

Forests and Food: Addressing Hunger and Nutrition Across Sustainable Landscapes

Dr. John Parrotta, U.S. Forest Service R&D and IUFRO

It is a pleasure to be with you today and participate in this session on Population and Food Security. I would like to thank Dr. Steiner for her initiative in organizing this session, and for giving me the opportunity to present and discuss the recently published global assessment report on forests, trees and landscapes for food security and nutrition.

This report is the product of the Collaborative Partnership on Forests (or CPF), an informal, voluntary arrangement among 14 international organizations and secretariats with substantial programmes on forests. The objectives of the CPF are to support the work of United Nations Forum on Forests, other international policy processes (such as the CBD, UNFCCC and UNCCD) and UN member countries and to enhance cooperation and coordination on forest issues. The Global Forest Expert Panels (GFEP) initiative was established within the CPF in 2007, and is led and coordinated by the International Union of Forest Research Organizations (IUFRO). The GFEP initiative is a mechanism to provide scientific expertise to governments and intergovernmental processes related to forests and trees. Rather than conducting new research, the Initiative is designed to consolidate available information and expertise in relevant fields.

GFEP produces assessment reports that reflect state-of-the-art understanding on issues that are high on international policy agendas. These peer-reviewed reports are prepared by thematic Expert Panels involving internationally recognized scientific experts in their fields.

The work of this particular Expert Panel was carried out over a 15-month period between February 2014 and May of this year. The Panel, chaired by Dr. Bhaskar Vira (Director, Conservation Research Institute, University of Cambridge), included over 20 members from all parts of the world representing a diversity of scientific disciplines. The assessment report was written by Dr. Vira and two co-editors, six coordinating lead authors (including myself), other panel members, and an additional 30 contributing authors.

While the report is of interest to a variety of audiences – including the scientific community – it is targeted particularly at policymakers, investors and donors in order to provide a strong scientific basis for interventions and projects related to forests, agroforests and landscapes aimed at addressing food security and nutrition challenges.

The expert panel had four key objectives:

- To assess the direct and indirect roles that forests and tree-based systems play in food security and nutrition across the rural landscape;
- To analyse the social, economic and environmental and political drivers of forest-food security systems.
- To examine the potential response options across the landscape for food security and nutrition, natural resource conservation and sustainable livelihoods;
- To assess macro-scale response options in relation to drivers of change (i.e., the role of markets, incentives, governance and public policy).

In this talk, I would like to provide some background – and context – for this multi-disciplinary assessment report, walk you through its main elements, findings, and conclusions, and hopefully leave you with some food for thought regarding the assessments' implications for the scientific community and for policy-makers.

Context

We live on a finite planet. As fast as human populations are growing, our individual and collective appetites for food, water, renewable natural resources, energy, minerals, and living space are expanding even faster, outstripping the capacity of the ecosystems on which we depend to provide the goods and services needed for a sustainable future. These demands for natural resources, and the capacity our lands, rivers and oceans to meet these demands, are – as we know – not evenly distributed. Most of us who live in more affluent societies consume – and waste – far more than the global average.

Our consumption habits exert enormous pressures on lands and waters far beyond our homes, and even our national borders, thanks in large part to economic globalization and energy prices that do not reflect their true costs. Meanwhile a significant proportion of humanity struggles to simply survive. These disparities between countries, and among communities within countries, are particularly stark when it comes to food security and nutrition. Today, an estimated 805 million people are undernourished worldwide and malnutrition affects people in nearly every country on the planet.

As population estimates for 2050 reach over 9 billion, the complex issues surrounding food security and nutrition have been dominating academic and policy debates, especially in relation to the global development agenda beyond 2015.

Prevailing Paradigms about Forests, Agriculture, Food Security and Nutrition

At the UN Conference on Sustainable Development (Rio+20) in 2012, the UN Secretary General proposed an ambitious goal to eliminate global hunger by 2025 – the so-called ‘Zero Hunger Challenge’. Fulfilling this challenge requires not just providing universal and year-round access to food for the world’s growing population, but doing so in a nutritionally-balanced way, while enhancing livelihood security for smallholders, reducing waste from consumption and production systems, and also ensuring that these systems are sustainable. A tall order.

