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Regional Workshop on Neglected and Underutilized Species for Zero Hunger: Status, Progress and Way Forward

Regional Initiative on Zero Hunger Challenge (RI-ZHC)
Regional Office for Asia and the Pacific of FAO
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The Workshop was participated by the the Government of Cambodia, Government of India, the Government of Lao PDR, the Government of Myanmar and the Government of Nepal. National agriculture research institutions including Cambodian Agricultural Research and Development Institute (CARDI), The National Agriculture and Forestry Research Institute of Laos (NAFRI), and Nepal Agricultural Research Council (NARC) also provided valuable support. International partners to this Workshop are the High Level Panel of Experts on Food Security and Nutrition (HLPE), UN Committee on World Food Security (CFS), Australian Centre for International Agricultural Research (ACIAR), and Massey University.

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Dr Xuan Li

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List of Acronyms

ACIAR	Australian Centre for International Agricultural Research
ADG/RR	Assistant Director-General and Regional Representative
BARI	Bangladesh Agriculture Research Institute
BI	Bioversity International
CARDI	Cambodian Agricultural Research and Development Institute
CATAS-TCGRI	Chinese Academy of Tropical Agricultural Sciences- Tropical Crops Genetic Resources Institute
CEO	Chief Executive Officer
CFF	Crops for the Future
CoRRB	Council for Renewable Natural Resources Research of Bhutan
DAR	Department of Agricultural Research, Myanmar
DoA	Department of Agriculture, Bhutan
FAO	Food and Agriculture Organization of the United Nations
FSF	Future Smart Food
GDP	Gross Domestic Product
GI	Geoinformatics
GIS	Geographic Information System
ICARDA	International Centre for Agricultural Research in the Dry Areas
ICIMOD	International Centre for Integrated Mountain Development
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IYP	International Year of Pulses
MoAD	Ministry of Agricultural Development, Nepal
MoAF	Ministry of Agriculture and Forestry, Lao PDR
MoALI	Ministry of Agriculture, Livestock and Irrigation, Myanmar
MSSRF-LANSA	M S Swaminathan Research Foundation - Leveraging Agriculture for Nutrition in South Asia
NAFRI	National Agriculture and Forestry Research Institute, Lao PDR
NARC	Nepal Agriculture Research Council
NGO	Non-governmental organization
NUS	Neglected and Underutilized Species
PRC	Plant Resources Centre, Vietnam
Q&A	Questions and Answers
RAP	Regional Office for Asia and the Pacific
R&D	Research and Development
RSPC	Regional Strategic Programmes Coordinator
SDGs	Sustainable Development Goals

TCGRI	Tropical Crops Genetic Resources Institute
TFNet	International Tropical Fruits Network
UBKV	Uttar Banga Krishi Viswavidyalaya, West Bengal
UWA	The University of Western Australia, Australia
RI-ZHC	Regional Initiative on Zero Hunger Challenge

Executive Summary

The Regional Workshop on Neglected and Underutilized Species for Zero Hunger: Status, Progress and Way Forward by the Regional Office for Asia and the Pacific, Food and Agriculture Organization of the United Nations (FAO), under the Regional Initiative on Zero Hunger Challenge (RI-ZHC), was successfully held on 11-12 December 2017 in Bangkok.

The purpose of the Workshop was to take stock of the work on scoping and prioritization of Future Smart Food (FSF) among NUS for Zero Hunger that has been done, draw lessons from the work done for the Regional TCP on Creating Enabling Environment on Nutrition-sensitive Agriculture (TCP/RAS/3602) under RI-ZHC, and identify the way forward and new work on FSF that can be integrated under RI-ZHC. Thirty-six participants, representing five countries, including national focal points/national project coordinators on Zero Hunger Challenge, national experts as well as international partners and FAO experts attended this Regional Workshop.

The Workshop was opened by Dr Kundhavi Kadiresan, ADG/RR, RAP. Dr Mahmoud Solh, Vice Chair of the Steering Committee member, the High Level Panel of Experts on Food Security and Nutrition (HLPE), UN Committee on World Food Security (CFS) delivered a keynote speech on Challenges, Opportunities and Strategies for Scoping, Prioritization and Promoting Future Smart Food (FSF) for Zero Hunger. Four countries (Cambodia, Lao PDR, Myanmar and Nepal) presented their national scoping and prioritizing study of FSF as well as their workplan and how to move FSF work forward. International and FAO experts have provided feedbacks and suggestions. One panel discussion was held during the Workshop on the future FSF work needed beyond the scope of the Regional TCP in 2018-2019.

The background of the Workshop is that hunger, food insecurity and malnutrition are major challenges of the 21st Century in Asia and the Pacific region. To achieve zero hunger, which stands at the core of the Sustainable Development Goals SDGs, we need to improve dietary patterns and food systems. Stakeholders along the agriculture and food value chain are affected by a disconnect between production, consumption and knowledge about nutrition, which result in a poor overall nutrition status among millions of people. Agricultural diversification and sustainable intensification offer enormous opportunities in addressing hunger and malnutrition in the context of climate change. In this regard, Future Smart Food, NUS that are nutrition dense, climate resilient, economically viable and locally available/adaptable, provide diverse and nutritious food resources. They are an essential source of protein and micronutrients, enhance climate resilience, and boost household income and livelihoods.

The major outputs of the Workshop include updated national scoping and prioritizing study on FSF, consolidated national and regional workplans of the Regional TCP and Recommendations prepared by experts collectively. The Recommendations address, among others, enhancing of public awareness and education on FSF and malnutrition and climate change, a need for consolidated national action plans on FSF with strategic and inter-ministerial coordination, FSF value chain pilot studies and development, as well as the call for a broader technical, policy and advocacy support to promote production, marketing and consumption of FSF.

Background and Introduction

Eradicating hunger and malnutrition is a major challenge in Asia and the Pacific, especially where low-income smallholder farmers in developing countries are concerned. Agriculture has to be made more sustainable – environmentally, economically and socially – and diverse, while improving healthy diets. This is indispensable for addressing hunger and malnutrition in a changing climate. An enabling environment has to be created to promote diversification of food production and consumption for national food security and nutrition.

This requires agriculture to be more climate resilient, less dependent on chemical fertilizers, and associated with lower methane emissions from rice cultivation and methane and nitrous oxide emissions from livestock. At the same time, farmers, particularly smallholders should be able to earn higher incomes for economic sustainability, which will enable households to afford a better, more varied diet, with higher intakes of protein as well as micronutrients.

Yet agriculture in this region is over-reliant on a handful of major staple crops, which poses inherent nutritional, agronomic, ecological and economic risks. Globally, only three crops—wheat, rice and maize—covered 40% of all arable land globally, delivering more than 50% of the world's consumption of calories and protein. About 95% of the world's food needs are provided by just 30 species of plants. In Asia, rice continues to be the dominant food.

Preserving agrobiodiversity is essential for reducing dangers of relying excessively on a few crops. Neglected and underutilized crops species (NUS: sometimes called “forgotten”, “underexploited”, “minor”, “orphan”, “promising” and “little-used”) are an essential component of agrobiodiversity.

These crops tend to be climate resilient and well adapted to arid and semi-arid agro-ecological zones, help fix nitrogen in the soil and are a relatively cheap source of protein, vitamins and micronutrients. By fixing nitrogen in the soil, pulses and legumes, in particular, reduce the need for chemical fertilizer and by providing substitutes for animal protein, they reduce the number of animals that need to be kept for meat and other livestock products, besides providing better nutrition. But it must be conceded that they do have some drawbacks. NUS are thus considered important for addressing the Zero Hunger Challenge.

NUS are abundant in most Asian countries. However, their potential nutritional and market value, as well as their suitability for climate-adaptation are underexploited. Scoping, prioritizing and promoting wider use of NUS provides an opportunity to diversify food systems and enhance resilience to both biotic and abiotic stress.

However, reorienting agricultural policies away from a focus on cereal production and consumption is not easy as influential groups benefit from current policies. Smallholder farmers who wish to diversify their crops need support which they do not get under the present system. There is therefore a need to 1) better understand the scope for diversifying agriculture to include NUS; 2) identify the policy and institutional changes that will be required for this, and 3) describe the support systems that will be needed to create an enabling environment to help realize the potential gains in terms of nutrition, climate adaptation and income generation.

In view of FAO's existing knowledge on the food system approach and long standing experience on NUS, building on successful experience of International Year of Potato, International Year of

Quinoa, and the International Year of Pulses, FAO is well placed to provide advice and support to its member countries on policies to promote NUS. This is being done through the RI-ZHC.

Accordingly, the Regional Workshop on Neglected and Underutilized Species for Zero Hunger: Status, Progress and Way Forward builds on the FAO/ACIAR's Regional Expert Consultation on Scoping and Prioritization of Neglected and Underutilized Crop Species held in December 2016 and ongoing FAO Regional TCP on Creating Enabling Environment on Nutrition-sensitive Agriculture (TCP/RAS/3602) and national TCP projects under Regional Initiative on Zero Hunger. Its main objectives are described below.

The main objectives of the Workshop were to:

- (1) Take stock of the work on scoping and prioritization of Future Smart Food among NUS for Zero Hunger that has already been done;
- (2) Draw lessons from the work done for the Regional TCP under Zero Hunger Initiative;
- (3) Identify the way forward and new work that can be integrated under RI-ZHC.

