



ICIMOD

FOR MOUNTAINS AND PEOPLE

Organic Agriculture Development Strategies: Roadmap for 12th Five Year Plan and Beyond



About ICIMOD

The International Centre for Integrated Mountain Development, ICIMOD, is a regional knowledge development and learning centre serving the eight regional member countries of the Hindu Kush Himalaya – Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan – and based in Kathmandu, Nepal. Globalisation and climate change have an increasing influence on the stability of fragile mountain ecosystems and the livelihoods of mountain people. ICIMOD aims to assist mountain people to understand these changes, adapt to them, and make the most of new opportunities, while addressing upstream-downstream issues. We support regional transboundary programmes through partnership with regional partner institutions, facilitate the exchange of experience, and serve as a regional knowledge hub. We strengthen networking among regional and global centres of excellence. Overall, we are working to develop an economically and environmentally sound mountain ecosystem to improve the living standards of mountain populations and to sustain vital ecosystem services for the billions of people living downstream – now, and for the future.



About MoAF, Bhutan

The Ministry of Agriculture and Forests (MoAF) of the Royal Government of Bhutan is the apex body tasked with overseeing the development of agriculture, livestock and forestry sectors (aka the Renewable Natural Resources [RNR] Sector) in Bhutan. About 57.6 percent of the Bhutanese people depend directly on RNR sector for their livelihoods. The sector contributed 16.52 percent (in 2016) to the country's GDP. The MoAF plays a very important role in improving Bhutan's economy and living standards of rural people by ensuring national food and nutrition security through availability of adequate and diversity of food, access and proper utilization. The Ministry executes research and development programmes in agriculture, livestock and forestry sectors and promotes income generating agro-based enterprises, makes efforts to reduce drudgery and improve access to services, market and information. MoAF also has a key role in protecting the country's natural environment through sustainable and judicious use and management of land, water, forest and biological resources.

ICIMOD gratefully acknowledges the support of its core donors: the Governments of Afghanistan, Australia, Austria, Bangladesh, Bhutan, China, India, Myanmar, Nepal, Norway, Pakistan, Sweden, and Switzerland.

This publication was produced with the financial support of the European Union. Its contents are the sole responsibility of ICIMOD and Ministry of Agriculture and Forests, Bhutan, and do not necessarily reflect the views of the European Union.

Organic Agriculture Development Strategies: Roadmap for 12th Five Year Plan and Beyond

International Centre for Integrated Mountain Development, Kathmandu, Nepal
Ministry of Agriculture and Forests, Royal Government of Bhutan, Thimphu, Bhutan
April 2018

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International Centre for Integrated Mountain Development (ICIMOD)

Ministry of Agriculture and Forests (MoAF), Bhutan

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Published by

International Centre for Integrated Mountain Development (ICIMOD)

GP Box 3226, Kathmandu, Nepal

ISBN 978 92 9115 601 6 (printed)

978 92 9115 602 3 (electronic)

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Printed and bound in Nepal by

Quality Printers (P) Ltd., Kathmandu, Nepal

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This publication is available in electronic form at www.icimod.org/himaldoc

Citation: ICIMOD & MoAF (2018). *Organic agriculture development strategies: Roadmap for 12th Five Year Plan and Beyond*. Kathmandu: ICIMOD

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Foreword

The agriculture sector in Bhutan engages more than 58% of the total population. Its contribution to GDP is over 16%. There is gradual transition from subsistence to semi-commercial operations. The transformational change constitutes a departure from the traditional system of producing food for family consumption and production outside of the market structure to market-led commercialized production. While the sector development strategies follow provision of inputs and services towards higher productivity, ensuring self-sufficiency and import substitution, there is increasing recognition and desire to harness comparative advantage offered by Bhutan's unique and diverse physiography and environmental conditions. Organic farming is one such option, in which Bhutan has unique strengths.

Bhutan's traditional farming constitutes use of forest litters and farmyard manure and low usage of chemical inputs, combined with its sound environmental policies and gross national happiness philosophy blends well with organic agriculture. Bhutan 2020: A Vision for Peace, Prosperity and Happiness outlines "becoming a country with environmentally clean food production systems". Accordingly, the ministry has formulated the National Framework for Organic Farming in Bhutan in 2007. On the basis of the framework, the National Organic Programme under the Ministry of Agriculture and Forests has been mandated to develop and promote organic farming to produce safe and healthy food for local consumers as well as for other markets. The approach to organic agriculture has been based on potential commodities in selected pilot sites. Investments are being made for capacity building, technology transfer, and market linkages. Notably, unique affordable certification systems such as Bhutan Organic Guarantee System and Local Organic Assurance Systems have been conceptualized and piloted.

While the benefits of organic farming are multifaceted, including safe food production, reduced environmental contamination, maintenance of soil fertility, and reduced use of external inputs, the dilemma for meeting the increasing food demand and addressing poverty remains. It is within this premise that the Ministry desired to "assess and revisit the implications of Bhutan going organic in terms of its long-term social, economic and environmental dimensions". In a way, there was a need felt to take stock of the last decade of experience in implementing the Organic Agriculture Framework and to provide guidance for the future of the organic agriculture sector in Bhutan.

In this context, the Ministry is happy to be associated with the International Centre for Integrated Mountain Development (ICIMOD) based in Nepal. ICIMOD through its Himalica programme supported expertise to review the progress of organic agriculture and produced this document in a participatory manner. This document comes at the most opportune moment when the ministry is preparing its 12th Five Year Plan (2018–23). The recommendations from this exercise will help the ministry to prioritize organic agriculture, allocate resources, and mainstream its development plan for ensuring sustainability.

We appreciate and acknowledge contribution of ICIMOD and the EU for this valuable support.

Tashi Delek!

Rinzin Dorji

Secretary

Ministry of Agriculture & Forests

Royal Government of Bhutan

Foreword

Bhutan's move towards organic agriculture well fits with the larger vision of ICIMOD: the well-being of mountain women, men, and children.

ICIMOD has been promoting high-value mountain niche products and setting up market links to get benefits to farmers. Mountain niche products are to be preferred over conventional, commercial, production-based agriculture. Traditionally, mountain agriculture has been organic and we have to build on this strength. With good links to markets, and promotion, it can help enhance farm returns and income for farmers.

Organic agriculture means healthy and nutritious food. It prevents ill effects of chemical fertilisers and pesticides and promotes the well-being of humans plus plants and animals as well as ecological resilience. By leveraging local resources and practices, farmers can source inputs locally, reduce dependency on external inputs, and thereby increase savings and build self-reliance. This ultimately contributes to resilience building.

There is a larger movement for organic agriculture across mountain areas (for instance, in Sikkim), and it fits with Bhutan's concept of Gross National Happiness. Bhutan's commitment to carbon neutrality has paid off. It is the world's only carbon negative country. Going organic can reduce the dependency of agriculture on fossil fuel-generated fertilizers and pesticides, and contribute to ensuring Bhutan remains a carbon neutral country. It will further strengthen the implementation of the vision of their majesties the 4th and 5th Kings, and Bhutan's dream of a carbon negative economy which is a major contribution to the global fight against climate change.

Having this in mind, ICIMOD signed a letter of intent with the Ministry of Agriculture and Forests to assess the potential and challenges for organic agriculture in Bhutan, with the objective of supporting the development of mountain rural livelihoods in the context of socioeconomic and climate change in Bhutan.

In line with the Government of Bhutan's endeavours to promote organic agriculture, the objective of this collaboration between the EU-funded Support to Rural Livelihoods and Climate Change Adaptation in the Himalayas (Himalica) initiative at ICIMOD was to assess the opportunities and challenges for organic agriculture as a source of livelihood for local people in Bhutan.

Our hope is that the assessment conducted under Himalica jointly with the Ministry of Agriculture and Forests, Royal Government of Bhutan shall serve as a basis for a consultative process in the country that may eventually lead to the formulation of a mountain-specific organic agriculture policy for Bhutan.

ICIMOD has a clear mandate of supporting its eight regional member countries on the mainstreaming of mountain-specific climate change adaptation in their policies, particularly with knowledge generation and sharing, and capacity building. Our role is to share knowledge between countries in the region and there is a keen demand for climate smart organic farming practices.

David Molden, PhD

Director General
ICIMOD

Acronyms and Abbreviations

AKRA	agency key result area
BAOWE	Bhutan Association of Women Entrepreneurs
BTN	Bhutanese Ngultrum
CH ₄	Thermogenic Methane
DAMC	Department of Agriculture Marketing and Cooperatives
DoA	Department of Agriculture
EDP	economic development policy
FAO	Food and Agriculture Organization of the United Nations
FYM	farmyard manure
FYP	Five Year Plan
GCF	Green climate fund
GEF	Global Environment Facility
GDP	Gross Domestic Product
GHG	greenhouse gas
GNH	Gross National Happiness
HKH	Hindu Kush Himalaya
HWC	human-wildlife conflict
IAASTD	International Assessment of Agricultural Knowledge, Science and Technology for Development
ICIMOD	International Centre for Integrated Mountain Development
ILO	International Labour Organization
IPM	integrated pest management
KPI	key performance indicator
MoAF	Ministry of Agriculture and Forests
NBC	National Biodiversity Centre
NFOFB	National Framework for Organic Farming in Bhutan
NGO	Non-governmental organization
NKRA	National Key Result Area
NOP	National Organic Programme
NPPC	National Plant Protection Centre
NSB	National Statistics Bureau
NWFP	non-wood forest product
OA	organic agriculture
RDC	research and development centre
RGoB	Royal Government of Bhutan
RNR	renewable natural resources
RSPN	Royal Society for Protection of Nature
SABAH	SAARC Business Association of Home based workers
SDG	Sustainable Development Goals
SHG	Self-help group
SRI	System of Rice Intensification
TCB	Tourism Council of Bhutan
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environment Programme
UNGA	United Nations General Assembly
WWF	World Wildlife Fund

About this Report

The International Centre for Integrated Mountain Development (ICIMOD) is a regional intergovernmental learning and knowledge-sharing centre serving the eight regional member countries of the Hindu Kush Himalaya (HKH): Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan. ICIMOD seeks to improve the lives and livelihoods of mountain women, men, and children now, and for the future. The ICIMOD aim is to influence policy and practices to meet environmental and livelihood challenges emerging in the HKH. ICIMOD delivers impact through its six regional programmes — Adaptation and Resilience Building, Transboundary Landscapes, River Basins and Cryosphere, Atmosphere, Mountain Environment Regional Information System, and Mountain Knowledge and Action Networks. These regional programmes are supported by the four themes of livelihoods, ecosystem services, water and air, and geospatial solutions and underpinned by knowledge management and communication.

Under the Adaptation and Resilience Building regional programme, the Rural Livelihoods and Climate Change Adaptation in the Himalayas (Himalica) is a demand-driven initiative financed by the European Union and managed by ICIMOD. Himalica aims to support vulnerable mountain communities in the HKH to adapt to climate and socioeconomic change.

The expected results of Himalica programme are:

- The capacity of national and regional stakeholders in dealing with livelihood development is improved;
- More sustainable and efficient use of natural resources and the protection of the environment in the HKH is enhanced; and
- Poverty among mountain people is reduced through increased resilience and the unlocking of new livelihood opportunities, and through the promotion of more equitable approaches.

ICIMOD signed a letter of intent with the Ministry of Agriculture and Forests (MoAF) in Bhutan to assess the potential and challenges for organic agriculture in Bhutan, with the objective of supporting the development of mountain rural livelihoods in the context of socioeconomic and climate change in Bhutan. This activity builds on the work already conducted by the National Organic Programme, DoA, MoAF, as well as on the pilots conducted by Himalica in selected sites in Bhutan.

With the aim of supporting mountain-specific policies and livelihood diversification and resilience for mountain communities, Himalica — in collaboration with MoAF — has designed a roadmap including several local and national level consultations, fieldwork in target areas, and the production of a comprehensive study on the challenges and opportunities for organic agriculture in Bhutan.

This study was carried out by Mr Sunder Subramanian, an Independent Consultant and Policy Advisor, and Dasho Sherub Gyaltshen, Former Secretary of the Ministry of Agriculture and Forests, Government of Bhutan, with inputs from Mrs Kesang Tshomo, Coordinator National Organic Programme; Mrs Kinlay Tshering, Director Department of Agriculture; Mr Ganesh B. Chettri, Mr Tirtha Bdr. Katwal, and other task force members from Bhutan; and Dr Giovanna Gioli, Dr Surendra Raj Joshi, Dr Dhruvad Choudhury, Dr Tashi Dorji, Dr Golam Rasul, and other professionals from ICIMOD. The process included initial inception meetings in Thimphu, Bhutan; desk review of the relevant literature; fieldwork across agro-ecological zones of Bhutan for primary research, visiting organic farms and farmers' fields, as well as research centres and research sub-stations; intense discussions and analyses; and report generation.

Key findings and recommendations from the draft report were presented at a multi-stakeholder consultative workshop in Thimphu on 22–23 May 2017, and comments from participants and key takeaways based on a shared consensus from the consultations were incorporated to develop this final report.

Executive Summary

Bhutan's stated vision is to go 100% organic by 2020. However, given the compulsions of ensuring food security and a desire to attain import substitution in agriculture, this vision demands a serious reappraisal. On a pragmatic level, given that there are only about three years to go, achieving this target holistically and systematically is unlikely, or practical. Aiming for a 100% organic agriculture is impractical in the short- to medium-term, especially given the significant challenges involved, including the fact that Bhutan currently imports about 50% of its food requirements. Nevertheless, it is feasible to move towards an agriculture that is predominantly organic, particularly in selected crops and agro-ecological settings, promoted in a phased manner and over a long-term framework.

