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DIVERSIFYING INSTITUTIONAL FOOD PROCUREMENT: OPPORTUNITIES AND BARRIERS FOR INTEGRATING BIODIVERSITY FOR FOOD AND NUTRITION IN BRAZIL

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ABSTRACT

The Brazilian Food Procurement Program (PAA) and the National School Feeding Program (PNAE) were identified by the GEF-funded *Biodiversity for Food and Nutrition Project* (BFN)[1] as policy instruments with the greatest potential for diversifying institutional food procurement and improving diets while supporting family farming. This paper discusses the opportunities identified for mainstreaming biodiversity through PAA and PNAE, targeted activities undertaken as well as two case studies. The first case study presents findings linked to the implementation of the PNAE in *quilombola* communities in Goiás, while the second describes results of the inclusion of Juçara fruits (*Euterpe edulis* Mart.) in school meals in São Paulo. The paper concludes by highlighting some of the key barriers to better biodiversity mainstreaming and institutional food procurement together with some recommendations.

Keywords: biodiversity mainstreaming, institutional food procurement, food and nutrition security

DIVERSIFICANDO A COMPRA INSTITUCIONAL DE ALIMENTOS: OPORTUNIDADES E BARREIRAS PARA A INTEGRAÇÃO DA BIODIVERSIDADE PARA A ALIMENTAÇÃO E NUTRIÇÃO NO BRASIL

RESUMO

O Programa de Aquisição de Alimentos (PAA) e o Programa Nacional de Alimentação Escolar (PNAE) foram identificados pelo projeto Biodiversidade para Alimentação e Nutrição (BFN) como os instrumentos com maior potencial para diversificação da compra institucional de alimentos e melhoria na dieta dos beneficiários, com incentivo à agricultura familiar. Este artigo discute as oportunidades que foram identificadas para a inserção da biodiversidade no PAA e PNAE, atividades realizadas e dois estudos de caso: o primeiro apresenta resultados relacionados à implementação do PNAE em comunidades quilombolas de Goiás, e o segundo descreve resultados da inserção dos frutos da juçara (*Euterpe edulis* Mart.) na alimentação escolar em São Paulo. São destacadas barreiras encontradas e recomendações para a efetiva inserção da biodiversidade em programas de compra institucional.

Palavras-chave: biodiversidade, programas de compra institucional de alimentos, segurança alimentar e nutricional

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1 The *Mainstreaming Biodiversity Conservation and Sustainable Use for Improved Nutrition and Well-Being* Project, or Biodiversity for Food and Nutrition Project for short, is led by Brazil, Kenya, Sri Lanka and Turkey. The initiative is coordinated by Bioversity International with implementation support from the United Nations Environment Programme and the Food and Agriculture Organization of the United Nations, and contributes to the implementation of the Convention on Biological Diversity's Cross-Cutting Initiative on Biodiversity for Food and Nutrition.

INTRODUCTION

Brazil, one of the largest economies in the world, still faces major challenges in the fight against extreme inequalities, particularly income distribution. Many Brazilians are among the World's poorest. Further, large segments of the population still suffer various forms of malnutrition and diet-related illnesses. Over the last decade, patterns of food purchases by the Brazilian population have changed significantly. Assessment of individual food consumption from a Family Budget Survey (Pesquisa de Orçamentos Familiares – IBGE 2011) carried out between 2008 and 2009 showed that, on average, Brazilians consume less than 120g of fruit per day (including fruit juice), an amount that is considerably lower than the WHO recommended intake of 400 g per day (WHO, 2003) and recommendations published in the *Dietary Guidelines for the Brazilian Population* (2014). Over the last 30 years, natural food items have been replaced by processed, high-sodium, high-calorie diets, both in urban and rural areas. In addition, measures of nutritional status gathered over the last 35 years from anthropometric survey data (weight, height, mass body index) (IBGE 2010) indicate that, while overall the alarming undernutrition rates observed in the poorest regions of the country have significantly decreased, women of reproductive age and children under five years of age still suffer from anaemia and vitamin A deficiency. Surprisingly, women and children living in urban areas are currently more affected by these deficiencies. In addition, overweight and obesity trends are on the rise regardless of age, region or economic class. Rapid increases in weight gain are observed even for children under 5 years of age. In children between 5 and 9 years of age, as well as in adolescents, the overweight prevalence is three times higher than it was 20 years ago. As for the adult population, overweight indices have been constantly increasing since the mid-1970s, and half of the Brazilian adult population is currently considered overweight.

Despite harbouring approximately 18% of global plant diversity, Brazil's agriculture and food security are, to a great extent, reliant on exotic or introduced biodiversity. Since the colonial period, Brazilian agriculture has been based on products destined for foreign markets. Until the 1960s, two main classes of products (coffee and some other agricultural commodities (rubber, cocoa, cotton)) accounted for the majority of the exports (Bacha & Carvalho, 2014; Pereira *et al*., 2012). From the 1960s, agriculture was progressively transformed into a modern and more diversified production, aligned with the "Green Revolution", consisting of the intensive use of machines and inputs, with the main goal of increasing productivity. This evolution was related both to international market changes and to domestic agriculture policy (Bacha and Carvalho, 2014; Redin & Fialho, 2010). However, this modernization process has been directed to large commercial farms, potential buyers of industrial products and those with access to rural credit, and was focused on richer areas of the country (South, Southeast and Centre-West), leaving poorer regions (North and Northeast), small holders and polyculture on the sidelines (Agra & Santos, 2001).

