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**AGRICULTURE AND FOOD  
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17 - 21 SEPTEMBER 2018 | PORTO ALEGRE | BRAZIL



**Biodiversity for Food and Nutrition Project: Promoting Food and Nutritional Security through Institutional Markets in Brazil.**

**Projeto Biodiversidade para Alimentação e Nutrição: Promovendo a Segurança Alimentar e Nutricional por meio de Mercados Institucionais no Brasil.**

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**Abstract.** In recent decades, agriculture and food systems have changed dramatically which has seen a worldwide trend towards dietary simplification with an increasing loss of biodiversity. Our current global food system still fails to provide adequate food for all, since 870 million people are hungry and 2 billion suffer from micronutrient deficiencies. The GEF-funded *Biodiversity for Food and Nutrition Project* (BFN) in Brazil aims at strengthening the conservation and sustainable use of biodiversity by providing evidence of its benefits for nutrition and well-being, and mainstreaming biodiversity into national food and nutrition policies and strategies. Brazil has a well-established political and regulatory framework aimed at promoting food and nutritional security, including institutional markets such as the Food Acquisition Program (PAA), the National School Feeding Program (PNAE) and the Minimum Price Guarantee Policy of Biodiversity Products (PGPM-Bio). These institutional food procurement programs were identified as entry-points by the BFN Project for potentially improving nutrition and livelihoods with positive outcomes expected for the conservation of native biodiversity. The BFN Project in Brazil negotiated Ordinance N. 284/2018, with the official list of native species of the Brazilian socio-biodiversity with current or potential nutritional value. This legal instrument represents the recognition of nutritional native food species to guide public policies and is being used to measure and monitor the expenditures of socio-biodiversity products by PNAE, PAA and PGPM-Bio. This paper discusses how this Ordinance can facilitate greater procurement of biodiversity and greater incentives for family farmers in institutional food procurement and school feeding programs.

**Keywords:** biodiversity, institutional markets, food and nutrition security, Brazil.

## Introduction

Food biodiversity is defined as food identified at the taxonomic level below species level (at either the variety, cultivar or breed level), and neglected, underutilized or wild species (FAO and Bioversity International, 2008). It includes species with under-exploited potential for contributing to food security, health (nutritional and medicinal), income generation and environmental services, including associated traditional knowledge, management of this diversity, as well as food preparation. Frequently, the terms ‘underutilized’, ‘neglected’, ‘orphan’, ‘minor’, ‘promising’, ‘niche’, ‘local’ and ‘traditional’ are used interchangeably to describe these species that have significant local importance and considerable global potential but are not widespread mainstream crops. These species are highly nutritious with other multiple uses and benefits; strongly linked to the cultural heritage



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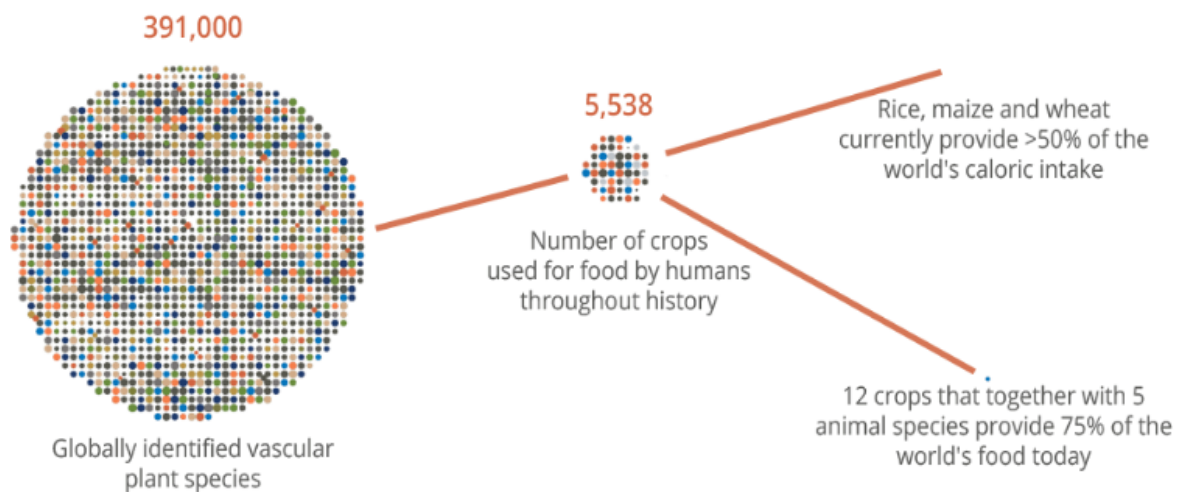
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of their places of origin; highly adapted to marginal, complex and difficult environments and have contributed significantly to diversification and resilience of agro-ecological niches; may be collected from the wild or produced in traditional production systems with little or no external inputs; and probably, most significantly, receive little attention from national and international research, policy and decision makers, international covenants, donors and consumers (Bioversity International, GEF, UNEP and FAO, 2011).

