

Research report

**MAINSTREAMING BIODIVERSITY CONSERVATION AND
SUSTAINABLE USE FOR IMPROVED HUMAN NUTRITION AND
WELL-BEING IN SRI LANKA**

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INTRODUCTION

Sri Lanka a nation rich in biodiversity with high nutritional significance related to agro-biodiversity species; comprises a vast array of cultivated and wild species that, if made available and utilized effectively, can contribute significantly to the dietary diversity, livelihoods and well-being of individuals in the urban and rural communities in the country. However the International Food Policy Research Institute categorizes Sri Lanka under the level: serious, with a Global Hunger Index (GHI) of 25.5 for the year 2016. The sustainability of the national food system is dependent on conservation and effective utilization of available biological diversity. Therefore, food security should be considered as a multi-dimensional commodity where multi-sectoral intervening is required to enable reliable access to sufficient quantity of affordable, nutritious food.

In the present era, farming trends have moved towards growing few agricultural crops which give high yield. As a result, consumers are also restricted to consume of few varieties of crops including rice, wheat and limited cultivars of pulses, vegetables and fruits to meet their dietary needs. It

has been shown that locally varied food production systems are under threat including traditional knowledge, culture and skills of men and women farmers. Effective utilization of biodiversity amongst crops and animals is proportionally disappearing with this reduction. Majority of the farmers are restricted into growing few agricultural crop species and are restricted to practice monoculture farming system lacking practice of poly-culture farming system or integrated farming system concept which is more sustainable. This phenomenon has led to a lesser diversity or variety of foods. As a result, at present people face the problems associated with the lack of dietary diversity resulting in a limited intake of nutrients especially micronutrients. This has led to wider prevalence of nutritional problems, both globally and nationally in terms of the triple burden of nutrition. Diet related nutritional problems or triple burden of nutrition are under-nutrition, critical micronutrient deficiencies or hidden hunger and over-nutrition or obesity; all contributing to aspects of food security. Monotonous diets based on starchy staples lack essential micronutrients and contribute to the burden of under-nutrition, micronutrient deficiencies and over-nutrition. However, there is a greater potential to grow a variety of crops and domestic animals through engaging in Chena (rain-fed upland cultivation) and home gardening.

A significant reduction in the diversity of available food and consumption of a variety of food by people; with the coexistence of massive increase in the incidence of diet related nutrition and health problems can be observed in Sri Lanka. Under the Global Environment Facility, UNEP/FAO (United Nations Environment Programme & Food and Agriculture Organization of the United Nations) funded project titled 'Mainstreaming Biodiversity Conservation and Sustainable Use for Improved Human Nutrition and Well-being', implemented under the Ministry of Mahaweli Development and Environment and executed by the Department of Agriculture is actively involved in addressing the prevailing concerns on nutrition through sustainable management and effective utilization of agro-biodiversity; through three implementation stages including Component 1: Knowledge Base; where relevant sectors, including agriculture, environment and public health adopt the integrated knowledge base on Biodiversity for Food & Nutrition (BFN) to build support for biodiversity conservation and enhanced well-being. 2. Policy

& Regulatory Frameworks; where enhanced policy and regulatory frameworks support the mainstreaming of biodiversity conservation and sustainable use across sectors. and 3. Raising Awareness & Out scaling; where tools, knowledge and best practices adopted and scaled up in development programs, value chains and local community initiatives

METHODOLOGY

Under the knowledge base component, the project conducted baseline studies for determining the status of agro-biodiversity, dietary diversity, impact on food security at household level in the given food production system, socio-economic status and associated traditional knowledge in three selected pilot sites representing three different agro-ecosystems in Sri Lanka. Gampola, Giribawa village in the Low Country, Dry Zone of Sri-Lanka to represent the village tank system; Ududumbara, Udukumbura village in the Mid- Country, Intermediate Zone representing the Kandyan home gardens and Niunhella village, Kegalle located in the Low Country, Wet Zone of Sri Lanka representing the Owita system. Addressing the knowledge gap existing and awareness on the nutritional value; The BFN project along with Universities of Peradeniya and Wayamba has collected existing data and under taken composition analysis of 58 varieties/land races of 28 species of priority/local agricultural species with establishment of a national nutrition database and a web portal on biodiversity food and Nutrition.