Nowadays, although more diversified than in the past, the main rural economic activities in Brazil are still based on a few (mostly exotic) species, such as sugar cane, coffee, beans, rice, soy, orange, corn and wheat. The last agricultural census (IBGE, 2006) showed that farms with more than 1,000 hectares occupied 43% of the total area of agricultural properties in the country and represented only 1% of the total number of properties, while family farmers represent 84,4% of properties and occupy less than 25% of the total area. However, family farming guarantees food production for the domestic market, providing around 70% of the foods consumed in the country.

According to Schneider *et al.,* (2016), there has been intense debate and controversy regarding the practices, processes and logic that underlie the conventional system of food production and consumption, resulting

in criticism about ways of producing and consuming food. On the production side, there are sound arguments supporting the search for alternative and more sustainable practices, which could contribute to both the improvement of small farmers' living conditions and the conservation and sustainable use of biodiversity and the natural resource base on which our food system depends . On the consumption side, criticism highlights food waste and overconsumption, which ultimately affects food safety and the health of populations.

The solutions to these problems are complex. While there is no quick fix, single answer, Brazil's considerable wealth of underutilized biodiversity does offer one option that could contribute to a sustainable solution. The Amazon alone, which accounts for 40% of the Brazilian territory, holds the largest biodiversity in the world - much of it still undiscovered - yet the habitats where it is found are increasingly under threat. Paradoxically, this biodiversity is potentially highly nutritious and exploring this underutilized food source could provide sustainable solutions to diversifying food production and tackling nutritional disorders and other malnutrition problems. Diet and food-based approaches which promote and increase the consumption of nutrient-dense and non-staple biodiversity and foods are important in addressing malnutrition problems identified in Brazil.,

Native species, many of which are already used at the local or regional level, may provide alternatives for market insertion, due to the growing demand for new product options, notably those related to a healthier diet. Several species native to Brazil are known as important food sources of local and regional relevance, such as cassava (*Manihot esculenta*), pineapple (*Ananas comosus*), peanuts (*Arachis hypogaea*), cacao (*Theobroma cacao*), cashew (*Anacardium* spp.), cupuaçu (*Theobroma grandiflorum*), passion fruit (*Passiflora edulis*), Brazil nut (*Bertholletia excelsa*) and açaí (*Euterpe oleracea*) to name some. The vast majority of other native biodiversity species are largely neglected. Although this situation is gradually changing with growing interest in the economic value, food and nutrition potential of native biodiversity, and the quest for alternative food production models, there is still a long way to go to better mainstream biodiversity for food and nutrition in Brazil.

At present there are many barriers and obstacles in Brazil, as there are elsewhere, preventing the better integration of biodiversity for enhancing food and nutrition security (Hunter et al., 2016). These challenges include: the knowledge and evidence gap that exists around native biodiversity and its nutritional value; limited capacity and research partnerships to address this; making this information widely available and in formats that meet the knowledge needs of a wide range of actors (from nutritionists to senior policy makers); establishing policy platforms and revising policy and regulatory frameworks; identifying and developing markets both public and private; and, promoting greater awareness and understanding of the nutrition and food benefits of native biodiversity (Hunter *et al*. 2015). This paper highlights how these challenges are being tackled in Brazil through improving knowledge, partnerships and alliances as well as awareness and understanding of the nutritional value and multiple benefits of native biodiversity. Specifically, it highlights how this is being brought to bear on already existing government initiatives and public policies that regulate and guide procurement and distribution of food, thereby creating a better enabling environment for biodiversity mainstreaming for food and nutrition security.

FOOD SECURITY GOVERNANCE AND OPPORTUNITIES FOR BIODIVERSITY MAINSTREAMING

The Zero Hunger Strategy was set forth by the Brazilian Federal Government in 2003, with the goals of ensuring the human right to adequate food to those people that have difficulty to access food, promoting food and nutritional security, and achieving social inclusion and citizenship. It has been highlighted

as an innovative and successful multi-sectoral institutional framework in addressing poverty and malnutrition (Maluf et al., 2015; Chmielewska & Souza, 2011). A number of initiatives were launched or strengthened under this program to increase access to food for the poorest Brazilians and to support small-scale and family farmers, as a strategy to strengthen domestic markets and promote sustainable development (see Box 1 for an overview). At an early stage of the Biodiversity for Food and Nutrition (BFN) Project, the partners involved – which included representatives of the ministries of the environment, agriculture, social development, agrarian development, education and health – identified this already established federal multi-sectoral institutional framework and associated federal initiatives and policies as a strategic opportunity to enhance the mainstreaming of biodiversity for improved food and nutrition outcomes.

Box 1. Relevant Federal Government Initiatives and Public Policies

Food Procurement Program (PAA)

The PAA has two main objectives: i) to ensure people facing food insecurity have access to food and ii) to promote social and economic inclusion in rural areas, by strengthening family farming. PAA also supports institutional market supply through government food procurement and ensures small producers are paid equitable prices for their products.

National School Feeding Program (PNAE)

PNAE ensures adequate nutrition for all students enrolled in public and philanthropic schools, across all levels of education (kindergarten, primary and secondary school, and youth and adult education). The program also promotes healthy eating habits.

