TWELFTH FIVE-YEAR PLAN
2018 - 2023

RENEWABLE NATURAL RESOURCES SECTOR

POLICY AND PLANNING DIVISION

MINISTRY OF AGRICULTURE AND FORESTS

Royal Government of Bhutan

Enhancing Food Self-sufficiency and spurring RNR Sector transformation while ensuring sustainable Natural Resource Management

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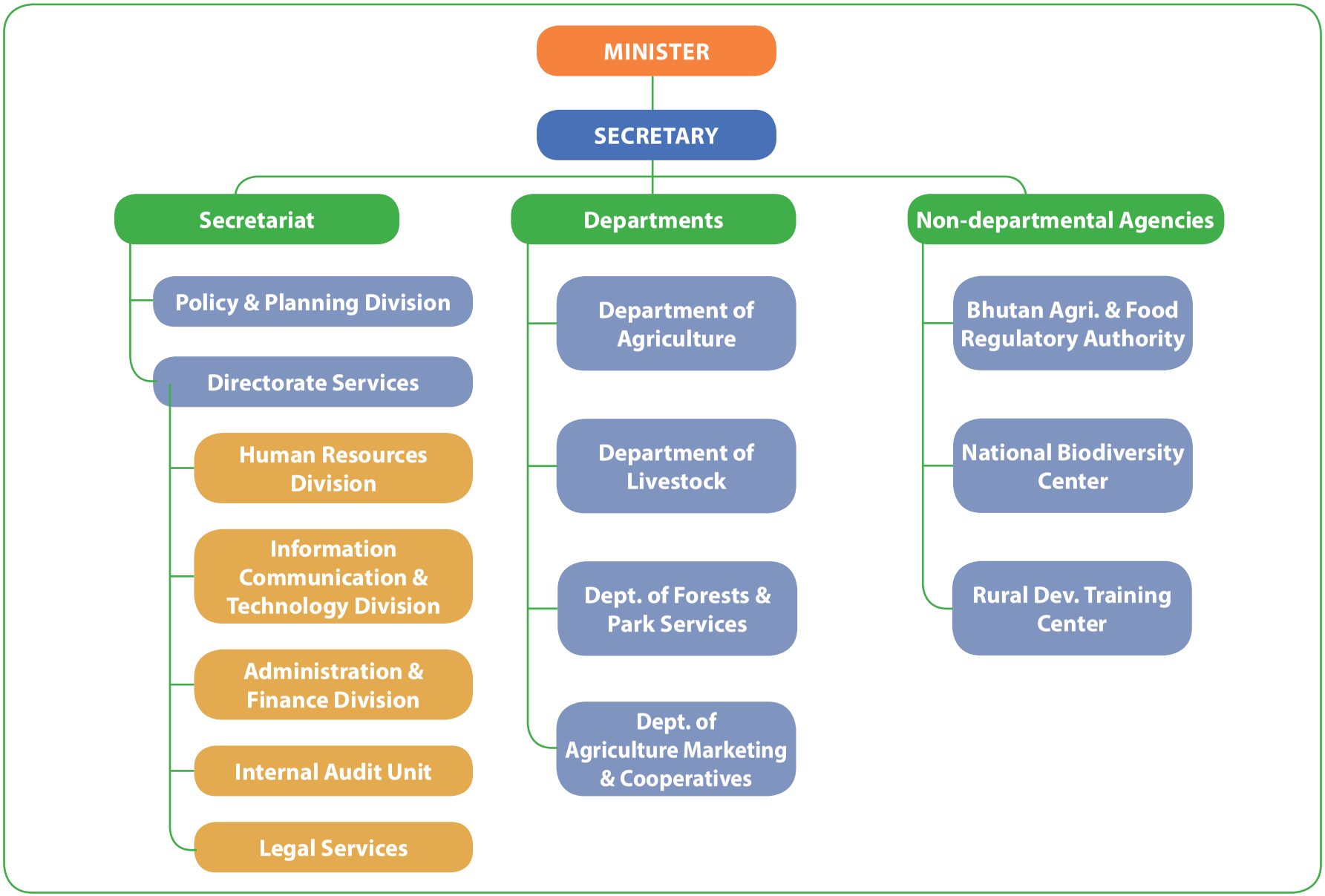
ACRONYMS

ACC : Anti-corruption Commission
MOAF : Asian Development Bank
AFPP : Accelerated Food Production Programme
AKRA : Agency Key Result Area
AMC : Agriculture Machinery Center
ANRDC : Animal Nutrition and Research Development Center
BAFRA : Bhutan Agriculture and Food Regulatory Authority
BDBL : Bhutan Development Bank Limited
BFL : Bhutan for Life
BLDCL : Bhutan Livestock Development Corporation Limited
BLSS : Bhutan Living Standard Survey
CFM : Centenary Farmers Market
CoRRB : Council for RNR Research of Bhutan
CSA : Climate Smart Agriculture
DAMC : Department of Agricultural Marketing and Cooperatives
DMCP : Disaster Management and Contingency Plan
DoA : Department of Agriculture
DoFPS : Department of Forests and Park Services
DoL : Department of Livestock
DPA : Department of Public Accounts
DYT : Dzongkhag Yargay Tshogdu
FAO : Food and Agriculture Organization
FMCL : Farm Machinery Corporation Limited
FNS : Food and Nutrition Security
FYP : Five Year Plan
GBCL : Green Bhutan Corporation Limited
GDP : Gross Domestic Product
GEF : Global Environment Facility
GNHC : Gross National Happiness Commission
GoI : Government of India
GRF : Government Reserved Forest
HRDC : Highland Research and Development Center
HWC : Human Wildlife Conflict
ICTD : Information Communication and Technology Division
IHDP : Integrated Horticulture Development Programme
INDC : Intended Nationally Determined Commitments
KPI : Key Performance Indicator
LDCF : Least Developed Countries Fund
LG : Local Government
LULC : Land Use and Land Cover
MAPS : Marketing, Access and Production System
MFA : Ministry of Foreign Affairs

M&E : Monitoring and Evaluation
MoE : Ministry of Education
MoEA : Ministry of Economic Affairs
MoH : Ministry of Health
MoHCA : Ministry of Home and Cultural Affairs
MoIC : Ministry of Information and Communication
MoWHS : Ministry of Works and Human Settlement
MTR : Mid-Term Review
NAPA : National Adaptation Plan of Action
NBC : National Biodiversity Center
NCD : Nature Conservation Division
NCWC : National Commission for Women and Children
NDC : Nationally Determined Commitments
NEC : National Environment Commission
NFI : National Forest Inventory
NKRA : National Key Result Area
NLFS : National Labor Force Survey
NPHC : National Post Harvest Center
NRED : Nature Recreation and Extension Division
NSB : National Statistics Bureau
NSSC : National Soil Service Center
NWFP : Non Wood Forest Product
ODA : Official Development Assistance
ODE : Organizational Development Exercise
PHCB : Population and Housing Census of Bhutan
PPD : Policy and Planning Division
PPP : Public Private Partnership
RDC : Research and Development Center
REDCL : Rural Enterprise Development Corporation Limited
RGoB : Royal Government of Bhutan
RMA : Royal Monetary Authority
RNR : Renewable Natural Resources
RSPN : Royal Society for Protection of Nature
RUM : Rural Urban Migration
SAPA : Sector Adaptation Plan of Action
SDGs : Sustainable Development Goals
SLM : Sustainable Land Management
SNC : Second National Communication
SoE : State Owned Enterprise
SRF : State Reserved Forest
SSR : Self Sufficiency Ratio
SYB : Statistical Yearbook of Bhutan
UN : United Nations
UWICER : Ugyen Wangchuck Institute of Conservation and Environment Research
WCD : Wildlife Conservation Division
WTO : World Trade Organization

Organogram, MoAF



Message from His Excellency Sanam Lyonpo

Bhutan witnessed accelerated development and an era of economic progress steered by the magnanimity of visionary Monarchs. The people of Bhutan has been blessed with stable and unprecedented growth through enduring peace, prosperity and happiness within the overarching spirit and guiding principle of Gross National Happiness.

As we launch the 12th FYP (2018-2023), Bhutan is poised to graduate from the list of Least Developed Countries to become a Low Middle-Income Country by 2023, which is testament of the prosperity and wellbeing accrued by the nation over the decades. The MoAF is committed to leave no stone unturned by strengthening and building on the past achievements and align its plans and programmes to maximize the Gross National Happiness.

Towards this end, I am delighted to present the Renewable Nature Resources Sector 12th FYP (2018-2023), which is underpinned by the principles of leaving no one behind, narrowing the gap between the rich and poor, and ensuring equity and justice. Within the overarching aspiration of RNR sector 12th FYP for *'Inclusive and Sustainable development for ensuring food self-sufficiency and economic self-reliance',* we are committed to achieve significant and sustained increase in level of food self-sufficiency; accelerate commercialization and enterprises development as well as maintain environmental sustainability through climate smart and disaster resilient development. In doing so, MoAF will adopt *'Landscape management, Production and Commercialization Approach' (LPCA) while an increased impetus will be put on 'enhancing environmental sustenance, commercialization and self-sufficiency'.*

The successful implementation of Plan is reinforced by the belief that involving all stakeholders at all levels are necessary for collective ownership. No single agency can tackle the tasks alone. Therefore, a participatory process, collaborative and informed planning with the local governments was made in view of the national objective of deepening decentralization, both in terms of resource and responsibility at the local government level. This plan is an outcome of engagement and inputs received from diverse stakeholders and jurisdictions that garnered collective endorsement on the RNR sector development priorities and its targets. I would like to thank, in particular, the Dzongkhags for valuable inputs during the process of consultation and the 12th FYP core working group for the hard work and taking the responsibility of formulating the plan.

The RNR Sector 12th FYP exhibits a need for an integrated sectoral responses and actions to achieve its objectives and targets. Concerted efforts and commitments are therefore prerequisite to successfully achieve its objectives and outcomes. Just as we begin the implementation of this ambitious plan, the Ministry of Agriculture and Forests is committed to support and create enabling policy, legal, financial and human resources environments. The opportunities and challenges that lie ahead of us call for unprecedented collaboration and partnership among our development partners, implementing agencies, *sanampas* and other important stakeholders to collectively fulfill our goals and objectives. Through our concerted effort, we are confident about realizing the RNR sector goals, objectives and reducing inequality which would in turn significantly contribute to the realization of the farsighted vision of His Majesty the *Druk Gyalpo.*

Finally, may I request everyone to work collaboratively with MoAF and engage in realizing the full potential of RNR Sector and in making 12th FYP a grand success, of which everyone of us can be proud.
Tashi Delek!

(Yeshey Penjor)
MINISTER

Message from Dasho Sanam Drungchen

The Ministry of Agriculture and Forests has an important role in enhancing the food and nutrition security, improving rural livelihood and sustaining the management and utilization of natural resources.

The RNR Sector continues to be a key sector for Bhutan's economy and livelihood as majority of population reside in rural areas. However, it is clear that the potential of fully realizing the RNR sector has still remained a challenge. Inter alia, the Sector is increasingly confronted with multiple challenges associated to social, economic, technological and environmental reasons such as – climate change, natural disasters, pests and diseases, crop damage by wild animals, insufficient irrigation, rural-urban migration and difficulties linked to adverse geographical conditions.

In the 12th FYP, strategies and actions are positioned to promote commercialization, agribusiness development and diversification while ensuring food self-sufficiency which are at the center of Ministry's mandate. It is for this reason that RNR sector in the 12th FYP has chosen a theme – "Enhancing Food Self Sufficiency and spurring RNR Sector transformation while ensuring sustainable natural resource management". The Ministry will ensure that the plan is driven by an enabling systemic approach encompassing policies, legislations and governance through a sound evidence-based decision making. Raising RNR sector to an even higher level of performance will largely rely on the collaboration and partnership. The goal and objectives of 12th FYP can only be achieved with the support of development partners, teamwork and information sharing among the stakeholders. Therefore, RNR sector growth and its contribution to economy diversification will need concerted effort, renewed alliance and commitment at all levels.

The plan was designed to strengthen coordination through a multi-sectorial approach, building a collective ownership. RNR Sector 12th Plan is comprehensive and inclusive as it was formulated through a process involving one-to-one consultation with the local government. This is a forward looking plan, which will form a critical launchpad for the Ministry as Bhutan prepares to graduate from the LDC. The Ministry will engage process and partnership at every step to ensure that 12th plan fulfills the aspiration of the national goals and priorities.

I would like to congratulate my colleagues in the Ministry, in particular the lead team and core working group for their persistent effort and in finalizing the plan. I would also like to take this opportunity to thank our development partners for the continued support and partnership.

As we commence the implementation of 12th FYP, I would like to urge concerned agencies and stakeholders to act together towards realization of the national goals and priorities.

Tashi Delek!

Rinzin Dorji
SECRETARY

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CHAPTER ONE

Context

1.1 Introduction

The RNR sector continues to be a predominant player in improving the country's economy, livelihood and environment. It contributes 17.4% to national GDP (NSB 2018) and employ about 49.1% (NSB, 2017) of the total population, of which 59.3% are female. More than 71% of country's total geographical area is maintained under forest cover with abundant biodiversity resources. The share of RNR Sector to National GDP in absolute terms has increased from Nu. 12,178 million in 2010 to Nu. 22,008 million in 2015, an increase of more than 80%. On contrary, percentage contribution of sector to GDP albeit decreasing over the same period is just 13%. Therefore, share of sector's contribution to national GDP is not an indicator of poor performance, but the result of growth and diversification in other sectors. RNR sector has also recorded the highest growth of 4.56% in 2015 since 2001 where agriculture (crop) sectors has 2.82% contribution followed by Livestock and Forestry at 0.96 and 0.78% respectively. The average growth rate of the sector during the 11th FYP was modest at 3.35%. Considering these scenarios, a drive to achieve national self-reliance and self-sufficiency has placed RNR Sector's importance in all the plans.

On the exports, the sector generates about Nu. 2,272 million notwithstanding the widening trade and current account deficits of over 20% and import value is twice the export value of Nu. 5,286 million in 2014.

The lessons from implementation of 11th FYP highlight critical issues which needs to be addressed. There is need to enhance the coordination and information sharing between the agencies and LGs towards fulfilment of plan objectives. Although commercialization and marketing were strategic spotlights over past FYPs, the agricultural value chains has remained at a nascent stage with limited agribusiness expansion and diversification. RNR Sector is also increasingly confronted with challenges associated with climate change, natural hazards and disasters, and on contrary, investment in research, innovation and technology has been on the decline due to overall decrease in share of the investment in the sector. Current incentive and subsidy packages have to be strengthened and clear strategies instituted so that FDIs and private sector investment are attracted in the sector.

Although Bhutan is known for its predominance of subsistence farming, the goal of enhancing national food sufficiency has transitioned from a mere focus on producing for self-consumption to commercialization. Notable transition in the farming systems are in the income generating farm activities such as cash crop cultivation and livestock related enterprises. The emphasis is now on improving agricultural and livestock productivity to meet not only domestic consumption, but also for export.

With a population that is largely agrarian and rural based (62.2% of total 735,553 persons in 2017), agriculture sector in Bhutan has potential to expand its role as a key driver of food security, economic diversification and growth, wealth creation, employment generation and poverty alleviation. The vast potential of sector's role in improving livelihood can be best underscored in Bhutan with majority of population still employed in the agricultural sector and poverty disproportionately concentrated in rural area. Despite tremendous progress in poverty reduction from 23.2% in 2007 to 12% in 2012, there is significant variation in level of poverty between rural and urban areas. Past three poverty assessment

reports conducted in 2003, 2007 and 2012 consistently reveals poverty to be a rural phenomenon. Further, PAR 2017 shows 8.2% of the population to be poor, wherein poverty in rural area (11.9%) continue to be significantly higher than urban areas (0.8%). However, only 1.5% of the population is subsistence poor – person below national food poverty line of Nu.1,473.45 per month, which is a decline from 2.8% in 2012. Additionally, households whose head works in agriculture has higher level of poverty among those employed.

These scenarios provide useful understanding in the roles of RNR sector and to design proper interventions. Also, recognizing the RNR sector's role in the socio-economic development and against the backdrop of trade deficit and renewed interest to substitute import, the Royal Government of Bhutan has placed RNR sector as the priority and at the center of development agenda labelled– 'Second Jewel' for economic development.