The baseline surveys were carried out collaboratively from the University of Peradeniya, Ruhuna and Wayamba University of Sri Lanka. Whole population in the village was considered as the study sample. Different information collection tools were utilized and data was mainly collected through interviews and interviewer administered pretested questionnaires aimed at the entire population throughout the study with accompanying field and household visits. Questionnaires were developed and pre-tested in the respective pilot sites. Enumerators were trained on survey techniques and specific data collection. Adult women were the main respondents for the questionnaire which was used to collect information regarding socio-demographic data, dietary intake, food security and coping strategies. Food

consumption of households and sources were determined by 24-hour recall method. Food security was determined using the United States Department of Agriculture food security core module. After the completion of the baseline surveys, key recommendations and interventions were identified to improve the prevailing conditions. Consequently, pilot site improving programs under BFN project component 3 were carried out focused on increasing awareness and introducing effective practices aimed at upliftment of the nutritional status and effective utilization of the available agro-biodiversity. Diversity fairs, food fairs, home garden establishment, bee keeping & composting, traditional knowledge dissemination, through cooking programs and trainings and awareness workshops are some of the activities that have been adopted as tools for creating awareness and out-reaching by the BFN project. The component 2 of the BFN project; policy and regulatory frameworks was implemented at higher levels where enhanced policy and regulatory frameworks support the mainstreaming of biodiversity conservation and sustainable use across sectors

RESULTS AND DISCUSSION

Baseline surveys were the first stages of the project which provided a scope of available biodiversity, co-relation of household food security with available agro-biodiversity, food security status of the households, dietary diversity, socio-economic data and interventions for betterment of the nutritional status in the pilot sites. The food security levels in the respective sites were depicted in Figure 1. Utilization of biodiversity and livelihood avenues correlated to income generation and educational level directly contributing to household food security. These correlations were depicted clearly by the surveys; the Niunhella site was the most food secure (79%) site with only 21% of households identified as food insecure. It was majorly due the fact of various sources of income generation and the site located in a semi-urban area where alternative livelihood options are available. However consumption patterns showed that the consumption of locally grown food varieties are less and micro-nutrient deficiencies persist in this ecosystem.

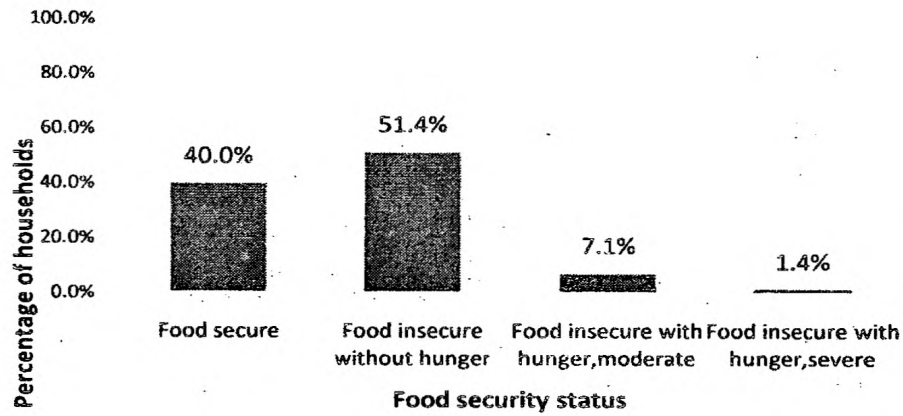


Figure 1.a)