The Workshop covered four countries in both Southeast and South Asia under the Regional TCP of Cambodia, Lao PDR, Myanmar and Nepal. Participants from these countries include three groups: (1) National Project Coordinator/National Focal Point for Zero Hunger from the Governments; (2) National Expert on Future Smart Food from national agriculture research institutes; (3) National Consultants under the Regional TCP. International experts and partners from the Ministry of Agriculture and Farmers Welfare of India, UN Committee on World Food Security (CFS), Australian Centre for International Agricultural Research (ACIAR), Massey University, covered multidisciplinary areas of agriculture, farming systems, genetic resources, nutrition and socio-economics to ensure a nuanced and holistic review of the Regional TCP and the NUS/Future Smart Food initiative. In addition, staff from the FAO including experts from the Headquarters, RAP and country offices activity contributed to the Workshop. The two-day meeting covered four sessions including one panel discussion on both policy and technical perspectives of how to move FSF initiative forward.

Sessions

Opening Session

The Workshop was opened by **Dr Kundhavi Kadiresan**, Assistant Director-General and Regional Representative of the FAO Regional Office for Asia and the Pacific. She thanked Dr Mahmoud Solh, Vice Chair of the Steering Committee member, the High Level Panel of Experts on Food Security and Nutrition (HLPE), UN Committee on World Food Security (CFS), as well as all experts and officials from various governments and international partner organizations for their attendance and welcomed all participants. She presented the challenges faced by FAO and governments in the region in ensuring food security and nutrition and the well-being of small holder farmers. She urged the projects to look into all the aspects of malnutrition as well as into the bright prospects of neglected and underutilized species in helping ensure zero hunger for all. The ADG likewise stressed the irony of obesity and overly nourished in the midst of undernutrition and nutrient deficiency. She appreciated the efforts of the project countries in studying other alternative sources of nutritious foods. There are challenges of population, migration and growing demand for consumption. It is inspiring to note that Asian consumption is increasing and we are moving toward a healthier Asia. The region, as a dynamic continent, has a lot to offer to the world in terms of production, technology and marketing opportunities. She thanked the project countries for sending larger delegation to the workshop and the convergence of international NUS/FSF experts as she looked forward to a fruitful discussion.

Dr Xuan Li, Senior Policy Officer and Delivery Manager of the Regional Zero Hunger Challenge (RI-ZHC) Initiative in FAO RAP, gave a brief on the proceedings, objectives and expected outcome of the Consultation. At first, she reviewed the five pillars and the five targets of Zero Hunger Challenge and the SDG2 on Zero Hunger. Linking the global goal on Zero Hunger to FAO RAP's Implementation Plan of RI-ZHC, she presented the three main programmatic working areas of RI-ZHC, namely (1) creating an enabling environment on food security and nutrition; (2) data collection, analysis and monitoring; and (3) strengthening sustainable agriculture and food systems. One of the specific working subject of focus under these working areas is to strengthen Future Smart Food (FSF) production, marketing and consumption for Zero Hunger. Dr Xuan Li then introduced the definition, partners, origin, path, milestones and advancement of FSF. Upon national requests from the region for FAO technical support to identify alternative crops to address malnutrition and climate change and develop agricultural diversification strategy for food security and nutrition to achieve Zero Hunger by 2025, FAO RAP together with FAORs, SPL 1-5 and AG, ES, and ODG stated to formulate the efforts in promoting NUS. The first Regional Expert Consultation on Scoping, Prioritizing and Mapping of Neglected and Underutilized Crop Species in Asia were successfully held in December 2016 in Bangkok. Through a multidisciplinary three-stage priority-setting exercise, 39 crops from 8 countries: Cambodia; Lao PDR; Myanmar; Nepal; Bangladesh; Bhutan; Viet Nam; West Bengal (India) were identified as NUS that are nutrition dense, climate resilient, economically viable and locally available/adaptable, thus qualified as Future Smart Food (FSF). The FSF initiative then attracted support and active engagement of 20 international and national partners of Future Smart Food. A FAO Regional TCP on Creating Enabling Environment on Nutrition-sensitive Agriculture (TCP/RAS/3602) then kicked off to provide assistance to the development of FSF to Cambodia, Lao PDR, Myanmar and Nepal from 2016-2019. Building on this background, Dr Xuan Li introduced the objectives, country coverage,

participants/partners, agenda and the ground rules of the Workshop. The briefs was then followed by a short self-introduction by all participants.

In his keynote speech, **Dr Mahmoud Solh**, Vice Chair of the Steering Committee member, the High Level Panel of Experts on Food Security and Nutrition (HLPE), UN Committee on World Food Security (CFS) presented the Challenges, Opportunities and Strategies for Scoping, Prioritization and Promoting Neglected and Underutilized Species (NUS) as Future Smart Food (FSF) for Zero Hunger. He called attentions on the current challenge of limited production diversity leading to unbalanced diets, and ultimately malnutrition since agriculture has concentrated on a few staple crops. It is essential to diversify the production systems for a balanced diet, enhance adaptation to climate change and increase income to improve livelihoods. NUS crops play an important role in the subsistence and economy of poor people throughout the developing world. Despite their potential for dietary diversification and the provision of micronutrients such as vitamins and minerals, they continued to attract little research and development attention. In this regard, strategies to transform NUS to commercially important crops are essential. Research needs a priority-setting to refocus on desirable traits to support production in the long run for the development of sustainable value chains. These traits include tolerance to certain climate-induced stresses, resistance to pests and diseases, nitrogen-fixation abilities and increased water-use efficiency. He gave examples of specific NUS that have evolved in the past based on trait selection and commercial potential, such as quinoa, lentil and grass pea. At the end of his presentation, he underlined the importance of NUS in fragile ecosystems and expressed his hope to come up with clear recommendations that builds on strong partnerships to focus on specific crops in selected areas.

The presentation by **Dr Arshiya Noorani** and **Dr Matthias Halwart** provided a Global Perspective on the Roles and Potentials of NUS for Zero Hunger. Dr Noorani firstly provided a comprehensive background in terms of the policy and legal background that has set the scene for promoting the Save and Grow Model and NUS. The Second Global Plan of Action (GPA) provided a set of 18 inter-related priority activities to enhance the efficiency of plant genetic resources for food and agriculture conservation and improve their utilization. There were four main groups of priority activities: i) In Situ conservation and management, ii) Ex Situ conservation, iii) Sustainable use and iv) Building sustainable institutional and human capacities. In addition, there were many other Treaties and Declarations on crop diversity and nutrition, although there were often missing links among conservation, utilization and legal frameworks as well as policy incentives. She then called for qualified seeds and extension services to promote NUS from a farming perspective. Dr Matthias Halwart, Senior Aquaculture Officer from SP2 FAO, added another approach to rediscover the potential of NUS, that is to promote integrated farming and integrated agriculture aquaculture, which will contribute to biodiversity in rice paddy. In this way, there would be higher overall output, better nutrition, enhanced resource flow, enhanced food and provision of ecosystem and well-being, and improved soil fertility and pest control. Dr Halwart advocated for a local approach that requires local and ecological knowledge.

Dr John Dixon, Principal Advisor/Research Program Manager for the Cropping Systems and Economics (CSE) program, Australian Centre for International Agricultural Research (ACIAR), presented the Farming and Food Systems of Future Smart Food/NUS in Asia. Dr Dixon acknowledged a positive development from NUC (neglected and underutilized crops) to NUS to FSF which integrated strengthened diversification and sustainable intensification that are positive for rural livelihood. Increased farm diversification (including FSF) is essential for rural and

national economic growth. Emphasizing on system thinking and a perspective on farming system, Dr Dixon recommended on foresight study (Typologies, characterization and analysis of farming systems and farm households; information for policy makers) for each system to frame FSF opportunities systematically. To be specific, to identify less number of FSF for each Asian farming systems, selected according to improved livelihoods, nutrient density and climate resilience, as well as to estimate nutrient density and resilience by system. In addition, Dr Dixon also presented the importance of both top-down and bottom-up approach. While there is a need to re-incorporate sustainability fully into sustainable intensification and diversification (SID) and construct target interventions to specific farming system, local capacity building is critical that required strengthened regional institutions for innovation spillovers.

Dr Barbara Burlingame, Professor of Massey University in New Zealand highlighted biodiversity for food and nutrition with experiences in Asia and the Pacific in her presentation. She mentioned that biodiversity is reflected at three levels: the ecosystem or agro-ecological zone, the species contained in the ecosystem, and the genetic diversity within the species. Food biodiversity covers neglected, underutilized and wild species; and cultivars, varieties, landraces, breeds within species. Dr Burlingame encouraged that agriculture, environment and health sectors must be equal partners to effectively, and sustainably, address malnutrition in all its forms. She continued to introduce The International Rice Commission (20th Session) recommended that the existing biodiversity of rice varieties and their nutritional composition need to be explored before engaging in transgenics. Nutrient content needs to be among the criteria in cultivar promotion. Cultivar-specific nutrient analysis and data dissemination should be systematically undertaken. Member countries should promote the sustainable development of aquatic biodiversity in rice-based ecosystems and policy decisions and management measures should enhance the living aquatic resource base. In areas where wild fish are depleted, rice-fish farming should be considered as a means of enhancing food security and securing sustainable rural development. Attention should be given to the nutritional contribution of aquatic organisms in the diet of rural people who produce or depend on rice. Moreover, she also introduced the Second Scientific Asia and the Pacific Symposium on Sustainable Diets: Nutrition and Livestock in Ulaan Baatar in 2013 noted that the dilemmas and trade-offs in diversity, in terms of sources of nutrients, deforestation, natural repositories of plant biodiversity and global carbon balances, among other. She likewise provided cases of biodiversity, the impact of food biodiversity on measurements of dietary adequacy and technical information on how much food to meet the Recommended Daily Intake. They noted the traditional use and availability of aquatic biodiversity in rice-based ecosystems such as those in China, Lao PDR and Sri Lanka. NUS crops such as sweet potatoes, bananas, taro, yam and local beans, among others were emphasized.