Agriculture is a primary sector that serves as the main source of livelihood and provides employment to about 58% of Bhutan's population. Mountain areas offer limited scope for irrigation; with only 29% of the arable land under irrigation, agriculture is dominated by dry-land farming, which is likely to be further impacted by increasing droughts and moisture stress as a result of climate change. Achieving food and nutritional security and alleviation of poverty continues to pose a formidable challenge. The overall self-sufficiency of rice, the most preferred staple through domestic production, is only about 50%; Bhutan annually imports 45–50% of the domestic rice requirement from India and other countries. The key constraints in agriculture include the shortage of water available for crop production, low yields, and high comparative production costs for many commodities.

The country's agriculture system is by default largely organic due to the very minimal use of external inputs like inorganic fertilizers and pesticides. The use of chemical fertilizers is among the lowest in the world and the use of plant protection chemical is highly regulated. This situation presents a huge potential to promote organic agriculture, both for increased and sustainable food production to safeguard food security as well as for enhanced income for the farmers. Over the years, a number of policies and policy statements by the Royal Government of Bhutan have explicitly announced a support for organic agriculture; collectively, these frameworks and documents cover virtually every aspect of a future move towards predominantly organic, and thus, to a large measure, there is very high policy support to move towards this stated National Vision. Currently, about 40,000 acres of land (including largely wild NWFP collections) are currently under organic management.

Bhutan is organic by default and there is a strong foundation for organic agriculture development based on the inherent traditional farming system. In order to meet the increasing demand for food and to ensure national food self-sufficiency and security, there was a slow transition of Bhutanese agriculture towards a low external input sustainable farming system starting from the 1960s. However, the low external input-based sustainable farming system practiced in Bhutan over the decades has not been able to meet the increasing food demands.

The priority and challenge for the MoAF is to meet the national self-sufficiency while keeping the agriculture systems largely organic. Although the National Organic Programme was recognized and given a programme status to take up the national organic agenda, it did not have the adequate resources to meet the desired goals. It is thus presumed that organic agriculture received relatively lower priority in the 11th FYP which is indicated by the progressively lower budgetary allocations and the national organic programme coordination was difficult.

In the current 12th FYP process, the organic agenda has been recognized as one of the agency key result areas (AKRA) for the MoAF. At the present context, organic agriculture is faced with different types of challenges. Empirical data relating to organic agriculture is largely unavailable and research on organic agriculture is at a nascent stage and needs emphasis to generate alternatives for organic farming. The framework for organic agriculture is not very comprehensive for each sector to prioritize and focus.

The organic sector is also beset with a number of issues related to markets and value chains, including lack of appropriate supply-and-demand-side mechanisms such as the relatively poor quality of organic produce currently available, absence of price premiums (over local produce), and low consumer awareness.

Evidence suggests that the transition from 'traditional' and low external input agriculture in rain-fed areas (which is the case in Bhutan) to organic farming leads to increased yields; as such, food self-sufficiency goals and organic agriculture can be in perfect sync with each other.

While most of the necessary frameworks to support organic agriculture, including a comprehensive Master Plan for Organic Sector Development that virtually addresses most aspects of a strategy for a shift towards predominantly organic, currently exist, they have largely remained un-implemented because of limited resources and implementation capacity.

Given the above conclusions, the recommendations are to adopt a phased approach over the immediate, short-, medium-, and long-term strategies and priorities — a conclusion that also found consensus in the multi-stakeholder validation workshop held in Thimphu on 22–23 May 2017.

This document thus provides the future directions for the organic sector development for Bhutan. Accordingly short-, medium- and long-term strategies are recommended.

Short-term (~5 years) priorities

1. Grounding the National Organic Programme through value addition, product development, and marketing and promotion of local organic products to immediately show the existing strength of traditionally organic agriculture.
2. Establishing a research programme to cover selected principal crops in pilot projects across relevant agroclimatic contexts in the country as a key strategy; other complementary and/or supplementary methods and interventions can also be taken up in parallel, including good farming practices through which high quality of organic produce can be ensured.
3. Developing a common policy for organic agriculture, through a review and revision of all relevant policies in Bhutan that may not be in sync to a shift towards predominantly organic.
4. Initiating activities to augment data mechanisms to support and monitor organic agriculture, and enhance technical capacity.
5. Developing human resource and financial capacities in all the relevant sectors.
6. Carrying out the necessary studies and evaluating options and developing a systematic plan for augmenting import of organic inputs to meet short-term demand and dis-incentivizing use of external inputs while still giving farmers a choice between OA and low external input traditional farming.
7. Putting in place the necessary measures for incentivizing organic agriculture production and also incentivizing the private sector to start producing organic inputs in-country.
8. Initiating a dialogue forum to study and examine new forms/models of partnerships including with the private sector to support organic agriculture at scale.
9. Initiating nationwide awareness campaigns on organic agriculture and all that it implies targeted at both producers and consumers as part of a larger effort to dispel misperceptions that are currently widespread, co-opting and harnessing the power of digital media (including social media platforms).
10. Initiating a review of current regulatory restrictions on sourcing agricultural labour from outside Bhutan.
11. Establishing mechanisms for continuous dialogue, especially among MoAF constituents and also other relevant parties such as the Tourism Council of Bhutan, Trade, Health, and Education.
12. Initiating dialogue with donors and development financing entities such as financial institutions with a view to realigning their Bhutan priorities to support the organic agenda; and potentially, initiating actions to put in place.



Medium- to long-term (~10–15 years) priorities

The medium- to long-term priorities include the integration of more holistic and broad approaches as a strategy for promoting organic agriculture. These approaches include adopting landscape approaches to planning and implementing organic agriculture interventions, explicitly incorporating risk management and mitigation strategies into organic agriculture policies and programming. The specific interventions for medium- and long-term priorities are:

1. Increasing public incentives for product and service providers to develop, formulate, market, and sell more options that are compatible with organic and advanced integrated pest management (IPM) systems, including biologically based pesticides.
2. Supporting structures for organic sector research, education, extension, building, and fostering knowledge management for organic and maintaining the traditionally organic system and transitioning to organic agriculture.
3. Capacitating extension systems to respond to OA needs.
4. Fostering and safeguarding indigenous knowledge on crop varieties and farming practices.
5. Examining prospects of ecosystem services payments to organic farmers for adopting OA.
6. Reviewing and eliminating publicly funded programmes that encourage unsustainable practices based on maximizing yield and profits at the expense of environmental quality and health.
7. Reforming national economic indicators of the agricultural sector to reflect impacts on ecology and environment at broader landscape levels.
8. Addressing labour shortage issues in the long-term, and fostering the shifts necessary in current markets, value chains, and trade systems through appropriate supply-and-demand-side (push and pull factor issues in market strategies) strategies and mechanisms including *inter alia* building consumer awareness and demand generation, and developing market information systems.
9. Developing good agricultural practices and building IPM as the key step towards transition to organic farming.
10. Reviewing and eliminating publicly funded programmes that encourage unsustainable practices based on maximizing yield and profits at the expense of environmental quality and health.
11. Supporting structures for organic sector research, education, extension, building, and fostering knowledge management for organic agriculture and conversion.

Overview of the Agriculture Sector in Bhutan

Introduction

Agriculture is a primary sector that serves as the main source of livelihood and provides employment to about 58% of the population. The agriculture sector is a significant contributor to the gross domestic product (GDP) — 16.7%¹ — while being critical for food security. Achieving food and nutritional security and alleviation of poverty continues to pose a formidable challenge for the Royal Government of Bhutan (RGoB). The largely subsistence agriculture heavily relies on the monsoon rains, which are increasingly becoming unreliable. Mountain areas offer limited scope for irrigation; with only 29% of the arable land under irrigation, agriculture is dominated by dryland farming, which is likely to be further impacted by increasing droughts and moisture stress as a result of climate change. Dryland farming or rain-fed agriculture is dominant with 71% of the arable area under dryland farming including orchards and plantations.² An estimated 2.8% of the Bhutanese population suffer from food poverty, which means that they consume less than 3211.20 kcal per day.³ Household food poverty in Bhutan is directly linked to numerous factors, including the subsistence nature of farming, smallholder farmers who farm on small land holdings (with an average landholding of about 3 acres), the rugged terrain and remoteness, low productivity of crops, poor soils productivity, extensive crop destruction by pests and diseases particularly vertebrate pests, and weak access to roads and markets.⁴ Domestic food production is unable to meet the increasing demand and the overall self-sufficiency of rice, the most preferred staple, through domestic production is only about 50%; Bhutan annually imports 45–50% of the domestic rice requirement from India and other countries. The current national poverty rate is established at 12%, with 16.7% poverty in rural areas and 1.8% poverty in urban areas.⁵



¹ National Statistics Bureau, 2016 data

² RNR Statistics, 2015, MoAF

³ National dietary energy consumption status & self-sufficiency ratio, 2015, Department of Agriculture

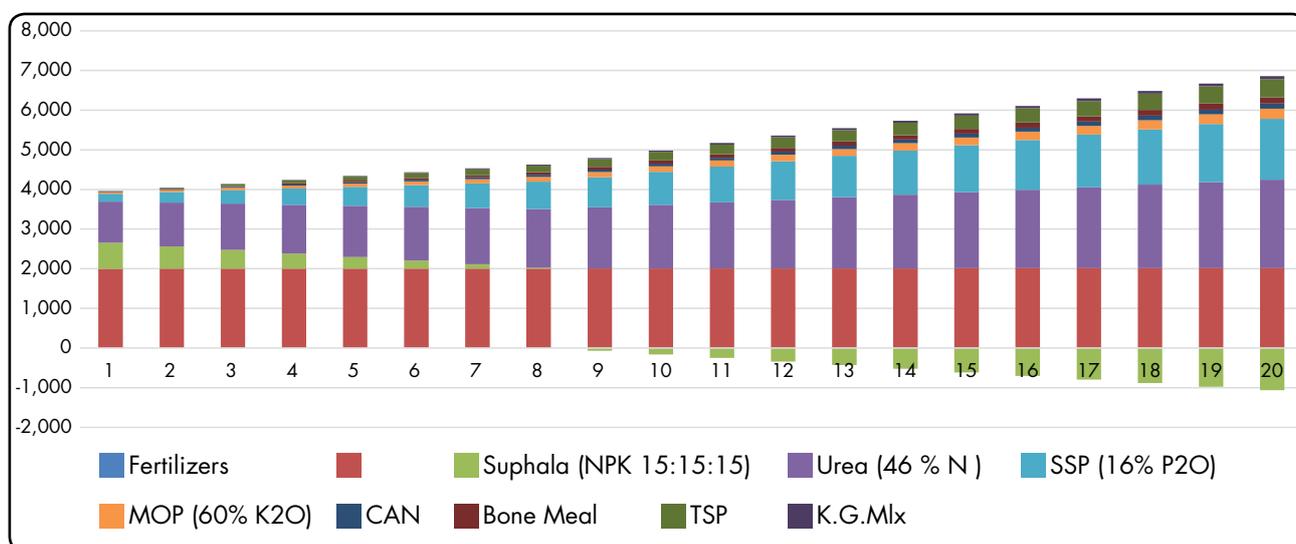
⁴ 11th Round Table Meeting, 2011, Gross National Happiness Commission

⁵ Poverty Analysis Report, 2012, NSB

In the current 11th Five Year Plan (FYP), the goal of the MoAF is to achieve a green economic growth, inclusive social development, poverty alleviation, and climate smart sustainable management and utilization of natural resources. Since the horizontal expansion of area for agriculture is nearly impossible, crop intensification, especially in the rice-based system, is a key focus of the Department of Agriculture (DoA). However, the application of conventional agrochemicals (fertilizers and pesticides) is relatively limited and confined to important cereals like rice and maize and cash crops like potato, vegetables, citrus, and apples. Bhutan's National Action Plan to Combat Land Degradation has identified unsustainable agricultural practices, ranging from the increasing use of inorganic fertilizers and pesticides to farming on steep slopes, poor management of water for irrigation, and construction of farm roads. The National Soil Service Centre estimates that the inorganic fertilizer use in 2016 was 11.9 kg/acre, which is low compared to 13.66 kg/acre in 2015. Of the chemical fertilizers distributed in Bhutan, urea is clearly the most in-demand nutrient. In the peri-urban areas where multiple cropping of vegetables is done for market, farmers apply substantial quantities of inorganic fertilizers in the form of urea and suphala (Figure 1). Data available from the National Plant Protection Centre (NPPC) shows considerable variation in pesticide use across dzongkhags, with Gasa, Pemagatshel, and Samdrup Jongkhar showing zero demand, and Paro, Trashiyangste, and Punakha showing the highest (Table 1).

The Department of Agriculture Marketing and Cooperatives (DAMC) has the primary mandate to support and guide the marketing of all agriculture produce in the country. The Agricultural Marketing Policy of Bhutan indicates that the state assumes the primary responsibility to provide support to enable smallholder crop, livestock, and non-wood forest product (NWFP) producers to commercialize their production, and to add value to their primary agricultural products.

