8,000 processors.¹³ In Mexico, the total value of NWFP trade was estimated at USD 56.4 million in 2018, with six states representing 83 percent of this total value: Michoacán, Coahuila, Durango, Veracruz, Chihuahua and Tamaulipas.¹⁴ Perú reported for 2021 a total exported value of some USD 58 million, led by Tara (*Caesalpinia spinosa*), Brazil nuts and Cochineal (*Dactylopius coccus*) extract.¹⁵ Chile reported for 2021 that NWFP exports amounted to USD 86.4 million, an increase of 9 percent over 2020. The three main exponents of this

⁸ LACFC/2021/REP

⁹ L. E. Meza y A. G. Rodríguez, “Soluciones basadas en la naturaleza y la bioeconomía: contribución a una transformación sostenible e inclusiva de la agricultura y a la recuperación pos-COVID-19”, Serie Recursos Naturales y Desarrollo, N° 210 (LC/TS.2022/43), Santiago, Comisión Económica para América Latina y el Caribe (CEPAL), 2022.

¹⁰ Shackleton, C. M., & de Vos, A. (2022). How many people globally actually use non-timber forest products? Forest Policy and Economics, 135, 102659. <https://doi.org/https://doi.org/10.1016/j.forpol.2021.102659>

¹¹ IPBES (2022): Thematic assessment of the sustainable use of wild species of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. J.-M. Fromentin, M.R. Emery, J. Donaldson, M.-C. Danner, A. Hallosserie, D. Kieling (eds.). IPBES secretariat, Bonn, Germany. <https://doi.org/10.5281/zenodo.6448567>

¹² Schindler, C., Heral, E., Drinkwater, E., Timoshyna, A., Muir, G., Walter, S., Leaman, D.J. and Schippmann, U. 2022. Wild check – Assessing risks and opportunities of trade in wild plant ingredients. Rome, FAO. <https://doi.org/10.4060/cb9267en>

¹³ Van der Wal, 2021 van der Wal, S. (2021). Brazil nuts: exploitative social and economic conditions in the Bolivian Amazon. Centre for Research on Multinational Corporations (SOMO). <https://www.somo.nl/brazilnuts/> Accessed on 23 January

¹⁴ SEMARNAT (2018). Anuario Estadístico de la Producción Forestal: 2018. Secretaría de Medio Ambiente y Recursos Naturales

¹⁵ Serfor (2021). Anuario forestal y de fauna silvestre. Lima. <https://sniffs.serfor.gob.pe/estadistica/es/tableros/publicaciones/anuarios>

export item account for more than 65.4 percent of the total amount exported: Rosehip fruits (29.0 percent), *Sphagnum magellanicum* moss (20.7 percent) and Quillai extract (15.7 percent).¹⁶

9. Production data on NWFP is equally scarce, but improving. Brazil, for example, reports for 2021 that NWFP represented some 11 percent of the value of the total forestry production (mainly from wild harvesting). Around 80 percent of NWFP production in Brazil was made up of food alone, with Brazil nuts, Mate herb, Pequi and Açai having the highest positive annual variation of the value of production, while açai extraction registered the highest value of production.¹⁷ In the LAC region, Brazil nuts and honey production continue their historic growth, with the latter reaching records highs for 2021.¹⁸ In Mexico, for 2018 resins, gums, rhizomes, organic substrate (“tierra de monte”), fibres, wax, among others, represented nearly 10% of forestry production, corresponding to USD 56.4 million.¹⁹