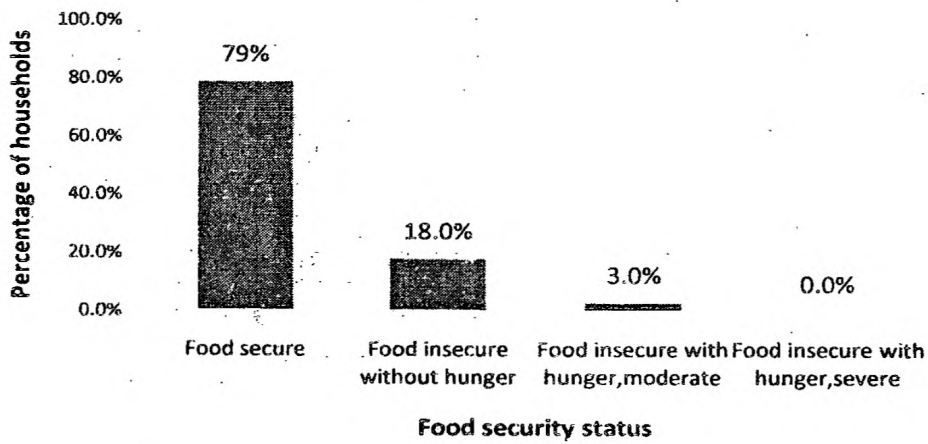


Figure 1.b)

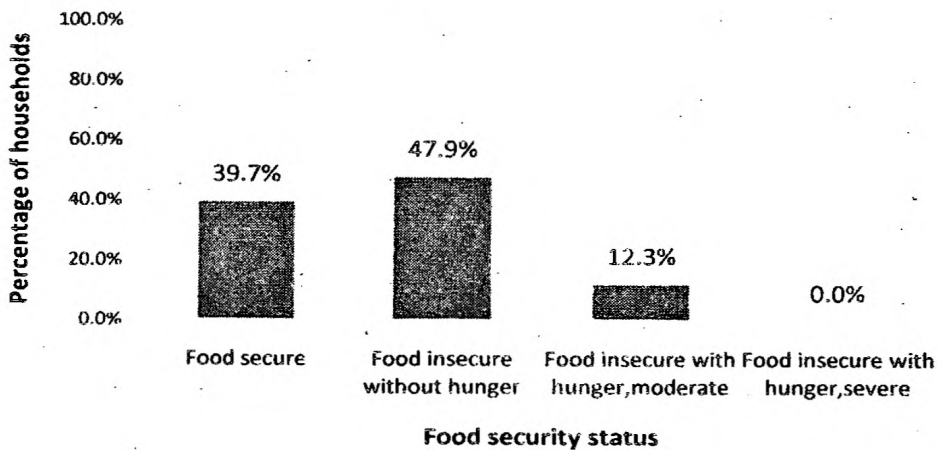


Figure 1.c)

Figure 1. Food security status of households in the
 a) Gampola, Giribawa b) Niunhella c) Udukumbura

In the other two sites, Gampola and Udukumbura have food insecurity values of 59.9% and 60.2% respectively; which is at an alarming level contributing to the persisting food insecurity levels in the low-income community inhabiting the rural areas of Sri Lanka. Predominant under-nutrition in school children were observed in the Udukumbura site, where pre-school children depicted higher values of stunting 24.3%, wasting 27.3% and under-weight 33.3% than the national average. Primary school children and adolescents also depicted higher values of under-nutrition than the national average or the Kandy district. Among adults too, the prevalence of underweight was higher. An overwhelming majority (85%) of households in the area spent more than 75% of their income on food (their food access is average or poor). Their household dietary diversity scores were poor depicting less diversity of food groups consumed. The energy and nutrient adequacy data suggested that the diet is adequate in energy but low in micronutrients like iron, vitamin A, vitamin C and Calcium, contributing micronutrient deficiencies or commonly known prevalent issue of hidden hunger.