In recent decades, agriculture and food systems have changed dramatically and there is a worldwide trend towards food production and dietary simplification with an increasing loss of biodiversity-rich habitats and the genetic erosion of local traditional food crops. Of over 30,000 known edible plants and around 5,000 crops used by humans in history, nowadays only 3 – rice, maize and wheat – provide more than 50% of our energy intake. These and a few other select crops have become the main staple foods for humans or feed for livestock around the world (FAO, 2005). All of this has a negative impact on food security, nutrition and health, not to mention resilience of agricultural systems. Figure 1 below helps to illustrate the loss of food biodiversity over the years and our current reliance on a narrow base of food crops.

**Figure 1: Shrinking diversity**



Source: RBG Kew, 2016; FAO (2005).

Our current global food system still fails to feed the world's population adequately, since 870 million people are hungry and 2 billion suffer from 'hidden hunger' or micronutrient deficiencies (FAO, WFP and IFAD, 2012). On the other hand, the simplification of diets, together with other lifestyle factors, contributes to the increasing problem of obesity: today about 2.0 billion adults are overweight or obese (Development Initiatives, 2017).

This situation is occurring across the globe in countries with very different cultures and dietary habits. The epidemic of obesity, with its attendant co-morbidities, including heart disease, hypertension, stroke, and diabetes, is not a problem limited to upper-income developing and industrialized countries (WHO, 2003). Currently, every single country in the world faces at least one form of malnutrition (IFPRI, 2016) and many countries are struggling with the "triple-burden" of malnutrition, a previously unknown phenomenon in which hunger,



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micronutrient deficiencies and overweight/obesity are evident within the same population, and often in the same individual across the lifecycle.

In Brazil, according to data from the Ministry of Health (Ministério da Saúde, 2016), 18.9% of the population is obese and more than half of Brazilians are overweight. The country is currently facing a transition from malnutrition to obesity, with an increase of 26.3% in overweight and 60% in obesity from 2006 to 2016.

Food biodiversity, often rich in micronutrients but low in energy-density, can contribute to reversing this trend and represents a nutrition resource that can address the multiple burdens of malnutrition by providing dietary energy, macro and micronutrients and other beneficial bioactive constituents (FAO, 2013). Also, the genetic diversity of livestock, marine species and crops, including their wild relatives, are a fundamental natural resource as a genetic pool for the continued improvement of crop varieties and livestock breeds needed to cope with ongoing challenges, like increasing population, pressure on natural resources and the uncertainty of climate change (CBD, 2013).

In 2016, only one out of three adults in Brazil consumed fruits and vegetables five days a week (Ministério da Saúde, 2016). The last Family Budget Survey (POF) conducted in 2008-2009 (IBGE 2011) also showed that Brazilians are consuming much less fruits and vegetables than the recommended daily intake by the World Health Organization of 400 g (WHO, 2003). On average, Brazilians consume less than 120 g of fruits per day (including fruit juice).

There is a call for a shifting paradigm in approaches to malnutrition and the recognition of the value of biodiversity to promote food and nutritional security is one of the main components (Hunter et al, 2016; Bioversity International, 2017).

### **Biodiversity for Food and Nutrition Project**

The GEF-funded *Biodiversity for Food and Nutrition Project* (BFN) aims at strengthening the conservation and sustainable use of biodiversity by providing evidence of its benefits for nutrition and well-being, and mainstreaming biodiversity into national food and nutrition policies and strategies. The Project is led by Brazil, Kenya, Sri Lanka and Turkey and is coordinated by Bioversity International with implementation support from the United Nations Environment Program (UNEP) and the Food and Agriculture Organization of the United Nations (FAO).