10. Multiple studies note an important and sustained growth in the commercialization of NWFP, fostered by significant advances in new commercial ventures driven by higher demand for natural and healthy products. Globally, an estimated 60–90 percent of internationally traded medicinal plant species are still wild-collected.²⁰ Additionally, growth has been accompanied by increased research and development actions focusing on adding value, methods and techniques for sustainable management of the forests, and improved harvesting practices by rural inhabitants. However, this growth has also been associated with inequalities in benefit sharing and access to knowledge and markets for the most vulnerable rural populations, who are largely dependent on forest resources for their livelihood. A recent assessment by FAO, TRAFFIC and IUCN’s Species Survival Commission on the risks and opportunities of trade in NWFP²¹ has identified medium biological risks and high social risks related to the exploitation of Brazil nuts. However, the assessment also identified a “clear opportunity to support wider Amazon rainforest conservation efforts through protection and sustainable harvesting of the Brazil nut tree, ... [which would] simultaneously safeguard the livelihoods of those depending on Brazil nut harvest for their families’ income, while contributing towards a stable supply of Brazil nuts into the future”. Prospects for domestication to alleviate pressure on wild resources and increase supply are improving for some NWFP species, with several native perennial species under research throughout the Amazon, for example, including acai palm (*Euterpe oleracea* Mart.), cupuassu tree (*Theobroma grandiflorum* Willd), and guarana tree (*Paullinia cupana* Kunth.), yet breeding challenges remain.²²

11. Bioeconomy has also an untapped potential to help transform agri-food systems due to its cross-cutting nature. It therefore offers a unique opportunity to comprehensively address interconnected societal challenges such as food and nutrition security, fossil fuel-based resource dependence, natural resource scarcity as well as biodiversity loss and climate change, while ensuring sustainable consumption and production patterns as called upon by the Sustainable Development Goals.

III. The contribution of NWFP to healthy diets and nutrition for all

12. Countries in LAC face increased hunger, food insecurity, child overweight and adult obesity, as well as rising prices for healthy food. The region has the costliest healthy diet compared to other regions of the world, where an estimated 131 million people cannot afford a healthy diet.²³ The greatest burden falls on vulnerable populations such as indigenous people, rural inhabitants and women. Fruits and

¹⁶ Infor (2022). Chilean Statistical Yearbook of Forestry. Santiago. <https://wef.infor.cl/index.php/publicaciones/boletines-estadisticos/anuario-forestal>

¹⁷ pevs_2021_v36_informativo.pdf(ibge.gov.br)

¹⁸ Available at <https://www.fao.org/faostat/en/#data/OCL>

¹⁹ Estadísticas por Estados de Producción Forestal Maderable y No Maderable - Sistema Nacional de Información Forestal (cnf.gob.mx)

²⁰ Schindler, C., Heral, E., Drinkwater, E., Timoshyna, A., Muir, G., Walter, S., Leaman, D.J. and Schippmann, U. 2022. Wild check – Assessing risks and opportunities of trade in wild plant ingredients. Rome, FAO. <https://doi.org/10.4060/cb9267en>

²¹ Schindler, C., Heral, E., Drinkwater, E., Timoshyna, A., Muir, G., Walter, S., Leaman, D.J. and Schippmann, U. 2022. Wild check – Assessing risks and opportunities of trade in wild plant ingredients. Rome, FAO. <https://doi.org/10.4060/cb9267en>

²² Chaves, S. F. D. S., Alves, R. M., & Dias, L. A. D. S. (2021). Contribution of breeding to agriculture in the Brazilian Amazon. I. Açai palm and oil palm. *Crop Breeding and Applied Biotechnology*, 21.

²³ FAO, IFAD, PAHO, UNICEF and WFP. 2023. Regional Overview of Food Security and Nutrition – Latin America and the Caribbean 2022: towards improving affordability of healthy diets. Santiago. <https://doi.org/10.4060/cc3859en>

vegetables are among the food groups that contribute most significantly to the cost of a healthy diet. Daily consumption of fruit and vegetables in the LAC region is however estimated to be under the recommended 400 grams per person per day in all countries.^{24 25}