According to World Bank (2016), structural transformation of the agricultural sector is 'characterized by the relative decline of basic agriculture and the rising importance of agri-business, with agro-related industries and growing share of high-value agricultural products in international trade'(p.1). Structural transformation is primarily illustrated by processes such as – increase in productivity, change in composition of production from subsistence to cash crops and from low value to high value commodities and change in mode of commercialization. Therefore, to catalyze the growth and development of the RNR Sector in the 12th FYP, MoAF will adopt **'Landscape management, Production and Commercialization Approach' (LPCA)**[2] that befits well with opportunities offered by the structural transformation of the economy while an increased impetus will be put on **'enhancing food self-sufficiency'** for essential commodities such as cereals, vegetables, dairy, meats and eggs. Further, Bhutan Poverty Assessment Report 2014 (NSB) has revealed increasing agricultural commercialization as one of the major drivers of prosperity in rural areas and therefore, commercial farming has greater role towards poverty eradication.

It is inevitable that significance of the RNR sector is going to increase with rising importance placed on opportunities of agribusiness and commercialization based on sector's comparative advantages. Bhutan has unique comparative advantage of its location and access to free trade and markets, young demography and clean environment.

1.2 Principles of RNR Sector Policy

The RNR sector is the custodian of the country's renewable natural resources and the natural environment. Its roles and responsibilities in contributing towards realizing the goals of the Vision 2020 and GNH are much greater than generally perceived. Following principles underlines the RNR sector policies, strategies, and programs:

- A people-centered development; aspirations of people for a better life to be realized through active public participation and community-based institutions;

[2]**LPPC: Landscape Management** – the landscape approach relates to sustainability, resilience, conservation, agricultural and other land uses that seeks to address the increasingly complex and widespread environmental, social and political challenges that transcend traditional management boundaries. ***Production*** – introduce, expand or improve food production systems; shift in composition of production from subsistence based to cash crop and export markets by focusing on high value crops and increase in productivity and yields for crops from given land resources; and **Commercialization** – expansion of value addition, agribusiness, industries and marketing.

- Holistic, Sustainable and equitable economic development based on the natural resource potential, and comparative advantages;
- Attaining an environmentally sustainable development by safeguarding the integrity of the country's fragile ecosystem; and
- Culturally sensible and responsible development preserving cultural heritage and socio-economic needs of the country;

1.3 Vision

Sustainable food system and natural resources for equitable social and economic well-being of the Bhutanese people and the nation state

1.4 Mission

To ensure sustainable social and economic well-being of the Bhutanese people through adequate access to food and natural resources

1.5 Mandates and Functions

The mandates of the Ministry of Agriculture and Forests are as follows:

- Enhance food and nutrition security for the country including the promotion of quality and safety of foods;
- Improve rural economy and livelihood; and
- Promote Sustainable Management and utilization of the natural resources.

The key functions of the Ministry of Agriculture and Forests are as follows:

- To develop agriculture, livestock and forests for the benefit of the Bhutanese people through research and development process;
- To raise the living standard of rural people through the promotion of income generating agro-based enterprises, agricultural trade and marketing, reduction of drudgery and improvement of nutrition and health, access to services, market and information;
- To protect the country's natural environment through the sustainable and judicious use and management of its land, water, forest and biological resources;
- To ensure food safety through preventive and mitigation measures including quality control of all RNR based consumer products and produces and regulatory measures; and
- To represent the interest of the rural people of the country in the functions of the government.

CHAPTER 2

CHAPTER TWO

Historical context: Evolution of RNR Sector goals and development plans (1961-2018)

2.1 Quinquennial Review of RNR Sector plans

The key features, objectives and strategies of the past plans provide an interesting account. Bhutan's development transformation has been rapid since 1961, when the 1st Five Year Plan (FYP) was launched. Bhutan is known for its significant progress in sustaining economic growth and poverty reduction with series of FYPs adopted successively with the help of bilateral and international support.

The 1st FYP (1961-66) was concentrated on the basic infrastructure development such as roads, power and communication which were critical for other developmental activities. Department of Agriculture and Animal Husbandry was also established during the plan period wherein modern farming techniques and practices were introduced in the country.

The 2nd FYP (1966-71) was an important milestone in agriculture development as the plan espoused Bhutan to be self-sufficient in agricultural produces suggesting an emergence of the self-sufficiency as the national policy although Bhutanese were known to be 'traditionally self-sufficient' (5th FYP Document) in cereals with small surplus traded. An emphasis was on increasing agricultural and horticulture production with support on farm inputs and infrastructures.

A major transition was witnessed during the 3rd FYP (1971-76) attributed to three major events. **First** – Bhutan became the member of global community by joining United Nation (UN) in September 1971 ending the years of self-contained isolation. Since then, its specialized agencies have played an important role in supporting the process of modernization. **Second –** In 1971, the Planning Commission was established under the chairmanship of His Majesty the *Fourth Druk Gyalpo*. **Third –**agriculture and animal husbandry was for the first time formally recognized as the mainstay of economy. The 3rd FYP asserted a firm footing for agriculture development through intensification based on past two plans by providing importance to strengthen the agriculture and horticulture research and expanding extension services to improve farming practices and input supplies. Intensive Area based agricultural development was also launched for the first time in the two valleys of Tsirang and Tashigang to offer a strong stimulus to economy of the country through targeted interventions such as "improved seeds, fertilizers, chemicals and farm machinery at reasonable rates and extend them credit facilities for buying the required materials and seeds, and disseminate among them the technical know-how" (3rd FYP Document).

The 4th FYP (1976-81) building on the foundation laid by previous plans focused on its endeavor to improve the living standard of its population with increased efforts on social, physical and administrative infrastructure. The decentralization policy was initiated with devolution of administrative and financial powers to the grassroots level.

The 5th FYP (1981-86) outlined the objective of achieving overall economic self-reliance with emphasis on attainment of *Dzongkhag* self-reliance as means towards national self-reliance. The policy of achieving self-sufficiency in food grains was envisioned and mainstreamed in the plan with major agricultural

production targets with RNR-sector departments placed directly under the Dzongkhag Administration. The 5th FYP therefore, guided the expansion of farmlands to increase the production of staple crops, revenue generating activities and an increased drive to promote cash crop productions such as potatoes, apples, oranges, cardamom; for exports.

In consonance with economic self-reliance as the long-term goal and priority, 6th FYP (1987-92) listed and recognized agricultural role in achieving the national self-reliance, which was implemented as one of the plan objectives. Agricultural development was subsequently aimed at increasing self-sufficiency of staple foods, increasing income and the farm productivity as a result of rising levels of cereal imports. Towards achieving these objectives, area-based development was scaled up and implemented in Paro, Gaylegphug, Punakha, Wangdi, Trashigang, Mongar and Tsirang Dzongkhags.

It was also during 6th FYP that nutrition programme was mainstreamed, with first nationwide nutrition survey carried out in 1988 that revealed stunting and underweight of children as well as anaemia of pregnant women and iodine deficiency as key nutritional issues. Nutritional situation in the country also further highlighted the growing importance of agriculture and livestock sector.

Until the end of 6th FYP, Bhutan's economy was mostly reliant on agriculture with industrial production, specialization and formal trade virtually absent. Therefore, 7th FYP (1992-97) stressed on production for export besides producing for the domestic consumption. As such, self-reliance within agriculture (earnings from export to substantiate domestic food requirement through import) was conceptualized during the 7th FYP and resonated in the subsequent plans. A striking example is the promotion of horticultural crops production for export to complement rice requirement. The plan also recognized the importance of food and nutrition security with strategies to enhance national, communities and household food security as it was realized that it is difficult to achieve 100% self-sufficiency. Achieving self-sufficiency was constrained with growing concern on increasing import, urbanization, limited arable land and low yield. Nevertheless, goal of food self-sufficiency continued to be the key priority. Further, Renewable Natural Resource Development approach and an integrated land-use planning was adopted recognizing nexus between agriculture, animal husbandry and forestry. Forestry sector, ever since stressed on sustainable utilization of forest resources with focus on community forestry. In order to resolve the issues of lack of integration and fragmented planning and implementation between three technical departments (agriculture, livestock, forestry), Policy and Planning Division was formed in 1990 with a mandate to provide technical support to planning activities.

The 7th FYP likewise stressed on privatization of agricultural sector aimed at providing an enabling environment, in areas such as promoting cooperatives, agricultural input supply and providing opportunities for individual entrepreneurs to take up commercial activities.

The 8th FYP (1997-2002) prioritized national food security wherein food self-sufficiency is one of the contributing factors to national food security. Export was emphasized based on the comparative advantage. Self-sufficiency policy was prioritized with target of "70% self-sufficiency in food grain production" (8th FYP Document, p.104). The food security policy for Bhutan is to maintain "broad national self-sufficiency through sustaining the cost of food imports from the sale and exports of cash crops and ensuring that the latter is adequate to cover food import costs" (MoAF, 2009, p.40). However, the notion of reliable access to cheap import from external markets came under scrutiny during the 2007-08 global food crisis when countries banned export of foods. Food crisis "brought higher and more volatile food

prices" (FAO, 2015-16, p. 1) with many countries expressing an increased interest in pursuing policies to bolster their levels of food self-sufficiency. Similarly, MoAF recognized the need for maintaining certain level of food self-sufficiency.

An increased importance on integration was placed with agriculture sector restructured as the Renewable Natural Resources (RNR) sector under the Ministry of Agriculture covering forestry, livestock and agriculture. In the recent years, the Government also recognized that RNR sector is experiencing a decline in terms of economic significance due to economic diversification. Nonetheless, it remains as the predominant sector due to largest proportion of its population engaged in farming.

In 1999 Vision 2020 was developed as a guiding document for the longer-term perspective and macro-economic outlook. The document provides renewed goal of economic self-reliance and envisions a balanced and well-diversified economy by a thriving horticulture and organic based high-value agriculture. Despite all the development challenges and compulsion to achieve food security as well as opportunities presented by conventional agriculture, intentions for organic farming to produce safe and healthy food for local consumers as well as for other markets was indicated. Consequently, the ministry formulated National Framework for Organic Farming in Bhutan in 2007.

From 8th FYP, RNR Sector adopted a "programme framework" approach. The programme framework approach became the mode of plan that is continued today.

The objective of the 9th plan (2002-2008) were to enhance rural income and food security, conservation and management of natural resources and employment generation. The plan emphasized on bottom-up planning with focus on 'gewog-based' planning approach with decision making and planning devolved to local government level. The central planning was based on area-based plans of the Gewogs and Dzongkhags. The plan was kept flexible with M&E system strengthened and MTR accorded highest priority to adjust any lessons and changes into plan.

Lack of a proper road infrastructure has been identified as a major obstacle for production and marketing increasing transportation and transaction costs related to input supplies. Therefore, the plan focused on enhancing accessibility and marketing components. Further, market linkages and opportunities were recognized beyond India and diversified export market with Bangladesh, Nepal and Thailand. Major strategies adopted includes creating enabling environment, RNR research and technology generation, enhancing extension services, farm mechanization, and marketing. Access to credit received attention since 5th FYP when Royal Monetary Authority (RMA) introduced rural credit schemes which was later transferred to Bhutan Development and Finance Corporation (present BDBL) from 6th plan onwards. The purpose of farm credit, then was targeted to enable farmers to purchase seasonal farm inputs, medium term credit for development works and purchase of farm machineries.

The 10th FYP (2008-2013) was launched coinciding with the accession of His Majesty the *Fifth Druk Gyalpo* to the golden throne and advent of parliamentary democracy. The development goal, based on the principle of GNH further sought to enhance broad-based, inclusive and equitable development. Therefore, objective of the 10th plan was to reduce poverty as it continues to be predominantly a rural phenomenon. GNHC (2009) reports that rural poverty in Bhutan was inherently linked to harsh geo-physical reality and constraints such as low agricultural productivity, weak infrastructure, inadequate

market access, economic opportunities. These are resultant impact of underdevelopment in rural area and farming sector which need to be addressed on a continual basis. Strategic interventions in the 10th plan was therefore to enhance agricultural commercialization and market.

Concurrently, the RNR Sector 10th plan was developed based on the principles of people centered and a balanced and equitable socio-economic development. Towards this and national goal of reducing poverty, an overarching strategy adopted in the 10th FYP to achieve these objectives is ***'RNR Triple Gem'*** approach of enhancing the **"Marketing, Access and sustainable Production"** (MoAF 2009, p. 36) for all programmes and projects. Through this approach, a drive to excel from subsistence-based to market-oriented farming was intensified with creation of marketing department in 2009 to facilitate markets.

The fact that Bhutan is largely an import dependent economy with widening trade and current account deficit, the goal of 11th FYP (2013-2018) focused on "Self-reliance and Inclusive Green Socio-Economic Development" (GNHC, 2013). Objectives of RNR Sector concentrated on social, economic and environmental themes towards enhancing food and nutrition security; enhancing rural livelihoods, accelerating sector growth and climate smart sustainable management and utilization of natural resources. The principal strategy was to continue marketing, access and sustainable production system known as MAPS (MoAF, 2013) whereas strategic interventions were towards strengthening investment in construction and renovation of irrigation, farm mechanization; improve/build farm roads and enhance marketing chains and infrastructures; and mitigating Human wildlife conflicts.

All-in-all, evolution of RNR sector development in Bhutan gives an interesting account during the period from 1st until 11th FYP. While the concept of self-sufficiency emerged as early as 2nd FYP, it was during the 5th FYP that government called for self-sufficiency in staple crops. The 6th Plan fully recognized that Bhutan's economy is fully dependent on agriculture but it was realized in the 7th Plan of its difficulty to achieve 100% self-sufficiency and therefore emphasized on export and commercialization. The 8th FYP thus prioritized achieving food security as its goal (within the overarching goal of economic self-reliance) with an increased impetus on privatization, enterprise promotion and above all, a call for increased export although achieving self-sufficiency is still favored as the primary goal of RNR sector.

The 10th and 11th FYP stressed upon enhancing food and nutrition security and in mainstreaming the cross-cutting themes such as gender, poverty, disaster, environment and climate change into development planning and budgeting. The National Food and Nutrition Security Policy 2014 was put in place as an overarching policy for the RNR Sector. The FNS policy draws attention to enhance food and nutrition security by making various kinds of foods available through improved production, access and enabling effective utilization of food.

Although organic agriculture was mainstreamed into Programme since 10th FYP, priority and challenge for the country is 'to meet the national self-sufficiency while keeping the agriculture systems largely organic' (MoAF 2017, p. 7).

On the economic front, country grapples with issue of trade deficit due to increasing import. And on the environmental and geographical aspect, sector faces divergent challenges and vulnerability associated to climate change and its impact (hazards and disasters), which is a cause of concern for food security and livelihoods.

Despite all these challenges, RNR sector needs to consolidate and build on past interventions to fulfil its mandates in tapping its huge potentials in the area of jobs and wealth creation for the country and in fulfilment of the long-term vision of GNH and economic self-reliance, which was espoused as aspiration for the country some decades ago.

The past eleven plans (1961-2018) manifest a clear benchmark of successional progress in RNR Sector. Starting modest with intelligible plans, RNR sector has come a long way to spearhead in effort towards enhancing food and nutrition security, environmental management, organic agriculture and community-based farming systems.

CHAPTER THREE

Investment patterns in RNR Sector (1961-2018)

3.1 Quinquennial Review of resource allocation and priorities

A quinquennial review of the investment trajectory between 1st and 11th FYP on Bhutan's agricultural development phase portray notable scenario which can be delineated as follow. Agriculture, forestry and animal husbandry received meagre 6.2% in the 1st FYP (1961-66) with a national outlay of Nu. 174.70 million. Major proportion of investment were towards infrastructure development, road constructions, education and health as they were aimed towards building a foundation for further progress and in enhancing the living standards of its population.

However, the 2nd FYP (1966-71) allocation for the sector soared to 17% of the national outlay, which was second to Roads, Water Supply, and Electrification.