Minimum Price Guarantee Policy for Sociobiodiversity Products (PGPM-Bio)

This agricultural income policy, complementary to PAA, compensates producers should their sociobiodiversity products not reach the market value established by the National Supply Company.

National Plan for the Promotion of Sociobiodiversity Value Chains (PNPSB)

The Plan, which ended officially in 2013, aimed at ensuring the productive inclusion of local populations who collect and utilise local biodiversity by promoting socio-biodiversity value chains, adding value to these products and strengthening sustainable markets. Most of the Plan's activities have since been incorporated in the National Plan for Agroecology and Organic Production (PLANAPO).

Development of Organic Agriculture (Pro-Orgânico)

Currently under PLANAPO, Pro-Orgânico supports and strengthens the production, processing and marketing of organic products through organizational capacity-building and the promotion of technological development, while setting appropriate legal standards and requirements.

National Food and Nutrition Policy (PNAN)

Part of the National Health Policy, PNAN regulates food and nutrition security actions in Brazil. Its guidelines are: promote inter-sectoral actions to ensure universal access to food; ensure food safety and quality and the provision of services in this context; monitor the country's food and nutrition status; foster healthy eating habits and lifestyles; and prevent and control nutrient deficiencies and diet-related illnesses, promoting relevant research and training.

As a first step, the Secretary of Biodiversity and Forests from the Ministry of Environment – the executing agency for the BFN Project in Brazil - spent considerable effort in raising awareness and understanding about the project, its objectives, expected outcomes and planned activities and funding support. This included regular visits to all relevant ministries and institutions to explore opportunities and synergies, to establish alliances and partnerships, and to discuss roles, responsibilities and issues around funding and co-financing. A project governance mechanism - the National Steering Committee – was established to coordinate and manage this partnership transparently and included the above-mentioned ministries as well as representatives of the National Supply Company (CONAB), the Brazilian Agricultural Research Corporation (EMBRAPA) and the National Food and Nutrition Security Council (CONSEA). Through partnership with these institutions, the BFN project team was involved in a series of national activities promoting the importance of biodiversity for food and nutrition within the following Federal Government Initiatives: the Food Procurement Program (PAA), National School Feeding Program (PNAE), Minimum Price Guarantee Policy for Sociobiodiversity Products (PGPM-Bio), National Plan for the Promotion of Sociobiodiversity Value Chains (PNPSB), Development of Organic Agriculture (Pro-Orgânico) and National Food and Nutrition Policy (PNAN), though the PAA and PNAE were of particular interest (Figure 1).

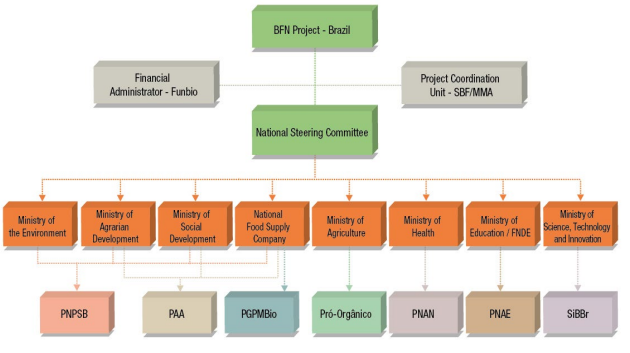

Figure 1 - Relationship among the ministries, initiatives, the Project Coordination Unit and the Financial Management Structure in Brazil

Both PAA and PNAE contain useful entry-points for potentially improving nutrition or livelihoods with links to native biodiversity and this was seen as one of many strategic interventions by the BFN Project in Brazil. In 2009, the PNAE decreed that at least 30% of the food purchased through its program must be bought directly from family farmers (Brasil, 2009). These initiatives include incentives of up to 30% in the price of organic or agroecological produce and prioritize the purchase from settlers of the agrarian reform, *quilombolas* and indigenous communities, while also supporting the work conducted by family agriculture organizations to rescue, produce, store, and distribute seeds of local or traditional varieties through the purchase of seeds produced by farmers and donation of these seeds to families and communities experiencing uncertain access to food. This creates new opportunities for the use of resources from the various Brazilian ecosystems, promotes the opening of "institutional markets" for biodiversity products while providing incentives for the management and sustainable use of Brazilian food and agricultural biodiversity (MMA, 2006).

MAINSTREAMING BIODIVERSITY INTO THE PAA AND PNAE AND OTHER INITIATIVES

Paraphrasing Sunderland (2011), the term "biodiversity" linked to food and nutrition security can be seen to include three components: ecosystems, the food species that grow therein (wild or cultivated, e.g. inter-species diversity) and the genetic diversity within each species, that is the variation in nutrient content existing among cultivars, breeds, and varieties of the same species (or intra-species diversity), which forms the basis of biodiversity for food and nutrition. Combinations of these species and varieties/breeds within our diets are mostly able to fulfill optimal human dietary needs as well as provide a local solution to diet-related nutrition and health conditions. However, realizing the potential of biodiversity to achieving improved and sustainable nutrition outcomes along with economic development is a challenge and there remain many barriers to creating more effective enabling environments for mobilizing biodiversity for food and nutrition (Hunter *et al*. 2016). It requires sustained efforts and activities focusing on strengthening the evidence base, improving policies, markets and governance as well as building capacity and raising awareness. Each of these areas represent the core components of the BFN Project and improving and demonstrating the evidence base and value of biodiversity was identified as the first key step on the road to better mainstreaming. If decision-makers and the general public are provided with the necessary tools and are able to recognize biodiversity's value in general, there is a better chance they will be interested in its conservation and sustainable use. More specifically, without detailed nutritional information on local biodiversity it would be very difficult for it to be considered in either the PAA or PNAE, or other relevant initiatives, in a significant manner.