Dr B Rajender, Joint Secretary of the Department of Agricultural Cooperation and Farmers Welfare in India, presented the Indian Government's perspective and initiatives on integration of FSF in rice-fallow in India. He mentioned that in 2015 and 2016 the production of pulses had been very low and crops had to be imported from outside. Prices had gone up and made pulses less affordable for poorer households. India's population is huge and the country has limited land available for growing crops. This is why the use of rice fallows for growing pulses has become a major step towards self-sufficiency. The first initiative taken by the Government of India was to map potential areas for cultivation of pulses and oilseeds via remote sensing and suitability analysis, followed by improvement of irrigation infrastructure, introduction of better varieties and creation of seed hubs. In 2016, a scheme had been launched to make use of 3 million ha of rice

fallow for cultivation of oilseeds and pulses in six States for a projected duration of three years. To move forward, Dr Rajender suggested to introduce enabling policies on markets, minimum support prices and warehousing, to promote intercropping, ensure input supply in critical times, build a strong seed supply system, facilitate credit, consolidate R&D, and strengthen capacity and awareness among farmers.

The following key messages have been discussed during the Q&A:

- Issues of farmers right and benefit sharing.
- There is a need for detailed participatory assessment in communities on whether or not NUS can be integrated in a value chain in a specific area. Often ideas are promoted that do not fit into the local systems, questions such as can NUS be feasibly integrated with communities and should certain NUS be the best option for farmers should be considered.
- Three Southeast Asian countries under the Regional TCP are not included in the ASEAN food composition table. There is a need to update the table and engage private sectors.
- There are different approaches when promoting different types of NUS. For instance, quinoa was popularized through private engagement whereas public sector has larger influence in the development of legume.
- Government could play an essential role to promote NUS through implementation of taxation and providing subsidy in environmental services, nutrition and health.
- Promotion and the marketing of NUS could go cross border. For instance, Nepal promoted and exported grass pea to other countries including India and Bangladesh.

Session 1 Country Studies on Prioritization of Future Smart Food among NUS for Zero Hunger (FSF/NUS-ZHC)

Dr Xuan Li started the first technical session by providing a conceptualization and overview of Regional Priority-Setting Exercise on Future Smart Food for Zero Hunger Challenge. She first presented the context of Zero Hunger in a changing climate towards 2030 and the gaps in current agricultural and food system. There are two major limiting factors in the global agriculture and food systems, both of which are observed in Asia: (1) limited production diversity with an emphasis on starchy crops can lead to unbalanced diets and ultimately malnutrition. An abundant supply of a few staple crops alone does not itself provide for wholesome sufficient nutrition, (2) reliance on a few staple crops with high input requirements leaves farming more vulnerable to environmental shocks, especially under a climate change scenario. In this sense, there are two significant gaps that exist, or will emerge, in agriculture and food systems: production gap and nutrition gap. Even if traditional staple crops provide enough calories to prevent hunger, they do not provide all the nutrients necessary for a healthy diet. Current high levels of malnutrition are often due to unbalanced diets with insufficient nutrition diversity. Therefore, a holistic food system perspective can provide answers for tackling malnutrition, and addressing climate change and environmental threats in agricultural production. Nutrition-sensitive and climate-smart agriculture interventions can tap local potential to promote agricultural productivity that meets nutritional requirements. Dr Xuan Li then identified the nutritional value and climate resilience characters of NUS thus making it a good intervention entry point for agricultural diversification and sustainable intensification. Dr Xuan Li then introduced the Priority-Setting Exercise on NUS Promoting Agriculture Diversification for Zero Hunger: Future Smart Food, which was initiated in 2016. The priority-setting exercise followed a four-step approach (conceptualization→partnership building→national study on NUS→ Regional Expert Consultation on Scoping and Prioritizing NUS) with the objectives to (1) review and validate the preliminary scoping report on crop-related NUS in the selected countries; (2) rank and prioritize high-potential NUS based on the established priority criteria; (3) identify 5–6 crop-related NUS per country, and d) strategize to enhance production and utilization of the selected crops in local diets. The participating countries include: Bhutan, Bangladesh, Cambodia, India, Lao PDR, Myanmar, Nepal and Vietnam. Out of which, four countries were presented in the Workshop.

Afterwards, participants from Cambodia, Lao PDR, Myanmar and Nepal presented their respective country studies on FSF/NUS-ZHC. This group of presentations is a recap and update on the Country Studies on FSF/NUS-ZHC, based on the results of FAO/ACIAR's Regional Expert Consultation on Scoping and Prioritization of Neglected and Underutilized Crop Species held in Bangkok in December 2016 (hereafter "The Consultation"), as well as international reviews. Each presentation was led by the National Focal Point for Zero Hunger Challenge (in the absence of National Focal Point on ZHC, it would be Head of national agriculture research institute) and then presented by the author(s) of the country scoping studies on FSF/NUS-ZHC.

Cambodia

H.E. Dr. Sok Silo, National Focal Point for Zero Hunger in Cambodia, emphasized that Cambodia's national priorities are on agriculture protection, food security and nutrition strategies for SDG2 and agricultural diversification. Many Cambodians rely too much on rice to supply their nutritional needs, even where alternative nutritious food sources are available in markets and

growing locally. The current review of the National Study on Food Security and Nutrition, and associated studies such as Fill the Nutrient Gap (WFP) clearly demonstrate the need to promote alternative foods and reduce dietary dependency on rice. In 2016, Cambodia launched the National Action Plan for ZHC in Cambodia 2016-2025. The plan was developed by task forces led by MAFF and MoH under the TWG-SP and FSN chaired by CARD. Regional ZHC started in 2016 and Cambodia country actions are aligned with the Regional Programme through involvement with the Regional TCP. In terms of challenges and way forward, Dr Silo emphasized that Cambodia will promote FSF/NUS as part of its strategies to diversify production and consumption for nutrition-sensitive agriculture. Cross-sectoral dialogue necessary under CARD to encourage wider interest from MAFF and MoH and to explore linkages for home gardens, school feeding, school gardening and other initiatives. CARD will ensure that FSF/NUS are considered in development of the new National Strategy for Food Security and Nutrition 2019-2023. Moreover, Cambodia will use the concepts of FSF/NUS in the ‘One Village One Product’ strategy.

Dr Kynet Kong, Deputy Head of the Plant Breeding Division at the Cambodian Agricultural Research and Development Institute (CARDI) first gave an overview on the agriculture sector, agro-ecological zone, and major crop pattern and crop diversity of Cambodia. He introduced NUS in Cambodia as mainly representing traditional landraces. Diversity of NUS is rather high, and farmers contribute to genetic diversity in their fields by maintaining traditional practices. Nevertheless, due to being neglected and underutilized, risk of extinction and genetic erosion are likely to happen for many of these local varieties. Other aggravating factors are staple-biased monocultures, population growth, droughts and lack of infrastructure. The major constraints for NUS are low productivity and insufficient consumer acceptance, making them less competitive compared with other mainstream crops. Furthermore, they are continuously replaced by improved varieties that can also provide better nutritional values. Dr Kong stressed that growing of population and infrastructure development are threatening to natural habitat of wild rice in Cambodia. After presenting the prioritized six FSF in Cambodia, he called on germplasm collection of endanger species to be carried out and conserve; and documentation of collected materials for better utilization in the future. He also opted for sustainable production practices for NUS to be developed by research, as well as improved marketing opportunities for these crops.

Cambodia	Food Group	English Name	Scientific Name
	Cereals	Wild Vigna	<i>Vigna umbellata</i>
	Roots and Tubers	Sweet Potato	<i>Ipomoea batatas</i>
		Taro	<i>Colocasia esculenta</i>
	Nuts and Pulses	Peanut	<i>Arachis hypogaea</i>
	Horticulture	Sleuk Bah	<i>Coccinia grandis</i>
		Drumstick	<i>Moringa oleifera</i>

Table 1 Prioritized FSF in Cambodia by food group

Lao PDR

Mr Savanh Hanephom, National Focal Point for Zero Hunger in Lao PDR first introduced the policy context of agrobiodiversity in Lao PDR. The National Agriculture Development Strategy emphasized equitable sector development, meeting national food security goals, commercialization, and ensuring graduation from Least Developed Country Status by 2020, as

well as high-value, niche market products. The National Nutrition Strategy (to 2025) and Plan of Action (2016-2020) employed a multi-sector approach for improved access to and availability of diverse foods for all communities. In addition, National Biodiversity Program (2015-2025) emphasized support of Laos' tremendous agricultural and natural biodiversity. In terms of Lao PDR's engagement with NUS, the Prime minister has announced taking up the Zero Hunger Challenge. The Minister of Agriculture (at 40th FAO Conference) committed to reducing food insecurity and malnutrition to near zero by 2025. In addition, a NUS inception workshop was conducted with multiple donors and projects participated. Mr Hanephom stressed that Lao PDR would like to further develop the NUS approach as a local-level tool for selecting NUS for extension support, as well as pilot extension services to support up-take of the selected NUS crops, as part of specific agriculture projects.