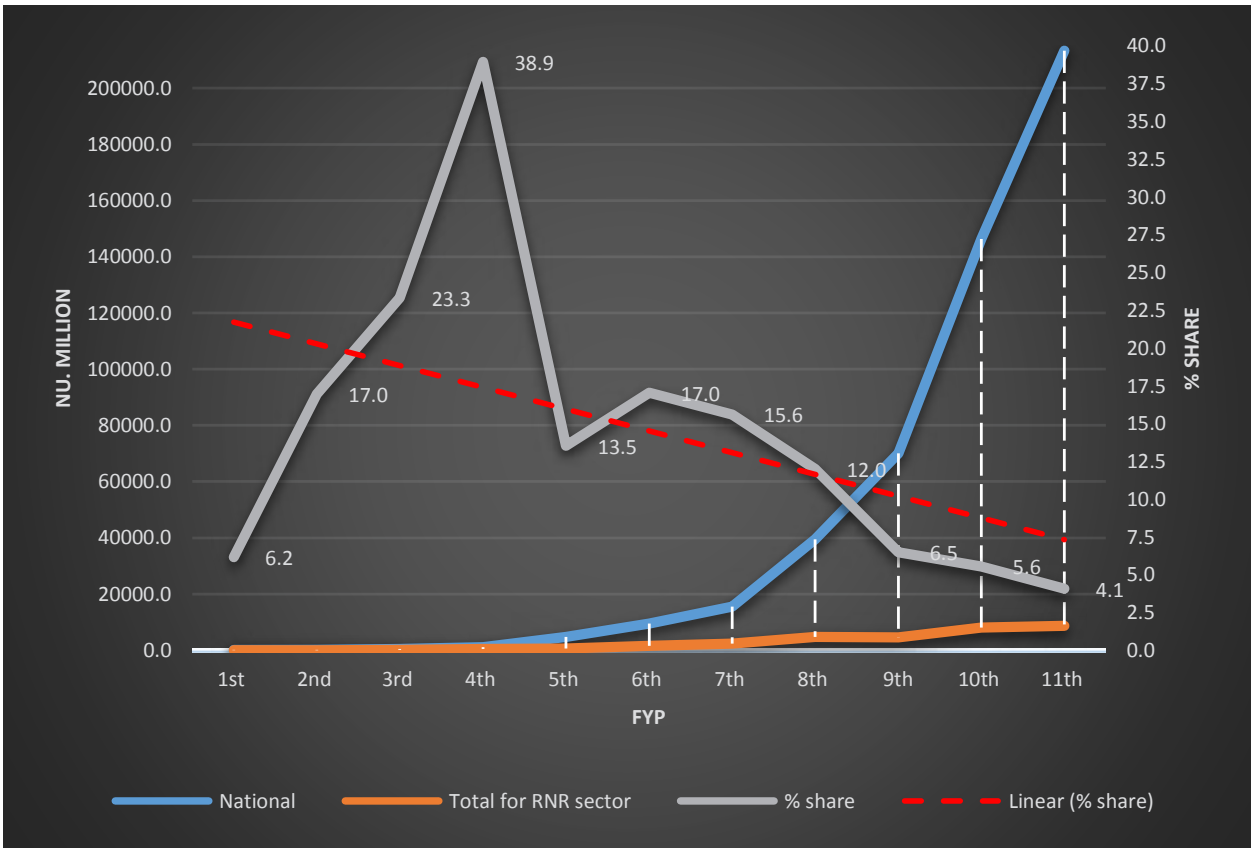


Figure 1: RNR Sector allocation against national outlay from 1st to 11th FYP

The budget share during the 3rd FYP for agriculture, livestock and forestry combined further saw an increase to 23% which is third in ranking after social services sector, transport and communication. Amongst the three sub-sector, agriculture received the highest and has continued with highest allocation until 7th plan. In the 8th plan, forestry sector received the highest share of the resources which increased by more than 138% compared to 7th plan.

Starting 4th plan, investment was directed towards growth of agricultural sector with special effort towards increasing its out-put and productivity.

Concomitantly, agriculture sector under the Ministry of Development received a share of 39% - by far the largest share of investment in the history of plan. As illustrated in the Figure 2, three sectors witnessed steady rise in distribution of budget with agriculture subsector receiving comparatively higher share (1.9% in the 1st FYP to as high as 60% of the 4th FYP sector's share).

The forestry on the other hand has been the singular sector that forms the major share of sector's outlay since 8th FYP. There has been a surge in sector allocation (in absolute) since 4th FYP which could have been possible as there was an impressive increase in national outlay due to assistance from UN and its specialized agencies. Therefore, total outlay in the 4th FYP was Nu. 1,106.2 million which is higher than the previous three plans combined, adding up to just Nu. 784.6 million (i.e. 41% lesser than 4th FYP). Assistance from UN and other international agencies in 4thFYP accounts for commendable 17.5% of the Nu. 1,016.2 million national outlay.

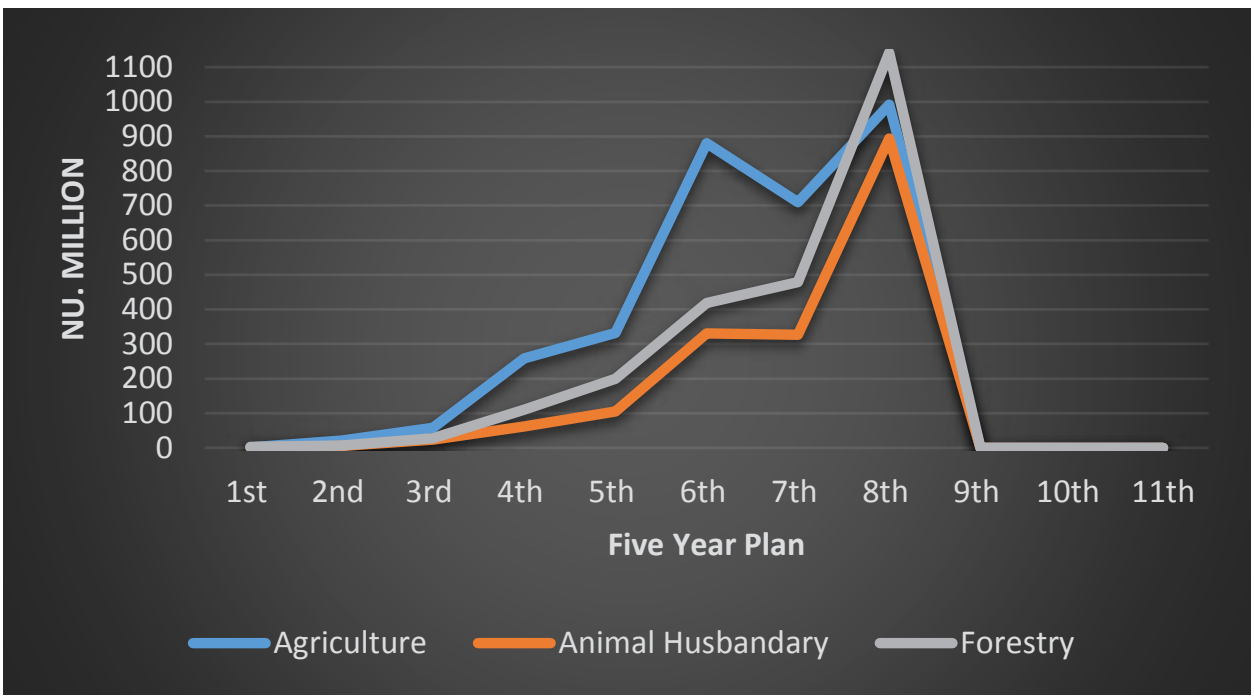


Figure 2: Sub-sector allocation across FYPs

The capital investments were dependent solely on the external assistance (5th FYP Document) although domestic sources augmented the investment requirement ascending gradually from 1% in the 2nd FYP to 7% during the 3rd FYP and then slightly reduced to 5.4% in 4th plan (p. 23).

The Royal Government has labelled the 5th Plan as "the most ambitious development Plan" (p.53) and "a watershed in Bhutan's socio-economic development" (p.38) as its size in terms of national outlay (Nu. 4.7 billion) was three times more than the 4th plan and "in terms of percentage to Gross Domestic Product, the investment works out to an average of 29% of GDP annually" (p.53). However, agriculture,

animal husbandry and forestry experienced modest increase from sectoral outlay of Nu. 430.8 million to Nu. 637.3 in 4th and 5th plan, respectively.

During the 6th FYP, the outlay increased by 155% when compared to the 5th plan, receiving about 17% of the outlay. Amongst the sub-sector allocation, agriculture secured allocation more than the animal husbandry and forestry. At the national-level, agriculture alone was featured as the 4th ranking in terms of budget allocation, next to trade and industries, power and public work development. However, if agriculture, animal husbandry and forestry are combined, sector topped the ranking with 1.63 billion. The prioritization of sector was also evident from recognition of its role in achieving national self-reliance which was one of the 6th plan objectives that was subsequently embedded in the policy.

Beginning the 7thFYP, the Ministry of Agriculture budget allocation share to national outlay reduced by 9.21% although absolute allocation increased to Nu. 2.31 billion (more than 33% as compared to 6th plan). The percentage share accounts for 15.61% of the national outlay of which capital budget is 52.42% which is little over the current budget . The reduction in the sector's outlay is mainly due to an increase in share towards economic and social sector. Total outlay for RNR sector experienced a continuous decline from previous plans reaching as low as 12% in 8th FYP.

On the other hand, national outlay for plans have recorded consistent increase from Nu.15.59 billion in 7th FYP to Nu, 40 billion and Nu. 70 billion in 8th and 9thFYP respectively. However, share for RNR sector has drastically reduced in the 7th plan, 8th and 9th plan consecutively. For the first time since 1st FYP, RNR sector also received lesser allocation in terms of absolute figures in the 9th plan which was a 4.34% reduction in absolute figure compared to 8th plan. However, if the budget of central programs, Dzongkhags and Gewogs are combined, allocation was progressive at Nu. 6.72 billion. Since programmatic budget allocation was followed from 9th FYP onwards, sub-sector allocation of budget analysis is not undertaken.

The total outlay for the sector in 10th plan was Nu. 8.12 billion corresponding to 5.55% of the national outlay i.e. 14.62% reduction when compared to 9th FYP share although absolute share continue increasing with Nu. 1.4 billion, of which the capital budget constitutes 44.64%.

Investment trajectories albeit on a declining trend in terms of share over the year has noticed a tremendous progress. Allocation for RNR Sector during the 11th plan stands at Nu. 8.69 billion corresponding to 4.1% of the national outlay (Nu. 213 billion). This was an increase from the beginning of plan which was where the capital outlay allocation was 4.86 billion. Sub-sector allocation was highest for DoFPS with 32% followed by the production sector – DoA and DoL shares at 29% and 22% respectively (MoAF 2018).

CHAPTER FOUR:

Snapshot of RNR Sector's 11th Plan Performance Review

4.1 Eleventh FYP Objectives and Performance Review

The objective of the 11th plan performance review is to understand the priorities of the sector as well as to ensure that relevant lessons learnt from the past plans are integrated into the current plan. Although so much has been progressed in 11th plan, the performance review provides an opportunity to identify implementation gaps to ensure that it is realigned to 12th plan.

RNR sector 11th FYP performance is reviewed in the context of four objectives, institutional restructuring and financial performance. The four objectives were enhancing food and nutrition security; enhancing sustainable rural livelihood; accelerating RNR sector growth; and promoting sustainable management and utilization of natural resources.

Key achievement during the 11th FYP

Objective 1: Enhance food and nutrition security

Self-sufficiency is one of the means towards enhancing food and nutrition security. Hence, self-sufficiency in cereals (rice, maize, wheat, barley, buckwheat and millet), vegetables (asparagus, chilies, cabbage, cauliflower, beans, potatoes, etc.) and fruits production were identified as the thrust areas for the agriculture sector. The self-sufficiency ratio by end of 11th Plan for cereals, vegetables (including potato) and fruits stands at 68.14%, 104.24% and 138.11% respectively. In 2013 the total cereal production was 163,830 MT, which has increased to 191494 MT in 2017. The vegetable production in the 11th plan was comfortable with the required demand. In 2013 the total vegetable production including potatoes stood at 97,187 MT, which has increased to 126,773 MT in 2017.

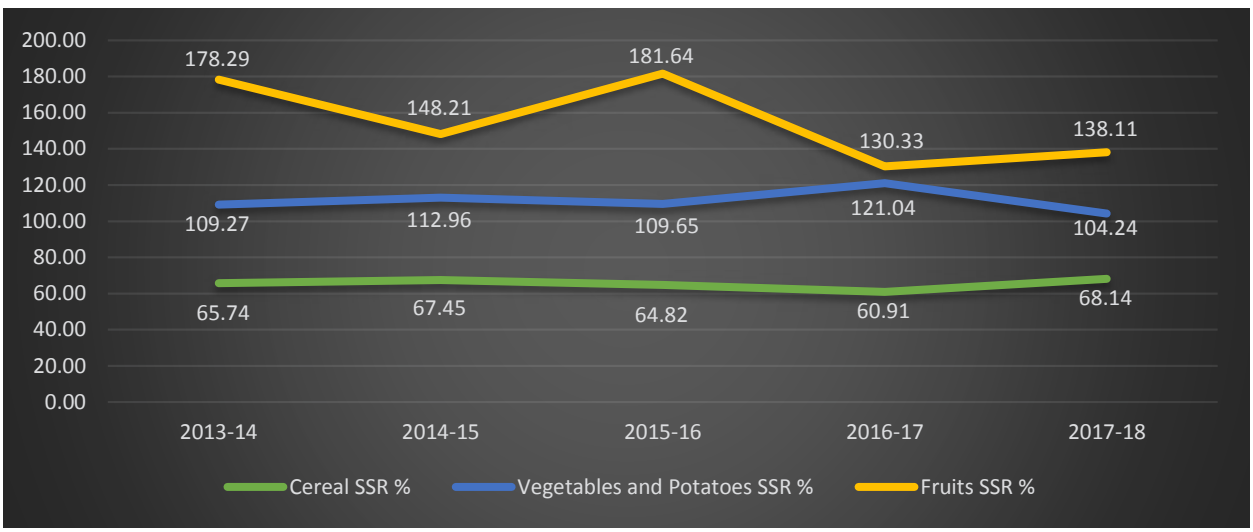


Figure 3: SSR for Key Agricultural Commodities
(Data source: Sanam Drupdrey; Terminal Report of the 11th FYP, 2018)

The livestock sector focused on enhancing self-sufficiency in dairy products, meat and eggs. The self-sufficiency ratios for dairy products, meat and eggs in 2017 stands at 92.53%, 33.51% and 100% respectively. Bhutan achieved self-sufficiency in egg since 2011.

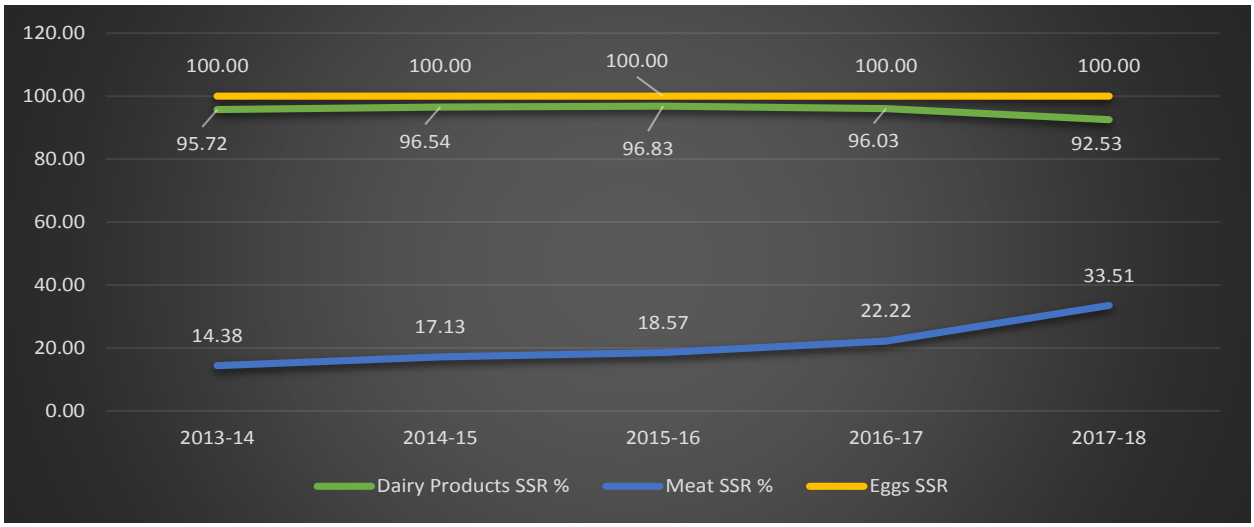


Figure 4: SSR for Key Livestock Commodities
(*Data source: Sanam Drupdrey; Terminal Report of the 11th FYP, 2018)*

Objective 2: Enhance Sustainable Rural Livelihood

Rural prosperity and inclusive development are one of the key objectives of the 11th FYP and hence, the RNR sector invested in certain strategic areas such as enhancing rural connectivity, marketing, irrigation, innovative energy sourcing and HWC mitigation actions. Further, in order to enhance the rural economy, three RNR related SoEs (FMCL, BDCL, GBCL) were established to foster agriculture commercialization and agribusinesses.