Evolving strategies to respond to this challenge focus primarily on achieving ‘*sustainable intensification*’, i.e., by improving the productivity of agricultural systems, without causing ecological harm or compromising biodiversity and ecosystem services. This is no easy task given the fact the principal driver of deforestation – particularly in tropical and subtropical regions of the world – continues to be conversion of forest lands for agricultural production.

Nonetheless, plant biologists, crop scientists and agronomists are working hard to find solutions to achieve this desired increase in productivity without the high fossil fuel inputs and ecological side-effects that were associated with the Green Revolution of the 1960s and 1970s (i.e., land degradation, water shortages, water pollution, pesticide impacts on people and ecosystems, etc.).

However, there are reasons to be cautious about these production-centric approaches to achieving universal food security.

Despite impressive agricultural productivity increases in recent decades, there is growing evidence that conventional strategies continue to fall short of eliminating global hunger, and that they result in unbalanced diets that lack nutritional diversity, enhance exposure of the most vulnerable groups to volatile food prices, and fail to recognise the long-term ecological consequences of intensified agricultural systems.

As Amartya Sen’s seminal (1983) work on famine demonstrated, it is not just the lack of food that keeps people hungry, but the lack of access to that food and control over its production.

Unfortunately, the large majority of smallholder farmers are constrained by lack of equitable access to land, technology and capital, which typically remain unavailable to most of the more than 500 million family farms worldwide. Further, the urban and landless rural poor may not have the means by which to purchase the increased output of food that new agricultural technologies promise.

Enhancing global production of food through productivity increases alone will not alleviate the challenges faced by the hundreds of millions of people in the world who are hungry and malnourished. In these contexts, food from forests and tree-based systems is likely to continue to form an essential part of household strategies to eliminate hunger and achieve nutritionally balanced diets. As they have for centuries or even millennia in many parts of the world.

Until very recently there has been little appreciation within international and national decision-making communities – or within the scientific community for that matter - of the diverse ways in which forests and trees outside of forests supplement agricultural production systems contribute to global food security.

The tremendous diversity of forest, woodland, and agro-forest management systems developed for food production throughout the world - over centuries - have remained, with few exceptions, either invisible to researchers and planners or condemned by governments and conservationists.

However, recent developments in the forest science and policy spheres point towards a convergence of interests in dealing with critical sustainable development issues, including food security.

Over the past 50 years, perspectives on forest management have evolved considerably, away from state-controlled approaches emphasizing timber production, biodiversity conservation and watershed protection, to ones which prioritise the needs of local people. Decentralised management systems that we now find in some parts of the world better reflect local demands, especially for woodfuel, fodder and small timber. There is also a growing appreciation of the importance of forests in providing critical ecosystem services, especially for genetic resources, pollination, pest control, soil protection, restoration of soil fertility and productivity, hydrologic regulation and, of course climate change mitigation and adaptation.

As a result of new forest management approaches which incorporate a broader set of social, economic and environmental values, forested landscapes in many parts of the world are now being managed for a much more diverse set of objectives. What has been relatively neglected, however, is an explicit recognition of the continued role that forests and forested landscapes play in food security and nutrition, their role in providing resilient and accessible

production and consumption systems, and their value for meeting the food security, health and other needs of some of the most vulnerable groups.

While the evidence base for the role of forests and tree-based systems for food security and nutrition is growing, many gaps remain in our understanding of these relationships and their potential contribution to reducing global hunger and malnutrition. Hence the need to explore the forest-food nexus in much more detail, particularly in relation to the integrated management of multi-functional landscapes, and the multi-scalar and cross-sectoral governance approaches that are required for the equitable delivery of benefits to people.

Scope and Objectives

The assessment report documents evidence of the relationships between forests and tree-based systems and food security and nutrition from different agro-ecological zones in all continents. However, a particular emphasis is placed on those regions of the world that are characterised by deep-rooted hunger and malnutrition, where food security is a particular challenge.

Our assessment included not only management of forests, woodlands, agroforests, and tree crops for direct food provisioning, but also the management of forested landscapes for the conditions they create that in turn affect all agricultural systems.