In the Gampola, Giribawa site majority of households (90.0%) obtained green leafy vegetables. About 34% of households had obtained medicinal plants from forest. Most commonly obtained product from the village tank was lotus stem (61.4% of households). Among food groups; vegetables, green leaves, fruits, fish, and sugar & honey were consumed by more than 50% households. But less than 50% of households had consumed starchy roots, meat, eggs, pulses & legumes, milk & milk products and fat & oil; therefore prevalence of child under nutrition in food secure and food insecure households were seen as 3.8% and 19.2%, respectively with persisting micro-nutrient deficiencies. Prevalence of adult under-nutrition in food secure and food insecure households was 12% in both types of households. Less dietary diversity with low consumption of animal food sources was observed in households. Mothers' and fathers' education level, household dietary diversity score and household income were positively associated with food insecurity.

Insufficient knowledge and inappropriate practices related to agrobiodiversity use and household nutrition were identified from the baseline

surveys. Loss of agro-biodiversity over time was evidently seen and traditional knowledge associated with local community is rapidly diminishing over generational lapses. The BFN project, thus has under taken several activities to carry out awareness programs, best practices, trainings and workshops to scale-up utilization of agro-biodiversity at selected pilot sites and at the national level. Under the pilot site upliftment program, several activities are carried out including establishment of school home gardens, promotion of bee keeping and food & diversity fairs; along with home garden diversification programs initiated at the three sites to address micro-nutrient deficiencies. Potentially Important Regional (PIR) foods that are both high in these micronutrients and were locally preferred across all 3 pilot sites, which comprise Gotukola (*Centella asiatica*), Pumpkin (*Cucurbita maxima* & *Cucurbita moschata*) and Eggplant (*Solanum melongena*). The project has also taken initiatives to upscale cultivation of traditional varieties in required sites thereby re-introducing important local varieties with a high nutritional value. In light of improving income generation activities using the available natural biodiversity in the area to improve their standard of living and food security the project has initiated a marketing survey for identification of new marketing options and guidelines for agro-biodiversity and food with high nutritional value and linking whilst expanding the already existing market opportunities at the sites. 92% of households reported selling excess produce to traders, with only 1% selling to other households. Local markets were the most common selling location (48%), followed by sale at the farm gate (29%), and least of all at regional markets (19%).

The school home garden establishment program, was initiated with the aim of establishment of home school garden exhibiting agro-biodiversity, sustainable use and promotion of home gardening for enhanced nutrition. Broadening knowledge of agricultural sciences through practical training and hands on experience on maintaining and establishment of home gardens would inculcate good practices amongst the younger generation; who will be the

enactor of a better food secure community. The officers of the Department of Agriculture successfully carried out training on establishment of home gardens for school children and tutors. School garden establishment at the *Gampola, Giribawa* School has been initiated, with promotion of practices on organic manure production, composting and bee keeping. Integrated pest management programs were carried out to address the issues faced by the farmers on pest and diseases that invade crop cultivation; thereby to create awareness on effective pest and disease management strategies. Expert consultation was provided by experts at the Plant Protection Services, Department of Agriculture and Department of Export Agriculture.

At the national level BFN implements multi-sectoral collaborations through national and international partners; to mainstream biodiversity conservation and sustainable use for improved human nutrition and well-being. Several activities are underway to promote the utilization of agro-biodiversity for human nutrition and establish marketing strategies for nutrient rich, under-utilized, traditional crop varieties including local root & tuber crops. This program is being successfully carried out by BFN partners at the Community Development Centre (NGO) aimed at conservation of the fast disappearing, highly nutritious, local root and tuber crops. With dissemination of knowledge and training on cultivation of local root and tuber crops, promotion and introduction of local root and tuber crops into home gardens, thus ensuring conservation of agro-biodiversity and production of novel food products using local root and tuber crops. The model garden established ensures dissemination of knowledge emphasizing importance on conservation of agro-biodiversity and sustainable use which emphasizes as well as creates awareness amongst the public on traditional knowledge, medicinal properties and local recipes using local root and tuber crops. A new marketing outlet has been opened with facilitation from the BFN project for sale of healthy food and local agro-biodiversity; a major highlight of the outlet is sale of value-

added food items prepared using local tuber and root crops. Ensuring sustainability of a continuous supply chain of local root and tuber crops along with local vegetables a new project has been initiated with 70 household for establishment of small-holder growers for root & tuber crops and home garden diversification for improved nutrition & livelihood in the Aranayaka area.