In the 11th plan, 5,363 km of farm roads were built/renovated. Over 2,589 km of irrigation channels were constructed to address the water availability issues and 187 farm shops were established across the nation to give extra impetus for agriculture marketing. Electric fencing is one of the successful HWC mitigation strategies with 3,492 km of fencing installed benefitting over 17,925 households to protect their crops from wild predators.

Agriculture commercialization is one of the means to food security and addressing unemployment issues in Bhutan. Therefore, in order to mechanize farms, create employment in rural areas, promote small and medium agriculture enterprises and economize water uses for sustainable agriculture farming, Farm Machinery Corporation Limited and Bhutan Livestock Development Cooperation Limited was established. Moreover, 1,200 power tillers and mini tillers were also distributed to the farmers to minimize farming drudgery and address farm labor shortages.

Agriculture sector is one of the most vulnerable sectors to impacts of climate change and hence various interventions were strategized to make farming households resilient to effects of climate change. Over 1,885 greenhouses were supplied to the farming households to encourage protected agriculture farming and 3,752 farming households adopted bio-gas plants as an alternative source of clean energy.

Objective 3: Accelerate RNR sector growth

The RNR sector exhibited modest growth with about 3.35% average growth rate during the 11th FYP. The sector recorded highest growth rate of 4.57% in 2015 against the plan target of 4% which later declined to 3.91% and 3.39% in 2016 and 2017 respectively. The average growth rate during 10th plan was only 1.78%.

	2013	2014	2015	2016	2017
Crops	3.38	3.98	5.74	6.58	6.33
Livestock	2.04	2.31	3.36	6.39	4.41
Forestry & Logging	0.82	-0.97	3.51	-5.4	-5.63
RNR	2.4	2.37	4.56	3.91	3.39

Figure 5: RNR Sector Growth at Constant Price (%)
(Data source: SYB 2016 & National Accounts Statistics 2018)

The percent share of RNR GDP has been declining since 1990s and the decline is attributed to growth and expansion of service sector whose labor force absorption capacity has increased to 34.2% in 2016 (LFS, 2016) from 6.5% in 1984 (SYB, 1984). On the other hand, the RNR (agriculture) sector's labor force absorption capacity has declined to 57.1% in 2016 (LFS, 2016) from 87.2% in 1984 (SYB, 1984). Nevertheless, the sector could maintain its GDP contribution over 16% during the 11th FYP and highest of 17.37% recorded in 2017.

Objective 4: Promote sustainable management and utilization of natural resources

The conservation and sustainable utilization of forest resources, and reduction of poverty are key focus and targeted approach of the 11th FYP. Conservation of forest resource and poverty reduction is also intricately linked and is therefore essential element to drive national goal of self-sufficiency and self-reliance. The Department of Forest and Park Services (DoFPS) in the 11th FYP pursued this crucial task through three programs namely; Sustainable Management of State Forests, Sustainable Forest Landscape and Conservation of Biodiversity and Integrated Watershed Management.

National Forestry Inventory (NFI) provides crucial information that serves as baseline for monitoring, planning and sustainable management of forests. Department of Forests and Park Services (DoFPS) completed the NFI covering 38,394 km^2 covering 2,424 Cluster Plots and the report was launched in February 2017. The first nationwide snow leopard survey was also conducted and reported that there

are 96 endangered big cats in the country. The conservation values and management performance of the protected areas was also launched (Bhutan State of Park Report 2016).

Institutional arrangements and enabling policy framework for conservation must be appropriately instituted and strengthened for Bhutan to continuously champion in environmental conservation. Thus, institutions such as Jomotshangkha Wildlife Sanctuary, Regional Centre of Tiger and Cats Research and, Green Bhutan Cooperation Limited were established to expand conservation scopes. Moreover, the Forest and Nature Conservation Rules 1995 and Access and Benefiting Sharing Policy of Bhutan 2017 were revised as Forest and Nature Conservation Rules 2017 and adopted to cater to emerging challenges.

Participatory conservation through formation of Community Forest and NWFP groups is one of the successful conservation strategies that the DoFPS pursued during the 11th FYP. To ensure sustainable management and utilization of forests resources, 750 CF groups covering about 86,000 hectares were formed and institutionalized. Similarly, with the objective of alleviating poverty and enhance household income through sustainable collection and sale forests products, 144 NWFP groups benefiting over 5145 households were also founded.

Urbanization is rapid and recreational spaces especially in urban areas that are vital element of healthy living are increasingly becoming limited. Thus, 33 recreational sites were established across the country. Similarly, 15 community-based ecotourism sites were established in state reserved forest land in addition to nine biking trails (10.3 km). Religiously and ecologically important sites were declared as heritage forests in all 20 Dzongkhags. The sector also instituted monthly cleaning campaign and awareness program and it is coordinated by respective field offices in all 20 Dzongkhags.

Watershed management initiatives seeks to balance healthy ecological, economic and cultural/social conditions within a watershed. The DoFPS has accordingly assessed 12 wetlands and developed two management plans (Bumdeling and Buli watersheds). The integrated water resource management landscapes have also increased to 11 from two. Further, about 26,689 hectares of SRF land were afforested and reforested and, revival of spring shed has been initiated at Lholing, Paro.

The ministry in collaboration development partners initiated sustainable financing project, Bhutan for Life (BFL) and mobilized US$ 43 million. BFL was launched on 11th November 2017 coinciding with birth anniversary of the His Majesty the Fourth Druk Gyalpo. It is the first Project Finance for Permanence (PFP) initiative in Asia and the first GCF supported initiative for Bhutan. The project will provide a sustained flow of funds to effectively manage Bhutan's protected areas and biological corridors.

Review on Institutional rearrangement and Organizational Development Exercise

As a part of revamping the institutional systems, avoid conflicting mandates and to align mandates of organisations to the national aspirations, Organization Development Exercise was undertaken in the 11th FYP. Accordingly, three erstwhile secretariat agencies, namely, Human Resource Division, Administration and Finance Division, Information and Communication Services and Legal Unit (previously under the Policy and Planning Division) was subsumed under the Directorate Services. Moreover, in line with the agencification framework, structural changes with new nomenclature were taken on board with various divisions under the technical department.

1. Directorate Services was created in 2017 bringing function of human resources, administrative, finance, legal services and information communication under it.

2. The Council of RNR Research of Bhutan (CoRRB) was dissolved in 2016 and its core mandate, RNR research was assimilated into technical departments. Research and Extension Divisions were formed under the department of agriculture and livestock.

3. ICS was also renamed as Information and Communications Technology Division under the newly created Directorate Services

4. Agriculture and Horticulture Division were merged to form to Agriculture Production Division under DoA;

5. Nature Recreation and Ecotourism Division (NRED) and Wildlife Conservation Division (WCD) under DoFPS were merged to form the Nature Conservation Division (NCD);

6. Integration of forestry research staff and forestry research responsibilities of RDC Yusipang with UWICE and the nomenclature was changed to Ugyen Wangchuck Institute of Conservation and Environment Research (UWICER);

7. Dzongkhag Forestry Sector was merged with the Territorial Divisions under DoFPS;

8. Dissolution of RNR-RDC Jakar as a Livestock Research Center and creation of it as a commodity centre with the new nomenclature National Highland Research and Development Center (NHRDC);

9. The National Feed and Fodder Program reclassified as a commodity center with the new nomenclature of Animal Nutrition Research and Development Centre (ANRDC); and

10. Given the importance and with an objective of strengthening market research and information system, Market Information and Research Division was created under DAMC. Further, Regional Marketing Office was also created in Gelephu.

11. Three SoEs was created namely Farm Machinery Corporation Ltd., Green Bhutan Corporation Ltd., and Bhutan Livestock Development Corporation.

BLDCL was established with the mandate to produce and supply inputs required for the livestock and agriculture sector, engage in production of livestock products for domestic and export markets, value addition and others.

AMC since its establishment in 1983 was actively engaged in the supply of farm machinery, equipment &tools while also involved in provision of services like installation, repair & maintenance. Recent drive towards agriculture commercialization and attainment of food self-sufficiency requires enhancement of farm mechanization services. Therefore, operation of farm machinery hiring services component has been delinked and FMCL created in 2016 to enhance efficiency and service delivery. AMC has since then focused on farm machinery research; training of farmers, improving standards and quality.

Review of Plan Outlay and Financial Performance of the 11th Plan

The total national plan outlay for the 11th Plan was Nu. 209.3 billion of which the capital outlay was Nu. 92, 000 million. The allocation for RNR sector was Nu. 4,856.22 million (capital) representing about 5.28% of the total capital outlay. As compared to 10th plan, the capital budget share allocated to the ministry in the 11th Plan has increased to 5.28% from 4.92%. The overall outlay (including current) has also increased to 6.4% from 5.5%. However, the sector during the 11th Plan received a revised budget of Nu. 18,377.72 million. Out of this, Nu. 8,693.46 million was the revised appropriation to the sector as capital outlay for implementing the 16 different programs proposed and Nu. 9,684.26 million as current budget. Out of the total allocation about 32% was allocated to Forestry, 29% to Agriculture and 22% to Livestock sector.

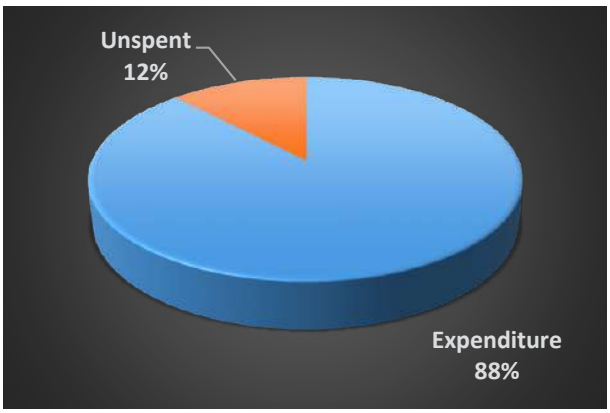


Figure 6: Percentage of State of Expenditure

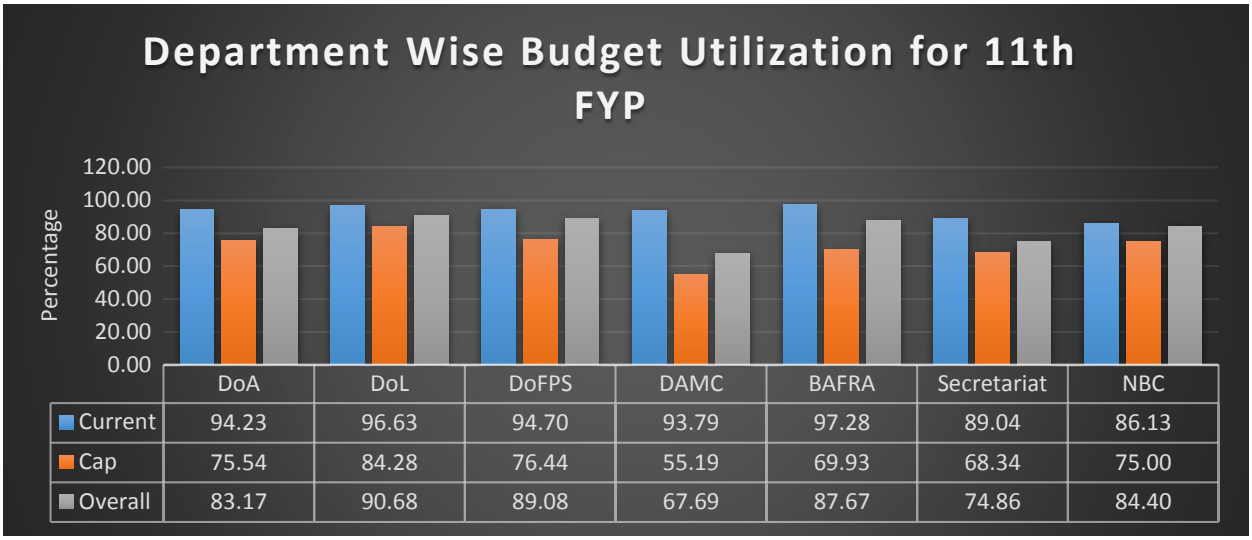
CHAPTER 4

Table 1: Proportion of revised budget allocation by agency

Agency	Proportion of Revised Budget (%)		
	Current	Capital	Total
Department of Agriculture	22.12	35.73	28.52
Department of Livestock	21.29	22.22	21.72
Department of Forests and Park Services	41.49	20.25	31.51
Department of Agriculture Marketing and Cooperatives	1.57	3.70	2.57
Council for RNR Research of Bhutan	0.77	0.59	0.68
Bhutan Agriculture and Food Regulatory Authority	5.05	3.04	4.10
Directorate Services & Secretariat	5.44	13.09	9.04
National Biodiversity Centre	2.28	1.38	1.86

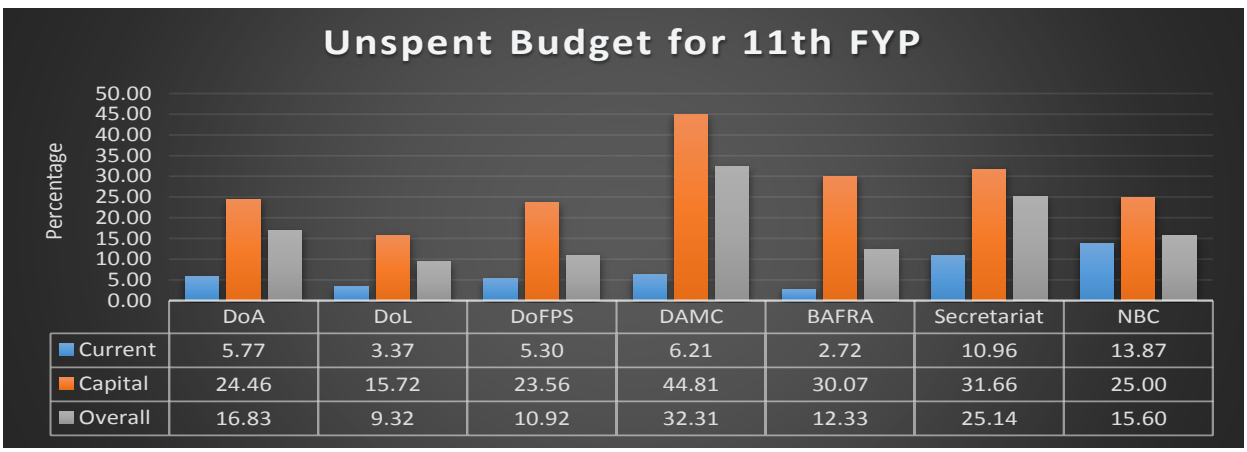
(Data *source: Sanam Drupdrey; Terminal Report of the 11th FYP, 2018)*

An assessment of the expenditure made by the ministry based on the expenditure figures obtained from the Department of Public Accounts (DPA) shows that 12% of the budget (both capital and current) allocated to the ministry was left unspent during the plan period. This indicates that the overall implementation capacity of the ministry in terms of both current and capital budget stands at 88%. However, the capital budget spending capacity stood at 82.95%.