13. Forests and especially NWFP can support efforts to tackle these challenges. Edible NWFP, both from plants and animals are rich in micronutrients, contributing to diet quality and providing essential nutrients, especially for women, children, and vulnerable segments of society. Their contribution varies greatly from one socioecological setting to another; however an increase in forest coverage, number of patches, and exposure have been correlated with a higher dietary diversity and the likelihood of fruit and vegetable consumption,²⁶ supporting dietary resilience and micronutrient intake along the year. The latter is key when half of the most vulnerable populations face micronutrient deficiency.²⁷

14. Many studies document the rich biodiversity characterizing traditional forest-based agrifood systems. In Colombia, at the national level, the use of around 137 species of tree-bearing plants (trees, shrubs, palms and others) has been reported for food in local communities. Overall, NWFP that are most used in food are fruits and seeds. The consumption of leaves, palms, stem and root of some plants is also reported for indigenous and Afro-Colombian communities, as part of the traditional culinary dishes of some peoples and ethnicities.²⁸ Mushrooms and insects were also reported by Iganos tribes.²⁹ In Ecuador, 354 wild plants are used by Mestizo farmers and indigenous Shaur and Saraguros indigenous communities,³⁰ which is in stark contrast to modern food systems with only nine species accounting for 66 percent of global crop production. In Jamaica, forest-dependent farmers venture up to three miles into the forest in search of food, mainly yams, fruits, bananas, plantains, bananas and wild pigs. However, it is also reported the use of forest for beekeeping, bird hunting, farming, firewood, grazing animals, and leisure.³¹ In the same study, most of the farmers (60 percent) who harvest wild food are either moderately (54 percent) or severely (six percent) food insecure, reaffirming the importance of wild foods to the food security of farmers.

15. While methodological challenges have made it difficult to quantify the nutritional contributions of NWFP to diets, this is improving thanks to better data on diets, and greater awareness and understanding of the nutritional composition of forest and wild species, which include many NWFP. In Ecuador, wild leafy greens were estimated to contribute an additional 8 percent vitamin A, 7 percent iron, 12 percent vitamin C, and 27 percent folate to children's recommended dietary intakes. In Brazil, the vitamin C content in 100g of the pulp of three native fruits and one native nut – camu-camu, mangaba, jabuticaba and cerrado cashew – have been found to provide at least three times the amount contained in 100g of common varieties of orange, banana and papaya. In view of this new

²⁴ Global Dietary Database. Global Dietary Intake Estimates. <https://www.globaldietarydatabase.org/data-download>. Data accessed on 23 February 2023.

²⁵ Kovalskys I, Rigotti A, Koletzko B, Fisberg M, Gómez G, Herrera-Cuenca M, Cortés Sanabria LY, Yépez García MC, Pareja RG, Zimberg IZ, Del Arco A, Zonis L, Previdelli AN, Guajardo V, Moreno LA, Fisberg R; ELANS Study Group. Latin American consumption of major food groups: Results from the ELANS study. *PLoS One*. 2019 Dec 26;14(12):e0225101. doi: 10.1371/journal.pone.0225101. PMID: 31877144; PMCID: PMC6932811.

²⁶ Rasolofoson, R. A., Hanauer, M. M., Pappinen, A., Fisher, B., & Ricketts, T. H. (2018). Impacts of forests on children's diet in rural areas across 27 developing countries. *Science Advances*, 4(8), eaat2853. <https://doi.org/10.1126/sciadv.aat2853>

²⁷ Stevens, G. A., Beal, T., Mbuya, M. N. N., Luo, H., & Neufeld, L. M. (2022). Micronutrient deficiencies among preschool-aged children and women of reproductive age worldwide: a pooled analysis of individual-level data from population-representative surveys. *The Lancet. Global Health*, 10(11), e1590–e1599. [https://doi.org/10.1016/S2214-109X\(22\)00367-9](https://doi.org/10.1016/S2214-109X(22)00367-9)

²⁸ Yepes Quintero, A. Santos Acuna, L. Ruiz-Jaen, M. (2023). Contributions of forests to food security for rural families in Colombia. [Unpublished manuscript].