Figure 1: Sales of fertilizers for the period of 1998 to 2017



The RGoB has accorded high priority to agricultural development in its successive FYPs, and agriculture is featured as one of the five jewels.⁶ This comes out of the realization of the importance of the farm sector to the economy and its significance in meeting food and nutrition security, poverty reduction, and equitable and sustainable economic development goals. These priorities are also embedded in the 12th FYP, currently under development. The importance of some imported agriculture and food items in the national diet — particularly rice — has led to concerns not only in relation to their import costs in foreign currency, but also for the wider food security of the country. Yet cereals (principally rice and maize) still accounted for a significant proportion of the total cultivated area.⁷ By contrast, it is estimated that the four

⁶ "The Five Jewels of Economy: Dzongdags' Roles" Speech from Lyonchhoen Tshering Tobgay, Prime Minister of Bhutan, during the Conference of Dzongdags, Kuensel, 12 August 2014.

⁷ *Agricultural Commercialization and Diversification in Bhutan*. Policy and Planning Division, MoAF, Thimphu. August 2010.

Table 1: Pesticide distribution by dzongkhag for the year 2014–15 (in kg/litre)

S.N.	Dzongkhag	Insecticides	Fungicides	Herbicides	Rodenticides	Total
1.	Gasa	0	0	0	0	0
2.	Pemagatshel	0	0	0	0	0
3.	Samdrup Jongkhar	0	0	0	0	0
4.	Haa	120.4	144.5	87.4	2.26	354.56
5.	Bumthang	54.65	150.45	323.7	0.21	529.01
6.	Zhemgang	41.2	1	5,011	0.12	5,053.32
7.	Samtse	56.6	49	5,000	0.01	5,105.61
8.	Sarpang	86	30.8	5,085	0.2	5,202
9.	Chukha	166.2	34	6,752	0.54	6,952.74
10.	Dagana	85.5	31	9,035	1.2	9,152.7
11.	Mongar	84	24	10,176	3.1	10,287.1
12.	Lhuntse	42.8	0.4	14,500	0	14,543.2
13.	Trongsa	115.6	10	17,072.2	1	17,198.8
14.	Tsirang	81.5	2.4	19,233	0.45	19,317.35
15.	Trashigang	0.3	0	21,021	0	21,021.3
16.	Thimphu	2,478.9	918.7	33,679.7	6.84	37,084.14
17.	Wangdue	183.1	1,407.55	53,954.5	5.28	55,550.43
18.	Punakha	167.9	22.6	70,005	0	70,195.5
19.	Trashigang Yangtse	43	41.95	76,515	0.64	76,600.59
20.	Paro	1,465.1	718.65	178,717.8	0.7	180,902.25
	Total	5,272.75	3,587	526,168.3	22.55	535,050.6

Source: NPPC.

major export crops (citrus, potatoes, apples, and cardamom) occupied 13% of total cultivated area, while the total national area dedicated to the production of these crops for export markets was only 4.3%.⁸

The FYPs set the following key objectives of the renewable natural resources (RNR) sector under the guideline: i) enhance food and nutrition security, ii) improve rural livelihood, iii) accelerate and sustain RNR sector growth, and iv) promote sustainable management and utilization of natural resources.

In addition to the national food self-sufficiency targets, dzongkhag-wise target setting is also being adopted to drive food self-sufficiency (Table 2). Among other aspects, the circumstances of economic

Table 2: Food self-sufficiency agency key result area for MoAF in the 12th Five Year Plan

AKRA	Key performance indicator	Unit	Baseline	Target
1. Enhanced National Food Self-Sufficiency	Rice self-sufficiency level	%	46.7	60
	Maize self-sufficiency	%	84	96
	Meat self-sufficiency	%	37	47
	Egg self-sufficiency	%	100	100
	Dairy products self-sufficiency	%	88	91
	Vegetable self-sufficiency	%	85	95
	Fruits production	Metric ton	45,018	60,949
	Area under assured irrigation	Acre	14,378	20,286
	Fallow land brought under cultivation	Acre	N/A	5,339

N/A = not available. Data source: Draft 12 FYP, document, December 2017.

⁸ *Agricultural Trade in Bhutan: Patterns, Trends and Economic Impact*. Policy and Planning Division, MoAF, Thimphu. August 2010.

issues such as foreign currency outflow and deterioration of the balance of international payments are also reasons for the push to achieve as much self-sufficiency as possible, at least for grains.

On the other hand, a 2015 report of the United Nations Food and Agriculture Organization (FAO)⁹ suggests that as overall cereal production decreased by an annual rate of 2.4% over the last decade, cereal imports increased by 7.1% annually, leading self-sufficiency to decline from 74% in 2005 to 57% in 2013, attributed to substantial increases in durum wheat imports in 2011 and significant rice imports in the years 2012 and 2013, which continued in 2014. The import of wheat and rice in these years includes those used for brewing and animal feed. In contrast to cereals in general, rice production remained stable or even expanded marginally over the last decade. Rice yields increased almost 50% between 2005 and 2013 (from 1,052 to 1,556 kg/acre), but this has largely been offset by a fall in harvested area from around 63,000 acres in 2005 to 48,400 acres in 2013. This is an average decline of 3.4% per annum, a tendency which has appeared to accelerate since 2009. As a result, rice self-sufficiency has decreased and currently stands at only about 47%.



⁹ Agricultural Trade and Food & Nutrition Security in Bhutan: An Assessment of Policy Options (2015 Draft)

Organic Agriculture in Bhutan

Bhutan remained organic by default based on the inherent traditional farming system and remoteness which provides a strong foundation for organic agriculture development. Farmers mostly practice mixed farming where livestock is reared as an integral part of the system for manure. Most of the cultivated soils have high organic matter content and some soils exceed 6% organic matter. The use of chemical fertilizers is among the lowest in the world and the use of plant protection chemicals is highly regulated. An analysis of the RNR survey data shows that only 31% of crop farmers use inorganic fertilizer and that farmers closer to roads are more likely to apply inorganic fertilizer.¹⁰ This situation presents a huge potential to promote organic agriculture (OA), both for increased and sustainable food production to safeguard food security as well as for enhanced income for the farmers.

Formal institutionalised processes to promote OA in Bhutan began in 2003, and the National Framework for Organic Farming in Bhutan (NFOFB) was launched in 2007 and the National Organic Programme (NOP) established in 2008. Further, Gasa District in the north and Samdrup Jongkhar in the south of the country chose to develop as organic districts in 2004 and 2010, respectively. The Economic Development Policy (EDP) 2010 of the Kingdom of Bhutan affirms that organic farming will be a major focus area for the RGoB to promote Bhutan as an 'Organic Brand' by exploring viable alternative methods and inputs. It also stresses to phase out harmful chemical fertilizers and pesticides. In 2012 Bhutan publicly announced its intent to go fully organic by 2020, and in March 2014 Bhutan co-hosted the International Conference on Organic and Ecological Agriculture in Mountain Ecosystems, resulting in the Thimphu Declaration, on Ecological Organic Agriculture in Mountain Agro-Ecosystems: Leading the Transformation (see Annex 1).



¹⁰ Ephraim Nkonya et al., 2014. Assessing the Economic Benefits of Sustainable Land Management Practices in Bhutan IFPRI Discussion Paper 01361



The mission and vision for NFOFB and NOP are to develop and promote organic farming and environmentally friendly farming systems as a way of life and to produce high quality and safe food, both for domestic and export markets. Some of the major initiatives of the NOP since its inception has been the development of a comprehensive range of frameworks and guidance material to support OA such as the Strategic Action Plan for OA Development in Bhutan (2011), the Master Plan for Organic Sector Development (Draft, 2012); the National Organic Standard of Bhutan (Draft), the Bhutan Organic Certification System, guidelines for the import and distribution of bio-pesticides/fertilizers, 2015; and a national logo for marketing organic products in Bhutan. Collectively, these frameworks and documents cover virtually every aspect of a future move towards predominantly organic agriculture, and thus, to a large measure, there is very high strategic preparedness to move towards this stated national vision.

The NOP promotes organic farming through viable alternative methods and inputs with select crops and in selected pockets of the country. The expectation is that this will be scaled up at an opportune time, and eventually all crops and the whole country will be included. Other strategies adopted by the NOP to promote organic farming include training of farmers and field extension workers, field demonstrations, facilitation of marketing, and the formation of farmers' groups and cooperatives. Since 2011, all agriculture extension workers based in the field have been trained by the NOP. This preparedness has been complemented with several programme initiatives leading to roughly 40,000 acres of land (including largely wild NWFP collections) currently under organic management. An additional target of 10,125 acres of land under organic management has been proposed under the 12th FYP. While Bhutan at this stage does not have a certification body or any regulation on sale of organic products, a local assurance system is in place for domestic markets to distinguish organically produced products from other local produce, and a process of setting up a certification system for providing assurance for organic produces is being implemented in collaboration with Bhutan Agricultural and Food Regulatory Authority, both for domestic and export markets.

Key Issues and Challenges

Perceptions of organic agriculture in Bhutan

As a part of this study, a series of consultations were organized with relevant stakeholders. The consultations included one-on-one meetings with representatives of government ministries and departments. These consultations as well as review of secondary information brought up a number of key issues and challenges, and supply-and-demand-side perceptions that are inhibiting the OA sector in Bhutan.

There were significant variations in stakeholder perceptions on what organic farming actually entailed. A majority of farmers assumed that organic farming simply means weaning off conventional agrochemicals and switching to farmyard manure (FYM) and/or leaf litter. While in a very general context this holds true, this also reflected the overall poor awareness amongst farmers in Bhutan of the need for the range of interventions including integrated soil health, nutrient management, and agronomic practices to achieve good quality organic produce. This aspect is also borne out by the fact that a lot of the 'organic' produce seen in markets across Bhutan appear to be of relatively poor quality, thereby also impacting prices.

While most stakeholders were generally aware of OA, this understanding was limited to crops and horticulture; stakeholders had virtually no understanding of the implications of going organic in the livestock, forestry, and fisheries sector. Also, most stakeholders in the dzongkhags visited were unaware of the relationships of agriculture to the wider landscapes around cultivated areas, ecosystem services, and



the larger aspects of landscapes and biodiversity conservation. There is also a widespread perception that organic farming is more 'expensive' than conventional farming, and thus not desirable. This perception was limited not to just farmers, but also was widespread across all categories of stakeholders. In response to a leading question on whether this perception was based on empirical data on comparison of the costs of organic versus conventional farming, stakeholders indicated that this was just a perception and not based on such empirical data. The perceptions on costs of OA are also linked to the overall poor levels of financial literacy that was evident from discussions with farmers and farmers' groups during field visits. Most farmers did not have clear ideas of whether or not they were making profits; this was also the case with many of the farmers' groups interacted with. This is also closely linked to the finding that while many farmers groups exist, most have extremely limited/rudimentary management and capacities to leverage the power of groups/aggregation.

There was a widespread perception that the switch to OA reduces production and that productivity will drop as compared to conventional agriculture, and that this will adversely impact the national goals of achieving food self-sufficiency. As in the case of cost comparisons, a follow-up leading question on whether this perception was based on empirical data on production and productivity comparisons in Bhutan, stakeholders indicated that this was just a perception. There was also a general perception that a shift to organic was not possible for all crops, especially citrus, and that at least minimal usage of conventional agrochemicals will be necessary. There was also a widespread perception that organic farming will involve more labour, especially for weeding, and thus that there is no substitute for herbicide use. This has resulted in widespread and increasing use of herbicides such as butachlor in rice over the years and the prevalence of metribuzin usage in potato and glyphosate for general weed control. Some stakeholders expressed concerns over the emerging usage of glyphosate, which is now banned in many countries, and the detrimental impacts it might have on the environment and on human health, in





addition to more general concerns about the impacts of increasing conventional agrochemical usage on pollinators such as bees. At the same time, discussions with other stakeholders such as Farm Machinery Corporation Limited and Agricultural Machinery Centre revealed that while technological options such as row planting and mechanical weeding were easily available, there was low uptake of these owing to a general attitudinal inertia.

Closely linked to the above issue was the widespread constraint expressed by farmers and MoAF personnel across dzongkhags of the lack of or very limited availability of organic alternatives to conventional agrochemicals (including fertilizers). This is one of the factors inhibiting organic farming, despite the fact that many farmers have a genuine desire to either stop using conventional agrochemicals, or at least minimize their use. Currently, virtually all inputs for the agriculture sector — conventional and some of the limited available organic inputs — are all imported, mostly from India. The implications of the limited availability of organic alternatives to conventional agrochemicals could lead to the undesirable increase in the import agrochemicals in order to achieve the production target. Also linked to the above perception, some stakeholders were of the opinion that it was not possible for Bhutan to achieve import substitution in the short to medium term for staple cereal crops, especially rice.

In general, there was very low awareness among most stakeholders in the dzongkhags on climate change and variability and its impacts (current and future) on agriculture. This is reflected in terms of the low demand for climate information data available from the National Centre for Weather, Climate and Water Resources (formerly the Department of Hydro-met Services under the Ministry of Economic Affairs, RGoB). There is also a lack of mechanism in place to make available more user friendly weather and climate information that can be readily used by the agriculture sector. At the same time, most stakeholders had perceptions of increasing water scarcity, although they did not attribute this to climate change factors. Some stakeholders expressed concerns about the emergence of large-scale commercial farms and generally had the perception that this might impact smallholder producers.

There appeared to be significantly low consumer awareness of the differences between 'local (or default organic)' produce and organic produce, leading to a lack of premiums for organic, despite the fact that there appeared to be a general belief that 'local' produce was significantly healthier than imported produce, and most consumers appeared to be willing to pay the higher price for local produce than buy the significantly cheaper imported produce.