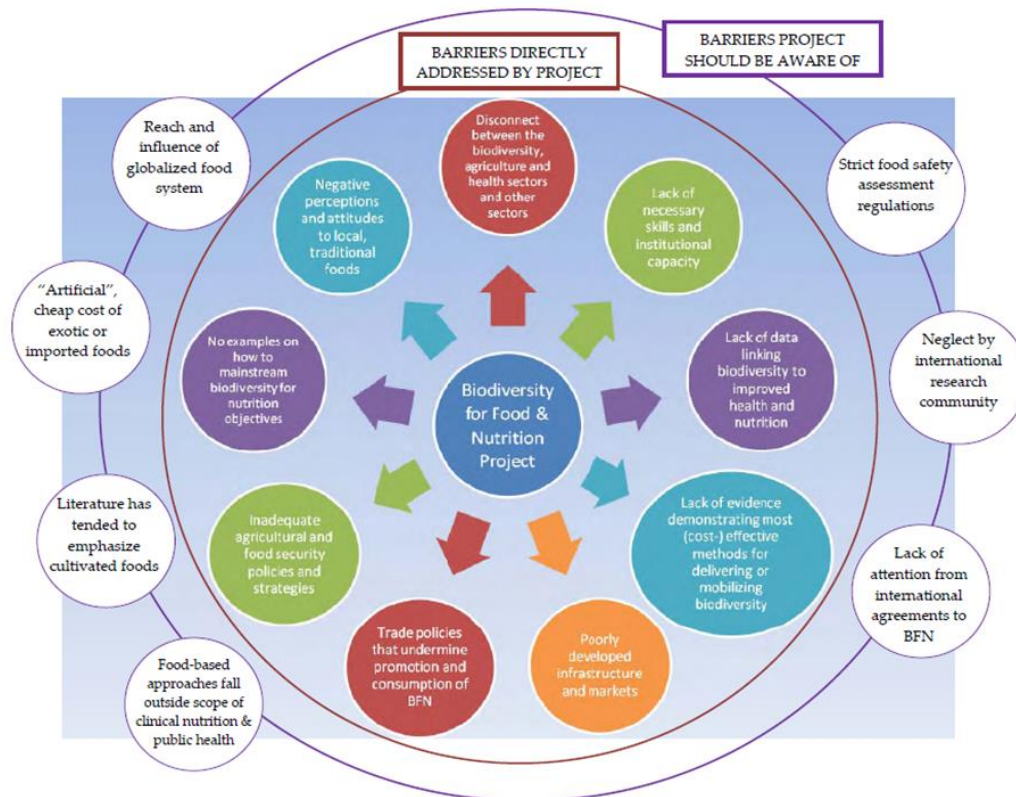
During the project preparation phase, many barriers preventing the wider utilisation of biodiversity for food and nutrition were identified, as illustrated below in Figure 2.

**Figure 2: Barriers to the promotion and mainstreaming of biodiversity for food and nutrition**



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Source: Bioversity International, GEF, UNEP and FAO (2011).

In Brazil, one of the strategies to address barriers such as “poorly developed infrastructure and markets”, “trade policies that undermine promotion and consumption of BFN” and “inadequate agricultural and food security policies and strategies”, during the implementation process of the BFN Project, was by mainstreaming biodiversity into already existing federal institutional food procurement and school feeding programs. Since the country had a well-established political and regulatory framework aimed at promoting food and nutritional security and generating income to small holders and traditional communities by linking family farmers to institutional markets and subsidy policies, the partners involved with the BFN Project identified existing institutional food procurement programs to act as entry-points for the promotion of biodiversity for improved nutrition and livelihoods with expected positive outcomes for the conservation of native species.

The BFN Project in Brazil started to implement activities focusing on strengthening the evidence base of the nutritional potential of native biodiversity, improving policies and markets, as well as building capacity and raising awareness in the ministries of environment, agriculture, social development, agrarian development, education and health.

Since 2012, the BFN Project has been working with partners of these ministries in Brazil to raise awareness on the importance of biodiversity in the context of food and nutrition, and, also, to improve market links to ensure its uptake. This was a potential opportunity to restore ecosystems and foods that were once part of traditional diets, although, up to now, there was a crucial gap in the knowledge base with the lack of scientific information on the nutritional content of promising native food species.





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To address this issue and increase the knowledge base about the Brazilian biodiversity, food composition analysis was carried out for 70 species targeted by the BFN Project, in collaboration with national research institutes and federal universities in Brazil. The data was made available through a Food Composition Database hosted by the Information System on Brazilian Biodiversity (SiBBBr) at the Ministry of Science, Technology, Innovation and Communications (MCTIC). Recipes for many of these species were also developed and will be uploaded to the Database, as well as published in a book during 2018.