²⁹ Kuhnlein, H. V., Erasmus, B., & Spigelski, D. (2009). *Indigenous Peoples' food systems: The many dimensions of culture, diversity and environment for nutrition and health*. Food and Agriculture Organization of the United Nations (FAO).

³⁰ Van den Eynden, V., Cueva, E. & Cabrera, O. Wild foods from Southern Ecuador. *Econ Bot* 57, 576–603 (2003). [https://doi.org/10.1663/0013-0001\(2003\)057\[0576:WFFSEJ\]2.0.CO;2](https://doi.org/10.1663/0013-0001(2003)057[0576:WFFSEJ]2.0.CO;2)

³¹ Campbell D, Moulton AA, Barker D, Malcolm T, Scott L, Spence A, Tomlinson J and Wallace T (2021) Wild Food Harvest, Food Security, and Biodiversity Conservation in Jamaica: A Case Study of the Millbank Farming Region. *Front. Sustain. Food Syst.* 5:663863. doi: 10.3389/fsufs.2021.663863

knowledge, "Brazilian Sociobiodiversity: Native Food Species of Nutritional Value" have now been officially defined and recognized³², a vital step towards mainstreaming biodiversity into food systems.³³

16. Wild meat are part of animal-sourced foods that can represent globally up to 80 percent of the protein consumed by certain populations.^{34 35} In Central America and Amazonia, a variety of vertebrates are hunted or gathered.³⁶ A meta-analysis of 78 hunting studies recorded a total of 90 hunted mammal species.³⁷ In the Amazon, recent studies demonstrate that urban consumption of wildlife is widespread in Amazonia's towns³⁸³⁹, as well as on the Pacific coast of Colombia⁴⁰ and the Caribbean.⁴¹⁴²⁴³ A number of large well-known urban markets exist, where wild animals are sold for human consumption, such as the market in Iquitos, Peru⁴⁴, Abaetetuba in Pará, Brazil⁴⁵, in the Amazon trifrontier⁴⁶ and on the Coast of Guyana⁴⁷. In South America, wild meat in rural communities remains an important component of household food security, not necessarily in terms of quantity, but as a key element in diet and income diversification as well as socially and culturally. Estimates indicate that 5–8 million people in South America (ca. 1.4–2.2 percent of the total population) regularly rely on wild meat as a protein source, with many being among the poorest of the region.⁴⁸ For example, in semi-arid regions, such as the Brazilian Caatinga, wild mammal meat can be a vital source of animal protein for human communities because the availability of fish is limited. In this ecoregion, wild meat can be especially critical during early drought periods, when crops are scarce and domestic animals may die because of starvation and dehydration.⁴⁹ Several studies have shown that wild meat from the most commonly hunted neotropical species contributes to healthy diets and that the nutritional content of wild meat is difficult to replace by most affordable sources of meat from domestic and industrial origin.⁵⁰ In addition, wild meat constitutes what could be called a festival food,⁵¹ understood as a food choice that

³² Ordinance N° 163 on Sociobiodiversity was published in May 2016 in the Union Official Journal of Brazil

³³ GEF, UNEP, FAO, Bioversity International & CGIAR. (2016). Biodiversity for Food and Nutrition Initiative, Country Profile. (available at: http://www.b4fn.org/fileadmin/templates/b4fn.org/upload/documents/Country_profiles/COUNTRY_PROFILE_-_BRAZIL_JUNE_2016.pdf)

³⁴ Nasi, R., Taber, A., & Van Vliet, N. (2011). Empty forests, empty stomachs? Bushmeat and livelihoods in the Congo and Amazon Basins. *The International Forestry Review*, 13(3), 355–368. <http://www.jstor.org/stable/24310711>

³⁵ Coad, L., Fa, J., Abernathy, K., Van Vliet, N., Santamaria, C., Wilkie, D.S., El Biziri, H.R., Ingram, D.J., Cawthorn, D. & Nasi, R. 2019. Towards a sustainable, participatory and inclusive wildmeat sector. Bogor, Indonesia, CIFOR.