Policy, programme, and institutional issues

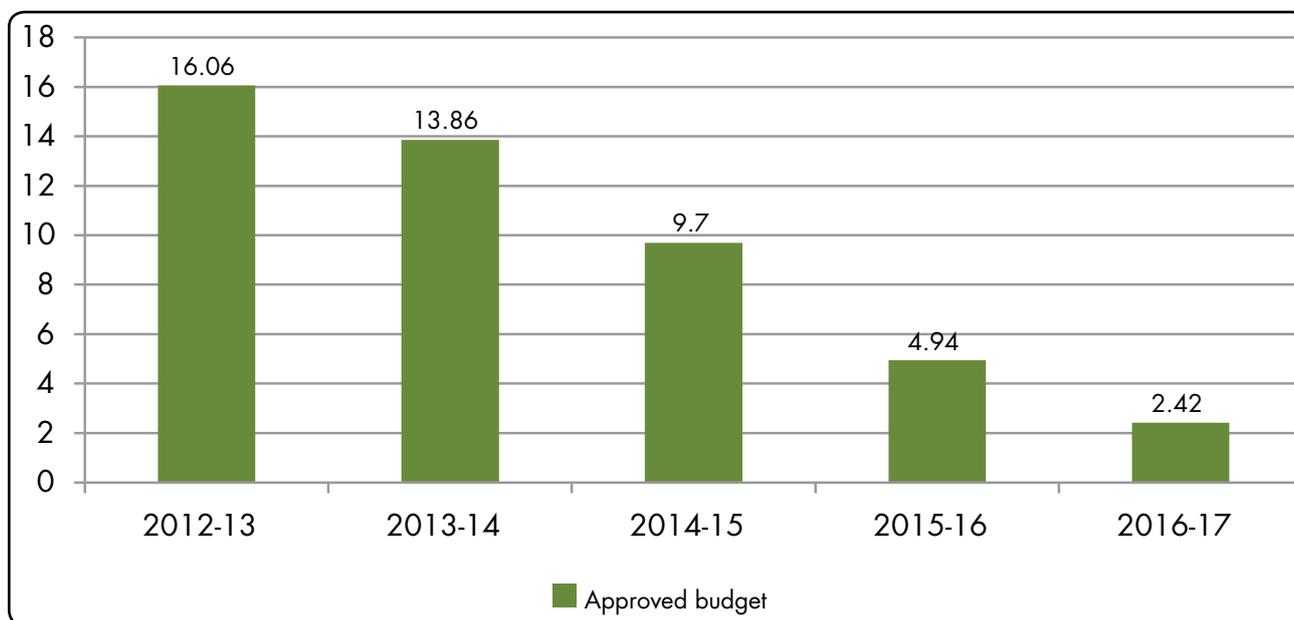
Over the years, a number of policies and policy statements by the RGoB have explicitly announced a support for OA which would seem to indicate significant political will to move towards going organic. In practice, however, the drive to meet the food security targets based on low input conventional agriculture that involves use of very minimal external inputs has prevailed.

While the NOP formulated the plans and targets for OA in the 11th FYP, the resources available from the national government and donor projects were limited. Especially in the 11th FYP, the NOP did not receive the required emphasis and priority and RGoB budgetary allocations made could not meet the needs (Table 3 and Figure 2). The major share of the budget allocated to the Department of Agriculture was prioritized for infrastructure, development of irrigation, and farm mechanization. Although attempts were made to obtain it, donor funding for the programme through project proposals did not materialize as expected within the given time. Also, as part of fiscal decentralisation measures, programme budgets are transferred directly to dzongkhags, so virtually no budgets are available at the central level for the NOP and its development. This situation is further accentuated by the fact that the government has limited source revenues and most programmes are dependent on donor projects.

Table 3: Department of Agriculture approved budget 2010–16 (in BTN millions)

2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
128.666	259.612	660.394	508.272	399.869	468.144	310.403

Figure 2: Total budget allocation to NOP over years



This has resulted in progressively smaller programmes being carried out by the NOP and lower outreach capability and increasing dependence on donor-funded projects. While the NOP theoretically is a cross-cutting programme with seamless coordination with other MoAF constituents (such as the Department of Forest and Park Services, National Soil Service Centre, NPPC, National Biodiversity Centre, DAMC, and National Seeds Centre, as well as the research and development centre (RDC)), in practice coordination is limited, owing partly to the institutional marginalisation of the NOP, and partly to the other agencies' budgetary and human resource constraints to support the NOP, given that they continue to follow conventional agriculture-based programmes with little or no convergence with NOP and the organic agenda.

The NOP is assisted by a technical working group (established in 2009) comprising 12 representatives from the MoAF. The group meets quarterly and provides guidance and direction to NOP for planning and implementation of the programmes.

Another significant policy issue confronting Bhutan that will have to be addressed is that of chronic labour shortages. The underlying cause for this has been reported as rural outmigration, partially driven by improved education, improved social services, and jobs. As a consequence of farm labour shortages, farmers are increasingly resorting to the use of herbicides in labour-intensive crops like rice and potatoes which calls for the urgent need for identifying or developing alternative interventions to address such issues in crop production.

There is an existing national policy which prevents the employment of low-wage migrant labour from neighbouring countries in agricultural production. For addressing such policy issues, coordination not only within MoAF and its constituents but also with other ministries and departments such as education, health, tourism, industries, as well as other relevant stakeholders, is important.

Empirical data relating to OA is largely unavailable, and comparison of organic versus low external input traditional Bhutanese farming system is not evident, apart from the annual DoA survey carried out in 2012 and reported in 2013.

This is compounded by the fact that the RDCs too lack dedicated research programmes on OA (which could generate research data on comparisons of various aspects of OA with the full suite of agronomic practices versus conventional agriculture).

Currently, the research and extension programmes are largely focussed on supporting low-input sustainable farming which is not specifically organic. Further, the existing technical capacity available at the research centres is limited for undertaking technology evaluation on organic agriculture and as a result the wide range of research priorities of the OA are not addressed.

The extension system has not been provided with alternatives to be promoted for OA. One of the initiatives of the government was that the research farm mandated to RDC Yusipang was declared fully organic; however, this opportunity was not fully utilized for the advancement of OA.¹¹

Critically absent from the current organic agenda are a framework and guidelines for an organic livestock, poultry, and fisheries sector and associated subsectors such as feed, fodder, and veterinary medicine, especially considering the significant number of domestic livestock and an emerging dairying sector. Livestock management is critical to the farming system in Bhutan to support the organic agenda, but there appears to be a general perception among many stakeholders that a shift to predominantly organic in the livestock sector may not be possible, and that the sector's contribution is limited to farmyard manure and the biogas and bio-digester slurry as organic inputs. At the same time, the reality is that due to lack of a common organic policy, conventional approaches to feed, fodder, and medication of farm animals impact the organic status of the crops. A perusal of livestock statistics for Bhutan also shows skewed livestock density, and thus also skewed availability of FYM across the country. Dzongkhags such as Bumthang, Trashiyangtse, Zhemgang, Haa, Pemagatshel, Thimphu, and Gasa have low cattle density, while those with high density include Samtse, Trashigang, Mongar, Sarpang, Wangduephodrang, and Chukha. Likewise, poultry densities (poultry droppings are potentially a rich source of fertilizer to support the organic sector) show skewed densities and some correlation with cattle densities across Bhutan, with low densities in Trongsa, Punakha, Zhemgang, Haa, Trashiyangtse, Bumthang, and Gasa and high densities in Sarpang, Tsirang, Samtse, Chukha, Thimphu, Mongar, and Dagana.

¹¹ Based on the Organizational Development exercise led by the Royal Civil Services Commission (RCSC), the RNR-RDC Yusipang has been designated as the Research and Development Centre for Organic Agriculture.

A detailed analysis of the seed sector has revealed that 98% of the country's seed need is met through the informal sector managed by the farmers which is entirely organic. The dilemma has been the inability to mobilize and take advantage of these organic seeds for the promotion of organic crops and varieties for value addition and product development. The National Biodiversity Centre in collaboration with the research and development centres has initiated local seed fairs across the country to motivate farmers to conserve and utilize the traditional seeds. OA could intervene positively in promoting such organic seeds available with the farmers by undertaking basic scientific selection and multiplication for commercialization. The immediate action could be the identification of the most popular crops and varieties for upscaling as organic seeds in the country. To facilitate the availability of organic seeds, the DoA should formally recognize the commercialization of such crops and varieties and further support its multiplication and commercialization.

Beekeeping is an emerging sector in Bhutan; however, the emphasis appears to be on honey production, rather than pollination services to enhance production and productivity of crops.

Effective conservation, sustainable utilization, and equitable sharing of benefits arising from access and use of biological resources is critical to maintaining Bhutan's biodiversity, which has close interrelationships to agriculture and its subsectors, including livestock. A national biodiversity action plan exists; however, biodiversity concerns and priorities do not currently seem to be integrated into planning processes at national, dzongkhag, and gewog levels. The extensive forest cover in Bhutan also means a rich diversity of NWFPs including medicinal plants, mushrooms, fruits and nuts, bamboos and rattan, oil and resin species, spices, ornamental plants, fodder species, dyes, and forest vegetables including yams. While this is a lucrative sector with significant potential under the organic agenda, currently only lemongrass has been successfully commercialised and certified as organic. There are many NWFPs collected and traded that have the biggest potential to be registered and certified. The sector is beset with numerous legal, institutional and organizational challenges — wild NWP management and resource sustainability, among other things — as articulated in the National Strategy for Development of NWFPs in Bhutan 2018. The NOP should support the commercialization of such NWFPs by giving due attention to their sustainability.





While nutritional indicators have improved, food security and malnutrition remains a challenge in the lagging regions. Nearly 27% of Bhutanese households consume less than the daily minimum caloric requirement of 2,124 kcal. A survey of rural households in 2007 reported that about 35% of the respondents faced food shortage during the year, and of this figure, 51% faced food shortage for more than four months, while 49% had inadequate food for three months or less, but as of recently are showing improvement. In 2011 one in seven households had limited access to food for one or more months and faced acute malnutrition, However, the number of stunted and underweight children has decreased. As per a 2011 Labour Force Survey Report of the Ministry of Labour and Human Resources, the RNR sector provides livelihood to 58% of the total population contributing to 14.3% of the total GDP. While the contribution of the RNR sector to GDP has been declining, it continues to be an important sector, particularly as a source of improved livelihoods, employment, and reduction of poverty levels.

Pest and disease management in agriculture remains and will continue to remain a critical issue. With increasing climate variability setting in (high temperature, high humidity, short spells of dry weather in between rainy days), the incidence of pests and disease in agriculture has increased and is turning out to be a major challenge for farmers. While there currently are no subsidies available to farmers for their input requirements, MoAF's mechanisms try to (a) incentivize input usage by providing subsidies for agricultural inputs in the form of commission given to the sales agents, and (b) support transportation costs of these inputs from ports of entry to the sales agents, thereby enabling farmers to buy agricultural inputs. All the inputs are available at the same price across the country for farmers who can afford and chose to use them.

Currently, most of the agricultural inputs are imported from the region and low import duties — 20% for fertilizers and 10% for pesticides — and a policy of distribution of inputs on a demand basis to the dzongkhags (pesticides through the NPPC, fertilizers through the National Seeds Centre) is in place. The

current availability of commercial organic inputs in Bhutan is limited to neem oil and pheromone traps. This is because of the lack of identification and recommendation of the relevant commercial organic alternatives for OA due to which many farmers, interested in a shift to organic, are not able to do so. NPPC has in a very small way started supplying various alternatives such as pheromone-based traps for insect control, but large-scale and easy availability of organic inputs will be necessary to support OA. Pesticide legislation (the Pesticide Act 2000) is in force, and new pesticide rules under the Act are being developed by the NPPC.

The MoAF has put in place the Framework and Guidelines for Biofertilizer and Biopesticide Supply and Distribution in Bhutan 2015 which was widely shared and has been endorsed by the RNR Gross National Happiness (GNH) Commission of the MoAF. This framework encourages local production, import, and supply to all districts to supplement needs.

A school agriculture programme is currently operational to promote agriculture and encourage younger generations to take it up. Although all programmes have been practicing OA since 2004, OA is not explicitly incorporated into the curriculum. At higher education levels, a proposal had been mooted to develop and put in place a dedicated bachelor's degree course in OA — an important step in developing a dedicated cadre of trained OA professionals. The College of Natural Resources under the Royal University of Bhutan is soon expected to start a degree course in OA. Financial literacy issues are a major concern, especially with farmers and OA producer groups across dzongkhags, and there are currently limited skills on the basics of group management, business planning (strategic and operational), and financial management such as basic book-keeping, cost-benefit analysis, and cash flow analysis.

Markets, value chains, and trade-related issues are the most critical areas of an organic agenda. The organic sector is beset with issues relating to absence of price premiums, as well as a general confusion as to the differentials between natural produce, default organic produce, organic produce, and certified organic produce; the widespread availability of cheaper imported produce further exacerbates this problem. The absence of price premiums for organic produce appears to be related in part to their apparent lack of quality in relation to conventionally grown or imported produce and an established system of organic verification or certification to distinguish organic from others. The domestic market in Bhutan is a small, challenging place to do business; however, there appears to be a growing demand for higher quality fruit, vegetable, and animal products, as well as rice.