	DoA	DoL	DoFPS	DAMC	BAFRA	Secretariat	NBC
Current	94.23	96.63	94.70	93.79	97.28	89.04	86.13
Cap	75.54	84.28	76.44	55.19	69.93	68.34	75.00
Overall	83.17	90.68	89.08	67.69	87.67	74.86	84.40

Figure 7: Proportion of expenditure by departments/agencies
(Data source: Sanam Drupdrey; Terminal Report of the 11th FYP, 2018)



	DoA	DoL	DoFPS	DAMC	BAFRA	Secretariat	NBC
Current	5.77	3.37	5.30	6.21	2.72	10.96	13.87
Capital	24.46	15.72	23.56	44.81	30.07	31.66	25.00
Overall	16.83	9.32	10.92	32.31	12.33	25.14	15.60

Figure 8: Proportion of unspent capital and current budget by departments/agencies
(Data source: Sanam Drupdrey; Terminal Report of the 11th FYP, 2018)

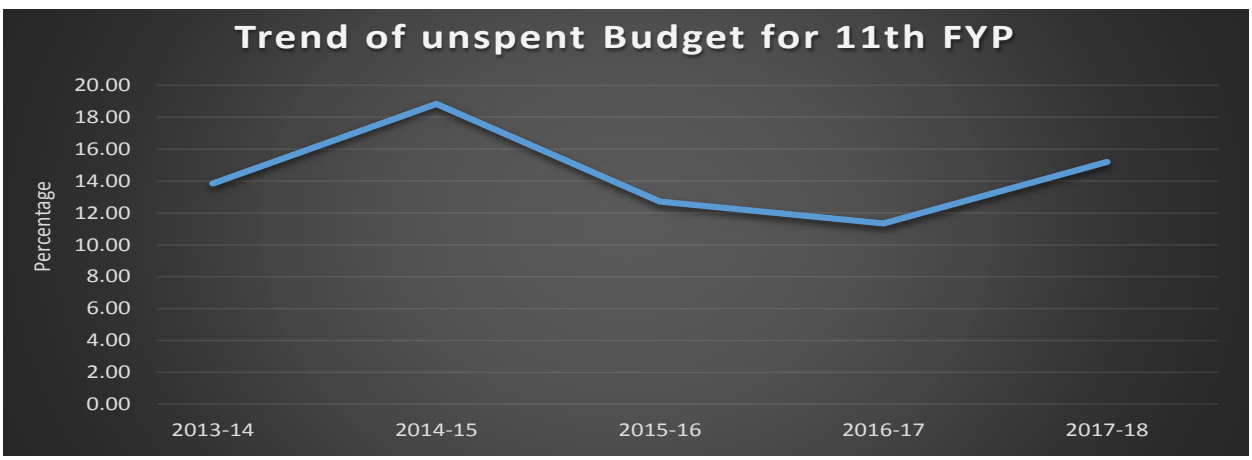


Figure 9: Year wise unspent budget (current and capital) trends
(Data source: Sanam Drupdrey; Terminal Report of the 11th FYP, 2018)

4.2 Key lessons learnt and recommendations from the 11th FYP

a. Strong coordination within the central agencies and local governments are critical in enhancing the implementation capacities at various levels of institutional arrangements.

b. RNR Sector during the 11th FYP grew modestly at an average of 3.35%. Nonetheless, sector's share of GDP contribution has been decreasing despite agriculture being one of the key economic sectors in the country with huge potential for commercialization of agriculture, expansion of agribusinesses and product diversification.

c. Agricultural value chains are still weak and nascent. Enhancing productive capacity along the value chains could help maximize the use of limited arable land, reduce import of food stuffs (cereals, horticulture, vegetables and dairy products) that can be easily produced and value added for domestic and export markets, create employment opportunities, product diversification and agribusiness expansion.

d. Share of government budget for the RNR Sector has been declining as compared to other service and industry sectors. Financing agricultural development will be one of the major challenges as Bhutan prepares to graduate from LDC category by the end the 12th FYP. Therefore, preparation and implementation of well researched transition strategies and innovative financing mechanisms are critical, especially for RNR Sector that is heavily depended on ODAs and grants from various development partners.

e. Research, innovation and technology developments are essential in light of changing climate, increasing disaster events and rapid urbanization. Regional research centers are being strengthened through human resource capitals, capacity enhancements and resource intensifications. However, RNR research institutions are involved in research works as well as implementation of development plans and programs which might result in dilution of their key mandates and jeopardizing the importance of research.

f. Agriculture and its associated businesses are highly volatile and risky venture. Current incentive and subsidy packages are less attractive although mostly targeted to small holders and vulnerable population. More attractive incentive and subsidy packages and, insurance mechanism are pivotal for attracting FDIs and private sector investment in agriculture who has potential to commercialize and expand agribusinesses.

g. Agricultural Marketing is one of the hurdles that is becoming more pressing due to limited domestic and international markets. On the other hand, ever evolving ICT and its associated services are not utilized to its full potential. ICT has proven to highly successful in the global arenas especially in marketing and business aspects.

h. Demand for reliable and accurate statistics is ever increasing which are vital for planning, investment and informed decision making. Various institutional arrangements and statistical capacity enhancement programs were initiated to overcome challenges and meet the emerging data requirements. Investment in improving agricultural (RNR) statistics is crucial, as it would enable

policymakers to formulate plans and programs that are realistic and evidence-based, and empower decision makers to take informed decisions. It would also improve plan monitoring and evaluation that would enable timely and right policy interventions.

i Most of the farm lands are located on mountain slopes and farm mechanization is generally difficult leading to high production costs. Thus, land development for farm mechanization would be a crucial input during the 12th FYP.

CHAPTER FIVE

5.1 Broad issues, risks and challenges for RNR Sector development

Food self-sufficiency and food security is high on the national policy agenda with National Food and Nutrition Security Policy 2014 as an overarching policy for the RNR Sector development. However, the task of achieving national food self-sufficiency, food security and rural poverty reduction comes with lot of issues and challenges particularly when the country's economy continues to diversify and modernize.

The top five farming constraints pointed out by farmers in 2016 include labour shortage (53%), crop damage by wild animals (40%), insufficient irrigation supply (26%), limited market access (16%) and crop damage by pests and diseases (16%) followed by others such as unproductive land, shortage of land, limited access to seeds, tools and equipment and natural calamities. Achieving food self-sufficiency becomes difficult for various social, economic, technological and environmental reasons. Fader *et al.* (2013) reports countries are unable to increase their level of self-sufficiency due to natural resource constraints such as limited amounts of available cropland, water, and fertile soil.

Some of the broad issues and challenges for the RNR sector identified in the 12th FYP are as follows:

a. Rural-Urban Migration (RUM) and Farm Labour shortages

While sustaining agriculture requires young and productive population, increased aging of farming population is a serious concern. Likewise, to make farming and rural livelihoods sustainable, introduction of enabling environment and conditions becomes indispensable. Retaining younger generation of population into agriculture becomes a challenge with increasing number of economically productive men and women moving to urban areas in search of better social and economic opportunities. Farming and rural life in Bhutan is entrenched with negative notion especially amongst younger generations who associates it with backbreaking and hard labor with little economic returns. Farming is also perceived as a risky venture dissimulating potential in the sector. Nonetheless, RUM has resulted in an increased urban population from 30.9 to 37.8% (NSB 2017) and youth unemployment remain high at 12.3%, an increase from 10.7% (MoLHR 2015).

Farm labour shortage continue to be a constraint as revealed by the farming household surveyed, which saw an increase from 53% (DoA, 2015) to 92% (DoA, 2017). Similarly, these reasons were consistent with a study on rural-urban migration conducted by the Ministry in 2013 although with few variations. Rural household respondents reported that more than half (65.6%) of members have out-migrated (MoAF 2013). This is a greater concern given that youth unemployment rate is on an increasing trend.

These factors underscore the causes for out-migration of farming population. Even worst, majority of migrants comprises of male in economically productive age–groups, leaving ageing rural population which is a concern. This is further substantiated by NSB (2017), report that out of total population engaged in agriculture, female constitutes more than male raising pressure to a new level on issue associated to feminization of agriculture and labour shortage.

b. Human wildlife conflict

Human wildlife conflict (HWC) continues to be recurring threats to the country's effort toward sustained food production as well as environmental conservation. The regularly cited conflicts between humans and wildlife in Bhutan are crop depredation, livestock predation, and attacks on humans with huge opportunity costs related to crop guarding, economic activities and livelihood disruptions (DoA, 2016). Livestock depredation incidence in 2015 accounts for 202 as opposed to 61 in 2014 and 90 in 2013, at times occurring human casualties. It is estimated that in 2015 alone, 1,356 MT of paddy and 3,892 MT of maize was lost to wild animals. Further, 74% of the farming households reported crop damage by wild animals and 28% crop damage by insects/diseases in 2017 (DoA, 2017).

As a result, loss of crops and livestock to wildlife and natural calamities is deterring farmers from cultivating their land and look for alternative means of livelihood (MoAF 2016). GNHC (2017) reports that HWC is a contributing factor in agriculture land fallowing and rural-urban migration. Agriculture Statistics (DoA, 2017) reports 205,026 acres of agricultural land operational (Dry land: 145,838 acres & Wetland 59,188 acres), of which 54,524 acres (Dryland: 46,704 acres & Wetland: 7,820 acres) are left fallow.

In the recent years, remarkable progress has been made in mitigating the threat through various interventions such as sound and light repellent, and of late, electric fencing installation. Since the legalization of electric fencing use in 2013, it has become a popular means to protect crop damage by the wild animals.

A study conducted by DoFPS has found that electric fencing has significantly reduced the average time spent by farmers on crop guarding, leveraging them to engage in other productive works. Nevertheless, a lasting solution is far from panacea. On an average, farmers across the country spent 48 days and 67 nights in a year (DoA, 2017) guarding crops reflecting hardship for farmers and substantial economic and social cost. The locally fabricated electric fencing has proven effective against wild boar and deer while not very effective against monkeys, porcupine and elephants. Therefore, alternative crop protection measures need to be further explored and tested.

c. Limited access to assured irrigation and poor water management

Bhutan has the highest annual per capita fresh water availability (109,000 m^3 annually) in the region but water is not necessarily available for irrigation due to distributional system and topography. It is estimated that 50% of the cultivable land in Bhutan is irrigable (MoAF, 2016). As of 2016, there are 962 irrigation schemes across the country with 1,995 KM length and covering 81,758 acre of agricultural land and benefiting 38,833 households (DoA, 2016). Currently, only 32% is irrigated. However, access to sufficient and assured irrigation and its management is a challenge due to factors such as drying up of perennial water source, poor maintenance and construction standards coupled with damages from floods and other climate variables. Farming in Bhutan is predominantly rain-fed (World Bank 2017) and most of the irrigation flows depends 'almost exclusively on monsoon rains' and 'infrastructures are in poor state'(MoAF 2016). Moreover, Water management and efficient irrigation technologies are still at a nascent stage with limited coverage.

d. Limited aggregation of production and inadequate marketing system

An increased emphasis on commercialization and marketing was given importance through establishment of a separate department for agricultural marketing and cooperatives in 2009. In the previous plans, notable achievements were made in formation of farmers groups and cooperatives, construction of market sheds, sales counter, collection sheds, roadside outlets etc. Additionally, 11th plan focused on construction of farm shops and linking farmers' groups/individual to institutions such as schools, monasteries, and mega-projects.

Marketing infrastructure – especially roads, transportation, storage and processing facilities are critical in stimulating increased RNR production, marketing, and income generation. However, infrastructure, especially in rural Bhutan is still inadequate to cater to RNR marketing effectively and efficiently. Poor road network hinders farmers' access to market, increases the time and cost of transport, and often results in quality deterioration of products.

At the same time, even areas that do have basic marketing amenities generally still suffer from a serious lack of storage facilities, poor linkages with processing and production chains, poor market-orientation, and inadequate processing facilities – all of which lead to high levels of postharvest losses. Further, RNR marketing is weakened by inadequate communication facilities in relation to market information, which adds to price uncertainty.

Farmers still complain of not being able to sell their produce at their expected price especially during the peak seasons. On the contrary, we still import substantial quantity of agricultural produce, which in other words mean that domestic markets do exist. There is also significant potential for export but currently there is lack of reliable end-to-end value-chain established for products and also value addition of produce is limited.

There is fundamental disparity between market demand and local products in terms of quantity (economy of scale), type, size, and taste. Packaging and handling practices are very rudimentary affecting quality and post-harvest loss. Post-harvest loss accounts for as high as 20-35% (CoRRB 2006) and there are no proper facilities for effective storage and drying. Furthermore, a case study conducted by DAMC in 2014 finds out that the cost of local produce is as high as 17 to 167% in Centenary Farmers Market, Thimphu. One apparent reason for high cost is due to higher cost of production.

Bhutan's geographical terrains and settlement patterns renders bottlenecks for efficient marketing system. Nonetheless, the future of RNR marketing looks promising in view of growing demand in the domestic and international market.

e. Limited agro-enterprises and commercial farming

The magnitude of problems on limited agro-enterprises and commercial farming was signified during the Royal Address of the 109th National Day in 2016. For example, "we export potatoes and oranges, and then import potato chips and orange juice" (Kuensel, 18th December 2016). Limited growth of agro-based enterprises and commercial farming limits income generation capacity, employment generation, and lead to an increase in trade deficit. Agro-enterprise development and commercialization are growing at an arguably stagnant and/or slow rate despite long-held notion of opportunities for high

value products, enabling policy and proximity to export markets in the border towns. Nevertheless, certain cash crops such as citrus, apple, cardamom, ginger and potatoes have responded adequately to the increased export market opportunities.

The Ministry has performed fairly well in production sector although not much is achieved in the post-production sectors such as value addition, processing, packaging and agro-enterprises development. Despite huge demand and potential for processed foods, a major proportion of processed agricultural products are being imported (evident from local businesses selling processed foods). On the other hand, apart from a handful of medium and large scale RNR-based enterprises, Bhutan's RNR enterprise sector is characterized by a multitude of informal home-level operations and some formal cottage-scale enterprises.

Developing value addition and processing industries requires skills and capacity that is currently lacking. While there are many studies on value-chain studies conducted, implementation and coordination between value chain players have not accomplished adequately. One of the key issues, perhaps the most important, challenges is reallocation of economic activity for promoting agro-processing (value-addition) activities and agro-based enterprises to create significant number of 'off-farm' jobs and to also achieve the economy of scale for full commercialization.

f. Distinct geographical conditions, climate and disasters

Bhutan face distinct difficulties and challenges associated with its geographical conditions, dispersed settlements and climatic factors. RNR sector is increasingly exposed to climate variability. Bhutan experience changes in average temperatures, precipitation patterns; increased risks of droughts, drying up of water sources and frequent extreme weather events. Bhutan's Second National Communication (NEC, 2011) projects a systemic change in future climate with a greater variability around the means. Mean annual temperature is estimated to increase by 0.8-1.0°C before 2039 and by 2.0-2.4°C before 2069 whereas rainfall is likely to increase slightly overall (~6%) for the 2010-2039 period with a change in seasonal distribution: a decrease in winter precipitation (~2%) and an increase of 4-8% in the monsoon period.

Bhutan's Nationally Determined Contributions (NDC) recognizes the vulnerability of agriculture sector to adverse impacts of climate change. Some of the strategic needs broadly identified in the NDC are promoting climate smart and resilient agriculture and livestock development, sustainable forest management and conservation of biodiversity. The RNR Sector Adaptation Plan of Action (SAPA 2016) also identifies climate change issues, vulnerabilities and adaptation plan.

Disaster Management and Contingency Plan for RNR Sector recognizes mounting frequency of natural hazards and disasters as the most critical threats and have prioritized natural hazards that have maximum probability and impact. The challenges arising from climate and disaster facing sector needs to be taken seriously. Increasing frequency of natural hazards and disasters raises concern for agricultural productivity in general and food security in particular, further exacerbating the complexity of climate change and its vulnerability. The production loss as a result of natural calamities has increased from close to 65 MT in 2011 to more than 1,154 MT in 2015 affecting 65 and 1,376 households respectively in the same year (MoAF 2016). Crops and livestock damages by pests, diseases and wildlife, forest fire, excessive rains, hailstorms and windstorms are becoming a more recurring phenomenon than ever before.

g. Limited agricultural land resource

Area under cultivation is defied by meagre arable land and limited scope for expansion. The Bhutan Land Cover Mapping (MoAF, 2010) reports only 2.93% (2,020 km^2 or 112,550 hectares) of the total land area (38,394 km^2) available for cultivation with majority of land under forest cover. Of the cultivated agricultural land, 60.6% is dry land farming followed by 28.4% wetland farming and 11% orchards.

In 2016, agriculture land under cultivation reduced to 2.75% (DoFPS, 2016). The average land holding is just 2.22 acres per household (NSB 2018). As a result of altitude and conditions for agriculture production, land cover varies between regions and districts. For example, agriculture land concentration is highest in lower altitudes with four districts (Samtse, Tsirang, Pemagatshel & Paro) exceeding 5% cultivated land whereas four districts (Gasa, Bumthang, Trongsa and Thimphu) have less than 1.4% (LULC 2016). Farmlands in Bhutan are thus small and scattered over a complex geographical terrain. The physical environment with rugged terrains and steep slopes imposes severe constraints on land available for farming. Those available for farming also become unattractive due to its topography.

Bhutan likewise suffers from acute trade-off between limited prime land and need of development infrastructures. For example, 423 acres of wetland was approved for conversion between 2008-2016, which is on an average a loss of about 53 acres loss annually.