Dr Siviengkhek Phommalath from the National Agriculture and Forestry Research Institute (NAFRI), started his presentation with an introduction to the climate and agricultural development in Lao PDR. Lao PDR is rich in plant species and genetic diversity. Recently, more than 14,000 accessions of rice have been conserved, with 80% being glutinous rice. Of the glutinous rice accessions, 55% are upland accessions and 45% are lowland accessions. Traditional glutinous rice varieties have a good aroma, eating quality, resistance to GM disease, drought tolerance, flood tolerance, pest and disease resistance, and other traits. The production of sticky rice is often supplemented with vegetable gardens, animal raising (goats, chickens, ducks, turkeys, pigs), and mango, coconut, or banana trees. Potential commercial agricultural products that are increasing in area and productivity include coffee, cassava, maize, sugarcane, tea, and rubber. The changing nature from subsistence to open market economy and the availability of fertilizers and other inputs are contributing to genetic erosion in several crops such as rice, local vegetables, and legumes. In addition, farmers are abandoning sticky rice varieties, replacing them with higher yielding non-glutinous types. Wild rice species are at risk of being eroded or becoming extinct due to the conversion of their habitats. There is insufficient information available on many crops and their crop associated biodiversity to ensure their improved use, development and conservation. Within the group of pulses, mung bean, rice bean and cow pea were selected according to their high protein content and suitability for animal feeding. He noted that tuber crops, such as cassava, supplement the food basket in times of rice insufficiency (July to August); therefore, prioritized tubers such as purple yam and taro can play an important role. The main constraints for NUS in Lao PDR are limited information on NUS, including germplasm and production knowledge, lack of marketing opportunities, inputs and investment. Research and Development on these aspects, as well as private sector engagement may be leading the way to NUS promotion in Lao PDR.

Lao PDR	Food Group	English Name	Scientific Name
	Roots and Tubers	Taro	<i>Colocasia esculenta</i>
		Fancy Yam	<i>Dioscorea esculenta</i>
	Nuts and Pulses	Rice Bean	<i>Vigna umbellata</i>
		Cowpea	<i>Vigna unguiculata</i>

Table 2 Prioritized FSF in Lao PDR by food group

Myanmar

Ms Khin Mar Oo, National Focal Point for Zero Hunger in Myanmar, pointed out that Myanmar was the second country in the Asia Pacific region to join the Zero Hunger Challenge in 2014. The

Government aimed to work towards achieving SDG2 and ending hunger by 2030. There is a change on national agriculture policy from community-based agriculture policy to producer-oriented agriculture policy. The new policy to improve food and nutrition security and food safety for all people and to enable smallholder farmers to increase their incomes through higher productivity and diversified production in response to market demand, as well as to enhance exports through and internationally competitive private agri-business sector. Ms Khin Mar Oo emphasized that the Government aimed to mainstream FSF for Zero Hunger with a focus on productivity and utility in the form of small scale farming activity and backyard farming system. She was confident that with the full package of technical and financial assistance, government and development partner can implement model demonstration project within the available time frame. In terms of way forward, Ms Khin Mar Oo called for expanded coverage of awareness campaigns and research on the cultural and gender elements that affect nutrition and food consumption within the household.

Dr Minn San Thein, Deputy Director and Head of the Myanmar Seed Bank at the Department of Agricultural Research (DAR), gave an introduction to his study on prioritization of FSF in Myanmar. More than 70 percent of people live in rural areas and rely on agriculture for work and subsistence. He highlighted the diversity of farms in Myanmar, often accommodating more than 20 species in one field. Although many species are neglected and underutilized, traditional knowledge on cultivation and preparation plays a big role and often, NUS are collected from the forest. He suggested a total of fourteen species from different food groups and also introduced possible interventions for their promotion. Next to nutritional value, he listed export potential, climate change adaptation and local consumption, such as lablab bean in traditional pickle tea, as factors for prioritization.

Myanmar	Food Group	English Name	Scientific Name
	Cereals	Specialty rice	<i>Oryza sativa L</i>
		Sorghum	<i>Sorghum bicolor</i>
	Roots and Tubers	Elephant`s foot yam	<i>Amorphophallus campanulatusRoxb, Bl.ex Decne</i>
	Horticulture	Roselle	<i>Hibiscus sabdariffa</i>
		Drumstick	<i>Moringa oleifera</i>
	Other	Amla/Burmese gooseberry	<i>Phyllanthus emblica(or)Emblica officinalis</i>

Table 3 Prioritized FSF in Myanmar by food group

Nepal

Mr Baidya Nath Mahto, Executive Director of Nepal Agriculture Research Council (NARC), stated that there are multiple varieties of NUS in Nepal and more than 40 types of lentils that are exported to other countries. He mentioned that in NARC, a special committee on NUS has studied and identified relevant NUS based on food groups and specifically their cultural values (i.e. barley is used in worshipping).

Dr Bal Joshi, Senior Scientist from the NARC presented the preliminary scoping results on NUS in Nepal. He gave an overview of the geographical zones in the country, the share of agriculture in the overall economy and underlined the country`s diverse agricultural diversity. He also pointed

out that investment in research and private interest in NUS are very low. He identified that these further studies and activities on NUS are needed: base line surveys on food, nutrition, health and climate changes; Crop improvement (breeding); Crop improvement (breeding); nutrient analysis; processing and food recipe and market linkages.

Nepal	Food Group	English Name	Scientific Name
	Cereals	Tartary Buckwheat	<i>Fagopyrum tataricum (L.) Gaertn</i>
	Roots and Tubers	Taro	<i>Colocasia esculenta</i>
	Nuts and Pulses	Grass pea	<i>Vicia sativa L</i>
	Horticulture	Drumstick	<i>Moringa oleifera</i>
		Jackfruit	<i>Artocarpus heterophyllus Lam</i>
		Nepal Butter Tree	<i>Bassia latifolia Roxb</i>

Table 4 Prioritized FSF in Nepal by food group

After the four countries' presentations on their process and result of country studies on prioritization of Future Smart Food, **Dr Mahmoud Solh** then presented an overview and feedbacks. He is grateful to learn the active country engagement and the ministries and partners have already invested much efforts. A multisector approach is essential as it is useful to have different ministries and partners to coordinate with local communities where NUS will be produced and consumed. He gave recognitions that all countries have taken a multidisciplinary approach covering a large varieties of areas that should be taken into consideration when promoting NUS: agro-ecology, production system, nutrition diversity, climate change, farmers perception, market and economy constrains and cultural preferences. The countries may wish to further identify targeted FSF for interventions to make the crops agronomically acceptable and economically acceptable to the markets.

The following key messages have been discussed during the Q&A:

- The concept of NUS can be well integrated to the concept of One Village One Product (OVOP) which has been developed in several Asian countries. It is important to put identity of a location to certain products for marketing in combination of culinary tourism, agro-tourism, genetic resource, and geography. Most of countries were in favour of the OVOP concept, especially Cambodia, of which the Government has officially requested technical and policy support to develop national OVOP strategy. However, there were critical voices, for instance from Nepal. They stated that OVOP is a strategy that may put agro-enterprise at high risk. In developing countries, agro-enterprise is the source of food security. Diversification is encouraged for smallholder producers but OVOP encourages production of single crop. The school of thought may be against the principle of diversity.
- More progress was made on technical dimensions of the challenge than the political economy and socio-economic dimensions. Further studies with a holistic approach situating NUS in a grand socio-and political economy will be valuable.
- Multi-institution was set up at the capital city level. It can help if such institution can be developed at district level. Local coordination mechanism can provide information at the national groups.

Session 2 Regional TCP: Country Work Updates and Expected Outputs

Dr Xuan Li opened the second technical session by providing an overview of the Regional TCP (TCP/RAS/3602). The national Governments of Cambodia, Lao PDR, Myanmar and Nepal have identified agrobiodiversity, among others, as a key priority, offering a huge potential in addressing malnutrition and agricultural sustainability. In this context, Future Smart Food (FSF) have been identified as a promising intervention area to address Zero Hunger in a changing climate. The Regional TCP “Creating Enabling Environments for Nutrition-Sensitive Food and Agriculture to Address Malnutrition” aims to link components and close the gaps along the food value chain by a holistic food system approach based on FAO’s previous experience in the region. The objectives of the Regional TCP is to: (1) create sound enabling policies and provide for coherence in national food and agriculture policies; (2) develop capacity, provide infrastructure and promote research for improved nutrition; (3) raise awareness and increase incentives for availability, access and consumption of diverse, nutritious and safe food; and (4) Foster multi-sectoral and multi-stakeholder food system approach along the value chain. Engaging concerned ministries and local smallholder farmers in the four countries and connecting with national research institutes, stakeholders along the food value chain (food processors, trader, consumer, etc) and international research and development partners, the concrete activities under the Regional TCP during 2017-2019 are: national and local policy dialogues; field surveys including food security and nutrition, value chain and food system analysis across a wide set of respondents from multiple sectors and all stages of the value chain; and evidence-based study on crop diversity, dietary diversity and nutrition analysis in selected countries. Dr Xuan Li then explained in detail about each activities and expected outputs.