Given Brazil's vast wealth of biodiversity, it was essential to be strategic in terms of the numbers of species targeted and as a starting point it was critical to undertake a prioritization process. To align with another well-established federal initiative, the Project opted to work with 65 native fruit species, which had been previously identified and prioritized by the *Plants for the Future*, an ongoing initiative coordinated by the Ministry of the Environment (MMA) that aims to survey, document and promote the conservation and sustainable utilization of neglected/underutilized plant species with economic value or economic potential. Nutritional composition analysis work of the selected species is being carried out in partnership with public Universities and research institutes across the country: the Federal Universities of Goiás (UFG), Rio Grande do Sul (UFRGS), Pará (UFPA), Federal and State Universities of São Paulo (UNIFESP and USP) and Ceará (UFC and UECE), National Institute of Amazonian Research (INPA) and the Brazilian Agricultural Research

Corporation (EMBRAPA). Currently, over 100 students, professors and researchers are working on activities developed in partnership with the BFN Project.

By working in a decentralized way, capacities are being developed in different Brazilian regions, facilitating the setting up of "Regional Centres for Food Composition Data" and also raising awareness among students, researchers and professors about the importance of food composition and biodiversity for food and nutrition. These groups act as multipliers within education and research institutions, building additional human capacity and also operating as opinion leaders and policy advisors. Some of the Universities engaged are Collaborating Centers on Food and Nutrition (CECANEs), linked to the National School Feeding Program (PNAE) and provide research and technical backstopping to those involved with PNAE. By providing technical assistance and capacity building for municipal managers, school managers, nutritionists and cooks responsible for implementing PNAE, the partnership is likely to favor the inclusion of biodiversity in school meals, as seen in case study 1.

Case study 1: The use of native biodiversity as a social and environmental agent of change: the case of juçara

Native to Brazilian flora, juçara (*Euterpe edulis* Mart.) is a dominant palm tree of the Atlantic Forest, its distribution spanning from the south of Bahia to Rio Grande do Sul (Iaderoza et al., 1992; Henderson, 2000). Years of illegal palm heart extraction have led the species close to extinction in nature reserves (Iaderoza et al., 1992; Mac Faden, 2005). Recently, in an attempt to promote the conservation of juçara and add value to the forest remnants of the Atlantic Forest, the Institute of Permaculture and Ecovillage of the Atlantic Forest (IPEMA) partnered with family farmers in the region of Ubatumirim in Ubatuba (São Paulo, Brazil), to revive the traditional extractive activities carried out by "caiçara" communities (native populations living in the Atlantic forest) and set up a cooperative for the processing, freezing and marketing of juçara fruit pulp for human consumption: http://www.projetojucara.org.br/gastronomia-jucareira-2/. IPEMA is also trying to revive interest in the consumption of the fruit by introducing juçara into school meals. The pulp is highly nutritious, due to high concentrations of phenolic compounds and mono and polyunsaturated fatty acids (Borges et al., 2011; Silva et al., 2014). Its vibrant purple color and mild flavor also make it highly palatable and easily acceptable by children, allowing its introduction into Ubatuba school menus. Recipes were developed and collected in the publication "Culinária Juçareira" and cooks were trained on how to use the pulp in school meals while maintaining its nutritional characteristics intact (IPEMA, 2012).

Forty family farms in the city of Ubatuba are now benefiting from the marketing and processing of frozen juçara pulp according to the guidelines set by the National School Feeding Program (Brasil, 2009). This case study demonstrates how public policies can simultaneously protect biodiversity, revive traditional food cultures, promote local economies and provide the population with access to organic, diverse and healthy food. Schools can also become the focus of nutritional and environmental education activities, thus strengthening the benefits derived by the sustainable use of native food biodiversity, ensuring food sovereignty, the human right to adequate food and local economic development.

Nutritional composition studies were initially carried out through compilation of national food composition data available in scientific literature, food composition tables, documents and reports from local universities and Research Institutes using methodologies developed by FAO/INFOODS (the International Network of Food Data Systems of the Food and Agricultural Organization of the United Nations). Training workshops were provided to postgraduate students and university professors who worked directly with the data compilation. As of December

2015, nutrient data was collected for 44 prioritized species and the literature review revealed the lack of data for dietary fiber, vitamins and minerals for most fruit species. As a second phase, nutrient data is being generated by undertaking food composition analysis for all prioritized species for which information is missing or incomplete.

Preliminary results available from the data compilation reveal that many of the prioritized native fruits are rich in nutrients. Compared with the five most commonly consumed fruits in Brazil (banana, orange, apple, papaya and watermelon) (IBGE, 2011), some native fruits score higher in terms of content of dietary fiber, calcium, iron, magnesium, vitamin C and vitamin E. For example, vitamin C content in 100g of the edible portion of four native fruits – camu-camu (*Myrciaria dubia*), mangaba (*Hancornia speciosa* Gomes), cagaita (*Eugenia dysenterica*) and cashew (*Anacardium occidentale*) – were found to be higher than amounts contained in 100g of common varieties of papaya, orange, banana, watermelon, and apple (Mendes, 2015) (Figure 2).