Crop damage by wildlife — one of the facets of human-wildlife conflict (HWC) — has been widely reported as one of the major constraints by farmers in Bhutan; HWC has also been a challenging issue to address in terms of interdepartmental coordination. It also appears that accurate quantifications of the full extent of human and economic loss from HWC in Bhutan on crop loss, livestock depredation, and attacks on people have been difficult.¹² This is largely due to the lack of a single national reporting

¹² Human Wildlife Conflict Strategy: Nine Gewogs of Bhutan. 2016, National Plant Protection Centre (NPPC), Thimphu, Bhutan and WWF Bhutan, Thimphu.



system and database. Available data are either not collected annually or not accurately collected. Nevertheless, the available information from 2011–15 indicates that during the period, almost 500 domestic animals have been killed — by tiger (382) and leopard (60) — and around 25 human casualties. The highest human loss was caused by the Himalayan black bear (17 people), followed by wild boar (4 people). The rest were lost to elephants and common leopard. Crop losses are far greater in scope and magnitude. During 2011–15, data submitted to the Department of Agriculture by the nine dzongkhags indicate that about 420 metric tons of crops were lost to wild boar, elephant, deer, and monkey. Wild boar caused the highest losses, about 315 metric tons. However, the figure does not reflect the data from all the gewogs within the dzongkhags.

The publication of the Bhutan Climate + Change Handbook 2016 co-produced by ICIMOD outlines how climate change and variability is likely to impact Bhutan. These impacts are widespread, acute, and likely to be magnified by the extreme changes in altitude over small distances. The available evidence base¹³ suggests that a temperature increase of 2°C would shift the cultivating zone further into higher elevation, and crops sensitive to low temperatures can be introduced into higher elevations with this temperature rise. In recent years, Bhutan has seen erratic and extreme rainfall and recent studies show a reduction in irrigation water availability in some areas. More specifically, the links between agriculture and climate change have been well documented: Climate change will influence crop distribution and production and increase risks associated with farming, including increased risk of pest and disease attacks. Crop yields have likely already experienced negative impacts.

Agro-ecotourism is a growing niche sector globally, and this market mechanism has considerable potential in Bhutan. Bhutan is regarded as one of the most exclusive travel destinations in the world, enjoying a reputation for authenticity, remoteness, and a well-protected cultural heritage and natural

¹³ *ibid.*

environment. Today, while tourism is a vibrant business with a high potential for growth and further development, the Royal Government of Bhutan adheres strongly to a policy of ‘high-value, low-impact’ tourism which serves the purpose of creating an image of exclusivity and high yield. This is evident from the vision of the Tourism Council of Bhutan (TCB): “To foster a vibrant industry as a positive force in the conservation of environment, promotion of cultural heritage, safeguarding sovereign status of the Nation for significantly contributing to Gross National Happiness.” Currently, Bhutan’s tourism development focus is on its cultural heritage. However, given Bhutan’s natural history, diverse landscapes and ecosystems, extensive network of protected areas including national parks, and diverse agriculture and food systems, including traditional Bhutanese cuisines, there is an excellent opportunity to expand the scope to include eco-equitable tourism with a focus on enhanced livelihoods and revenue maximisation for local communities in rural areas of the country, built around promotion of OA as a core strategy. TCB is currently exploring expanding the scope of community-based rural ecotourism through the homestay concept in collaboration with National Park managements; this was initiated in 2016 and currently has over 100 village homestays, mostly in eastern dzongkhags, and more recently in Haa as well. TCB indicated in discussions with the consultant that there is much demand for organic produce to cater to this segment. However, at present, quality standards for homestay services and infrastructure are very stringent and key questions include how to address quality and quantity to feed the ecotourism sector.

The most important elements of eco-equitable tourism include ecological sustainability and sociocultural activities for the protection of the natural environment. OA and supply of high-quality organic produce — cereals, legumes, fruits, vegetables, dairy, and poultry — represent significant potential to foster these elements, and are in sync with not only the globally acknowledged principles of eco-equitable tourism, but also Bhutan’s GNH principles. Organic handicrafts and lifestyle and personal hygiene products also present significant opportunities to complement the tourism sector in Bhutan, coupled with a



comprehensive integrated approach to promoting local and indigenous crop varieties and a strategy for revival and promotion of local/traditional cuisines (and thereby also supporting revival of such crops and sustaining indigenous agro-biodiversity, while also documenting and sustaining indigenous knowledge systems). While fledgling discrete efforts in this direction are already being promoted by private entrepreneurs and higher-end resorts in Bhutan, significant efforts will be required to integrate these approaches into a roadmap and strategy for a shift towards predominantly organic in Bhutan.

This will necessarily imply inter-sectoral, inter-ministerial, and inter-departmental joint strategy development, planning, and coordination, especially between NOP and MoAF (including the forestry, conservation, and agriculture subsectors, as well as other constituent agencies of the MoAF such as the TCB, the National Biodiversity Centre, and others) and with the private sector and banking and financial services sectors to support and foster necessary investments. Significant investments will be necessary to build requisite capacities and integrate global best practices within the relevant agencies, as well as within target communities. A possible approach could be to develop a network of pilot fully organic villages in existing areas with cultural and natural capital potential as models; these can be subsequently replicated based on lessons learned from the pilots.

Livestock management strategies are particularly critical for climate-smart agriculture. Improved pasture and grassland management, including rotational grazing, regenerate vegetation and restore degraded land which will be critical for climate change resilience. They also contribute to mitigation through carbon sequestration in deep-rooted vegetation and soils. For better manure management, converting manure to biogas provides the added benefits of an alternative energy source with fewer negative health impacts from cooking, heating, and lighting. Improved feed mixes and nutritional supplements can decrease methane emissions; however, this is more feasible at larger scales of operation.

To implement climate-smart agricultural landscapes requires at least four institutional mechanisms: multi-stakeholder planning, supportive landscape governance and resource tenure, spatially targeted investment in the landscape that supports climate-smart objectives, and tracking the multiple dimensions of change to determine if social, economic, ecosystem, and climate goals are being met at different scales. Public and private investment programmes must be structured in a way that supports climate-smart landscapes. Such investment may be financed through climate programmes, or climate criteria may be incorporated into sectoral funding sources or through a special window for inter-sectoral funding of activities that have climate co-benefits. Spatial or ecosystem criteria can be added to develop marketing strategies that target specific ecological niches and social groups in a landscape. Climate-smart elements can be incorporated into agro-industrial investment programmes. Spatially targeted investments in agriculture can be linked to payment for ecosystem services schemes or eco-certification systems for agricultural products that further incentivize ecological management and climate resilience — this may be particularly looked at in the Bhutan context, while reviewing certification schemes for OA.

For stakeholders to invest in climate-smart landscapes, they must understand and be able to communicate the benefits, including yield improvements, food and energy security, adaptation, mitigation, human health, biodiversity conservation, and other ecosystems services. This aspect of adopting landscape approaches in any large-scale transition towards OA in Bhutan should be considered. However, there is a disconnect between the ways that climate-smart landscapes will need to be managed and the current financing systems available to support them. Funds for agricultural development, food security, climate mitigation, and climate adaptation generally come from different sources even though these goals are inextricably linked in agricultural systems. The consequences of this separation are inefficiency and insufficient access to financing for climate-smart agricultural development. As part of a shift towards OA, Bhutan should make adequate budgetary provisions in its FYPs. Potential sources of financing to take up approaches to blending climate and agriculture finance to support climate-smart landscapes as part of a larger OA roadmap and strategy at scale could include green

climate fund (GCF) and GEF-7. To achieve climate-smart landscape initiatives widely and at scale will require strengthened technical capacities and climate resilient agricultural infrastructure, institutions and political support for multi-stakeholder planning, governance, spatial targeting of investments, and multi-objective impact monitoring.

While HWC is not specific to OA per se, it is an issue that will need to be addressed urgently in any proposed shift towards predominantly organic in Bhutan. Typical responses for HWC and crop depredation by wildlife have included subsidised electric fencing and payment of compensation to farmers. Global experience has shown that a range of other tried and tested/potential solutions exist. Some examples include: a united effort amongst international organizations, governments, NGOs, communities, consumers, and individuals, with financial backing for their support and development of HWC solutions; appropriate land-use planning ensuring that both humans and animals have the space they need if possible and protecting key areas for wildlife (possible solutions include creating buffer zones and investing in alternative land uses); community-based natural resource management; risk transfer or insurance for animal-induced damage; payment for environmental services; and developing OA and OA produce as wildlife friendly, practical field-based solutions that can limit the damage done both to humans and human property, and to wildlife, by preventing wildlife from entering fields or villages. For example, synthetic products mimicking predator pheromones are gaining ground and products are now becoming available in certain markets internationally.

More recent advances in HWC research suggests that there are ways to manage the coexistence of wildlife and agriculture and that previously unrecognised synergies can lead to increased food productivity and conservation gains. These increasingly recognise that ecosystems must be managed as a whole, with protected areas as reservoirs of wild biodiversity within a matrix of land managed to protect its habitat value, while also providing food and income to people. When farmers, conservationists, and policy-makers manage landscapes with both food production and species conservation as essential values, dramatic progress can be made on both fronts. Managing entire ecosystems or entire landscapes with a unified strategy to feed people and protect wild inhabitants simultaneously can be a cost-effective approach to biodiversity conservation — yet another rationale for integrated landscape approaches as a larger strategy in transitioning towards OA in Bhutan.

Improvements in the way that farmers manage their natural resources can allow many different wild species to flourish, with no reductions — and sometimes with increases — in crop yields. Good logging practices can prevent damage to forests and increase long-term production. Reduced tillage can lower farming costs while protecting the microorganisms that live in the soil. Improved irrigation efficiency can make more water available for wetlands. Methods can be adapted to labour or capital-intensive farming systems. Much remains to be done in Bhutan to study, perfect, and disseminate such strategies. These next steps include research, public education, the development of markets, the creation of incentives, implementation of local projects, and investment in integrated landscape approaches by the government, international development agencies, civil society, and the private sector.

Further enabling, co-opting, and augmenting the role of the private sector in OA needs to become one of the core strategies for OA sector growth in Bhutan. The private sector and private sector partnerships have a considerable role to play in financing for and developing organic supply chains (including for OA inputs), reliable production and post-harvest operations, fair-trade partnerships, and the like. The private sector also has a potential role in bringing in new organic production techniques and post-harvest operations in extension services; developing credit lines for conversion and certification costs, purchase and storage of harvested crops, post-harvest and processing equipment, and cold chain facilities and transportation; and supporting training in food handling, food safety and quality management, business and marketing management, and associated consulting services from local private suppliers. In association with environmental NGOs, the private sector, and leading producers in the organic sector,



governments can also promote organic products for domestic consumption through consumer awareness campaigns, support the development of organic marketplaces in partnership with municipalities, and promote the procurement of organic products for public sector health, food, and nutrition programmes. Private sector companies could help identify feasible markets abroad as a preliminary step prior to participating in or developing export-oriented organic supply chains, and also help develop business, marketing, and technical skills to back the development and operation of the organic supply chain.

Providing an enabling environment for augmenting the role of the banking and financial services sector needs to become a core medium- to long-term strategy for OA. The sector's role could include, for example, financing import substitution through localised organic input production; financing private sector and rural enterprise and value chain development for organics; developing and deploying financial literacy and inclusion-related programming for farmers and OA producer groups, financial management capacity of groups, loans, and financing for organic at various scales; and supporting the organics-linked self-help group (SHG) savings groups and helping enhance credit ratings of the sector.

Currently, the role of civil society in OA in Bhutan is limited or weakly integrated into OA programming. There is considerable potential to augment civil society's role by creating the enabling environment for co-opting and encouraging full participation in OA, and this needs to become a core agenda for OA in the medium- to long-term. Civil society organizations such as the Tarayana Foundation, World Wildlife Fund (WWF Bhutan), Royal Society for Protection of Nature (RSPN), SAARC Business Association of Home-based workers (SABAH Bhutan), Bhutan Association of Women Entrepreneurs (BAOWE), and others have been playing niche roles to date and have developed considerable expertise and experience in working with and supporting local communities and groups. This niche capability needs to be augmented and leveraged to provide full support to the NOP specifically and to OA in general for a full

range of support including but not limited to mobilizing smallholder farmers (building viable, focused groups); training farmers on production, quality control, and marketing; developing and establishing internal quality management systems among the groups; identifying niche products and helping develop consumer awareness and market linkage and promotional services for increased advocacy on OA; and providing interfaces in public-private partnerships for increased government and development partner support to the OA sector in Bhutan.

For effective deployment and implementation of medium- to long-term strategies — given that these will require addressing issues and coordination across not just MoAF and its constituents, but cross-cutting issues across a range of other ministries and departments as well as other institutions — an apex coordination body or mechanism for OA may be considered, in line with the recommendations of the workshop. It could be composed of representatives from the NOP, other MoAF constituents, the GNH Commission, the Royal Civil Services Commission, and other ministries and departments such as education, health (including traditional medicine), tourism, finance, and the National Centre for Weather, Climate and Water Resources, as well as from private sector and industries/private sector associations, banking and financial services sector, international development agencies, and civil society organizations. The national Council of Stakeholders suggested under short-term priorities could possibly evolve to become the apex coordination mechanism after appropriate review and with a revised term of reference as needed. Collectively, the above recommendations could also form the basis for a Common Organic Policy for Bhutan.