Afterwards, participants from Cambodia, Lao PDR, Myanmar and Nepal presented on their respective work progress and work plan under the Regional TCP. The presentation were recaps and updates on the country implementation of the ongoing FAO Regional TCP on Creating Enabling Environment on Nutrition-sensitive Agriculture (TCP/RAS/3602). The first part of each presentation was led by the National Focal Point/National Project Coordinator on government attention/level of engagement/support/expectation/needs/recommendations of the Regional TCP. The second part of the presentation was led by the Lead National Consultant on the work progress and workplan.

Cambodia

H.E. Dr Sok Silo stated that the Cambodia Government will develop effective and coherent national policies and regulations to support the regional TCP and cooperate FSF/NUS into the FSF framework. In specific, Cambodia will (1) encourage wider interest from other stakeholders (individual/agencies/ institutions) and to explore linkages for home gardens, school feeding, school gardening and other initiatives; (2) use the concepts of FSF/NUS in the ‘One Village One Product’ strategy; (3) ensure that FSF/NUS are considered in development of the new National Strategy for Food Security and Nutrition 2019-2023. In regard to the future plan for way forward, he mentioned that the Government planned to organize workshop to introduce and raise awareness on the importance of the NUS; conduct assessment and priorities for NUS for further promotion; conduct stakeholder consultative workshops (4 regional workshop and 1 national workshop) to present the result of the assessment and dissemination; and organize Food Day at the regional level to promote the potential of the selected NUS crop/products available in the region and country on the whole.

Ms Thany Hour, Lead National Consultant of Cambodia, presented that currently the Cambodia National Consultant (NC) team was actively collecting and analyzing national policy questionnaire from 47 institutions including public institutions, research organizations/universities, private institutions, INGOs/NGOs, school gardens and farmer associations. In regard to the field survey site, the NCs identified four locations based on the agro-ecological zones of Cambodia, namely Western coastal and mountainous fringe: Kompong Speu, Central zone: Takeo, Eastern Upland mixed system: Rattanakiri, and Northwest upland mixed system: Preah Vihear. In addition, two studies have already been drafted from Cambodia. They are the report on the key potentials and gaps on existing natural resources endowments to support Future Smart Food in various agro-ecological zone in the context of climate change and the impact assessment of climate change on agriculture with copying strategy and plan of actions for increasing resilience of crop sector to climate change, identifying the entry points and interventions. Ms Hour lastly presented the timeline and the workplan for the upcoming studies and policy dialogues.

Lao PDR

Mr Palikone Thalongsechanh, National Project Coordinator of Lao PDR, first confirmed the Government commitment to support the Regional TCP, including find synergy with other ongoing projects and facilitate introduction to and collaboration with selected provinces, districts and relevant stakeholders. Nevertheless, he also pointed out some limitations from the Government that there is limited funds thus calling for additional support especially on extension services and opportunities for joint learning in the region.

Mr Khamphou Phouyyavong, Lead National Consultant of Lao PDR, reported on the progress of national policy questionnaire that they have been collected through face-to-face interviews with 42 institutions. Statistics on LSIS, RVS, LECS, soil, rain fall, and temperature have also been collected. In addition, first drafts of national report on farming systems in various agroecological zones and National report on on-farm PGRFA/NUS in various agroecological zones (based on nutrient value, climate resilience and economic viability) have been completed. Regarding the field survey, two provinces have been identified as the field site: Oudomxay for North and Xekong for South. In these two places, the NC team aimed to produce targeted analysis on malnutrition, crop diversity and food consumption analyses in target geographic areas and populations; value chain analysis, through field survey to identify policy, regulatory and institutional constraints and potential for production, consumption and market development of NUS; food system analysis on the productivity gaps and potential for selected underutilized crop(s) from field to market; and participatory assessment with community on FSF.

Myanmar

Ms Min Mar Oo presented the progress of the Regional TCP in Myanmar. Since there are some internal process within the Government before the completion of signing the project document, with the assistance from FAO Country Office in Myanmar, national consultants shall be first selected within the Government. Then an inception workshop would be organized with the participation of project steering committee, project implementing committee, and task force. Lastly, She presented that, with this Regional TCP, the Myanmar Government wished to expand coverage of awareness campaigns; leverage mass media to provide information and knowledge of FSF (farmer channel is operated by DAR, easy to conduct relevant program); mainstream nutrition into curriculum in primary and secondary schools (cross cutting issue with MOE, MOH and MOALI); analyzing nutrient composition on selected FSF crops; work closely together to ensure

that interventions are designed to support national strategic policy and objectives of food and nutrition security

Nepal

Mr Dal Prasad Pudasainy, National Project Coordinator of Nepal, stated that Government of Nepal has committed to implement the Zero Hunger Challenge Initiative to eliminate all sorts of hunger by 2025. The Government has launched Agriculture Development Strategy (ADS- 2015 to 2035): A long term visionary policy document and initiated to action with sustainable agriculture development. Regarding the government support to NUS, Nepal aimed for effective implementation of plans and programmes related to food and nutrition security in the change context of federal structure of Nepal. There was need for comprehensive research and extension in NUS (focused in targeted community) and expanded economic scale of production of NUS and its market channel development.

Dr Hari Dahal, Lead National Consultant of Nepal reported that the NC team is collecting and analyzing the national questionnaires. Meanwhile, a national meeting organized at the Ministry of Agriculture (MoAD) was taken place in September 2017 with the participation of all NCs, MoAD, DOA, FAOR, NARC and the Genebank. Buckwheat and Mungbean was selected as targeted FSF for Nepal. In addition, APGR data base from national Gene bank and other sources have been collected and analyzed and the reports on farming system and genetic resources /seed policy has been drafted. For Nepal, field site is yet to be determined and the first policy dialogue is under preparation.

A summary of assistance requested by countries present in the workshop according to their presentations and comments are the following:

- Developing an action plan that can be used for approaching funding agencies. This can be developed as a final output of the project.
- Assistance related to marketing of NUS that range from identifying value-adding activities, value chain development, and linking smallholder producers with markets. One Village One Product (OVOP) can be part of this activity. This can be provided in the value chain analysis component in the study sites. However, actual linking of farmers to markets is beyond the scope of the TCP.
- Strengthening of extension services through research, joint learning or knowledge exchange activities. Knowledge exchange can be local, national, regional, or with international development agencies. This also involves providing access to production technology on NUS. This may be developed through the knowledge exchange platform.
- Information awareness campaigns among consumers and farmers through mass media, integration in the curriculum or through schools, and extension services. This may be developed through the knowledge exchange platform, policy briefs, and food fairs for NUS.
- Support for regional gene bank or germplasm exchange

A summary of lists of support requested by countries as outlined in their presentations, including activities that they will perform:

Cambodia

- A national action plan on NUS , which can be used for approaching funding agencies or ODAs
- To update the National Strategy for FSN 2019-2023, aiming at improving FSN and a reference document for further mainstreaming in the FSN related priorities in other sectorial strategies and plans
- To develop a new strategic action plan of OVOP (2019-2023) for Cambodia, linking producers, markets and consumers
- Ways forward (role of the Government)
 - Organize workshop to introduce and raise awareness on the importance of NUS
 - Conduct assessment and priorities for NUS for further promotion
 - Conduct stakeholder consultative workshops (4 regional workshop and 1 national workshop to present the result of the assessment and dissemination)
 - Organize a Food Day at regional level to promote the potential of the selected NUS crop/products available in the region and country on the whole
 - Promote policy dialogues/introduction on NUS related crops/products as well as bi-monthly National Forum on FSM aiming at promotion and mainstreaming
 - Research and development on selected NUS for production improvement and markets

Lao PDR

- Currently, there are limitations on funds for study and implementation. In addition, understanding of NUS/FSF is limited to a few people. Provincial/district level teams have not had opportunity to engage yet
- There are supports needed: funds to support additional research and extension (production, local use, value chains, and marketing) and more information dissemination and opportunities for joint learning
- Field study needs to engage district extension teams to increase the advocates for the NUS Approach
- Support a pilot extension project to test the NUS methodology in selected districts (with continued technical support in refining the approach):
 - NUS potential analysis and selection of target NUS
 - Technical extension
 - Production
 - Processing, cooking demonstration
 - Marketing and value chain development
 - Exchange among district farmers and extension staff
 - NUS expo, demonstrating production, processing, use of products

Nepal

- Supports needed
 - Support marginalized communities in marginal land for larger coverage of NUS
 - Support for developing marketing mechanisms
 - Establishment of Regional Gene bank and germplasm exchange

- Capacity development of research and extension workers on NUS promotion
- Linkage establishment with international organizations for knowledge sharing and management
- Value addition, processing, value chain and marketing
- Infrastructure development (especially for laboratory)

Myanmar

- Expand coverage of awareness campaigns
- Leverage mass media to provide information and knowledge of FSF (Farmer channel is operated by DAR, easy to conduct relevant program)
- Mainstream nutrition into curriculum in primary and secondary schools (cross-cutting issue with MOE, MOH, and MOALI)
- Analyzing nutrient composition on selected FSF crops
- Work closely together to ensure that interventions are designed to support national strategic policy and objectives of food and nutrition security.