Results show that many of the studied species are high in vitamins, such as the high concentrations of vitamin A encountered in the pulp of peach palm (*Bactris gasipaes*; 317 µg retinol activity equivalent [RAE] per 100 g), tucumã (*Astrocaryum aculeatum*; 808 µg RAE per 100 g) and buriti (*Mauritia flexuosa*; 1204 µg RAE per 100 g). High vitamin C concentrations were found in the pulp of camu-camu (*Myrciaria dubia*; 1620 mg/100 g), guabiroba (*Campomanesia xanthocarpa*; 428 mg/100 g) and mangaba (*Hancornia speciosa*; 209 mg/100 g). Protein concentrations were high in seeds of chicha (*Sterculia striata*; 19 g/100 g), pequi (*Caryocar brasiliense*; 29 g/100 g) and baru (*Dipteryx alata*; 29 mg/100 g) (Beltrame *et al.*, 2018).

The BFN Food Composition Database provides important evidence for the inclusion of nutritious species in institutional procurement markets and public policies targeting food and nutrition security and the promotion of healthy and diversified diets (Beltrame *et al.*, 2016). Federal institutions linked to initiatives such as the National School Feeding Program (PNAE), the Food Procurement Program (PAA) and the Minimum Price Guarantee Policy of Biodiversity Products (PGPM-Bio) started working to increase awareness on the importance of native biodiversity. With reliable data on more than 180 local and regional foods based on native biodiversity species, policymakers can now demonstrate their value as sources of nutritious foods and, potentially, sources of income for family farmers and communities. Similarly, the nutrition benefits of native biodiversity to diversify and improve the nutritional content of diets can be demonstrated to consumers.

One important instrument to guide food procurement and other public policies is the official list of native Brazilian socio-biodiversity species of nutritional value, published by the Ministry of the Environment and the Ministry of Social Development through the Interministerial Ordinance N. 163, from 11th of May 2016, and updated in 2018 with the publication of Interministerial Ordinance N. 284, from 30<sup>th</sup> May 2018, which includes 100 species, separated in 83 common names.

Socio-biodiversity is a concept defined by the Brazilian legislation (Interministerial Ordinance N. 239/2009) as "the relationship between biological diversity and diversity of socio-cultural systems", and socio-biodiversity products are "goods and services (final products, raw materials or benefits) generated from biodiversity resources, aiming the development of production chains of interest to traditional communities and family farmers, that promote and valorise their practices and knowledge and ensure the sharing of benefits, thus generating income and promoting better quality of life and quality of the environment they live in".

These definitions are used by a range of public policies, programs and other initiatives in Brazil related to sustainable development and food and nutrition security and aim to promote the recognition of the socio-cultural identity and guarantee the rights of indigenous and traditional communities and family farmers, regarding their products and practices related to native biodiversity resources.



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The socio-biodiversity species listed in Ordinance N. 284/2018 are now more attractive for smallholders not only to use and conserve them, but also to produce and commercialize, since they have greater recognition by federal institutions partners of the BFN. Some steps have already been taken in this direction, as one example, on 7 March 2018, the Special Secretariat for Family Farming and Agrarian Development (SEAD) published Ordinance N. 129/2018, instituting the Socio-biodiversity Label, linked to SIPAF (Identification Label for the Participation of Family Farming), as a measure to benefit producers who grow native species in their regions and to promote the production of native biodiversity. All products derived from the species of the native Brazilian socio-biodiversity list (Ordinance N. 284/2018) and later updates are entitled to receive the Label.

The official list of socio-biodiversity species recognized by Ordinance N. 284/2018, as well as its subsequent updates, will also facilitate the monitoring and tracking of biodiversity within the PAA, PNAE and PGPM-Bio, a challenge encountered by the BFN Project up to now. The lack of an adequate monitoring system to track and assess the purchase of biodiversity food products by national food procurement programs is another result of the poor understanding of the definition of “biodiversity for food and nutrition”, which the list is helping to clarify (Beltrame et al, 2016).

Among supporting activities from PNAE to encourage the promotion and monitoring of purchases of foods from Brazilian biodiversity, arising from Ordinance N. 284/2018, was the recent development of the Quality Index of the Coordination of Food and Nutritional Security (IQ COSAN) to assess the quality of the diet plans in the Program. PNAE is the oldest food and nutrition policy in Brazil and, according to article 4 of Law 11,947/2009, one of its purposes is to develop healthy eating habits in school children, through education actions and the provision of meals that guarantee the nutritional needs during the school year. Therefore, the menus prepared for PNAE are an important strategy for the consolidation of the children’s eating habits. The main objective of the IQ COSAN is the standardization of the analysis of the menus, not only for the technical staff of the National Fund for the Development of Education (FNDE), coordinators of PNAE, but also for the nutritionists and other actors involved with PNAE, to encourage that the menus elaborated will meet the guidelines of the Program and the pillars necessary for an adequate and healthy food.