The systems included in our analysis range from management of forests to optimise yields of wild foods and fodder, to shifting cultivation, through the very broad spectrum of agroforestry practices, to single-species tree crop management. We considered the variability and applicability of these management systems within and across geographical regions, and agro-ecological zones, highlighting the traditional and modern science and technology that underpin them.

Although the report documents the role that forests and tree-based landscapes play in relation to food security and nutrition at a relatively aggregated level, it also highlights important regional, seasonal and socioeconomic variations. It places special emphasis on the roles that land and tree tenure and governance, human capital, financial capital, and gender play in mediating the ways in which people have access to, and consume, food from forests and tree-based production systems.

In framing our discussion around the UN Secretary General's Zero Hunger Challenge, we emphasized the salience and importance of forest- and tree-based diets for these most

vulnerable groups, even when the aggregate contribution to global food production from such landscapes might not be quite as significant.

Structure of the report

Chapter 2 examines the ways in which forests and other tree-based systems such as agroforestry contribute to food and nutritional security, both directly for food, fodder and fuelwood and indirectly for income and a variety of ecosystem services.

The chapter discusses the complexities in quantifying the relative benefits and costs of tree-based systems in food provision. It highlights the need for systematic methods for characterising their effects on food security and nutrition across different landscapes and on different segments of society for development of supportive national and international developmental policies.

Chapter 3 takes a closer look at the diverse spectrum of forests and tree-based systems that are important components of rural landscapes, and how they continue to sustain livelihoods and contribute to the food security and nutritional needs of hundreds of millions of people worldwide.

The chapter also discusses the importance of the social, cultural and economic contexts in which these production systems exist, with a focus on three factors that affect the socio-economic organisation of forests and tree-based systems, namely: land and tree tenure and governance, human capital, and financial capital. How these biophysical and socio-economic conditions and their complex interactions influence food security and nutrition outcomes, particularly for vulnerable segments of the population (i.e., the poor, women and children), are of particular concern in this discussion.

Chapter 4 the broader drivers of change – environmental, social, economic and political – that impact the forest-food ‘nexus’, and highlights the importance of these drivers in framing available options for responding to hunger and malnutrition.

Twelve major drivers were identified and discussed: population growth; urbanisation; governance shifts; climate change; commercialisation of agriculture; industrialisation of forest resources; gender imbalances; conflicts; formalisation of tenure rights; rising food prices; and increasing per capita income. These drivers can have different consequences for different segments of society; for example, they can support food security for elite groups but can increase the vulnerability of other groups.

Chapter 5 presents potential landscape-scale responses that attempt to reconcile the often competing demands for agriculture, forest management, biodiversity conservation and other land uses.

While there is no single configuration of land-uses in any landscape that can optimise food security and nutrition outcomes, there are options for evaluating and negotiating the inherent trade-offs that characterise such outcomes. The chapter attempts to provide an over-arching framework for such analyses.

Finally, **Chapter 6** looks at response options in relation to the broader drivers of change, focusing in particular on the role of markets and incentives, different forms of governance, and the public policy challenges. Three different angles are considered:

(i) **policy response options** to enhance linkages between food security and forests with a focus on setting up the appropriate institutional and governance structures and addressing the important issue of forest tenure reform;

(ii) **market-based response options** that focus on global processes for supporting sustainable supply, and innovative corporate and multi-actor initiatives, to support inclusive value chains of forest and tree products; and

(iii) **socio-cultural response options** to enhance food security where the focus is on: changing urban demand; education to change behaviour and improve dietary choices; reducing inequalities and promoting gender-responsive interventions; and social mobilisation for food security.

Conclusions

While it is not possible to discuss all of the conclusions drawn from this assessment, I would like to present some of the major results and recommendations that the expert group was able to distil from its collective work. These are discussed in the final chapter of the assessment report and were the basis for the development of the associated policy brief.

Forests Matter for Food Security and Nutrition

- Forests and tree-based systems have played a major role throughout human history in supporting livelihoods as well as meeting the food security and nutritional needs of the global population.