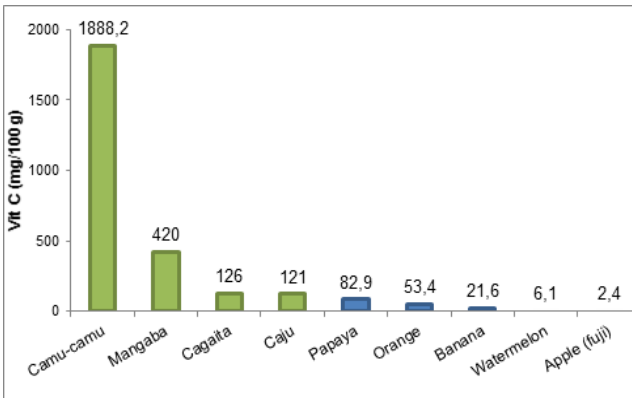

Figure 2 – Vitamin C content (mg/100g of edible portion) in underutilized native fruits (green) and in the most consumed fruits in Brazil (blue). Source: Mendes, 2015.

Three of the partner universities (UFG, UFC and UFRGS) are also developing recipes using prioritized species to foster their inclusion in school meals, other public/social programs and also the private gastronomy sector. Additional activities include assessing and documenting traditional knowledge and use of the species by traditional communities and identifying challenges for the effective implementation of initiatives that may favor traditional communities and the sustainable use of biodiversity (as shown in case study 2), capacity building (so communities can benefit from native biodiversity), development of information material and awareness raising activities

Case study 2: PNAE implementation in quilombola communities in Goiás, including barriers for the integration of National Curriculum Guidelines for Quilombola Schools

Partnering with the Federal University of Goiás (UFG) was instrumental in establishing some of the main on-the-ground barriers and opportunities for introducing traditional foods in school meal programs. Particularly interesting is the case of the *quilombola* communities from the Central Region of Brazil, descendants of the *quilombos* – runaway African slave communities – who are a self-proclaimed ethnic and racial group with a common history of resistance and oppression (INCRA 2009). Once suffering from undernutrition, a recent study carried out in *quilombola* schools in Goiás (Cordeiro et al. 2012) showed that children between six and nineteen years of age were more likely to be overweight (17.2%) than undernourished (1.3%), especially students attending urban schools (28.2%) ($p<0.05$). The households where they came from (75.2%) were also found to experience mild food insecurity.

This case study set out to establish whether the *National Curriculum Guidelines for Quilombola Schools*, developed by the National Fund for the Development of Education (FNDE), could be used to diversify diets, revive food culture and improve livelihoods in *quilombola* communities in Pombal, Goiás. These guidelines provide schools in *quilombola* areas with 50% more funds than other schools for the purchase of school meals, establishing that school management takes into account the ethno-cultural background and habits of the students in both education activities and school meals. However, these pre-

scriptions, it seems, have remained largely on paper with little or no field implementation.

Three visits were made to each of the two schools between 2014 and 2015 to assess the level of exposure to and awareness of the guidelines by members from the *quilombola* community, school managers and nutritionists from two schools in Pombal. A survey of school meals offered by these schools was also carried out to establish just how much fruit biodiversity was available in 20 select *quilombola* communities for possible introduction in school meals. Loss of food options were documented, specifically whether some of the edible species identified as nutritionally important were: 1) cultivated or naturally present in the communities; 2) consumed regularly and why; 3) viewed as a "childhood food" or "food of the past".

Preliminary results showed that, despite reporting familiarity with the guidelines, school managers mostly disregarded recommendations contained therein when developing the school curricula and planning the Pedagogical and Political Project (PPP) each school is required to prepare. Activities centred on *quilombola* culture are few and poorly integrated within the school curricula, which is partly due to the lack of literature or educational material on the subject, and *quilombola* food culture is also rarely taken into account in school meal planning and preparation. Regarding available fruit biodiversity, most respondents from the community (76%) declared consuming the fruits since childhood, recognized fruit consumption as a healthy dietary habit and the production of these species as a possible income-generating activity. Seventeen fruits species prioritized by the Project are produced in at least one community (pequi, mangaba and barú are found in all communities), among other fruits and vegetables, and are collected only for personal consumption. However, all respondents reported a decline in fruit consumption within their communities, especially among younger generations, and that consumption of local fruits is low due to availability of other types of food, particularly processed foods, which are more convenient to obtain. In conclusion, although many fruits from native biodiversity are available naturally in the *quilombola* communities evaluated, they are not benefiting from their nutritional and income-generating potential.

It is evident that the effective implementation of the *National Guidelines for Quilombola Schools* represents a major challenge. On the one hand, it offers great potential for the mainstreaming of biodiversity and food culture in education while on the other, it is a complex and challenging task for managers at all levels. Qualified teachers are required to develop the PPP and expert nutritionists trained to incorporate traditional foods into school menus.