IQ COSAN is an easy-to-use and accessible instrument, elaborated in Excel, that analyzes the school feeding menus, with points being awarded according to four parameters:

- a) Presence of six food groups (1. cereals and tubers; 2. beans; 3. vegetables; 4. fruits; 5. milks and derivatives; 6. meats and eggs);
- b) Presence of regional and socio-biodiversity foods;
- c) Weekly diversity of meals offered;
- d) Absence of foods classified as restricted, prohibited and sweets.

For the presence of socio-biodiversity foods, IQ COSAN uses the official list of native Brazilian socio-biodiversity species of nutritional value published by Ordinance N. 284/2018, which adds an extra 2.5 points if it appears on the menus. At the end of the evaluation of these parameters, the instrument sums the points of each week and calculates the weekly averages. The IQ COSAN score ranges from 0 to 95 points and classifies the menus as Inadequate (0 to 45.9 points), Needs improvements (46 to 75.9 points) and Adequate (76 to 95 points).

IQ COSAN will not only function as a control mechanism, but also as a form of incentive for socio-biodiversity and support for the nutritionists and other actors from PNAE, providing guidelines when preparing the menus. (FNDE, 2018)



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Together, the list of native Brazilian socio-biodiversity species of nutritional value and the BFN Food Composition Database will facilitate greater procurement of products from socio-biodiversity species, as well as greater incentives for family farmers to promote the production and sale of these products in the scope of the PAA and PNAE. Likewise, it is expected for a greater number of native food species to be included in the list of PGPM-Bio, as has occurred with buriti (*Mauritia flexuosa*), that became part of its 2018 subsidy list. This agricultural income policy, complementary to PAA, compensates producers should their socio-biodiversity products not reach the market value established by the National Supply Company.

The development of new market chains and the increase of interest by the private sector are also expected. In the long term, expanding production and marketing of native nutritious species has the potential to increase the income of family farmers and gatherers, as well as the diversification and improvement of diets and nutritional status of beneficiaries of these programs and the population in general. Decision-makers, family farmers and gatherers, and the general public will be able to recognize biodiversity's value, thus promoting greater conservation and sustainable use.

Despite the economic crisis that hit Brazil since 2014, there is a positive scenario with financial gains for PNAE. In 2017, the amount passed on by the federal government to states and municipalities was adjusted by 20%, after seven years without any increases for all stages of basic education. The increase in the value per capita injected R\$ 465 million, only last year, in the school feeding for students of public schools, benefiting 41 million students in basic education.

Payments by PGPM-Bio for socio-biodiversity edible products also increased more than 100% from 2016 to 2017 (from R\$ 505 thousand to R\$ 1,2 million). PAA, on the other hand, was strongly affected by the recent economic recession. Nevertheless, the Program showed an increase on the purchases of socio-biodiversity products for the species listed on Ordinance N. 284/2018: although the total annual budget decreased from R\$ 430 million in 2016 to around R\$ 360 million in 2017, due to budgetary constraints, there was an increase in the proportion of expenditures with socio-biodiversity products, rising from 2.75% in 2016 to 5.02% of the total disbursement in 2017.

One of the next steps also is to work on strategies to increase procurement of socio-biodiversity and create new incentives for municipalities to buy these products, such as rewards. With the supply and demand rule, it is expected that more farmers will grow and conserve socio-biodiversity species. On the other hand, there is also a need to create further strategies to attract farmers, especially smallholders, to the cultivation and marketing of these species by employing additional payment for the sale as an incentive.

### **Conclusion:**

Undoubtedly, one of the great achievements of the BFN Project in Brazil was providing to stakeholders in different levels involved with public policies related to institutional food procurement and school feeding programs the list of nutrient-rich native species from Ordinances N. 163/2016 and N. 284/2018, plus the nutritional information present on the BFN Food Composition Database, for possible inclusion in their menus and, therefore, in procurement.



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As shown, increased purchases of these species are already being documented, although, the proportion is still low in terms of socio-biodiversity products being purchased through these federal procurement initiatives. This also means there is a great opportunity to monitor how increasing the diversity produced, purchased and consumed will, in the longer-term, improve nutrition and affect the livelihoods of the small-scale producers involved, thus promoting better food and nutritional security.

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