- These systems remain important components of rural landscapes in most parts of the world.
- There is increasing evidence of the importance of forests and other tree-based production systems their contributions to dietary diversity and quality, as well as addressing seasonal nutritional shortfalls.
- Non-timber forest products and agroforestry tree products are important sources of revenue to local people and governments. Tree-based incomes typically offer a considerably more diversified livelihood portfolio which is important given the environmental and economic risks of relying on cash incomes from single commodity crops.
- Forests and tree-based production systems also provide valuable ecosystem services that are essential for production of staple crops and that of a wider range of edible plants. These services include soil and water conservation, pollination and natural pest control, among others.
- Such systems offer a number of advantages over permanent (crop) agriculture given the diversity of food products derived from them and their adaptability to a broader range of climatic, soil and topographic conditions, as well changing socioeconomic conditions.

Governing Multi-functional Landscapes for Food Security and Nutrition

- Forests and tree-based systems are embedded within broader economic, political, cultural and ecological landscapes that typically include a mosaic of different, and often competing, food production systems and other land uses. How these different land use patches interact with each other in space and time can profoundly influence the productivity and sustainability of forests and tree-based systems, as well as their food security and nutrition outcomes.
- A range of environmental, social, economic and governance drivers affect forests and tree-based systems and their food security and nutrition outcomes. These drivers influence land use and management, as well as consumption patterns, incomes, and livelihood opportunities. Designing appropriate and integrated responses to these

complex influences that are effective across multiple, nested scales is a major challenge.

- Managing resilient and climate-smart landscapes on a multi-functional basis that combines food production, biodiversity conservation, other land uses, and the maintenance of ecosystem services should be at the forefront of efforts to achieve global food security.
- Governance shifts, from state-focused government to multi-sectoral and cross-scale governance offer better prospects for integration of different interests and goals related to forest and food systems. Greater attention from the scientific and development communities is required, particularly to support development of a supportive policy framework that considers both forestry and agriculture sectors.
- Current governance arrangements are imperfect, complex, and ambiguous. This complexity dictates the need for different solutions on a case-by-case basis. Co-regulatory approaches that involve both public and private actors also have the potential to enhance the effective governance of food systems. Initiatives aimed at enhancing the governance of large-scale investors in support of sustainable practices in the commodity value chain; improved benefit sharing; and protection of local people's rights, can complement state-led regulatory approaches and policy frameworks.
- A central governance issue is how, and to what extent, policy and regulatory frameworks help ensure equitable access of the poor, women and other disadvantaged groups to forests and tree-based systems, and to what extent these regulatory arrangements recognise their rights to direct and indirect benefits for food and nutritional security.
- The impacts of policy and management interventions are also felt differently, depending on social structures and local contexts. They could improve food security and nutrition for some groups while increasing vulnerability for others. Responses must be sensitive to these differences, and ensure that they meet the needs of the most vulnerable groups.

The Importance of Secure Tenure and Local Control

- Improving food sovereignty can help to ensure that local people have better access to food, and control over their own diets. Community level engagement will be particularly important for those people facing the burden of malnutrition.
- Tenure regimes in forests and tree-based systems for food security and nutrition are highly complex. Different bundles of rights are nested and overlap in these different systems - they vary among geographical, social, cultural, economic and political contexts, and affect the access of different population groups to trees and their products for food, income and other livelihood needs.
- Policies that support communities' access to forests and that encourage the cultivation of tree products are required. While there is a growing trend towards restoring land and management rights to communities and indigenous peoples who traditionally hold *de facto* rights to forest, some 80 percent of forest land worldwide remains under state ownership. Improved security of tenure has significant potential to enhance access to nutritious food.
- Although women represent 43 percent of the global agricultural labour force, women's weak and often insecure rights of access to land, forests and trees is undermining their engagement in innovation in forests and agroforestry systems. This has serious implications for their food security and nutrition and that of their families.

Reimagining Forests and Food Security

- Applying an integrated landscape approach provides a unique opportunity for forestry and agricultural research organisations to coordinate efforts to achieve more sustainable agricultural systems. A clear programme of work on managing landscapes and ecosystems for biodiversity conservation, agriculture, food security and nutrition should be central to development aid.
- The restoration of degraded landscapes has the potential to strengthen connections between agriculture and biodiversity conservation. In such landscapes, tree-based agriculture in particular may win-win opportunities.