Education interventions will be implemented in one of the schools, composed primarily by *quilombola* students. Capacity building activities targeting teachers and school staff will help integrate the *National Guidelines for Quilombola Schools* in the school curriculum and raise awareness of African and *quilombola* history and culture. Technical advice to these communities and other family farmers can help with this. The involvement of institutions such as SESC (Social Service of Commerce) and EMATER (Technical Assistance and Rural Extension Company) is key for the effective production of diversified quality products based on local biodiversity. Once traditional farming communities seize this opportunity, the PNAE and PAA could guarantee the purchase of the products, thus strengthening economic development and contributing to improve the quality of the school meals by increasing the use of regional ingredients and promoting greater biodiversity conservation.

The nutritional information and recipes generated in partnership with the universities will be made available through a Nutritional Composition Database hosted by the Information System on Brazilian Biodiversity (SiBBr) at the Ministry of Science, Technology and Innovation (MCTI). With reliable data

on local and regional biodiversity, policymakers can demonstrate the value of these species as a source of livelihood and income for family farmers and communities. Similarly, the nutrition benefits of native biodiversity within diversified diets can be demonstrated to consumers. The Database will provide important evidence for the inclusion of nutritious species in food procurement programs like PAA and PNAE and other public policies targeting food and nutrition security and the promotion of healthy and diversified diets.

Among supporting activities to highlight this knowledge and encourage the promotion of foods from Brazilian biodiversity in PNAE and PAA were the organization of workshops with technical staff directly involved in implementing these policies at the Federal level, such as FNDE, responsible for the coordination of PNAE. In addition, a partnership was established with the initiative "Educating through School Gardens and Gastronomy" (PEHEG), executed by the Centre for Excellence in Tourism/University of Brasilia (CET/UnB) and funded by FNDE. This initiative aims to diversify school curricula using school gardens and gastronomy as educational tools and to promote healthy eating habits, appreciation of regional ingredients and recipes, learning of cooking techniques as well as experiencing flavors, food textures and aromas. PEHEG also trains professionals involved with PNAE to act as facilitators and agents of change promoting healthy eating habits and sustainability. In 2014, the PEHEG network consisted of 10 hubs, each one comprising 30 municipalities on average, with at least 3 professionals in each municipality responsible for multiplying the technical assistance provided by CET/UnB and working directly with schools. The BFN Project team has collaborated closely with CET/UnB to mainstream biodiversity into PEHEG's activities, organizing workshops for PEHEG personnel, contributing to the development of new training materials used in the municipalities and advocating for the inclusion of native biodiversity tree nurseries as well as the growing of non-conventional leafy vegetables in school gardens, through collaboration with EMBRAPA Hortaliças.

During the 5th National Conference on Food and Nutrition Security (CNSAN) an interactive workshop was organized by the BFN Project to raise awareness about the importance of biodiversity for food and nutrition. CNSAN is the forum where guidelines and priorities for food and nutrition security actions are set and communicated to CONSEA to inform policy making. Encouragingly, the reference document for the 5th CNSAN incorporated biodiversity as one of the main aspects related to food and nutrition security and the 2015 Policy Letter, the main outcome from the annual conference, included several recommendations related to the sustainable use of biodiversity to achieve food sovereignty and security. Some of the recommendations focused especially on expanding public policies and actions to guarantee self-sufficiency to family farmers through agroecological practices and promotion of biodiversity, such as creation of organic seed banks and promotion of market chains for nonconventional vegetables and native fruits. Further efforts to mainstream biodiversity into public policies affecting the PAA and PNAE include the development of the National Plan for Food and Nutritional Security (PLANSAN 2016–2019) and lobbying to include biodiversity as one of the solutions for combating food and nutrition insecurity in specific population segments, particularly traditional peoples and communities.

The Project also participated in the development of the National Pact for Healthy Food (Decree n. 8553/2015) (Brasil, 2015), which aims to enhance the supply, availability and consumption of healthy foods to combat overweight, obesity and diet-related illnesses and where there is huge potential for promoting organic and agroecological products from family farming and from native biodiversity. Further, many of the actions included in the pact are related to the implementation of PAA and PNAE and these will be multiplied nationwide since they can be integrated by the states, Federal District, municipali-

ties, civil society organizations, international organizations and private sector.

Technical inputs and institutional support to promote and strengthen sociobiodiversity within the National Plan for Agroecology and Organic Production (PLANAPO) were provided, through participation in the National Agroecology and Organic Production Committee (CNAPO) and the Interministerial Chamber of Agroecology and Organic Production (CIAPO), which also includes representatives from the PNAE, PAA and other initiatives.

Procurement programs are also closely aligned to the Food and Nutrition National Policy (PNAN), coordinated by the Ministry of Health. Within the framework of the PNAN and in order to increase the opportunities for mainstreaming biodiversity into federal procurement programs, BFN participated in a series of activities emphasizing the strategic role biodiversity can play in contributing to food and nutritional security and in promoting enhanced conservation and sustainable use. This resulted in the new edition of the book Brazilian Regional Foods (MS, 2015) including a chapter on "Biodiversity for Food and Nutrition". The goal of this publication is to promote greater awareness of the different species and varieties of fruits, vegetables, legumes, tubers, cereals, herbs found in Brazil and to showcase regional foods combining recipes and nutritional information. It also encourages the development and exchange of culinary skills, reviving the very act of cooking. For its development, several cooking workshops were organized regionally with support from public universities and professionals linked to schools, social assistance programs, secretaries of health, food and nutrition security councils, non-governmental organizations, among others.