³⁶ Alves, Rômulo Romeu Nóbrega & Van Vliet, Nathalie. Wild fauna on the menu. In : *Ethnozoology*. Academic Press, 2018. p. 167-194.

³⁷ Stafford, C. A.; Preziosi, R. F. & Sellers, W. I. (2017). A cross-site analysis of Neotropical bird hunting profiles. *Tropical Conservation Science*, 10, 1940082917736894.

³⁸ Parry, L.; Barlow, J., and Pereira, H. (2014). Wildlife harvest and consumption in Amazonia's urbanized wilderness. *Conservation Letters* 7: 565–574.

³⁹ Van VLIET, Nathalie, Mesa, Maria Paula Quiceno; Cruz-Antia, Daniel, *et al.* (2014). The uncovered volumes of bushmeat commercialized in the Amazonian trifrontier between Colombia, Peru & Brazil. *Ethnobiology and Conservation*, vol. 3.

⁴⁰ Van Vliet, Nathalie; Quiceno, M.; Moreno, J.; Cruz, D.; Fa, J. E. & Nasi, R. (2017). Is urban bushmeat trade in Colombia really insignificant?. *Oryx*, 51(2), 305-314.

⁴¹ Saadoun, A.; Cabrera, M. C.; Terevinto, A. & del Puerto, M. (2014). Why not a piece of meat of rhea, nutria, yacare, or vicugna for dinner?. *Animal Frontiers*, 4(4), 25-32.

⁴² Foster, R. J.; Harmsen, B. J.; Macdonald, D. W.; Collins, J., Urbina, Y., Garcia, R., & Doncaster, C. P. (2016). Wild meat: a shared resource amongst people and predators. *Oryx*, 50(1), 63-75.

⁴³ Van Vliet, Nathalie; Puran, Anupana; David, Oswin, *et al.* (2022). From the forest to the coast: the wild meat trade chain on the Coast of Guyana. *Ethnobiology and Conservation*, vol. 11.

⁴⁴ Bodemer, Richard E. & Lozano, Etersit Pezo. (2001) Rural development and sustainable wildlife use in Peru. *Conservation Biology*, vol. 15, no 4, p. 1163-1170.

⁴⁵ Chaves Baia Junior, Pedro; Guimaraes, Diva Anelie and Le Pendu, Yvonnick. (2010) Non-legalized commerce in game meat in the Brazilian Amazon: a case study. *Revista de biologia tropical*, vol. 58, no 3, p. 1079-1088.

⁴⁶ van Vliet et al. (2014). Same as 39

⁴⁷ van Vliet et al. (2022). Same as 43

⁴⁸ Rushton, J., R.; Viscarra, C.; Viscarra, F.; Basset, R. B. and D. Brown. (2005). How important is bushmeat consumption in South America: now and in the future? ODI Wildlife Policy Briefing No. 1. Overseas Development Institute, London, UK. [online] URL: <http://www.odi.org.uk/resources/download/2418.pdf>

⁴⁹ Barboza, R. R. D., Lopes, S. F., Souto, W. M., Fernandes-Ferreira, H., & Alves, R. R. (2016). The role of game mammals as bushmeat in the Caatinga, northeast Brazil. *Ecology and Society*, 21(2).

⁵⁰ Van Vliet, N., M. Calderón, J. L., Gomez, J., Zhou, W., Fa, J. E., Golden, C., and Nasi, R. (2017). Bushmeat and human health: assessing the evidence in tropical and sub-tropical forests.