Addressing the wastage of vast numbers of under-utilized fruits in Sri Lanka, production of under-utilized fruit RTS (Ready To Serve) and commercialization has been spear headed by the BFN project with the partners at the National Food Promotion Board. Highlighting the aim of using the under exploited potential of the fruit to contribute to food security, nutrition, health, income generation and environmental services. RTS of three under-utilized fruits have been produced including; *Elaeocarpus serratus (veralu)*, *Anona muricata (anoda)* & *Mangifera indica L* (local). At present RTS is marketed under the brand "Sun Mack" through 14 "Healthy Food" outlets of the National Food Promotion Board at a price of 80 Rupees. Commercialization and training for entrepreneurs are underway.

Other programs currently implemented under the component 3: Awareness raising and out-scaling include; empowerment and self-employment programmes for women to popularize the use of nutritious herbal food and beverages in partner with the Department of Ayurveda. Medicinal plants are rich sources of nutrients and most are scarcely utilized as medicine as well as herbal food and beverages; through this project awareness raising and training on preparation of herbal based food and beverages were up-scaled along with providing cooking accessories for small hold women entrepreneurs. Increasing local fruit and vegetable consumption of Sri Lankans through *Hela-bojun* sales centers; and development of model urban home gardens were other initiatives undertaken by BFN promoting biodiversity for food and Nutrition.

THE WAY FORWARD

Sri-Lanka is a middle-income developing country, attaining steady strides of progress; development of a food secure nation with sustainable development goals which address; ending hunger, achieving food security, improved nutrition and promoting sustainable agriculture is in fact one of its priority goals. Effective policy mainstreaming tools and recommendations encompassing biodiversity, food and health has been reviewed by policy consultants' supported by BFN, in addition revisions in the NBSAP 2016-2022 completed with integration of BFN concerns and goals, reinforcing the policies to suit the in-situ concerns of securing national food security through sustainable use of agro biodiversity. The BFN project facilitating multi-sectoral collaborations, has embarked on carrying out awareness programs, best practices, trainings and workshops to address the above said sustainable development goals at selected pilot sites targeting the low-income population and nationally to meet and fulfill national goals.

BFN project's latest initiation "multiple media approach to promote conservation & utilization of local agro biodiversity for improved human nutrition & wellbeing" aims to conduct information events that foster greater appreciation of biodiversity for food and nutrition as a resource for development and wellbeing nationally, implement selected national information events, increase awareness and inculcate trends on healthy food habits and nutritious food through upgrading *Hela-bojun* with promotion of organic products and dissemination of information on local agro biodiversity, their nutritional value and associated traditional value & knowledge. These efforts are aimed at the public to create awareness and inculcate trends amongst Sri Lankans on the concept of calorie-based intake of foods and nutrition labeling of processed food, with emphasis on quality and quantity also highlighting the rich nutritional diversity amongst the traditional Sri

Lankan dishes. The BFN project's marketing consultancy team from the University of Peradeniya is presently upgrading a strategy for value chain and market development with the development of guidelines & management plans for the sustainable production and use of wild and cultivated resources by identifying suitable assess markets or market niches nationally and in project targeted ecosystems. The Biodiversity for Food & Nutrition Project expects to contribute through its numerous activities in reducing the Global Hunger Index of Sri Lanka to a less alarming level to produce a better food secure nation with effective utilization, conservation and sustainable use of agro biodiversity.