Included in the PNAN is the "Health in School Program" (PSE), which was also identified as a key entry point for promoting biodiversity. This program fosters visits by primary health care professionals to public schools and provides capacity building for school teachers and managers for the development of educational activities. Activities are carried out to monitor eating habits and nutrition and to promote healthy eating behaviors consistent with the dietary guidelines for Brazilian children, which impact directly on PNAE. New training materials for the implementation of PSE are being developed, including booklets targeting teachers and health care professionals. To promote the inclusion of biodiversity, technical contributions were made to ensure that biodiversity is included in all training materials with considerable attention drawn to regional foods, particularly native fruit species and their roles in promoting better health and nutrition.

In 2014, the new version of the "Dietary Guidelines for the Brazilian Population" (MS, 2014) was launched by PNAN, aimed at promoting food and nutrition education actions and national food and nutrition programs and policies in Brazil. The drafting of this new edition involved a complex process with six key steps, the participation of more than 400 people including the BFN project team, who contributed by highlighting the importance of biodiversity for food and nutrition. The new dietary guidelines now take into account healthy diets derived from socially and environmentally sustainable food systems. It highlights the importance of forests and biodiversity conservation, offering reasons to base diets on many varieties of natural or minimally processed foods mainly of plant origin. The guidelines support municipal and farmers' markets, street vendors, and other places selling fresh foods, including those produced by organic and agroecological methods. Besides, it mentions the need to expand inter-sectoral actions that positively impact on the determinants of health and nutrition. It focuses on importance, survival and expansion of family farming, which is closely related to and supported by PNAE and PAA.

As a result of the actions described above, many changes in behaviors and attitudes are already evident within the ministries and federal institution partners of the BFN Project. One example is the Multi-year Bud-

get for 2016-2019 (Brasil, 2015), approved by the National Congress in December 2015 that included many objectives, targets and initiatives related to the sustainable use of biodiversity and sociobiodiversity for food and nutrition. Specifically, for the PAA and PNAE, these include: promoting the inclusion of sociobiodiversity products in public purchases from family farming; expanding the inclusion of family farmers in agroecological, organic and sociobiodiversity production systems, with emphasis on the production of healthy food; and, increasing management capacity and promotion of innovation in organizations and collective enterprises related to sociobiodiversity to generate income and achieve sanitary and environmental requirements.

One major outcome from the Project is the list of native sociobiodiversity species published in Ordinance Nº 163, from 18th May 2016, signed jointly between MMA and the Ministry of Social Development and Fight Against Hunger (MDS). This document is an important step in mainstreaming biodiversity for enhanced food and nutrition security in the country, and means that "Brazilian Sociobiodiversity Native Food Species of Nutritional Value" are now officially defined and recognized. It is expected the Ordinance will facilitate the greater procurement of sociobiodiversity species and their integration into programs like school feeding, and it should also contribute to greater incentives for family farmers through mechanisms such as premium prices for sociobiodiversity within the PAA. Ultimately, it is hoped that the official identification of sociobiodiversity species will facilitate better monitoring and tracking of biodiversity within the PAA, PNAE and PGPM-Bio, something that has been a challenge to date.

To identify the current status of biodiversity for food and nutrition into food procurement programs and as a way of measuring their institutional market potential, the BFN Project carried out a preliminary analysis of the expenditures incurred by the PAA, PNAE and also PGPM (Minimum Price Guarantee Policy) - that has one "branch" focusing specifically on biodiversity products (PGPM-Bio) - and which fixes minimum prices for select agricultural products and compensates producers should the market price fall below the minimum price established by the National Supply Company (Santana & Nascimento, 2012). Total food expenditures in 2013 and 2014 were compared with the amount spent on purchasing native species of Brazilian biodiversity, based on the list of 65 native species prioritized by the BFN Project - which are also part of the list published by Ordinance 163/2016 - for PAA and PNAE and on the official list of edible species included on PGPM and PGPM-Bio for 2012/2013 and 2014/2015 harvests (Figure 3).

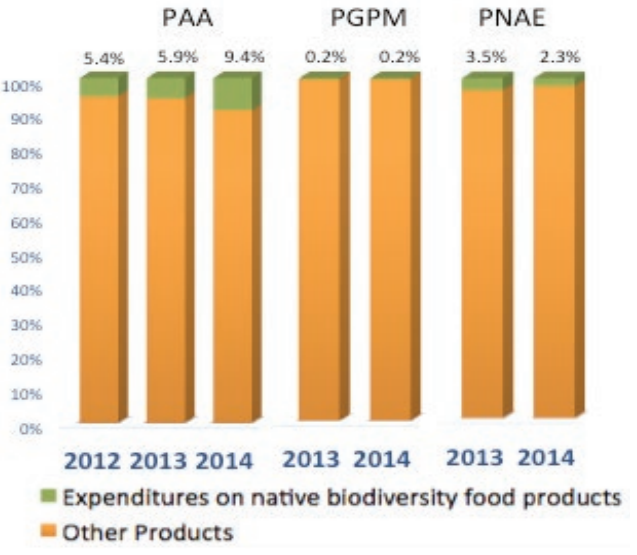

Figure 3 - Percentage of funds used by public policies for the purchase (PAA, PNAE) or subsidy (PGPM) of native biodiversity products.