Towards a Predominantly Organic Bhutan

Conclusions

Current studies on large-scale conversions vigorously debate the existence and size of yield gaps between conventional and organic agriculture¹⁴ and the question whether fully OA can feed a growing world population.¹⁵ So far, little research has been conducted on the economy-wide impacts of large-scale conversions to OA at a national scale. In 2012, 37% of Bhutan's farmers used agrochemicals on about 19% of arable land.¹⁶ Given its low reliance on agrochemicals, there is the notion that the country is destined for fully OA.¹⁷ OA also fits well with Bhutan's GNH philosophy, within which environmental conservation is one of the four pillars (GNH Commission 2013). A recent attempt at economic modelling¹⁸ using the 2013 survey data (*as yet unpublished*; carried out by researchers from the International Agricultural Trade and Development Group, Humboldt-University of Berlin, the Agricultural and Food Policy Group, and the Institute of Crop Science, Coordination for Organic Farming and Consumer Protection, University of Hohenheim, Germany) suggests that despite the country's low reliance on agrochemical inputs, any shift towards 100% organic *under the present circumstances* is likely to lead to a strong contraction in agricultural output and substantial losses in welfare, and is largely driven by lower organic yields.

The same study indicates that any shift towards 100% organic under the present circumstances is likely to negatively impact the output and supply and increase the purchase price (Table 4).

At the same time, as Bhutan continues to have strong growth rates in the industry and service sectors, agriculture is becoming less important, thereby lowering the economic costs of achieving predominantly OA relative to the economy as a whole, partially given the fact that agriculture will remain the mainstay for a large group of Bhutan's population.

Evidence based on experiences outside Bhutan shows that it is not possible to make simple statements about the productivity implications of a conversion to OA. In general, this will depend upon the system previously employed by the farmer. Farm systems that intensively use agrochemicals can expect to see a decrease in yields, often estimated at between 5% and 20%, mostly in the initial years as the soil recovers its natural fertility and farmers learn new management techniques. This is the most likely scenario associated with conversion in most developed countries, where intensive agriculture has been the norm, as well as in those parts of the developing world, where Green Revolution technologies have taken hold.

Table 4: Changes in agriculture output, supply, and purchase price by going 100% organic

Commodities	Output (%)	Supply (%)	Purchase price (%)
Rice	-15.8	-15.8	7.9
Maize	-2.6	-2.0	11.8
Potatoes	-29.7	-7.6	41.8
Vegetables	-14.1	-5	21.3

¹⁴ For example, Ponisio, L.C., M'Gonigle, L.K., Mace, K.C., Palomino, J., Valpine, P.d. and Kremen, C. (2015), "Diversification practices reduce organic to conventional yield gap", *Proc. R. Soc. B*, Vol. 282 No. 1799, p. 20141396.

¹⁵ See generally, Badgley, C., Moghtader, J., Quintero, E., Zakem, E., Chappell, M.J., Aviles-Vazquez, K., Samulon, A. and Perfecto, I. (2007), "Organic agriculture and the global food supply", *Renewable Agriculture and Food Systems*, Vol. 22 No. 2, pp. 86–108.; and Connor, D.J. (2008), "Organic agriculture cannot feed the world", *Field Crops Research*, Vol. 106 No. 2, pp. 187–190.

¹⁶ Ministry of Agriculture and Forests, Bhutan (2013), *Agricultural Sample Survey 2012*, Thimphu, Bhutan.

¹⁷ See generally, Tashi, S. (2015), "The Prospects of Organic Farming in Bhutan", *Dissertation*, University of Bonn, Bonn, Germany.; and Tashi, S. and Wangchuk, K. (2015), "Organic vs. conventional rice production: comparative assessment under farmers' condition in Bhutan", *Organic Agriculture*, pp. 1–11.

¹⁸ Feuerbacher, Arndt, Luckmann, Jonas, ;Boysen, Ole, Zikeli, Sabine; Grethe, Harald: *The 100% Organic Agriculture Policy in Bhutan – A gift or a curse?*

By contrast, evidence suggests that the transition from ‘traditional’ and low external input agriculture in rain-fed areas (which is the case in Bhutan), to organic farming very frequently leads to increased yields. Yield comparisons can also be misleading, for technical as well as social reasons. In the first place, intensive agriculture often focuses upon (one variety of) one crop, whereas organic systems tend to be more diverse — and should thus be evaluated on the basis of total farm productivity, rather than yields of single crops. Farmers may prefer multifunctional crops, such as rice varieties that yield high quality straw (for livestock fodder) as well as grain. Labour costs of organic farming are higher than conventional farming due to the need for mechanical pest control, creative approaches to marketing and selling of organic products, and labour-intensive practices such as weeding. However, the cost-benefit analyses evidence globally shows that the economic benefits of organic farming, such as price premiums and the lowered need for costly pesticide and fertilizer inputs, make up for these higher labour costs.

Price premiums are already the norm for organic produce in export markets; when consumer awareness, appropriate marketing mechanisms, and strategies are adopted, good quality organic produce has the potential to generate price premiums in domestic markets as well. Currently in Bhutan there is a clear preference for local ‘default organic’ produce over imported produce despite the price premiums for such local produce. This is likely indicative of the fact that there is a potential for achieving price premiums for organic produce in Bhutan, and monetary benefits for farmers. This is also borne out by the demand for organic produce in Bhutan, especially from the tourism and hospitality sectors, including upper-end hotels, many of which are prepared to pay or are already paying premium prices for such produce.

Although a number of environmental and social benefits accrue from OA, they are not reflected in any currently available economic models thus calling into question the real validity of such models.

Organic agriculture has higher energy efficiency (input/output) and provides other important environmental advantages, such as halting the use of harmful chemicals and their spread in the environment and along the trophic chain, and reducing water use. When used as a mitigation and adaptation strategy, OA has the potential to address the threats of climate change. Mitigation is primarily achieved through long-established and optimized organic farming practices (many of the following practices fulfil the requirements identified by the Intergovernmental Panel on Climate Change for mitigation in agriculture) such as: (a) avoiding chemical fertilizers and herbicides; (b) building soil carbon and soil fertility; (c) avoiding bare soil; (d) appropriate tillage; (e) combining perennial and annual crops; (f) sustainable livestock management; (g) optimal manure management; (h) system of rid intensification (SRI); (i) improved manure management including distribution systems, such as slurry injections into soils or drag hoses, to reduce nutrients losses considerably; and (j) improved grassland management. Ensuring the soil is always covered with vegetation prevents exposure to processes that accelerate greenhouse gas (GHG) emissions from stored soil carbon. Moreover, including catch crops and green manure within organic farming systems avoids the emissions associated with additional nitrogen inputs. Perennial grasslands are very effective in sequestering carbon in the soil especially by building up carbon in their root systems. OA optimizes the huge soil sequestration capacity of grasslands through different measures. Rice production is a key agricultural emitter of greenhouse gases. Innovative rice production systems based on organic principles of increased root development and increased soil organic matter through decreased flooding offer the potential to significantly decrease agricultural thermogenic methane (CH₄) emissions.

Organic agriculture and its key principles also fulfil many of the requirements identified for successful adaptation strategies. Preventing and reversing soil erosion and restoring degraded land is one such example. Organic practices like using cover crops, catch crops, green manure, composting, appropriate tillage, and the integration of perennials and trees into the farming system increase soil health. Healthy soils have higher organic matter contents and greater biological activity which improves soil structure and stability. Drought and flooding resilience and water use efficiency is another example: OA systems



capture, store and use water more efficiently due to better soil structure and higher levels of humus and other organic matter compounds with sponge-like properties. Organic matter also enhances drainage in soils significantly reducing the risks from waterlogging and surface-water flooding. Practices like crop residue retention, mulching, and agroforestry conserve soil moisture and protect crops against microclimate extremes. Moreover, plants that obtain their nutrients through natural biological processes are more resilient to environmental stress than crops that obtain their primary nutrition artificially through highly soluble chemical fertilizers. This is mainly achieved through optimal soil and water management, the building of soil structure and fertility, and the choice of locally adapted robust crop varieties. In addition, organic crops tend to have longer and denser roots that are able to seek out water reserves deeper in the soil profile and which are also more resilient to desiccation.

Agro-genetic biodiversity inherent within OA principles encourages the use of locally adapted varieties and decentralised participatory breeding programmes especially in-situ (on-farm) based conservation, breeding, and production. In-situ approaches maintain varieties for future needs while allowing them to continuously adapt to environmental pressures such as climate change. Biologically diverse organic farms that optimize ecological functionality avoid the build-up of disease and pest levels and are more resilient to other environmental pressures. Crop diversity (both temporal and spatial) inherent in OA systems provides a variety of rooting depths that enhance soil stability and structure, improves nutrient and water use, and contributes to a stabilized microclimate. Indigenous and traditional knowledge are key sources of information on adaptive capacity, centred on the selective, experimental, and resilient capabilities of farmers. Diversity has several climate mitigation and adaptation functions: (1) to reduce risks of production and livelihood losses from erratic and harsh climatic conditions; (2) to utilize areas of the landscape strategically as emergency food, feed, fuel, and income reserves; and (3) to sustain minimally disturbed habitats within the landscape mosaic that also serve as carbon stocks. Diversity of land uses and species can reduce ecological risks associated with homogeneous crop cover, in terms of pests and diseases and vulnerability to unexpected weather conditions. Improving genetic diversity on farms, by increasing the number of different crops grown or the number of varieties of the same crops, also

provides important climate adaptation and risk management benefits. Crop genetic diversity improves the chances that some varieties will be suited to shifts in temperature, precipitation, and salinity regimes caused by climate change. Moreover, having a portfolio of diverse food and income sources, from crops, livestock, trees, and non-cultivated lands can cushion households and communities from climatic (and other) shocks.

As research and policy links between climate change and agriculture have advanced, 'climate-smart agriculture' has emerged as a framework to capture the concept that agricultural systems can be developed and implemented to simultaneously improve food security and rural livelihoods, facilitate climate change adaptation and provide mitigation benefits. Climate-smart agriculture includes many of the field-based and farm-based sustainable agricultural land management practices already in the literature and in wide use, such as conservation tillage, agroforestry, residue management, and others. However, climate-smart agriculture requires actions beyond the farm scale. Thus, parallel to development of the climate-smart discourse has been the emergence of integrated landscape management as an organizing framework for action and policy within the agricultural development and conservation communities. Landscape approaches are also often necessary for agricultural systems to achieve climate-smart objectives, including improved food security and rural livelihoods as well as climate change adaptation and mitigation; that is, they must become 'climate-smart landscapes'. Climate-smart landscapes operate on the principles of integrated landscape management, while explicitly incorporating adaptation and mitigation into their management objectives. The integrated landscape approach offers a strategy to achieve climate-smart agriculture objectives at scale and in all its dimensions. Through climate-smart agricultural landscapes, important synergies for agricultural production, climate adaptation and mitigation, and other livelihood and environmental objectives, can be generated through coordinated action at farm and landscape scales. Climate-smart landscapes are composed of a variety of field and farm practices, in different land and tenure types, that support both adaptation and mitigation objectives. These practices include soil, water, and nutrient management along with agroforestry, livestock, husbandry, and forest and grassland management techniques. All these are consistent with an integrated approach to a shift towards OA.

The potential social benefits including the site-specific nature of OA also means that traditional/indigenous knowledge systems relating to agriculture and traditional and indigenous crop and other plant varieties, so often discounted, are of great value. In many places, this knowledge has been eroded with the introduction of high external input agriculture, promotion of monocultures, and selection of 'improved products'. Farmers may readily welcome a management system close to their own traditions and not driven solely by a production ethic. Organic management which relies on local knowledge of complex interactions and variations of conditions from place to place carries an enhanced potential for more equitable distribution and access to productive resources, namely land. Engaging in organic production means experimenting new techniques, introducing different management of labour time, investing efforts in different management of space, adapting and refining solutions to change, comparing different options with farmers that have similar conditions, and making appropriate choices. This can only be achieved through farmers' participation in research and its application. This on-farm research component can support rural communities and generate new knowledge that will benefit all farmers.

Consistent labour needs, combined with the enhanced capacity of the land and protection of water associated with OA, may encourage people to permanently locate and thus reinvigorate rural communities. As OA practices are fostered and their viability — in terms of the potential to not only deliver sustainable livelihoods (especially in combination with other interventions such as ecotourism) but also contribute to food security and sufficiency — becomes increasingly evident, the current trend of rural outmigration (and resultant labour shortages) in Bhutan is likely to be not just stemmed but potentially reversed. Moreover, OA builds on and keeps alive farmers' rich heritage of traditional knowledge and traditional agricultural varieties. Organic farming has also been observed to strengthen communities and

give youth an incentive to keep farming, thus reducing rural-urban migration. It also offers opportunities for female farmers to improve their incomes.

From the above, it can be concluded that *therefore, the national priority and goal of food self-sufficiency and the stated national vision of a predominantly organic Bhutan can be in perfect sync.*

On-farm experimental plots for testing and demonstrating new OA technologies are recommended for inspiration and experience. Extension has to be adapted to the dynamic development and holistic work of OA, where the theoretical background, certification issues, market, and surrounding policies are integrated into the conversion and production aspects. Extension workers therefore need continuous further education focusing on OA to provide good advisory services.

For a farmer, converting to organic means a major shift in the farm's operation. Growing systems and the choice of crops, management techniques for pest control and nutrient supply, and animal husbandry may change completely. In addition, there are several factors that will impact the farmer's economic situation. More diverse production may require investment and increased labour. The yields may decrease in the beginning, especially if production was intense before conversion, and on top of that there will be no premium prices during the conversion period. Additionally, from the beginning there will be certification costs and new requirements for documentation and control. Often, however, the farmer's adoption of the OA concept is the main bottleneck. Conversion requires conviction and confidence that organic production will be successful and benefit the farmer and his or her family. Therefore, dedicated OA-specific extension services and capacity-building activities must address the farmer's whole situation (economic, social, health, etc.). Contact with other farmers with similar experience is an excellent way to get the right motivation, mentorship, contacts, access to OA groups, and networks.