Given the topography, agricultural activities are concentrated relatively on river valleys or less steep areas. As such, prime agriculture areas could increasingly become a target for rapid socio-economic development and expanding infrastructures thereby threatening the goal of achieving food self-sufficiency, sustainable agriculture and food security. A relatively small land holding per household further compounds the setback associated to geographical factors. Diminishing farmlands is a serious concern for food security which policy vision 2020 of Bhutan recognizes it "as a basic necessity to ensure the nation's sovereignty" (MoWHS, 2008, p. 25).

h. Import dependent economy

Bhutan is largely an import dependent economy with a negative RNR trade deficit. Import figures of RNR products are twice the size of exports. Bhutan Trade Statistics (2016) estimated that in 2015 alone, import was worth Nu. 5,286 million of agricultural commodities constituting primarily the basic essential items such as rice, meat, dairy and vegetables. The export of RNR commodities worth Nu. 2,654 million include mainly cardamom, potato, fruits and cordyceps amongst other. RNR products export constituted about 4% in 2015; a small percentage of total production and they are mostly exported unprocessed. At the national level, trade deficit has increased from 27.09% of GDP in 2015 as compared to 21.05% in 2014 (NSB, 2016). This issue is further compounded by price competition from cheap imports of foods and vegetables.

Nevertheless, food imports are necessary to supplement the dietary and other food requirements which cannot be produced domestically. BLSS (NSB, 2017) reports that on an average, households spend 20% of their food budget on dairy products, 13% on vegetables, 10% on rice, 10% on other cereals and pulses, and 10% on spices and seasonings. That's why cash income earning needs to be promoted too as it is practically difficult to produce everything a country requires.

Even more so, the demand for essential commodities has been increasing in the recent years and is likely to increase with changes in population, food habits and income. For example: 53% of rice and 74% of meat consumption is met from import amounting to millions.

i. Limited access to credit and subsidies

Access to agricultural finance has been one of the major bottlenecks. During the Royal Address on 109th National Day in 2016, His Majesty the King stressed – of Nu. 85 billion worth of loan stock that has been lent out, only 4.5 billion, or 2.5% has been utilized in the agriculture sector and commanded that it must change (Kuensel, 18th December 2016). Proportion of agricultural loan shares in 2016 stands at 5.1%, a slight increase from 4.9% in 2015. On contrary, the shares of the sectors such as trade and commerce, manufacturing, services and tourism are much higher at 20.3%, 12% and 13% respectively.

DAMC's assessment in 2017 indicated that the majority of loans from Rural Enterprise Development Corporation Limited (REDCL) were availed for input-based and primary production purposes. In addition, various subsidies are provided for specified sub-sector interventions. However, there is lack of standardized guidelines, procedures and mechanism to enhance its result-based outcomes. The "RNR Subsidy Policy" is still at a draft stage since 2010.

j. Increasing Pressures on Biodiversity

Biodiversity holds greater 'economic, social, ecological, cultural and spiritual' values (NBSAP, MoAF, 2014). Bhutan has therefore maintained a parallel attention and importance to environmental consideration in socio-economic development. However, loss of forest, habitat degradation, overgrazing, land use conversion and unsustainable agricultural practices (MoAF 2014) for various purposes are a concern. In addition, impacts of climate change and forest fires are placing increasing pressure on the integrity of biodiversity and ecosystems services in the country (GNHC, 2017). A total of 38,577 acres of Government (State) Reserved Forest (GRF) was allocated for development from 2008 to 2013. Forest fire incidences increased from 33 in 2015 to 84 cases in 2016 destroying 15,376 and 21,133 respectively, an increase of 155%. Other visible threats include construction of hydropower, infrastructure development, mining and quarrying.

Illegal harvesting and wildlife poaching further compounds pressure on forest resources and biodiversity. An estimated value of Nu. 36.48 millions of forestry offences was apprehended by forestry official in 2016. The most common offences committed were "hunting and poaching of wild animals and its parts, smuggling and illegal sale & misuse of Timber products, collection of Non-wood Forest Products without permit" (DoFPS, 2016).

CHAPTER SIX

6.1 Twelfth Five Year Plan Preparation Process

The RNR Sector 12th FYP preparation commenced as early as December 2016 following the national consultation workshop and a draft National Planning Guidelines issued by the Gross National Happiness Commission in January 2017.

Collective ownership of the development plan is key to effective implementation. Therefore, a participatory and inclusionary planning process has been the cornerstone for success of RNR Sector five-year plans. Similarly, in view of the national objective of deepening decentralization, both in terms of resource and responsibility at the local government level, 12th FYP preparation followed a participatory consultation approach with stakeholders whilst firmly anchoring to the national and sectorial priority and planning guidelines. Further, an emphasis on informed decision-making and planning was undertaken by carrying out one-on-one consultation with 20 Dzongkhags involving *Dzongdags*, Planning Officers, *DYT Thrizins*, RNR sector heads as well as various RNR regional centers and central programmes. Therefore, 12th FYP preparation process has been more collaborative, in the sense of garnering prior endorsement and understanding from the stakeholders. Consultative meetings with the local governments have facilitated to achieve unanimity and understanding on the RNR sector development priorities and its targets.

For the purpose of better coordination, monitoring and reporting, National Guideline on 12th FYP (GNHC, 2016) has introduced a concept of a lead and collaborating agencies by assigning National Key Result Area/s (NKRA) to the agencies. Of the 17 NKRAs, MoAF has been assigned to lead **NKRA 5 (Healthy Ecosystem Services Maintained)** and **NKRA 8 (Food and Nutrition Security Ensured)** and **collaborator to 9 NKRAs**. MoAF coordinated series of core group meetings with collaborating agencies and actively participated as a collaborating agency and contributor to nine NKRAs. Furthermore, series of RNR sector 12th FYP Core Working Group meetings and consultation workshops with stakeholders were undertaken to identify and agree on strategic policies, issues, challenges, KPI and opportunities as well as on the key programmes. The information collected was then used to design the overall plan and programmes.

The detail of planning process is narrated in the flow charts:

1. Planning Cycle – I: Drafting of the Plan

2. Planning Cycle – II: Finalization of the Plan

Figure 10: Planning Cycle I

Figure 11: Planning Cycle - II

CHAPTER SEVEN

Strategic Framework for 12th Five Year Plan

7.1 Guiding principles & strategic framework

The RNR sector 12th FYP is inspired particularly by the 109th Royal Address where the importance and the role of agriculture in socioeconomic development of the country was highlighted. The approach to RNR sector development is also guided by the development philosophy of Gross National Happiness, guiding principles of RNR sector development policy, constitutional obligations of environmental conservation and economic self-reliance, lesson from Mid Term Review of RNR Sector 11th plan, long-term vision such as vision 2020, and other international goals and commitments such as Sustainable Development Goals (SDGs) and NDCs. The plan also rigorously considered domain impact of plan objectives and AKRAs. By taking into account these guiding principles, the plans are prepared and fitted into the Results Based Planning model. Implementation of Result based plans and programs are reinforced by set of broad strategies drawn to address key issues and challenges facing the sector.

The plan attempts to be rigorously responsive to the issues and opportunities arising from the country's graduation from LDCs to low middle-income country in the years ahead. Plan formulation also seeks to recognize and integrate the development prospects provided by the structural transformation of nation's economy, carbon neutrality and sustainable development. Likewise, the 2030 agenda for SDGs provides opportunities for holistically integrating development challenges and, therefore, RNR Sector plan seeks to address immediate development challenges concerning, in particular, three goals of SDGs which Royal Government of Bhutan has prioritized as an early mover: **Goal 1*(end poverty in all its form everywhere)***– through enhanced food self-sufficiency and sustainable agriculture, improved livelihood opportunities, RNR marketing and value chain development and targeted pro-poor interventions; **Goal 13*(Take urgent action to combat climate change and its impacts*)** – through climate smart agriculture, livestock and forestry development and disaster resilient development; and **Goal 15*(Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss)*** – through sustainable management of natural resources, land use planning and development. In fact, sector directly contributes to these goals and others, and is best positioned to fulfil other global commitments. SDG also recognizes the role of farming communities such as smallholders, family farmers, rural women and youth as the 'critical agent of change'.

Towards effective implementation of plan, an emphasis is placed on having proper coordination mechanisms as well as collaboration with stakeholders both within and outside MoAF. Given that past plans have placed importance on expansion of infrastructures, the 12th plan will provide increased impetus on consolidation and strengthening of existing infrastructures to achieve better efficiency and utilization. One of the key features of the 12th plan is the National Flagship Programmes to further leverage and achieve transformational socio-economic impact through multi-sectorial intervention. Flagship program proposals were prioritized in the areas of Highland development, Organic Farming and Agriculture Land Development.

All in all, the central theme of 12th plan framework for RNR sector is formulated drawing upon the magnitude of synergistic relationship between sectorial objectives, national priorities and global commitments/obligations. The framework, therefore, is aligned towards ensuring "*Just, Harmonious and*

Sustainable society" and underscored by the principles of *"leaving no one behind"* which is the national goal for the 12th FYP.

In consonance with the Royal Government's effort on decentralization efforts and National Guideline for Preparation of the 12th FYP (GNHC, 2016), vigorous attempt has been made to clarify the responsibility and resources for the Dzongkhags, Central Programs and Research Development Centers for effective implementation. In doing so, central and local government priorities were assessed for harmonization through extensive consultations.

Unlike the past plans, 12thFYP formulation also considered attributing and supplementing role of State-Owned Enterprises (SoEs) in achieving the sector's goal and objectives.

7.2 Salient features and shift in the 12th FYP

a. Planning approach:

- For the purpose of better coordination, monitoring and reporting, National Guideline on 12thFYP has introduced a concept of a lead and collaborating agencies by assigning NKRA(s) to the agencies.
- The MoAF has been assigned to lead for NKRA 5 (Healthy Ecosystem Maintained) and NKRA 8 (Food and Nutrition Security Ensured) and collaborator to 9 NKRAs.
- One to one consultation meeting with 20 Dzongkhags were carried out to agree on the baseline and plan production targets.

b. Flagship program:

- A notable feature of the 12th FYP is the Flagship Programmes to address high priority national issues in a concerted and holistic approach by providing a formal mechanism for multi-sectoral collaboration and coordination.

c. Resource allocation:

- In keeping with the provisions of the Constitution and LG Act, and Government's decentralization efforts, a greater responsibility (authority and accountability and resources (functional and financial) have been delegated from the Centre to the LGs with clear delineation of responsibilities between LGs and Central agencies in implementation of plans and programmes.
- To this effect, share of resources to the LGs was increased to 50% in the 12th plan as compared to 30% in the 11th plan.

d. Production approach:

- Parallel approach and an equal importance is placed towards subsistence and commercialization (cash crops) and market led production in fulfilling the dual goal of food self-sufficiency and agribusiness growth in the 12th FYP through landscape management, Production and Commercialization approach.

e. Infrastructure development:

- Given that past plans have placed importance on expansion of infrastructures, the 12th plan will provide increased impetus on consolidation and strengthening of existing infrastructures to achieve better efficiency (quality) and utilization (functionality).

7.3 Sector Plan Strategic Result Framework

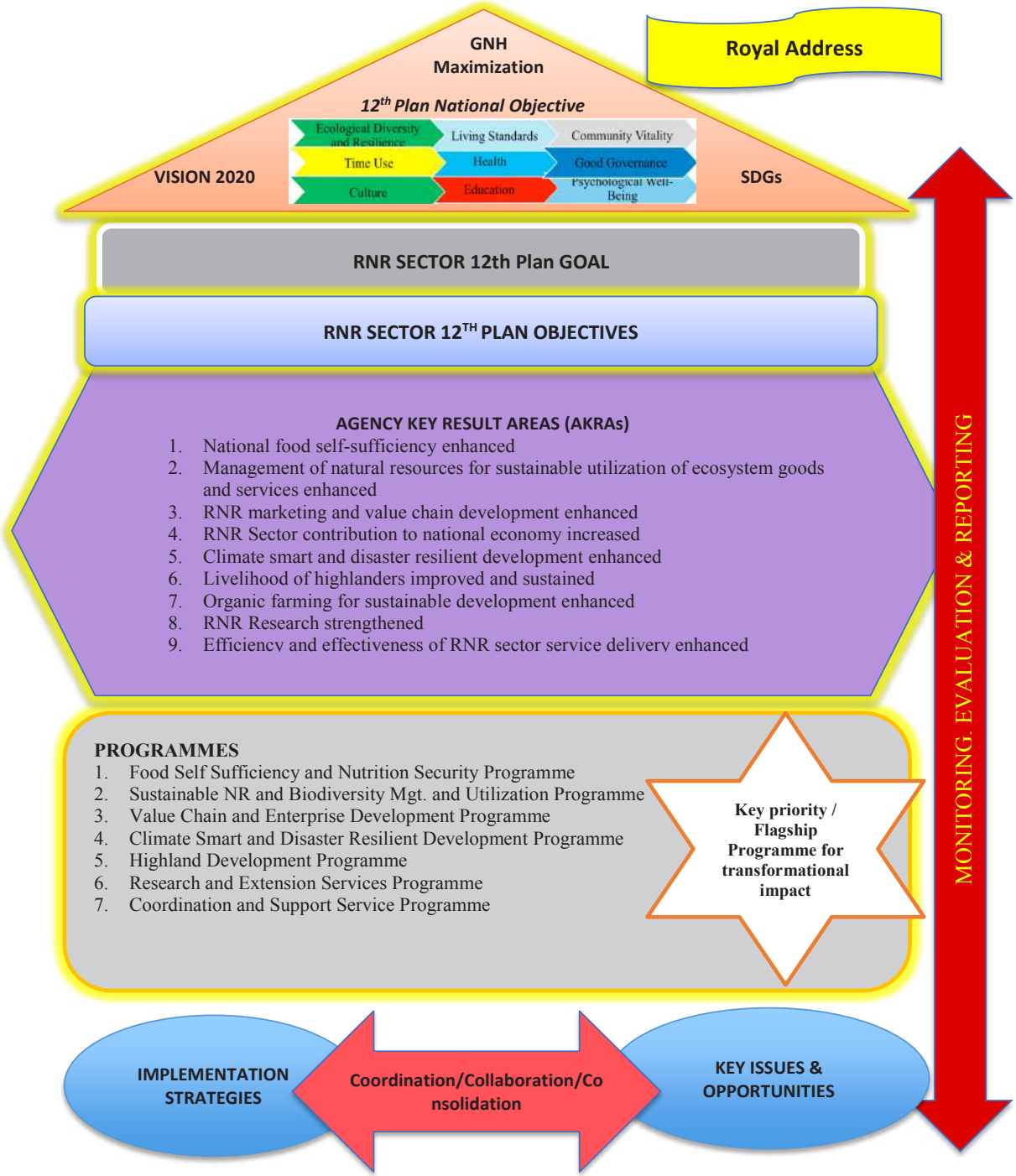


Figure 12: Sector Plan Strategic Result Framework

7.4 Goal and objectives for RNR Sector 12th Plan

The guiding theme for 12th FYP is *"Enhancing Food Self Sufficiency and spurring RNR Sector transformation while ensuring sustainable natural resource management".*

The broad objectives and thrust areas are to increase food self-sufficiency; commercialization and enterprises development and maintaining environmental sustainability through climate smart and disaster resilient development.

Goal

Inclusive and Sustainable development for ensuring food self-sufficiency and economic self-reliance

Objectives

Towards fulfilling the national objective and RNR sector goal for the 12th plan, the MoAF will continue to embrace social, economic and environmental themes. Therefore, RNR sector 12th plan objectives will continue to clinch on the essence of previous five-year plans although with amplified focuses and approaches. A major shift would be an increased emphasis on commercialization and agro-enterprise development. Following are the primary objectives:

1. Enhance food and nutrition security
2. Enhance sustainable management and utilization of Natural Resources
3. Sustain RNR sector contribution to the national economy
4. Enhance effective and efficient delivery of RNR services

7.5 Linkage of NKRA and AKRA to GNH Domains

Following table illustrates the synergistic relationship and contribution of each objective to the nine domains of GNH.

Objective 1 has the highest linkage with 4 domains followed by Objective 3 and 4 with 3 domains each.

Table 2: Mapping of individual plan objective linkage to Nine GNH Domains[3]

Objectives	Linkage to Nine GNH domains
1. To enhance food self-sufficiency	Living standard, health, community vitality, culture
2. To enhance the RNR sector contribution to national economy	Living standard, Education
3. To enhance sustainable management and utilization of Natural Resources	Ecological diversity and resilience, community vitality, psychological wellbeing
4. To enhance RNR service delivery	Good Governance, Time use Psychological wellbeing

[3]**Nine Domains of GNH: (1)** Psychological wellbeing, (2)Health, (3) Time use, (4) Education, (5) Cultural diversity and resilience, (6) Good governance, (7) Community vitality, (8) ecological diversity and resilience, and (9) living standard

The RNR Sector plan has been synergized to enable maximum positive impact to nine domains, and to indicators such as People enjoying sufficiency level of Responsibility towards environment and People enjoying sufficiency level of ecological index, which are articulated in the form of KPIs under NKRA 5 – Healthy Eco-system Services Maintained. Similarly, plan objectives; considering nine GNH domains, its indicators and variables identifies AKRAs and KPIs.