Results show that food procurement programs and PGPM are indeed purchasing foods derived from native biodiversity and delivering to target beneficiaries, proving to be strategic channels for the promotion, conservation and sustainable use of such biodiversity. However, the study also highlights that the volume of resources currently deployed for the purchase of native biodiversity products is still only a fraction of the total expenditure on foods in general. An increase in expenditures for biodiversity products on PAA was observed from 2013 to 2014, but it is still early to correlate this increase directly to any of the actions of BFN Project.

CONCLUSIONS: BARRIERS AND RECOMMENDATIONS FOR FUTURE ACTION

The BFN Project has contributed substantially to creating a better enabling environment for the inclusion of biodiversity into public policies related to food and nutrition security. Still, the wider mainstreaming of biodiversity for food and nutrition faces many barriers, and one that affects most of the activities at the federal level is the high turnover of policy makers at partner Ministries, which often undermines project efforts directed at engaging relevant sector policies and requires fresh lobbying with newly appointed staff.

Another barrier is that biodiversity is usually viewed through a conservation lens and is seldom recognized as a strategic resource for health and nutrition, for improving livelihoods and generating income opportunities. Although the initiatives related to food and nutrition security that were created/strengthened under the Zero Hunger Strategy mention the importance of local agrobiodiversity (including traditional crops and wild species) as an option for fighting hunger and malnutrition on paper, its conservation and use remains largely confined to the environmental sector.

The lack of an adequate monitoring system to track and assess the purchase of biodiversity food products by national food procurement programs is another shortcoming, which is also a result of the poor understanding of the definition of "biodiversity for food and nutrition". One of the outcomes from the BFN Project that may tackle these barriers is the official list of sociobiodiversity products, recently launched by the Interministerial Ordinance 163/2016. For the effective implementation of this ordinance on food procurement programs, next steps should include the establishment of clear incentives for the production, commercialization and marketing of the sociobiodiversity products listed, such as a differentiated price to be paid for these products within PAA and PNAE, considering the ecosystem services present – and similar to what is being done for organic products, that receive an increase of 30% in the price paid – as well as inclusion of more species among those favored by PGPM-Bio.

In addition, ongoing and future capacity building and awareness raising activities with policy makers are fundamental to the wider mainstreaming of biodiversity for food and nutrition. While the mandatory expenditure of 30% of FNDE funds on products from family farms is seen as a crucial entry point for the inclusion of greater biodiversity and diverse foods in general, data from FNDE (2015) clearly shows that in 2014, 3345 out of 5534 (60%) of Brazilian municipalities did not reach this amount, and 23% reported that purchases from family farmers were non-existent. Procurement in big cities still represents a major challenge, as only 0,06% of FNDE funds were spent on products from family farmers in São Paulo, 10,02% in Rio de Janeiro, 14,9 % in the Federal District and 29,72% in Belo Horizonte, four of the biggest metropolitan areas in Brazil.

Regarding aspects related to the production and supply of biodiversity food products for the PAA and PNAE, the unfamiliarity and lack of recognition of these foods by the population in general – and, as consequence, of those responsible for the purchase in schools or municipalities - is also a major barrier, and may be considered a simple reflection of the agro-food system that prevails in the country and of the history of the school meals program.

Since its creation in the 1940's until 1993, the execution of PNAE was centralized by the federal government, which was responsible for planning and developing menus, purchase and distribution of all the foods to municipalities and schools (FNDE, 2016). The centralization favored the acquisition of industrialized ready-to-eat foods, such as biscuits, packed beverages and canned foods, which may have reflected on the structure of canteens in schools and how school meals are perceived. Therefore, since many schools are more used to buying processed foods, it is al-

so a challenge to fit the structure and requirements of schools for the reception and proper preparation of foods from native biodiversity.

Furthermore, food procurement programs, especially the food purchased for school meals, require regularity of supply, compliance with sanitary quality standards and homogeneity, criteria that are not always easily achieved by the products derived from native biodiversity. Most of the fruits prioritized by the BFN Project and listed on Ordinance 163/2016 are not domesticated and cultivated, are available only in small amounts, irregularly and often only by extractivism. Some of these foods may be strongly affected by factors that can diminish the visual quality and homogeneity of the product. Many of the products are also highly perishable and demand care in the production, processing, transportation and storage. Therefore, they require considerable investment to gather, prepare and cook. This often means additional challenges for competing with industrialized products, easier to prepare and which in many cases may be cheaper.

To tackle these barriers, it is of paramount importance to work closely with producers and their cooperatives/associations in order to build capacities on best practices of production and handling of foods in order to guarantee the achievement of quality and sanitary standards and aggregate value to their products. To this end, a series of booklets on best practices for the collection of wild, organic native foods were published in 2015 by the Ministry of Agriculture, and new booklets for sustainable collection of species prioritized by the BFN Project are being developed by the Secretary of Extractivism and Sustainable Rural Development (SEDR) of the Ministry of the Environment (MMA).

Further attention to capacity building with those responsible for the purchase of foods for the PNAE and PAA, and planning and preparation of school meals is essential to enhance the use of foods derived from biodiversity. Tools and methods are needed to map local products and their seasonality, diversify purchases by these procurement programs and thus provide diverse and quality diets to schools and other institutions. To this end, an online course to promote the mainstreaming of biodiversity for food and nutrition is under development, and will contain theoretical background as well as practical examples, tools and methods to effectively include biodiversity in school meals and nutrition education activities.

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