Farmers' premiums are often a small part of the total cost of organic products. Typically, high retail prices of organic products are mainly the result of a limited supply. Increased production is an important strategy to reduce one of the costliest market barriers: the expensive handling of small amounts of niche products through the whole chain. When production grows, logistical advantages appear that may reduce the retail price with little or no pressure on the farmers' premiums. A common conclusion is that increased production that can provide an expanding processing industry and market is the most effective way to develop the organic sector and will reach more consumers, and not only wealthy ones. Farmers' premiums at the same time have to be motivated through another process of product quality assurance (itself achieved through better agronomic OA practices, reduction of post-harvest losses, sorting, grading, etc., aggregation and price leveraging by OA groups and cooperatives, etc.) and information about the costs, awareness about organic values, and transparency throughout the whole chain from producer to consumer.

Livestock management strategies are particularly critical for climate-smart agriculture. For better manure management, converting manure to biogas provides the added benefits of an alternative energy source with fewer negative health impacts from cooking, heating, and lighting. Improved feed mixes and nutritional supplements can decrease methane emissions; however, this is more feasible at larger scales of operation.

To implement climate-smart agricultural landscapes requires at least four institutional mechanisms: multi-stakeholder planning, supportive landscape governance and resource tenure, spatially targeted investment in the landscape that supports climate-smart objectives, and tracking the multiple dimensions of change to determine if social, economic, ecosystem, and climate goals are being met at different scales. To achieve climate-smart landscape initiatives widely and at scale will require strengthened technical capacities and climate resilient agricultural infrastructure, institutions and political support for multi-stakeholder planning, governance, spatial targeting of investments, and multi-objective impact monitoring.

Recommendations

The recommendations towards a way forward in terms of a roadmap and strategy for OA presented below emerge from (a) the situational analyses and conclusions from this study; and (b) a stakeholder workshop held in Thimphu on 22–23 May 2017 (hereinafter referred to as ‘the Workshop’), to present the draft findings and recommendations and to seek consensus on these. A separate summary of the Workshop proceedings is being produced.

Bhutan’s stated vision is to go fully organic by 2020. However, given the compulsions of ensuring food security and a desire to attain import substitution in agriculture, the vision of going 100% organic demands a serious reappraisal. On a pragmatic level, given that there are only about three years to go, achieving this target holistically and systematically is unlikely to be feasible, or practical. Aiming for a 100% organic agriculture is impractical in the short- to medium-term, especially given the significant challenges involved, including the fact that Bhutan currently imports over 50% of its food requirements. Nevertheless, it is feasible to move towards an agriculture that is predominantly organic, particularly in selected crops and agro-ecological settings, promoted in a phased manner and over a long-term framework. Therefore, the vision needs review keeping this in mind.

However, a phased approach over a longer term to moving towards predominantly organic is likely to be the more judicious approach, keeping in mind a more rational target in line with the post-2015 Sustainable Development Goals (SDGs) for 2030. This approach needs to address immediate, short-, medium-, and longer-term priorities and adopt the necessary actions to implement the approach, while recognising the compulsions of food self-sufficiency, food security, and the goal of attaining import substitution of key agricultural commodities. This recommendation was also part of the shared consensus achieved at the Workshop held in Thimphu.

Immediate priorities

1. Updating the Master Plan for Organic Sector Development, which was developed in 2012, keeping in mind (a) the current circumstances and keeping realistic and attainable targets, (b) the need for a shared responsibility and accountability¹⁹ for the organic agenda among all MoAF constituents and for these agencies to incorporate OA-related components as part of their programmes and set relevant key performance indicator (KPI) against these under MoAF’s AKRAs, and (c) the need for a separate AKRA for OA as part of the preparations for the 12th FYP. This review and revision of the master plan for OA also needs to embed Bhutan’s national priorities towards achievement of the post-2015 SDGs for 2030, as OA is a potentially powerful tool for achieving the post-2015 SDGs, particularly those related to poverty reduction and the environment.
2. Grounding the National Organic Programme through the promotion and commercialization of local crops and varieties to immediately show the existing strength of traditionally organic farming practices, value addition, product development, and marketing of local produce.
3. Establishing a research programme to cover selected principal crops in pilot projects across relevant agroclimatic contexts in the country as a key strategy; other complementary and/or supplementary methods and interventions can also be taken up in parallel, including promotion of good farming practices through which high quality of organic produce can be ensured.
4. Developing a common policy for organic agriculture, through a review and revision of all relevant policies in Bhutan including the organic master plan that may be not be in sync to a shift towards predominantly organic.
5. Initiating activities to augment data mechanisms to support and monitor organic agriculture.
6. Developing human resource and financial capacities in all the relevant sectors.

¹⁹ Anecdotal references during meetings of the consultants suggested that shared responsibilities without shared accountability may not contribute to improving program activities being taken up diligently.

7. Carrying out the necessary studies and evaluating options, and developing a systematic plan for (a) augmenting import of organic inputs to meet short-term demand and dis-incentivizing use of external inputs while still giving farmers a choice between OA and low external input traditional farming.
8. Putting in place the necessary measures for incentivizing organic agriculture production and also incentivizing the private sector to start producing organic inputs in-country.
9. Initiating a dialogue forum to study and examine new forms/models of partnerships including with the private sector to support organic agriculture at scale.
10. Initiating nationwide awareness campaigns on organic agriculture and all that it implies targeted at both producers and consumers as part of a larger effort to dispel misperceptions that are currently widespread, co-opting and harnessing the power of digital media – (including social media platforms).
11. Establishing mechanisms for continuous dialogue, especially among MoAF constituents and also others such as Tourism and Trade.
12. Initiating dialogue with donors and development partners such as financial institutions with a view to realigning their Bhutan priorities to support the organic agenda and, potentially, initiating actions.
13. Facilitating the promotion of organic seeds available with the farmers through the identification of the most popular crops and varieties for upscaling as organic seeds in the country. The DoA should formally recognize the commercialization of such crops and varieties and further support its multiplication and commercialization.
14. Assessing criteria²⁰ for pursuing OA as a National Flagship Project under the 12th FYP and building the required justification/validation. OA has the potential to satisfy each of these criteria as outlined in this report; a separate note for the justification needs to be developed, to be read with this report.
15. Recognizing the potential role of tourism in general and the ecotourism sector in supporting and promoting OA in Bhutan and initiating in the most potential areas to develop agro-ecotourism to enhance engagement, rural employment, and income generation for the rural communities.

Short-term (~5 years) priorities

One of the key priorities in the short-term will be to strengthen the NOP financially through adequate budgetary provisions and augmented human resources to (a) be able to implement the updated master plan for OA, and also to empower and strengthen the NOP to coordinate effectively with other MoAF constituents and other relevant agencies and/or as may be necessary for OA-related policy, institutional and programme implementation measures. The other short-term priorities include:

1. Initiating a review of current regulatory restrictions on sourcing agricultural labour from outside Bhutan.
2. Initiating measures to strengthen the certification systems for OA in Bhutan, including strengthening Bhutan Agricultural and Food Regulatory Authority's capacities to deliver OA certification and other relevant functions in support of OA. These measures should result in, inter alia, strengthening and/or development and institutionalization and smooth functioning of (i) local assurance system by registration with NOP, (ii) participatory guarantee system, (iii) internal control systems as a step towards organic certification for groups for exports, and (iv) formal internationally accredited third-party certification for exports.
3. Setting up a high-level advisory council with key experts on organic agriculture to support the NOP. Consider setting up a National Council of stakeholders.
4. Carrying out a review of all relevant polices in Bhutan that may not be in sync with the Common Organic Policy.

²⁰ Criteria for flagship programmes under the 12th FYP include (a) high priority, national issues; (b) multi-sectoral/multiple dzongkhags/central agencies and dzongkhags; (c) high contribution to achieving NKRA; and (d) economic sector flagship programmes, employment generation, and enhancing export and import substitution.

5. Considering the necessary actions for RDC Yusipang to fulfil the role of the nodal research and development centre for OA in Bhutan, and operating under the aegis of the NOP and/or with close integration of the RDC and the NOP.
6. Mainstreaming OA planning and implementation into the agenda of the relevant sectors and agencies including dzongkhags for effective implementation.
7. Pursuing and facilitating (by the NOP with the support of the DoA) the prioritization of OA as one of the key areas for priority sector lending. The involvement of private sector in this area should be strongly supported for future continuity.
8. Initiating measures to augment capacities in other RDCs and dzongkhags by recruiting, training, and putting in place OA focal points; RDCs also need to focus on appropriate approaches/technologies to address pest and disease management, in close coordination with RDC Yusipang. Adopting climate-smart landscape approaches (further described in the subsection on medium- to long-term priorities below) will be one area for further focus.
9. Carrying out the necessary studies and evaluating options and developing a systematic plan for (i) putting in place the enabling environment and incentivizing the import of biopesticides and biofertilizers to meet short-term demands and thus provide farmers with alternative inputs for OA, (ii) dis-incentivizing use of conventional agrochemicals — fiscal disincentives such as a tax on conventional agrochemicals (when sufficient imports of organic inputs begin to make an impact) that will allow reduction in usage where they are least efficient, while still allowing them where they provide a high benefit-cost ratio during a transition to predominantly organic, (iii) phased withdrawal of these, and (iv) putting in place the necessary measures for incentivizing OA production and also incentivizing the private sector to start producing organic inputs in-country. These could include tax breaks, review, and rationalization of import duties (gradually increase import duties for conventional agrochemicals pending a full withdrawal, and allow import of organic inputs with zero or low import duties).
10. Reviewing and adopting a transitional minimum price support for organic produce to bridge the current lack of premiums for organic produce to support organic farmers, particularly smallholders and marginal farmers, possibly deployed through the Food Corporation of Bhutan and in discussion with the DAMC.
11. Given that an organic livestock sector is equally important as organic crop and horticulture sectors in a move towards predominantly organic, initiating development of a comprehensive package of guidance material on transformation of conventional livestock and related feed systems, dairying, poultry, and other subsectors towards predominantly organic based on international best practices, and also initiating relevant studies towards an organic livestock sector; likewise, similarly addressing the NWFP sector.
12. Initiating discussions with relevant banking and financial services agencies in Bhutan including the Royal Monetary Authority of Bhutan as well as banks and other non-banking financial institutions to review and relax interest rates and other incentive mechanisms to incentivize OA and develop a range of innovative financial instruments/products to specifically support OA as appropriate and to incentivize increased entrepreneurship and private sector participation in OA.
13. Initiating a comprehensive review of the roles of all MoAF constituents and other relevant institutions/agencies/organizations in the context of a move towards a predominantly organic Bhutan.
14. Initiating a study to examine new forms/models of partnerships including with the private sector to support OA at scale. Cooperation between the organic sector and other environmental, conservation, sustainable agriculture, and consumer organizations provides good opportunities for involvement in agriculture policy, extension, research, and education programmes and a high capacity to communicate in the market. Creating a National Council of Stakeholders to facilitate continuous dialogue between the organic organizations, government institutions, and private

sectors can also potentially mitigate any hostility between organic and conventional farmers and lead to stronger public support and market development, especially in light of the expectation that the conventional farmers of today will be the organic farmers of tomorrow in the shift towards a predominantly organic Bhutan.

15. Initiating necessary actions for data collection, collation, and dissemination on the organic sector including disaggregated reporting on OA and progress in national agriculture and RNR statistics. This will be a critical intervention to lay the groundwork for robust and efficient evidence-based future strategy, programme, and policy design.
16. Undertaking a review of the gender dimensions of OA in Bhutan; using the results to embed gender-disaggregated reporting and also where appropriate, gender equitable and disaggregated strategies for development and promotion OA in Bhutan.
17. Initiating the development of capacity enhancement plans of OA groups with a view to strengthen their financial and management skills.

Medium- and long-term priorities (~10–15 years)

1. Increasing public incentives for product and service providers to develop, formulate, market, and sell more options that are compatible with organic and advanced IPM systems, including biologically based pesticides.
2. Supporting structures for organic sector research, education, extension, building and fostering knowledge management for organic, and maintaining the traditionally organic system and transitioning to organic.
3. Capacitating the national extension systems to respond to OA needs.
4. Fostering and safeguarding indigenous knowledge on crop varieties and farming practices.
5. Examining prospects of ecosystem services payments to organic farmers for adopting OA.
6. Reviewing and eliminating publicly funded programmes that encourage unsustainable practices based on maximizing yield and profits at the expense of environmental quality and health
7. Reforming national economic indicators of the agricultural sector to reflect impacts on ecology and environment at broader landscape levels.
8. Addressing labour shortage issues in the long-term, and fostering the shifts necessary in current markets, value chains, and trade systems through appropriate supply-and-demand-side (push and pull factor issues in market strategies) strategies and mechanisms including *inter alia* building consumer awareness and demand generation, and developing market information systems.
9. Integrating eco-equitable tourism including a focus on rural farm stays, revival of local and traditional crops as well as traditional cuisines and using holistic health approaches as a strategy for promoting organic agriculture.
10. Adopting landscape approaches to planning and implementing organic agriculture interventions, explicit incorporation of risk management and mitigation strategies into organic agriculture policies and programming.
11. Setting specific medium- and long-term national targets for OA through stakeholder cooperation by building strategies around common goals, shared responsibility, accountability, and division of roles among politicians, government ministries, and departments, market actors, and organizations, sub-targets for organic production and consumption.
12. Implementing the Framework and Guidelines for Biofertilizer and Biopesticide Supply and Distribution in Bhutan 2015 which encourages local production and import and supply of bio products at commercial scale.
13. Considering subsidies, grants, credit, or low-interest loans to OA, and the removal of subsidies and other interventions that currently work against OA, in order to promote sustainable agricultural production systems through OA.