The progress and attainment of the NKRAs and AKRAs in next five years are to be measured through corresponding set of KPIs whereas the progress towards long-term goal of maximizing Gross National Happiness is to be measured at the national level through GNH index and progress of nine domains.

The mapping of outcome KPIs for programmes vis-à-vis the nine domains through indicators and variables was conducted to understand the interpretation of the domain effects on programmes. The sample format of the mapping exercise is presented in Table 2.

Table 3: Mapping of programme KPI to GNH Domains and variables (Format)

GNH Domain	GNH Indicator	GNH Variables	Programme KPI		
			Negative effects	Neutral	Positive effects
Psychological Wellbeing	Life satisfaction	1. Living standard			
		2. Work-life balance			

7.6 National Key Result Area (NKRA)

In order to achieve the national plan objectives, the Royal Government has identified seventeen NKRAs as the national level outcomes for the next five years. Following are the NKRAs:

Table 4: Seventeen National Key Result Areas

NKRA	
NKRA 1	Macroeconomic Stability Ensured
NKRA 2	Economic Diversity and Productivity Enhanced
NKRA 3	Poverty Eradicated and Inequality Enhanced
NKRA 4	Culture & Traditions Preserved and Promoted
NKRA 5	Healthy Ecosystem Services Maintained
NKRA 6	Carbon Neutral, Climate and Disaster Resilient Development Enhanced
NKRA 7	Quality of Education and Skills Improved
NKRA 8	Food and Nutrition Security Ensured
NKRA 9	Infrastructure, Communication and Public Service Delivery Improved
NKRA 10	Gender Equality Promoted, Women and Girls Empowered
NKRA 11	Productive & Gainful Employment created
NKRA 12	Corruption Reduced
NKRA 13	Democracy & Decentralization Strengthened
NKRA 14	Healthy & Caring Society Enhanced

NKRA 15	Liveability, Safety & Sustainability of Human Settlements Improved
NKRA 16	Justice Services & Institutions Strengthened.
NKRA 17	Sustainable Water Ensured

MoAF contributes towards delivery of 11 NKRAs of which NKRA 5 and NKRA 8 are led by MoAF. For these two NKRAs, MoAF will be responsible for monitoring and reporting whereas Mid-Term Review in 12th plan is to be done at NKRA level.

Table 5: NKRAs - MoAF as lead agency

NKRA	Collaborating agency
Healthy Eco-system Enhanced (NKRA 5)	NEC, MoEA, NLC, LGs, RSPN
Food, and Nutrition Security Ensured (NKRA 8)	MoH, MoE, LGs

MoAF is a collaborating agency to 9 NKRAs. Amongst other, given the importance of NKRA 10 as well as recognizing the role of youth in agriculture development, this NKRA is mainstreamed as a cross cutting theme.

Table 6: NKRAs - MoAF as a collaborating agency

NKRA	Lead Agency
Economic Diversity and Productivity Enhanced	MoEA
Poverty Eradicated and Inequality Reduced	GNHC
Culture and Tradition Preserved and Promoted	MoHCA
Carbon Neutral, Climate and Disaster Resilient Development Improved	NEC, MoHCA
Infrastructure, Communication and Public Service Delivery Improved	Cabinet/MoIC/ MoWHS
Gender Equality Improved, Women and Girls Empowered	NCWC
Productive and Gainful Employment Created	MoLHR
Liveability, Safety, and Sustainability of Human Settlement Improved	MoWHS
Sustainable Water Ensured	NEC

7.7 Agency Key Result Areas (AKRAs)

Cascading from two NKRAs to which MoAF is assigned to lead and 9 NKRAs to which MoAF is assigned as one of the collaborating agencies, MoAF identified Nine AKRAs and corresponding key performance indicators (KPIs). The RNR sector is responsible for reporting the achievement of the AKRA and its KPIs during the mid-term review of the plan. The nine AKRAs and the number of corresponding KPIs is as illustrated in Figure 9 below**:**

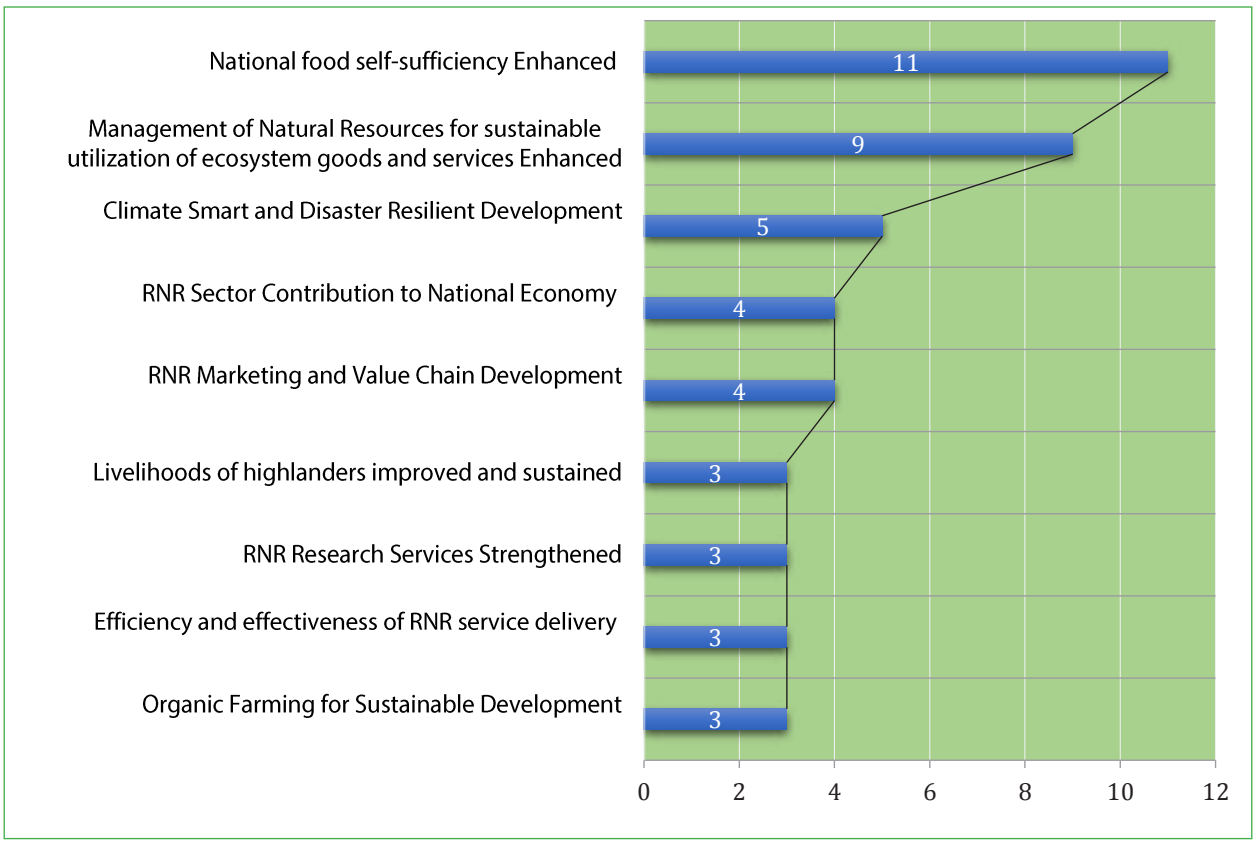


Figure 13: AKRAs and corresponding number of KPIs

Table 7: Result chain between RNR 12th FYP Objectives, AKRAs & NKRAs

Objectives	AKRAs	NKRAs
To enhance food self-sufficiency	• National food self-sufficiency enhanced • Livelihood of highlanders improved and sustained • RNR marketing and value chain development enhanced • Organic Farming for Sustainable Development Enhanced • RNR Research Strengthened	• NKRA 8 (Food and Nutrition Security Ensured) • NKRA 17 (Sustainable Water Ensured)
To enhance the RNR sector contribution to national economy	• RNR Sector contribution to national economy increased	• NKRA 2 (Economic diversity & productivity enhanced) • NKRA 3 (Poverty eradicated & inequality reduced)

To enhance sustainable management and utilization of Natural Resources	• Management and utilization of Natural Resources for sustainable supply of eco-system goods and services enhanced	• NKRA 5 (Healthy Econ-system Maintained)
	• Climate smart and disaster resilient development enhanced;	• NKRA 6 (Carbon Neutral, Climate and Disaster Resilient Development Improved)
	• Livelihood of highlanders improved and sustained	• NKRA 8 (Food and Nutrition Security Ensured)
		• NKRA 4 Culture & Traditions Preserved and Promoted
To enhance RNR service delivery	• Efficiency and effectiveness of RNR sector service delivery enhanced	• NKRA 9 (Infrastructure, Communication and Public Service Delivery Improved)
		• NKRA12 (Corruption Reduced)
		• NKRA 13 (Democracy and Decentralization Strengthened)

CHAPTER EIGHT

Approaches and strategies

8.1 Implementation Approaches and Strategies

Based on the diagnosis of key issues, challenges and scenario presented in Chapter four and five, an umbrella strategy is to embark on transitioning from a largely subsistence based to commercial farming through an inclusive development by strengthening RNR marketing systems, value chain and enterprise development. Additionally, for Bhutan, food self-sufficiency can be seen as a strategy for long-term national food security.

These strategies will be implemented by embracing Landscape Management, Production, and Commercialization Approach (LPCA). The RNR sector will focus on transforming resources into a tangible development results through past lessons, sharpened focus and consolidation.

Key strategies for 12thFYP are:

a. Intensify farm mechanization, land development and fallow land reversion

Sustainability of farming in Bhutan to a large extent will depend upon how the consequences resulting from geographical terrains are addressed. Physical expansion of agriculture land is near to impossible due to limited land resources. More than 70% of its total agriculture land is located on steep slopes (NSSC, 2017). Many households leave land fallow or grow few crops due to farm labour shortage and farm drudgeries.

Labour productivity in Bhutan has also virtually not changed. Briones & Felipe (MoAF, 2013) reports that Bhutan join nations such as Nepal and Philippines where agricultural labour productivity has not grown comparing to other Asian countries with average growth of 2.2% during 1980-2010. Sustained agricultural productivity growth in the long run is driven by creation and dissemination of technical change (Perkins et al., 2013). Other strategic interventions, therefore, to increase agricultural productivity include targeted farm inputs subsidies; farm equipment, power tillers, adoption of high yielding varieties and irrigation development.

One of the straight-forward strategies, therefore, is to intensify and upscale land development (such as terracing, rehabilitation, consolidating existing land wherever feasible) and training through applications of technology and farm mechanization, in a complementary and synergistic fashion, which has proven to be a successful initiative in Bhutan. Farm mechanization provides an alternative means to alleviate labour shortage and reduce farm drudgery. In the 11th plan, large tracts of lands were developed and made feasible for cultivation and mechanization program has been accorded the utmost priority. Also, with an objective of enhancing the mechanization services, FMCL was established in 2016 to provide hiring services at subsidized rate along with the supply of labour saving tools (e.g. transplanters, reapers) and power tillers. The low adoption rate of power tillers was due to lack of spare parts and repair services which FMCL now caters to public through network of regional services centers and operators in the field. Some of the direct benefits from ventures in the recent year are increased farm labour productivity, reduced farm drudgery and increased production through double paddy

cropping. Additionally, women which constitutes majority of farming population or the feminization of agriculture has been highly benefited through easy and affordable access to farm machinery. However, such support from the government has not been adequate to meet new and emerging challenges. Farm mechanization entails many more interventions than the supply of machinery, labor-saving tools and implements.

In view of the above, farm mechanization will continue to be a strategic priority through provision of support in the form of subsidy aimed at reducing farm labor shortage, enhancing efficiency of farming and upscaling agricultural production. The hiring services which are found to be very useful by the farming communities needs to be strengthened and expanded with adequate number of machineries (power tillers, tractors, combined harvesters, etc.). Further, farm mechanization needs to adopt a holistic and an integrated approach at the entire value chain – from supply to after sales services such as operation of machinery/tools/implements, maintenance and management including capacity building and research.

Additionally, improved management and techniques as well as providing access to machineries that best suit the local topography has potential to contribute towards fallow land reversion and agricultural labour productivity enhancement. Therefore, 12th FYP will intensify and upscale development, rehabilitation and reversion of fallow land in a complementary and synergistic fashion through farm mechanization services.

b. Capitalize on potentials emanating from transition from subsistence-based to commercial farming

The growing economy coupled with structural transformation offers greater economic opportunities. RNR Sector's proportion in economy is experiencing a change. Sector's national employment share is declining although at a relatively slow pace in comparison to its national GDP share. Employment share has declined from 62.3% in 2013 to 51.34% in 2017 (MoLHR, 2017) as opposed to sector's national GDP contribution reduced from 16.77% in 2014 to 16.67in 2016 (NSB, 2016) and slightly increased to 17.4% (NSB, 2018).

More so, in view of keeping a shift towards commercial based farming, seeking a balanced and parallel approach between production and post-production activities will be emphasized. Thus, there is a need to draw linkages of agricultural sector with that of post-production value addition and agro-enterprise development through better access to finance, technology and product distribution system. The 12th plan will, therefore, focus on targeted investments to transform RNR Sector potentials into a commercial and market-oriented approaches.

Recognizing the important roles private sector plays in commercial farming, there is need to ease business environment. Towards this, MoAF will review procedures on lease of SRF land to expedite access to land. A guideline for promoting FDI/PPP ventures in the RNR Sector will be instituted. The major economic reforms for agriculture identified in the Economic Development Policy 2017 will be implemented to accelerate sector growth, export promotion and employment generation.

A differentiated approach for regions/dzongkhags will be adopted by recognizing the potential of each region in terms of agro-climatic conditions, comparative advantage and other factors.

c. Irrigation and water management

One of the key determinants for food production depends on availability of water for irrigation. There are more than 1,270 large networks of open gravity-fed irrigation systems in the country (MOAF, 2016). However, basic issues confronting these irrigations are low technology efficiency due to conveyance loss and damage from natural calamities such as floods, erosions and landslides as they are earthen canals. Therefore, intervention will be towards promoting the construction of climate smart irrigation systems and renovation of irrigation schemes to increase assured access, efficiency, availability and sustainable management of water. Further, research and development on application of new and climate smart irrigation/water harvesting technologies will be explored, generated and adopted.

Sustainable management of forest resources is critical for conservation, protection, sustainable management and utilization of state forests, forest soil, water resources and biodiversity through insightful application of science-based management prescription.

Under the scenario of accelerated drying up of springs and the deterioration in spring water quality, springs will be revived using local as well as scientific hydrogeological knowledge. Watershed management is going to be one of major activities to address the issue of drying springs for better water security for mountain communities in Bhutan.

d. Enhance climate and disaster resilient development

Nationally Determined Contribution (NDC) and National Adaptation Plan of Action (NAPA) recognizes water, agriculture, forests and biodiversity as the most vulnerable and sensitive to the impacts of climate change and disaster events.

RNR sector is uniquely sensitive to extreme weather events such as is the fact that most farmers depend on timely monsoon for agriculture, which accounts for 60-90% of annual precipitation. In the context of mounting challenges associated to increasing environmental issues, climate change, natural hazards and disasters, the Ministry will continue to pursue and upscale climate smart and disaster resilient development approach.

Climate and disaster concerns will receive proper and balanced consideration towards integrated and holistic development. Mainstreaming of environment, climate and disasters as well as gender provides an opportunity to adequately address vulnerability and threat confronting our farming community. Mainstreaming will seek to adequately implement action plans prioritized in the RNR Sector Adaptation Plan of Action (SAPA) and Disaster Management and Contingency Plan for RNR Sector (DMCP). For a sustainable progress to be made, Disaster Management Unit will be instituted as a nodal point for coordination on the development and implementation of comprehensive disaster risk management strategies; institutional capacity building; and better coordination mechanism and monitoring arrangements. Further, the annual RNR data collection and statistical system will consider disaster and climate into future planning. Climate Smart Agriculture (CSA) related activities would include water management, SLM, soil fertility improvement, feed and fodder management, improved breed, pests and diseases management etc.

e. Reduction and Management of Human Wildlife Conflict (HWC)

While Bhutan is globally reputed for richness in biodiversity and for promoting sound conservation policies, HWCs has been recognized as one of the biggest challenges for conservation and proving to be costly for the security and sustainability of farming and livelihoods. The impact is felt predominantly by farming communities who depends on agricultural farming and livestock rearing for their livelihood.