Session 3 Ways Forward

A Panel Discussion moderated by Dr. Sumiter Broca, FAO SEDPS GL, was conducted at the end of the workshop. The panel experts were composed Dr Airshya Noorani, Dr Barbara Burlingame, Dr John Dixon, Dr Mahmoud El Solh and Dr Matthias Halwart. Four questions were prepared for the panel discussion and after each round of responses, participants were also asked to share their views.

Question 1: What is your view of the initiative of Future Smart Food among Neglected and Under-utilized Species for Zero Hunger (FSF/NUS-ZHC, under FAO RAP initiative on ZHC, including its objectives, processes, methodology and outcomes?)

Dr. Solh underscored the fact that the world now and in the future has to produce more with less inputs, it is high time to diversify production as the world is specific to only 12 crops. He also emphasized that diversification is not to supplant currently popular plants but to look into NUS that need less inputs, more nutritional, adaptable to harsh environments, and are socially accepted.

Dr. Dixon sees the initiative as critical in relation to a broader challenge faced by the region and globally. His response also supports that diversification is adding to existing cropping systems of high value. NUS can help in the diversification, intensification and sustainability of farming and food systems, that cleans and at the same time save and protect the environment. He also added that diversification is for value chains and consumers, not only for producers. In this regard, the private sector has a critical role but not sure if how to integrate corporate to local entrepreneurs were given full thought. He further added that there are combined areas that had to be given thought: (i) How to integrate effectively and properly new crops in a way that is attractive and compelling for farmers to adopt because it will require financing, labor and water. (ii) If there are existing NUS on the ground, there is a need to understand all NUS while bringing new NUS and that the broader socio-economic and cultural dimensions/aspects should not be overlooked.

Dr. Burlingame highlighted the need for data and metrics, and the terminology of Future Smart Food. There should be enough statistical data and evidence to motivate people to see NUS food as nutritious. Regional data centers such as SAARC, ASEAN and Oceania have a tremendous wealth of documented knowledge that can be shared among collaborating organizations. There are many other concerns that are not yet fully documented or endorsed such as the date of start of trading of NUS products, scientifically studied nutrients to be able to enter developed markets and regulations relating to trade acceptance or barriers and food safety. Many things have not been mentioned like a decade of action, analysis of NUS-included farming systems and full analysis of NUS contribution to diet. The terminology on smart foods or future foods may have negative connotation like synthetic food. Smart food has definition and may not be linked to smart- like putting into supplements, synthetic. It may help if the branding uses the term 'traditional' for crops like quinoa or UNESCO giving recognition to a certain NUS as traditional food and therefore natural to eat.

Dr. Noorani recognized that the initiative was long overdue and is needed globally. One comment is on the varieties of staples as Asia is home to indigenous staples such as rice and soybeans. She recognized that it is country-specific and each one has a different point but there are commonalities, which presents an opportunity for information exchange. A platform for information exchange can be setup. The process is presented as positive because of the commitment from countries. In terms

of methodology, it is incredibly diverse, and the scope is wide and milestones need to be fine-tuned.

Dr. Halwart underscored that what is important is that there is agreement that intensification through diversification is the correct way. The initiative sits very well with FAO's vision of sustainable food and agriculture and follows the five principles and grounded on strategic framework and regional initiative. The key areas of emphasis in the 156th Council are sustainable agriculture, agroecology and food systems delivered through multi-stakeholder, cross sectoral, and South-South cooperation.

After the responses of the panel, participants of the workshop were also given the opportunity to provide their comments. Nepal stated that what is important is how to produce with less pesticides and chemicals and that there is a gap between agriculture production and nutrition. Cambodia agreed with Nepal that the clear option is food security. However, Cambodia is facing labor shortage in agriculture and mechanization is becoming an option. Large-scale and commercial production are discussed in Cambodia. It is also not clear how to take NUS into the market in the current context. As a comment, Dr. Solh provided the example of lentil which was grown as a subsistence crop in the past and harvested by hand. Until it was possible to mechanically harvest it, lentil cannot be grown in large scale. Maize was also given as an example, and it took 100 years to reach its current level. The fact that NUS products are put into the global awareness, consciousness and discussion is already a big step. Lao PDR commented that NUS is an easy and nice word- nearly forgotten crops, but still there, without much intervention, growing near homes or on farms. It takes time but once it moves from forest to farm, then it becomes a commercial plant. Like the passion fruit -from forest to farm. Hence, depending on its current use, it can be food for the community, for commercial use or as urban food. Hence, for some it is NUS, for others they are already commercial plants. Mr. Jones from FAO Lao PDR commented about the process and expected outcome and provided the examples of stories of crops like quinoa that may replace other staples or lentils that are part of production systems. The question was whether it was a promotion of a system or a crop. The other question was on how to defend or keep diversity, if one specie is promoted, how to defend other 100 species. The access to thinking of policy makers on the definition of NUS is important if diversity is the goal. To really maintain the relation of SDGs to the work, maintaining diversity and empowering farmers must go hand-in-hand. Nepal added a comment that NUS is not very new and people consume it regularly, and became a lesser priority because of the promotion of rice. People need to understand the nutritional value of these crops in rural areas. A piloting component should be built with behavioural change component. Developing sustainable farming systems and nutrition systems, framing needed to be made on production systems and also consumption systems or patterns. Dr. Solh commented that there is no one-size-fits-all and diversification is not an aim by itself but a means to achieve sustainability or nutrition.

Question 2: What in your view should be done in terms of strategies and mechanisms to upscale successful experiences on Future Smart Food among NUS for Zero Hunger Challenge (FSF/NUS- ZHC) in Asia and the Pacific region, including partnerships and collaborative efforts?

Dr. Halwart responded that NUS is a broad range of species, which is not reflected in statistics, then they are neglected in some way. Hence, if NUS are promising, we need to upscale them. Once we know a specific NUS plant's contribution based on scientific basis, nutrient make-up and

production processes, countries through bilateral or multilateral groupings can share and build its market. Investments are important and will come if there are good cases to show. Good communication is important to mobilize investment to get more funds. The initiative is grounded on strategic framework but also should be grounded in country strategic framework.

Dr. Noorani recognized that there are opportunities for big upscaling proposals (e.g. GEF). Upscaling must be relevant to local people because the TCP is about Zero Hunger. It may involve development of public goods with the private sector who are amenable to the idea. For example, seeds can be provided for free to farmers. It is up to the countries to make the case and if they want to scale up.

Dr. Burlingame provided inputs on the role that governments play in food composition tables. The generation of data can be embedded in the Ministry of Health, Universities and Research to be sustainable. Data is important because it can be compared between countries and used for the health sector, agriculture sector, biodiversity for food and nutrition. And the private sector cannot export with labels that do not contain the nutrition panel. The sharing of information can be through regional data centers that can work with secretariats. Examples of data centers are that of the USDA and FSANZ.

Dr. Dixon added that the private and public sectors should never be thought as separate, rather think about collaboration. The government can ensure flow of investments, stability of policy environment, friendliness for private sector engagement. The private sector tends to look ahead while the government are driven by a rear-view mirror. A public-private sector collaboration can be employed foresight studies.

The potential for upscaling will depend on how NUS was selected according to **Dr. Solh**. Government role is important in the early stages and the private sector will come in if there are returns to their investments. Many people are not eating food without taste but are nutritious. There is a need to look at the nutritional value and publicize or communicate the value. Subsidies need to be placed to support farmers.

Participants expressed their comments after the panel provided their responses to the question. Cambodia asked the question whether there are any successful experiences from other countries that can be put into policies. **Dr. Solh** suggested to look at the problems that the government is facing then show that NUS can address these problems. Awareness of policy-makers must be enhanced, and they need right information. This can be done by showing the importance of diversification and nutritional value through pilot case studies. **Dr. Dixon** added that documented cases can be translated into the form of a policy brief. What is not available right now is documentation. There is also a question on how to get effective coordination among sectors and ministries.

Question 3: How can FSF/NUS's role be enhanced in contributing to the three pillars of sustainability: environmental (water, soil, biodiversity conservation, etc.), economic (improving access to market and income, marketing, etc.) and social (improved nutrition and livelihoods, children, youth, gender)?

Dr. Solh responded that the most successful cases of sustainable agriculture development is sustainable integrated agriculture production systems, which is broader than NUS. This approach requires bigger investment and more attention than just crops. **Dr. Dixon** added that farming

systems analysis in a participatory way needs to include elements of sustainability (economic, environment, and social) and indicator for monitoring systems. **Dr. Burlingame** made mention of using indicators for sustainable diets, which is a systematic, qualitative and quantitative process. There is also a need to look back at traditional systems that can inform future food systems. **Dr. Noorani** responded that nutrition must go hand-in-hand with the right seed that goes with the right diet. In terms of measuring, it can be measured using the SDG indicators. **Dr. Halwart** stated that minorities need to be considered in the social side. Mainstreaming NUS into the curricula of primary schools because of cross-cutting issues may be applied. NUS has to be economically attractive and not limited to economically viable. He also added that we should not be afraid to make small changes to make small wins. Look at it from a different angle, make it low risk for farmers so that if it fails, it will not totally destroy them.