- The traditional knowledge of indigenous and local communities has been crucial to the development of forest and tree-based systems over generations under diverse and changing variable environmental socio-economic conditions. This contribution should be acknowledged and incorporated into management practices and policy.
- Agricultural and forest scientists, extension agents and development organisations have only recently begun to understand the importance and relevance of forests and tree-based systems. Working with farmers to combine the best of traditional and formal scientific knowledge offers great potential to enhance both the productivity and resilience of these systems and the flow of benefits to their practitioners.
- By targeting particular tree species for improved harvest and/or cultivation, more optimal 'portfolios' of species could be devised that best support communities' nutrition year-round. There is further potential for the domestication of currently little-researched indigenous fruit trees.
- The development of 'nutrient-sensitive' value chains is also needed. This involves improving nutritional knowledge and awareness among value-chain actors and consumers, focusing on promoting the involvement of women, and considering markets for a wider range of tree foods.

By promoting local tree food processing and other value additions, the non-farm rural economy can also be stimulated.

- Dietary choices are complex and depend on more than which foods are locally available to communities. Rather than assumptions based on availability, assessments of actual diets through dietary diversity studies and other related estimators are needed to better understand the reasons behind current dietary choices.
- Appropriate education and awareness-building regarding sustainable forest management, health, education and general household nutrition play an important role in empowering rural populations, and has the potential to generate tangible and fundamental benefits.
- Technological innovation, in particular mobile technology, can help deliver relevant information to rural populations and may be critical for improving existing extension

services, education and products to enhance food security and nutrition, dietary choices and health.

The assessment also identified a number of important knowledge gaps and opportunities for targeted research and development. I would like to highlight a few of these.

Knowledge Gaps

- There is a need to assess the actual extent of most forest and tree-based management systems, the numbers of people who rely on one or more such systems to meet their household food and/or income needs, and the relative value of different forests and tree-based systems to the diets and health of those who manage them.
- Further research is also needed to assess the complementarity and resilience of different crops in agroforestry, particularly in the face of climate change. Research should also support food tree domestication options appropriate for meeting smallholders' needs. There are also opportunities to develop valuable new tree commodities that are compatible with other crops and that therefore support greater agro-biodiversity.
- There are gaps in our understanding of the inter-relations between drivers affecting the contributions of forests and tree-based systems to food security and nutrition. In particular, greater understanding is needed of the link between economic valuation of ecosystem services, and their incorporation into global commodity markets, as well as the ensuing risk of local and indigenous communities being dispossessed of land and related rights and access.
- There is a need further work to understand the economic, environmental and other trade-offs for different sectors of rural societies with respect to the harvesting, cultivation and commercialization of non-timber forest products, as the benefits and costs for different members of society vary. In the land sparing/land sharing debate, greater attention is needed on issues related to food production and access to nutrient-rich foods.
- More attention is needed on how to effectively link local innovations in management practices, institutions and governance arrangements to an enabling policy environment.

- To develop appropriate land tenure policy frameworks, more comprehensive information is needed on the complex relationships between land tenure, use, control, ownership and how these relationships impact on food security, forests and tree-based systems.

Final Thoughts

Forests and tree-based systems can contribute to the 'Zero Hunger Challenge'. To do this, however, requires a much greater understanding of the forest-food nexus, effective management of rural landscapes, and improved governance.

Recognising the role of different configurations of the landscape mosaic, and the ways in which forests and tree-based systems can be managed to effectively deliver ecosystem services for crop production, provide better and more nutritionally-balanced diets, greater control over food inputs - particularly during lean seasons and periods of vulnerability, are critical elements of response to global hunger.

There is both tremendous scope and great need for interdisciplinary research & development work on many topics covered in the report. Enhanced collaboration among agricultural and forest scientists, ecologists, geographers, anthropologists, economists, and other social and policy scientists can help to improve our understanding of the forest-food nexus. It should also facilitate the development of more effective policy and management approaches to address food security and nutrition challenges without jeopardizing biodiversity conservation priorities and further degrading the capacity of forests to provide the goods and services needed by present and future generations.

Beyond collaboration amongst scientific disciplines, and with land managers, planners and policy-makers, perhaps even more important is the need to work closely with – and to learn from – those whose lives we seek to improve. The people in rural communities worldwide who manage the more than 500 million smallholder or family farms that supply most of the world's food have much to teach us, and to share with each other.

Thank you very much for your attention.