14. Reforming national economic indicators of the agricultural sector to reflect depletion and degradation of natural resources and increase of public funding for research on OA to continue to sustain a shift towards predominantly OA.
15. Investing in building awareness, training, and capacity development to support a shift towards predominantly OA.
16. Developing comprehensive strategies in the livestock sector for organic feed and pasture as well as incentivizing livestock sector development in Dzongkhags that are low in either livestock and poultry numbers or alternative mechanism with a view to enabling availability of adequate FYM or poultry droppings as organic fertilizers in combination with further promoting biogas and bio-slurry units.
17. Developing and integrating OA-related modules into educational curriculum at all levels from schools upward, since OA is knowledge intensive — tackling big issues like environment and ecosystems, energy and climate, human and animal health and ethics, and rural development, including social and economic aspects.
18. Developing a cadre of trained and certified OA professionals to support Bhutan's move towards predominantly organic, and developing and deploying OA-specific university degree courses at the bachelors, masters, doctoral, and post-doctoral levels.
19. Making considerable medium- to long-term investments in research and development, and in re-orienting the extension system, to increase yield levels of today's 'organic farming by default' and to support OA in Bhutan to leverage the contribution of the OA sector to sustainable food security and self-sufficiency and fostering entrepreneurship and economic opportunities in rural areas. Increased investment in research and innovation for the organic food and farming sector has much to offer, regarding the design not only of more sustainable production systems, but also of new and resilient business models and forms of cooperation among stakeholders across the value chain.

Some examples of research priorities over the medium- to long-term could inter alia include:

- a. Developing a diverse organic sector through better farming policies, better certification, and market data.
- b. Developing new awareness-building strategies and methods for ensuring consumer confidence in organic food and farming.
- c. Developing plant-based pesticides as well as strengthening ecological support-functions and using natural regulation and crop diversity to prevent pest and diseases.
- d. Breeding adapted crop varieties tolerant to pest and diseases.
- e. Improving mixed farming systems with animal husbandry for an intensification of the traditional agricultural systems.
- f. Ensuring in-country availability of organic seeds and shifting current in-country production of conventional seeds into predominantly organic.
- g. Building on principles for improving soil fertility through incorporation of technology development (e.g., optimised fertilization strategies based in N-fixation by legumes and compost).
- h. Developing and putting in place mechanisms and technologies for eco-efficient production of animal feed at local level.
- i. Improving organic poultry systems.
- j. Developing innovative systems for organic aquaculture.
- k. Promoting organic food processing concepts and technologies.
- l. Designing and promoting business models and labour dynamics of value addition through food and feed processing.
- m. Strengthening the resilience and innovation capacities of the organic sector.
- n. Promoting agro-ecological and organic farming as means of improving food security and rural development.

- o. Enhancing eco-functional intensification for enhanced productivity, stability, and resilience of agro-ecosystems and improved ecological support functions through OA.
 - p. Promoting innovative information and communication technology based tools for organic cropping systems.
 - q. Advocating the contribution of the organic food system to sustainable diets, public health effects of organic food systems, and the effects of organic foods and foods of different quality on the risk and severity of allergies, and on the general health and well-being of children and the aged.
20. Developing and deploying focused market development (supply and demand side) and marketing mechanisms over the medium- and long-term to support OA as weak development of the domestic market is currently an important limiting factor for OA. This could be achieved by balancing a push or pull strategy which could be further supported preferably by a single common label for organic products.
 21. Ensuring market transparency when developing organic food markets, so that all market actors receive market signals of growing demand. There is a need for data on production, sales, consumption, and prices of organic products. Not least it is essential for producers to access information about demand, prices, and contract possibilities. OA market statistics are a priority task for agricultural policy.
 22. Promoting eco-tourism and OA in parallel and supporting and encouraging communities to produce and supply high-quality organic produce like cereals, legumes, fruits, vegetables, dairy, and poultry. A possible approach could be to develop a network of pilot fully organic villages in existing areas with cultural and natural capital as models; these can be subsequently replicated based on lessons learned from the pilots.
 23. Urgently addressing HWC in any proposed shift towards predominantly organic in Bhutan. More recent advances in HWC research suggests there are ways to manage the coexistence of wildlife and agriculture and that previously unrecognised synergies can lead to increased food productivity and conservation gains. Managing entire ecosystems or entire landscapes with a unified strategy to feed people and protect wild inhabitants simultaneously can be a cost-effective approach to biodiversity conservation — yet another rationale for integrated landscape approaches as a larger strategy in transitioning towards OA Bhutan.
 24. Identifying and fostering opportunities for private sector and public-private partnerships - these have a considerable role to play in financing and developing organic supply chains (including for OA inputs), reliable production and post-harvest operations, and fair-trade partnerships. Private sector companies could help identify feasible markets abroad as a preliminary step prior to participating in or developing export-oriented organic supply chains, and also help develop business, marketing, and technical skills to back the development and operation of the organic supply chain.
 25. Leveraging the banking and financial services sector to become a core medium- to long-term strategy to upscale and support OA through exploring development of mechanisms for financing import substitution through localised organic input production, financing private sector and rural enterprise and value chain development for organic farmers and OA producer groups, as well as the development of new and innovative financial products to support OA.
 26. Augmenting the role of civil society organizations by creating the enabling environment for co-opting and encouraging full participation in OA. This needs to become a core agenda for OA in the medium- to long-term.
 27. Considering the establishment of an apex coordination body/mechanism for effective deployment and implementation of medium- to long-term strategies, which will require addressing issues and coordination across not just MoAF and its constituents, but cross-cutting issues across a range of other ministries and departments as well as other institutions.

Annex 1: The Thimphu Declaration, March 8, 2014

Ecological organic agriculture in mountain agro-ecosystems: Leading the transformation

Preamble

Experts, including farmers, scientists, groups involved in value chains and representatives from governments, international organizations and development agencies from mountain systems in every arable continent joined forces at the International Conference on Ecological Organic Agriculture in Mountain Ecosystems in Thimphu, Bhutan March 5th to 8th, 2014 to develop an action plan for the transition of agricultural and food systems.

Building on the Bhutanese Government's commitment to make a transition to fully ecological organic agriculture guided by the philosophy of Gross National Happiness (GNH), the conference has developed an action plan for the world's mountain regions based on the recognition that:

1. The chemical-based agriculture and food system is ecologically and economically harmful. It contributes to half the greenhouse gases that accelerate climate change and this, in turn, further constrains food production. It uproots millions of people from rural areas and pushes them into urban poverty. It creates health problems that are bankrupting communities and national health systems. It leads to the erosion of soil and the loss of biodiversity, and aggravates social injustice and conflicts. Despite an over production of commodities, one seventh of the population of the world remains hungry, malnourished and poor and a similar proportion is affected by diseases linked to unhealthy foods. Chemical based agriculture has clearly failed to fulfil its promise of providing food and nourishment for all. There is an urgent need for a transformation towards the only possible alternative that addresses these problems — ecological organic agriculture.
2. The existing agriculture and food system contravenes the principles and guidelines of GNH. There is a need to build an agricultural and food system that is aligned with these principles and guidelines. This is necessary to avoid the continued exploitation of human and natural resources; the degradation of land and water bodies; the destruction of indigenous knowledge, biodiversity and cultures and the disempowerment of smallholder farming communities.

The paradigm change

Overwhelming evidence from key agencies of the UN, including UNEP, UNCTAD, ILO, FAO, UNGA, the Interagency International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) Report, and the Special Rapporteur to the UN on the Right to Food, as well as numerous peer reviewed scientific studies acknowledge the role and importance of ecological small-scale family farming for food and nutrition security, employment generation, environmental, social and economic wealth, peace and security. The Rio+20 Declaration, "The Future We Want", reiterated the main conclusions of the IAASTD Report on the need for a transformation of the agriculture and food system as well as the need to carry out national assessments that will inform new agricultural and food system policies that address the main shortcomings of the present systems and lay out the ground for the paradigm change.

Furthermore, this International Year of Family Farming focuses the world's attention on the importance of small family farms in providing the bulk of the world's food, nutrition and the need to provide support to them. Based on evidence from the best knowledge, science, technology and practices, it has been shown that ecological organic agriculture systems, informed by the science of agro-ecology can achieve

the multiple goals of sustainable development. These include resilience to climate change and volatile markets, improving the quality of our food supply and environmental, social and economic health and increasing livelihood and job security. The agriculture of the future needs to be multifunctional and to address the three dimensions of sustainable development (social, ecological, economic) as also reiterated in the Rio+20 Declaration.

The new paradigm will also address the transition from “feeding” to “nourishing” people, and entails a shift from thinking in terms of yield per ha of single commodities in monocultures to total nutrition per ha in biodiverse ecological organic systems and from empty calories to balanced nutrition. The solutions to the multiple crises lie in smallholder family farms. These are, by definition, multifunctional and have been shown to be more productive, both by unit area and at farm level. Mountain ecosystems are perfectly suited for ecological organic agriculture to fulfil the needs of the present and future generations but are also the most vulnerable to ecological and economic disruption from chemically-based farming.

Implementing the paradigm change

The Thimphu conference therefore calls for action from people, governments, development partners, the knowledge, science and technology communities and the private sector to:

1. Ground food and agriculture systems on the principles of happiness, well-being, and quality of life.
2. Ensure the universal right to food, e.g., access to food for all, at all times, by dealing with inequalities and improving distribution. This will involve shifting the value chain’s current emphasis on export and placing the kitchen table and local food sovereignty centre stage. This implies achieving an appropriate balance between imports, exports and local markets and nurturing values that promote health, nutrition and sustainable livelihoods.
3. Place small family agriculture, food and nutritional security and food quality at the centre of the post 2015 sustainable development agenda.
4. Carry out national multi-stakeholder assessments of agri-food systems as the basis for informing new policies and trajectories regarding investments in this transition process.
5. Support the development of new partnerships within the mountain regions of the world (including the downstream regions) and between mountain ecosystems. These partnerships will facilitate and promote exchanges of information between farmers, researchers, consumers and policy-makers.
6. Set up a global fund to support this transition with a focus on education awareness, research and exchange.
7. Implement farmers’ rights and empower them by facilitating fair access to credit, education and required production inputs, particularly for women and the youth. Assure the rights of farmers to secure land tenure, food sovereignty, the right to save and trade seeds and the customary use of the commons (forests, grazing lands, water, etc.).
8. Promote the valuation of ecosystem functions and the true pricing of agricultural products by internalizing externalities and reallocating subsidies.
9. Push for commitments from governments and development partners for funds to support research and development for ecological organic agriculture and the associated paradigm change.

We as participants commit ourselves to take united and collective action to make this transition to ecological organic food systems in mountain areas, and areas dependent on them.

Annex 2: MoAF's proposed agency key result areas and key performance indicators for the 12th FYP

NKRA	AKRA	KPI	KPI description	Unit	Baseline (year)	Target	Data collection methodology	Source
NKRA 8: Water, food and nutrition security ensured	Enhanced national food self-sufficiency and nutritional security	Rice self-sufficiency	It accounts for the per capita rice consumption by the Bhutanese between the age of 5 and 80 years	%	45 (2012–15)	65 (by end of 2023)	Biannual survey	Agriculture statistics
		Maize self-sufficiency		%	84	91	Biannual survey	Agriculture statistics
		Vegetable self-sufficiency	It accounts for the per capita vegetable consumption by the Bhutanese including expatriate workers	%	88.73 (2012–15)	100	Biannual survey	Agriculture statistics
		Chili self-sufficiency	It is inclusive of export, import, and production within the country (2012–14)	%	84	96.94	Biannual survey	Agriculture statistics
		Beans self-sufficiency	It is inclusive of export, import, and production within the country (2012–14)	%	94	100	Biannual survey	Agriculture statistics
		Tomato self-sufficiency	It is inclusive of export, import, and production within the country (2012–14)	%	29.46	40	Biannual survey	Agriculture statistics
		Fruit production increased	The fruit production includes only two fruits: mandarin and apple	Metric ton	41,345 Apple: 5,300 (2015) Mandarin: 36,045 (2012–15)	53,413 Apple: 6,858 Mandarin: 46,555		
		Area under assured irrigation (wetland)	Assured irrigation during paddy growing season is taken into account	Acre	14,378	20,286	Annual data collection	Administrative data
NKRA 6: Carbon neutral, climate and disaster resilient development improved	Enhanced climate smart and disaster resilient development	Climate resilient technologies released	Technologies include crop varieties, crop management practices (smart irrigation, soil fertility management)	Number	24	48	Annual data collection	Administrative data
		Area brought under organic management (agriculture, livestock, and forestry)	Includes cultivated crops, animal husbandry, and NWFP under organic management (agriculture, livestock, forestry)	Acre	23,530.34	10,125	Annual data collection	Administrative data
		Area brought under sustainable land management	Areas brought under sustainable management through various means of bio-engineering, wood stone bunding	Acre	1,000	2,500	Annual data collection	Administrative data



Himalica is funded by the
European Union

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ISBN 978 92 9115 601 6