Question 4: What activities under the initiative on FSF/NUS-ZHC need to be or could be considered in the next biennium from a food system perspective (production, processing, marketing, consumption, etc.) beyond what has been done or is being done.

Dr. Halwart responded that it is important that the general concept is not lost and definition to be kept broad. **Dr. Noorani** highlighted that the multicultural TCP can be an opportunity for exchange or germplasm, practices. She added that it is important to show the farmers what they can do through demo farms, which are cheap and can be done in research stations. **Dr. Burlingame** reiterated the need for looking at statistics which can be monitored over time, and nutritional indicators. She also mentioned the importance of geographic indicators and quality in marketing and promotion. **Dr. Dixon** stated that we need to recognize the food system as a whole, categorize into 20 or so farming systems that underpin the production of food into the future. These farming systems or types can be cross-referenced to NUS across the region, which can provide a framework for prioritization and policy dialogue. There is little understanding why consumers choose one food over another, and why farmers choose one crop over another. He suggested building knowledge and putting together a field guideline for food and farming systems analysis and enrichment that incorporates value chains and practical indicators. **Dr. Solh** suggested looking at components of production systems of each group, germplasm on hand, and possibly at the region, and develop a crop improvement program based on potential. Each component of processing should also be looked into and identify constraints, including for mechanization or grinding, grading and quality. Marketing issues will depend on the demand and look at campaign about desirable traits, including affordability and where these commodities fit into the diet. Then develop a roadmap of each of these crops to move forward.

Summary of Ways Forward

There was consensus among the panel of experts that promoting NUS/FSF is the right direction towards diversification for food security and nutrition. During the discussions in this session, key concepts that are needed for the implementation of the initiative also emerged and these are:

- Key to promoting NUS/FSF for diversification and food security and nutrition is information and developing a body of knowledge. Information that are supported by evidence is crucial for activities that will enhance awareness among consumers, producers, and policy-makers.
 - Updating the food composition table that can show nutrient contents and for facilitating trade and commercialization of NUS/FSF

- Countries possess unique characteristics that are rich sources of information that can be shared in a Knowledge Exchange Platform
- Making information accessible through the preparation of policy briefs
- Translation of knowledge into a set of guidelines for mainstreaming NUS/FSF that can be used as a reference by stakeholders
- Enhancing the understanding of the behaviour of actors in the system
 - Investigating why consumers consume the food that they do and why farmers grow specific crops
 - A behavioural change component can be included in the promotion of NUS/FSF, which requires understanding of the system
- Recognizing the role of the private sector, public-private partnerships, and potentials of collaboration at the local, national and international level
 - Partnerships can be developed in the generation of knowledge in research and development
 - The private sector can assist in investments that can help smallholder farmers like in the provision of seeds
- Collection and preservation of genetic resources
 - The richness of diversity is being eroded because of the dominance of a few crops
 - Genetic resources can be shared among countries

Conclusions and Recommendations

The two-day Regional Workshop created a platform where countries were able to share their accomplishments and experiences on the implementation of the Regional TCP. It also allowed experts to express their insights on the initiative and suggestions to enhance its implementation. During the course of the workshop, it was evident that there is consensus among participants and experts that promoting FSF for diversification and to achieve food security and nutrition is the right direction. It is recognized that it can help contribute to improving food and nutrition security in countries while addressing adverse effects of climate change.

The identified ways to moving forward as a result of the workshop and requests from countries involve activities that are beyond the scope of the Regional TCP. However, these activities also present opportunities for partnerships and collaboration among local, national and international communities who are interested in promoting FSF. The following activities have been suggested for RAP to respond requests of countries and enhancing the implementation of the initiative.

- Developing knowledge products to support mainstreaming NUS/FSF in the national food security and nutrition strategy and policy for Zero Hunger
 - A Guidelines for Mainstreaming FSF for Diversification and Food Security and Nutrition be prepared that can be used by governments as a guide when preparing action plans. The resulting action plans may be used for approaching ODAs and funding agencies.
 - Policy Briefs highlighting the relevance and benefits of mainstreaming FSF.
 - Case studies with countries be prepared to improve local and national understanding of FSF.
- Organizing national/regional knowledge sharing and awareness raising activities on NUS/FSF
 - The Regional knowledge sharing event can serve as venue for exchanging information and results of case studies on FSF.
 - It can also serve as a venue for developing partnerships and collaboration at the national/regional/international level

Additional activities have been proposed and can be developed through international collaborations include:

- Conduct pilot studies for FSF where actual linking of smallholder producers with markets is involved. This is an assistance for countries that can be implemented by international research institutes through an action research.
- Updating of the Food Composition Table which can be a role of research institutes

Appendix

Annex 1 Concept Note

Regional Workshop on Neglected and Underutilized Species for Zero Hunger: Status, progress and way forward

Regional Initiative on Zero Hunger Challenge (RI-ZHC)

FAO RAP

11-12 December 2017

Bangkok, Thailand

Concept Note

Background

Eradicating hunger and malnutrition is a major challenge in Asia and the Pacific, especially where low-income smallholder farmers in developing countries are concerned. Agriculture has to be made more sustainable – environmentally, economically and socially – and diverse, while improving healthy diets. This is indispensable for addressing hunger and malnutrition in a changing climate. An enabling environment has to be created to promote diversification of food production and consumption for national food security and nutrition.

This requires agriculture to be more climate resilient, less dependent on chemical fertilizers, and associated with lower methane emissions from rice cultivation and methane and nitrous oxide emissions from livestock. At the same time, farmers, particularly smallholders should be able to earn higher incomes for economic sustainability, which will enable households to afford a better, more varied diet, with higher intakes of protein as well as micronutrients.

Yet agriculture in this region is over-reliant on a handful of major staple crops, which poses inherent nutritional, agronomic, ecological and economic risks. Globally, only three crops—wheat, rice and maize—covered 40% of all arable land globally, delivering more than 50% of the world's consumption of calories and protein. About 95% of the world's food needs are provided by just 30 species of plants. In Asia, rice continues to be the dominant food.

Preserving agrobiodiversity is essential for reducing dangers of relying excessively on a few crops. Neglected and underutilized crops species (NUS; sometimes called “forgotten”, “underexploited”, “minor”, “orphan”, “promising” and “little-used”) are an essential component of agrobiodiversity.

These crops tend to be climate resilient and well adapted to arid and semi-arid agro-ecological zones, help fix nitrogen in the soil and are a relatively cheap source of protein, vitamins and micronutrients. By fixing nitrogen in the soil, pulses and legumes, in particular, reduce the need for chemical fertilizer and by providing substitutes for animal protein, they reduce the number of animals that need to be kept for meat and other livestock products, besides providing better nutrition. But it must be conceded that they do have some drawbacks. NUS are thus considered important for addressing the Zero Hunger Challenge.

NUS are abundant in most Asian countries. However, their potential nutritional and market value, as well as their suitability for climate-adaptation are underexploited. Scoping, prioritizing and promoting wider use of NUS provides an opportunity to diversify food systems and enhance resilience to both biotic and abiotic stress.

However, reorienting agricultural policies away from a focus on cereal production and consumption is not easy as influential groups benefit from the current policies. Smallholder farmers who wish to diversify their crops need support which they do not get under the present system. There is therefore a need to a) better understand the scope for diversifying agriculture to include NUS; b) identify the policy and institutional changes that will be required for this, and c) describe the support systems that will be needed to create an enabling environment to help realize the potential gains in terms of nutrition, climate adaptation and income generation.

In view of FAO's existing knowledge on the food system approach and long standing experience on NUS, building on successful experience of International Year of Potato, International Year of Quinoa, and the International Year of Pulses, FAO is well placed to provide advice and support to its member countries on policies to promote NUS. This is being done through the RI-ZHC.

Accordingly, the proposed workshop builds on the FAO/ACIAR's Regional Expert Consultation on Scoping and Prioritization of Neglected and Underutilized Crop Species held in December 2016 and ongoing FAO Regional TCP on Creating Enabling Environment on Nutrition-sensitive Agriculture (TCP/RAS/3602) and national TCP projects under Regional Initiative on Zero Hunger. Its main objectives are described below.

Objectives

The main objective of the workshop is to (1) take stock of the work on scoping and prioritization of Future Smart Food among NUS for Zero Hunger that has already been done, (2) draw lessons from the work done for the Regional TCP under Zero Hunger Initiative, and (3) identify the way forward and new work that can be integrated under RI-ZHC.

Outputs

Expected outputs from this regional event are (i) stock-taking of the work on scoping and prioritization of NUS for Zero Hunger and a reaffirmed list of Future Smart Food among NUS for ZHC; (ii) clarified workplan of Regional TCP; and (iii) new activities identified related to the Regional TCP for 2018-19 biennium.

Participants

Participants for this event will include government officials, national experts, consultants, international experts and FAO staff from HQ, RAP and country offices.