⁵¹ Van Vliet, N., Quiceno, M. P., Cruz, D., de Aquino, L. J. N., Yagüe, B., Schor, T., ... & Nasi, R. (2015). Bushmeat networks link the forest to urban areas in the trifrontier region between Brazil, Colombia, and Peru. *Ecology and Society*, 20(3).

may be related to identifying with ethnic background,⁵² or as a comfort food, consumed in positive social contexts resulting in a positive association between the food and emotional well-being.

17. Inland fisheries provide food for about one billion people globally and it is estimated that more than 200 million people depend at least partly on livelihoods generated from inland fisheries. Inland fisheries continue to constitute an important part of rural livelihoods in LAC countries, especially among Indigenous Peoples. Colombia, for example, is among the LAC countries where the most inland fish are landed as inland fisheries employ the same number or more people as marine fisheries. The importance of collaboration across sectors was highlighted in recent studies in the Magdalena basin which demonstrated that decreases in catch are mainly due to environmental degradation, including loss of forest cover, rather than management of the fishery itself. The analysis highlighted intersectoral relationships and demonstrated significant potential to enhance institutional and intersectoral collaboration within basins to ensure sustainability and restore ecosystem services.⁵³

IV. Optimizing the contributions of non-wood forest products

18. NWFP are gaining prominence as governments in the LAC region aim to tackle hunger, malnutrition, climate change, land degradation and biodiversity loss, while making efforts into moving towards a sustainable bioeconomy. The urgency to produce diverse, nutritious and affordable food and products in support towards a sustainable bioeconomy positions the forest sector in a key role for contributing to agri-food systems transformation. Greater ambition, the exploration of alternative and innovative pathways, improved legal frameworks to enable sustainable use of NWFP and coordinated policies across sectors, following lessons learnt from multi-sectoral programmes such as the Sustainable Wildlife Management Programme⁵⁴, will be required for maximizing the contributions from forests, trees and wild species to healthy diets, nutrition for all, and a transition to bioeconomies for sustainable food and agriculture. Depending on the specific country context and priorities, optimizing the contributions of NWFP will require:

- i. *Securing conservation and sustainable supply*, including embracing multi-functional forest management (including freshwater systems) to enhance NWFP production that also supports nutrition, recognizes NWFP-rich agroforestry habitats, supports long-term investments in forests for higher private profitability, and strengthens domestication efforts that could enhance the forest resource base.
- ii. *Building viable, competitive and nutritional sensible value chains*, including favoring co-management of public forests with local populations; supporting territorial value chains and local networks; promoting ventures that make nutritious and diversified food available, accessible, affordable and desirable to people; promoting new business models and downstream integration; supporting certification for quality, origin and sustainability; and incorporating systems of Payment for Environmental Services (PES).
- iii. *Providing transparency, data and information flow on NWFPs*, including establishing databases with priority NWFP for the country; improving official NWFP reporting in International Statistical Classifications Systems; integrating NWFP in individual/household consumption surveys; and complementing information by targeted sectoral and market surveys.
- iv. *Creating enabling conditions*, including clarifying legal frameworks and promoting more coherent action across different policy areas related to NWFP, including nature

⁵² Morsello, Carla; B. Yague; L. Beltreschi, *et al.* (2015). Cultural attitudes are stronger predictors of bushmeat consumption and preference than economic factors among urban Amazonians from Brazil and Colombia. *Ecology and Society*, vol. 20, no 4.

⁵³ Hernández-Barrero Sandra, Valderrama Barco Mauricio, Barreto Reyes Carlos Guillermo, Paramo Jorge, Sierra Sierra Luis, Stotz Wolfgang (2022) Is traditional fisheries management correctly addressing the possible causes of fish production decline? The relationship between environmental degradation and artisanal river fisheries in the Magdalena River basin, Colombia. *Marine and Freshwater Research* 73, 1475-1488. <https://doi.org/10.1071/MF22025>

⁵⁴ <https://www.swm-programme.info/country-guyana>.

conservation, rural development, tourism, agri-food, industry, bioeconomy, labor, taxation, and trade.