Annex 2 Agenda

Regional Workshop on Neglected and Underutilized Species for Zero Hunger:

Status, Progress and Way Forward

Regional Initiative on Zero Hunger Challenge (RI-ZHC)

FAO RAP

11-12 December 2017

Provisional Agenda

Venue: Novotel Bangkok Platinum Pratunam

Bangkok, Thailand

DAY ONE		
Time	Topic	Presenter
08:30-09:00	Registration	
Opening Session		
09:00	Welcoming remarks by ADG/RR RAP, FAO	Dr Kundhavi Kadiresan, ADG/Regional Representative, FAO RAP
09:15	Proceeding of the workshop	Dr Xuan Li, Senior Policy Officer, Delivery Manager for RI-Zero Hunger, FAO RAP
09:20	Challenges, Opportunities and Strategies for Scoping, Prioritization and Promoting Neglected and Underutilized Species (NUS) as Future Smart Food (FSF) for Zero Hunger	Dr Mahmoud Solh, Vice Chair of the Steering Committee member, the High Level Panel of Experts on Food Security and Nutrition (HLPE), UN Committee on World Food Security (CFS)
09:50	Global perspective on the roles and potentials of NUS for Zero Hunger	Dr Arshiya Noorani, Plant Production and Protection Division (AGP), Dr Matthias Halwart, Senior Aquaculture Officer, FAO HQ
10:10	Current farming systems and integration of FSF/NUS-ZHC into farming systems in Asia	Dr John Dixon, Principal Advisor/Research Program Manager for the Cropping Systems and Economics (CSE) program, Australian Centre for International Agricultural Research (ACIAR)
10:30	Group Photo and Tea/Coffee break	
11:00	Promoting nutritious FSF/NUS-ZHC for healthy diet: experience in Asia and Pacific countries	Dr. Barbara Burlingame, Professor, Massey University, New Zealand

11:20	Integration of pulses to rice fallows in India: experience in India	Dr Bommakanti Rajender, Joint Secretary of Ministry of Agriculture, India
11:40	Q&A	Plenary
12:00	Lunch break	
Session 1: Country Studies on Prioritization of Future Smart Food among NUS¹ for Zero Hunger (FSF/NUS-ZHC)		
13:00	Conceptualization and overview of Regional priority-setting on scoping and prioritizing of FSF/NUS-ZHC	Dr Xuan Li, Senior Policy Officer, Delivery Manager for RI-Zero Hunger, FAO RAP
13:30	Country study on FSF/NUS-ZHC in Cambodia	H.E. Sok Silo, National Focal Point for Zero Hunger Cambodia, Dr Kynet Kong, Cambodia
14:00	Country study on FSF/NUS-ZHC in Lao PDR	Mr Savanh Hanephom, National Focal Point for Zero Hunger Lao PDR; Dr Sivienkhek Phommalath, Lao PDR
14:30	Country study on FSF/NUS-ZHC in Myanmar	Ms Khin Mar Oo, National Focal Point for Zero Hunger Myanmar, Dr Min San Thein, Department of Agricultural Research, Ministry of Agriculture, Livestock and Irrigation, Myanmar
15:00	Country study on FSF/NUS-ZHC in Nepal	Dr Baidya Nath Mahto, Executive Director, Nepal Agricultural Research Council (NARC); Dr Bal K. Joshi, Dr Renuka Shrestha, NARC
15:30	Tea/Coffee break	
16:00-17:15	Overview of country studies on FSF/NUS-ZHC and lessons learnt	Dr Mahmoud Solh, Vice Chair of the Steering Committee member, the High Level Panel of Experts on Food Security and Nutrition (HLPE), UN Committee on World Food Security (CFS)
	Q&A	Plenary
18:00	Welcome cocktail	FAO RAP
DAY TWO		
Session 2: Regional TCP under Zero Hunger: country work plan, updates and expected outputs		
09:00	Overview of Regional TCP under Zero Hunger (TCP/RAS/3602)	Dr Xuan Li, Senior Policy Officer, Delivery Manager for RI-Zero Hunger, FAO RAP
09:30	Cambodia country workplan on Regional TCP	H.E. Sok Silo, National Focal Point for Zero Hunger Cambodia; Ms Hour Thany, Cambodia
09:50	Lao PDR country workplan on Regional TCP	Mr Savanh Hanephom, National Focal Point for Zero Hunger Lao PDR; Mr Khamphou Phouyyavong, Lao PDR

¹ Future Smart Food (FSF) refer to Neglected and Underutilized Species that are nutrition-dense, climate-resilient, economic-viable and locally-available or adaptable for Zero Hunger. For more information: <http://www.fao.org/3/a-i7717e.pdf>

10:10	Nepal country workplan on Regional TCP	Mr Dal Prasad Pudasainy, National Project Coordinator; Dr Hari Dahal, Nepal
10:30	Tea/Coffee break	
11:00	Myanmar country workplan	Mr Khin Mar Oo, National Focal Point for Zero Hunger, Myanmar
11:20	Discussions session	Plenary
12:00	Lunch break	
Session 3: Ways forward		
13:00	Overview of FSF/NUS-ZHC related activities based on outcome of Regional Inception Workshop of Regional TCP under Zero Hunger	Dr Xuan Li, Senior Policy Officer, Delivery Manager for RI-Zero Hunger, FAO RAP
13:15	Panel Discussion Moderator: Dr. Sumiter Broca, Senior Policy Officer and Group Leader, SEDP, FAO RAP	<ul style="list-style-type: none"> • Dr Mahmoud Solh, Vice Chair, Steering Committee member, HLPE, CFS • Dr John Dixon, Principal Advisor/Research Program Manager for the Cropping Systems and Economics (CSE) program, ACIAR • Dr. Barbara Burlingame, Professor, Massey University, New Zealand • Dr Arshiya Noorani, Plant Production and Protection Division (AGP), FAO HQ • Dr Matthias Halwart, Senior Aquaculture Officer, FAO HQ
14:30	Tea/Coffee break	
15:00	Summary of recommendations and way forward	Dr Xuan Li, Senior Policy Officer, Delivery Manager for RI-Zero Hunger, FAO RAP
15:20	Closing remarks	Dr Kundhavi Kadiresan, ADG/Regional Representative, FAO RAP

Annex 3 List of Participants

Country	Name	Position and Organization
Nepal	Dal Prasad Pudasainy	National Project Coordinator for Zero Hunger, Nepal
Nepal	Biadya Nath Mahto	Executive Director, Nepal Agricultural Research Council, MoAD, Nepal
Nepal	Bal Krishna Joshi	Senior Scientist, Nepal Agricultural Research Council, MoAD, Nepal
Nepal	Renuka Shrestha	Chief/Principal Scientist, Nepal Agricultural Research Council, MoAD, Nepal
Nepal	Hari Dahal	National Consultant on Policy/Value Chain, Nepal
Nepal	Binayak Rajbhandari	National Consultant on Genetic Resources/Seed Policy, Nepal
Nepal	Madan Raj Bhatta	National Consultant on Agriculture/Nutrition/Food System, Nepal
Cambodia	Sok Silo	National Focal Point and Project Coordinator for Zero Hunger, Cambodia
Cambodia	Mak Soeun	Deputy Director General, General Directorate of Agriculture, Ministry of Agriculture, Forestry and Fisheries, Cambodia
Cambodia	Kynet Kong	Deputy Head, Plant Breeding, CARDI
Cambodia	Hour Thany	National consultant on Policy/Value Chain, Cambodia
Cambodia	Men Sarom	National Consultant on Genetic Resources/Seed Policy, Cambodia
Cambodia	Vuthy Lic	National Consultant on Natural Resources Management and Climate Change
Lao PDR	Savanh Hanephom	National Focal Point for Zero Hunger, Lao PDR
Lao PDR	Palikone Thalongsengchanh	Main Project Coordinator, Lao PDR
Lao PDR	Sivienkhek Phommalath	Researcher, National Agriculture and Forestry Research Institute
Lao PDR	Kampasith Sengsouvanh	National Consultant on Policy/Value Chain
Lao PDR	Khamphou Phouyyavong	National Consultant on Agriculture/Nutrition/Food System, Lao PDR
Myanmar	Khin Mar Oo	National Focal Point and Project Coordinator, Myanmar
Myanmar	Minm San Thein	Deputy Director, Myanmar Seed Bank, Department of Agricultural Research, Ministry of Agriculture, Livestock and Irrigation (MOALI)
CFS	Mahmoud Solh	Vice Chair of the Steering Committee member, the High Level Panel of Experts on

		Food Security and Nutrition (HLPE), UN Committee on World Food Security (CFS)
India	Bommakanti Rajender	Joint Secretary, Department of Agricultural Cooperation and Farmers Welfare, Ministry of Agriculture, India
ACIAR	John Dixon	Principle Advisor/Research Programme Manager for the Cropping Systems and Economics programme, ACIAR
Massey University	Barbara Burlingame	Professor, School of Health Sciences Massey University, New Zealand
FAO	Arshiya Noorani	Agricultural Officer, FAO HQ
FAO	Matthias Halwart	Senior Aquaculture Officer, FAO HQ
FAO	Binod Prasad Saha	Assistant FAO Representative in Nepal
FAO	Kosal Oum	Assistant FAO Representative in Cambodia
FAO	Michael Joseph Jones	FIRST Officer in Lao PDR
FAO	Sumiter Broca	Senior Policy Officer, FAO RAP
FAO	Xuan Li	Senior Policy Officer, Delivery Manager of RI-ZHC, FAO RAP
FAO	Maria Tuazon	Consultant, FAO RAP
FAO	Luis Antonio Hualda	International Consultant, FAO
FAO	Zixi Li	Consultant, FAO RAP
FAO	Sujoy Chakma	Intern, FAO RAP
FAO	Yowanat Voratira	Office Assistant, FAO RAP