Given the magnitude of constraints and opportunity costs posed by wildlife depredation on crops and livestock, 12th plan will build resilience of communities by exploring evidence-based alternative strategies and solution including risk transfer mechanism and establishment of Endowment Fund for Crop and Livestock Conservation. The Ministry will implement a compensation program through this fund. Simultaneously, the Ministry will continue to explore viable mechanism on the crop and livestock insurance schemes.

The National Human Wildlife Conflict Management Strategy 2008 will be revised to address HWC through management interventions based on the technologies, innovations and lessons learnt from past interventions. Further, wildlife rescue and rehabilitation will be strengthened so that wild animals can be rescued and translocated to minimize conflict. RNR Sector personnel will be trained to carry out research and technology generation to improve service delivery.

f. Enhance commercialization, value addition and RNR Enterprise development

An increased impetus and focus on market driven production on the high value products with value addition and enterprise development will be a priority so that RNR sector contribute towards imports substitutions and youth engagement. Commercialization, value addition and enterprise development would also increase private sector activities and participation in agribusinesses. Towards this, following strategies, yardsticks and clustered approach will be adopted:

a) Identify unique selling point of communities, gewogs, districts or regions in selected agricultural commodities and provide necessary support to develop enterprises;

b) Upscale and expand value chain on the selected commodities;

c) Facilitate development of project profiles/business plans for selling the business ideas;

d) Conduct a comprehensive market studies, create a reliable market information base (data bank) and establish market linkages;

e) Consistent R&D for agro-product development and necessary skills development;

f) Efficient and sustainable agro-based processing enterprises will be promoted near the production sites; and

g) Promote contract farming between producers and processing plants and capacity building.

In addition, targeted interventions will be initiated to support agribusinesses and enterprises including organized aggregator, input suppliers, youths, and processing and packaging businesses. Therefore, operationalization of value chain development includes entire processes starting from provision of agricultural inputs, production, processing, product standard, packaging and marketing.

Further, agro-based industries/enterprises will be facilitated through certification based on the international and national standards to enable trade and to ensure foods are of good quality and safe for consumption. RNR enterprise framework will be put in place to guide enterprise development.

g. Marketing intensification

The recent drive by the Ministry towards agriculture commercialization asserts special focus on marketing. One of the strategic priorities in the 12th plan will be to contrive an appropriate marketing system to encourage sustained production. The focus has been on formation of farmers group and cooperatives, infrastructure development, and logistics. Besides production, focus is equally on enhancing farming incomes. However, there are fundamental marketing issues with fear of not getting investment return and inadequate market information and access.

Building market institutions, both for domestic and export should best supplement and incentivize the promotion of commercial agriculture. Marketing intensification will focus on consolidation and optimum utilization of existing market infrastructures. Any new infrastructure development will consider the production potentials during site selection. Infrastructures such as commercial scale storage system will be enhanced. RNR marketing strategy will pursue key commodity-based approach for both the domestic and export in close synergy with production capacity and priority. Targeted strategy and coordination for each product will be charted out with dynamic market chain for better efficiency and impact. Towards this, the attainment of above strategies will be through RNR Marketing Policy 2018 and RNR Marketing Infrastructure Guidelines.

In order to prevent community from producing same commodity at a same time in mass scale (leading to market glut), an emphasis will be placed for production in a staggered and phased manner. Additionally, marketing of subsidized input supplies such as fertilizers, farm equipment, livestock breeds etc. will form a critical ingredient of marketing. Market research, information and market extensions, which have not maintained pace with production will be further, strengthened. To leverage investment in postproduction value chain and marketing, private sector participation (traders, processers) will be promoted.

h. Increase access to farm credits, subsidies and incentives to trigger multiplier effects

Farming and rural life is misunderstood by majority of population as risky and uncertain ventures. Even more remarkably, agriculture sector has received a low priority lending from financial institutions' loan portfolio. Farming, therefore, has been unreceptive amongst youths treating it as an option rather than a lucrative choice.

Currently, transport subsidies for seeds and fertilizers are borne by the Ministry and no taxes or import duties are levied for farm inputs such as seeds, fertilizers, animal breeding stocks and AI services. In addressing these needs, RNR subsidy and cost sharing mechanism will be put in place with particular

emphasis upon subsidies and incentives targeted towards youth taking up farming. Youths will be encouraged to access priority sector lending and land use certificate wherein necessary supports will be provided.

Towards improving access to credits, the Ministry signed MoU with REDCL in June 2017 to provide financial support for small and cottage industries under RNR sector. Such partnership with financial institutions needs to be widened to increase coverage for small and marginal farmers. Furthermore, private individuals and agri-businesses that supplies inputs and undertake value-addition and processing will receive equal importance. Likewise, there is need to persuade for the financial institutions to maintain a minimum level of commitment in agriculture loan portfolio.

i. Increase and intensify access to input and services

The existing government farms and centers, by and large, are the singular established system available for farm input supplies. However, government farms and centers have been facing difficulty in meeting the growing demands of inputs and services required by the farmers and private entities. For better efficiency and access, SOEs and private sector alike will be therefore engaged to supplement the demand and to slowly take over the roles of delivering agricultural inputs and services. Few private sectors have evolved as a farm input supplier but their reach has been limited both in terms of focus and demand.

As such, during the 11th plan, three SOEs related to RNR ventures as responsible entities were established for distribution and hiring of farm machinery, livestock input supplies, plantations and nursery development. It is hoped that issue related to efficiency, quality, price escalation through tendering, high mortality and not meeting the demand of farmers would be met through these mechanisms. SoEs will likewise leverage growing importance of commercialization through timely and quality supply of farm inputs for already growing number of small and medium size private farms such as poultry, piggery, dairy etc. across the country. These SoEs caters to the services that is more effective and market driven in areas where private sectors have not been able to cater thus far on a larger scale.

Simultaneously, private sectors will be encouraged to play far greater roles. Currently, private sectors are involved in distribution of seeds and seedlings. Moreover, outsourcing of input supplies role to SoEs and private sectors has encouraged private investment, improved production and productivity aside from employment generation.

In the medium and long term, SoEs' role in modern farm inputs supply is expected to enhance technology transfer and increase in use of modern inputs. Their involvement over time will also stimulate more agro-enterprise development, employment generation and livelihood improvement. The expansion of input distribution networks also increases economic efficiency through reduced cost and time. The government farms and centers would then subsequently focus fully on research, knowledge management, innovation and training. In view of the above, activities which may not need the Ministry's intervention will be outsourced and transferred to the SoEs and private sectors.

j. Strengthen research, innovation and training institutions for increased efficiency

Research has a major role in supporting and advancing the RNR sector goals and objectives. In order for the research to contribute and adequately complement the allied initiatives in production sectors – a

targeted and result based research shall be promoted. Research needs assessment and prioritization on the basis of urgency, responsiveness and synergy as per the farmers' need will be pursued.

Towards this, a dedicated research and development centers would receive the focus and attention it deserves in terms of investment and human resources capacity. Support services of research and extension will be expanded through promotion of farmers' field schools/model, capacity building of farmers and cooperatives.

The RDTC farm will be developed as a Technology Park or TVET for new and emerging agriculture technologies especially on climate smart agriculture, protected farming, organic and value chain, amongst others. The youth will be targeted for commercial farming and general farming communities on CSA.

The Ministry will also initiate institutional linkages with similar institute in the region and beyond. Further collaboration with RNR Sector agencies and academic institutions on thematic researches will be encouraged.

k. Multi-sectorial coordination and delegation of clear implementation responsibility

The National Guideline for Preparation of 12th FYP (GNHCS, 2016) assigns lead and collaborating agencies for each NKRA with an objective to achieve better coordination and maximum orientation to National goals and priority. Similarly, the plan is designed to strengthen teamwork and a coordinated multi-sectorial approach at national, sub-national and programme level towards fulfillment of plan's target. No individual agency owns any programme thereby building a collective ownership. Multiple agencies contribute to common programme although their contribution is to be differentiated by respective programme outputs and activities. For example: Food Self Sufficiency and Nutrition Security Program are assigned to multiple agencies such as DoA, DoL, DAMC, BAFRA and others. This is expected to progress towards implementing a plan in an integrated approach.

l. Enhance RNR Service Delivery

The increase in usage of mobile phones, Internet, computing devices and social media provides huge opportunity for RNR Sector to enhance its service delivery. As such, the Ministry will emphasize on "ICT enabled, Knowledge-Based Society". The Ministry will cater ICT and media services related to agriculture solutions and service delivery in all areas in line with Bhutan's ICT road maps, eGovernment Master plan, e-Government Framework(e-GIF) and Parenting concepts.

Further, one window advisory and direction services for input, technologies, and investment will be instituted in the Ministry. RNR statistical system will be strengthened to enhance one window data services for evidence based policy and planning.

CHAPTER NINE

RESOURCES ALLOCATION AND FINANCING FOR 12TH FYP

9.1 Resources Allocation Framework

Based on the Decentralization Policy and the Division of Responsibility Framework (DoRF), the Royal Government has taken a major policy decision in the resource allocation. The capital budget for the central ministries/agencies and the LGs is apportioned equal (50:50). With this, LGs allocation has increased significantly from 30% in the 11th FYP.

The total estimated cost required for the MoAF to successfully implement seven programmes over the next five year is Nu. 4,679.65 million whereas the capital outlay allocation is just Nu. 3,050 million, i.e 2.63% share of the national capital outlay (Refer figure 13). This is 37.24% reduction from the 11th FYP when 4.86 billion that was allocated in the beginning of 11th FYP. Further, the reduction is significantly higher at 62.44% when revised allocation of Nu. 8.12 billion during the 11th FYP is taken into consideration.

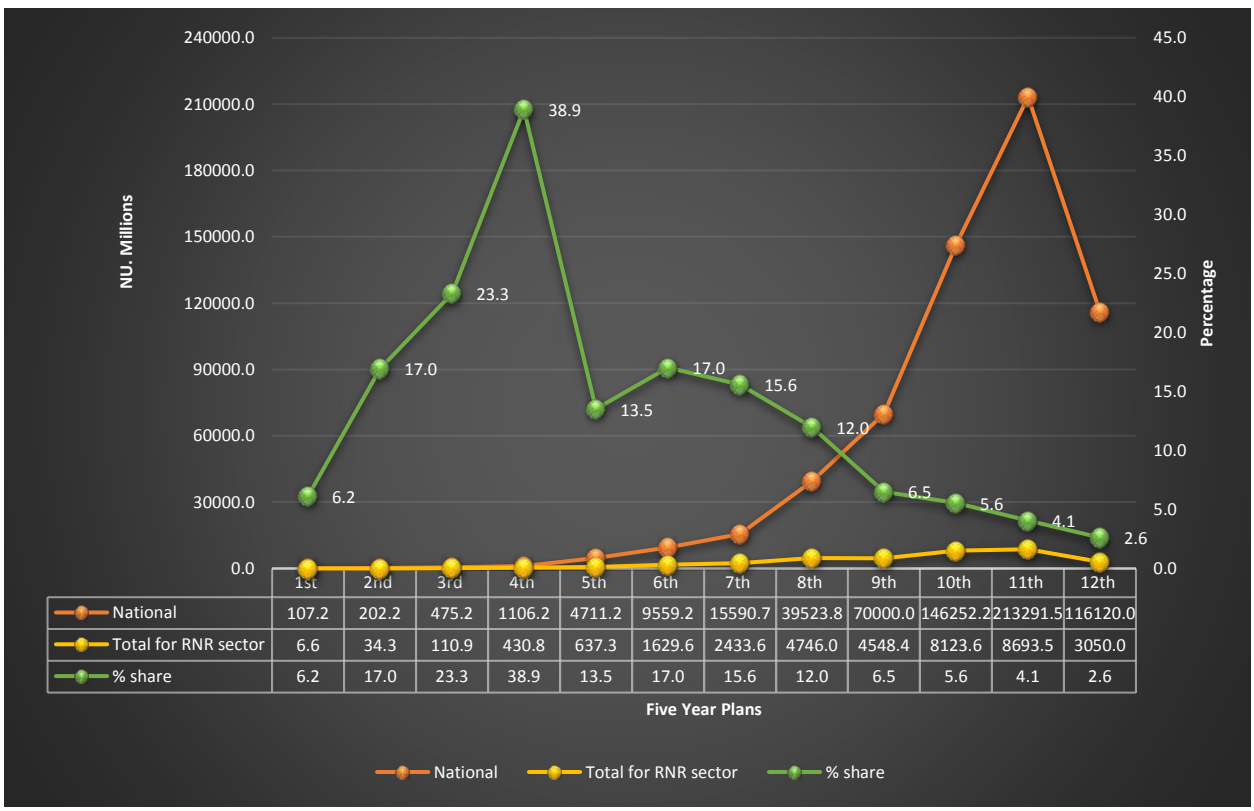


Figure 14: Share of 12th FYP Budget allocation for RNR Sector

9.2 Programme wise allocation and resource gap

Following parameters were fittingly considered to justify the resource allocation for the seven programs to be implemented by the agencies under the MoAF:

1. Programme contribution to NKRAs and AKRAs
2. Contribution to nine domains of GNH
3. Contribution to 12th FYP goals and objectives of the ministry
4. Spending capacity of the agencies

Programme One – Food and Nutrition Security is the largest programme of the 12th FYP where multiple agencies (DoA, DoL, BAFRA) will be involved in its implementation. Program one is therefore allotted the largest share of Nu. 2,362.42 million equivalent to about 50% of the overall funds.

Programme Three – Sustainable Natural Resources Management and Utilization is allotted Nu. 706.97 million accounting for 15% and 2nd in fund distribution ranking. The Programme Three receives one of the highest shares as almost all activities of this programme will be executed centrally by the DoFPS through its functional divisions and field offices across 20 Dzongkhags where they are institutionally under the administrative control of the Department.

Unlike the past plans, Climate Smart and Disaster Resilient Development is elevated to a programme level to address the most pressing and urgent challenges of climate change and disasters in the sector which will be implemented as the cross cutting theme by all sectors. This programme accounts for 14% of the total outlay, which is Nu. 655.68 million. RNR research and extension is allocated more than 9% of the outlay.

Programme Two – Value Chain and Enterprise Development will receive the share of 8% accounting for Nu. 353.73 million. In view of the goal of commercialization, marketing and agro-enterprise development, this programme is accorded the highest priority and its share is significant when activities under other programmes contributes to this programme.. The programmes on Highland Development and Coordination and Support Services is allocated Nu. 86.54 million and 70.73 million respectively.

Taking into consideration of the required estimated fund over the plan period against the available resource envelope and the need to achieve ambitious target of the 12th FYP, the Ministry would require an additional resource of Nu. 1,629.23 million to finance the gap (Refer Table 8).

Table 8: Financing Plan and Programme-wise budget allocation

Sl. No	Programmes	Indicative Outlay (Nu in million)		
		Priority 1 Activities	Priority 2 Activities	Total
1	Food and Nutrition Security	1228.19	1134.23	2362.42
2	Value Chain and Enterprise Development	*297.28*	*56.45*	353.73
3	Sustainable Natural Resources Management and Utilization	655.97	51.00	706.97
4	Research and Extension Services	224.08	219.50	443.58
5	Climate Smart and Disaster Resilient Development	535.68	120.00	655.68
6	Highland Development	56.64	29.90	86.54
7	Coordination and Support Service	52.58	18.15	70.73
	Total	**3,050.35**	**1,629.23**	**4,679.65**

Based on the resource availability and gaps identified in Table 8, the planned activities are prioritized to be implemented in a phased wise manner. Those activities that requires immediate and urgent intervention are classified as the First Priority activities to be implemented through Nu. 3,050 million; whereas activities under Priority Two will be implemented through Nu. 1,629 million.

An analysis on budget allocation and expenditure plan amongst agencies shows that DoA will receive the largest share accounting for 38% (Nu. 1,790 million) of the total estimated budget, closely followed by DoL at 32% (Nu. 1,504 million); and 17% (Nu. 818 million) for DoFPS, 6% (300 million) for BAFRA, 4% (Nu.184 million) for DAMC, and about 2% for the Secretariat that comprises of PPD, Directorate Services, RDTC and NBC.

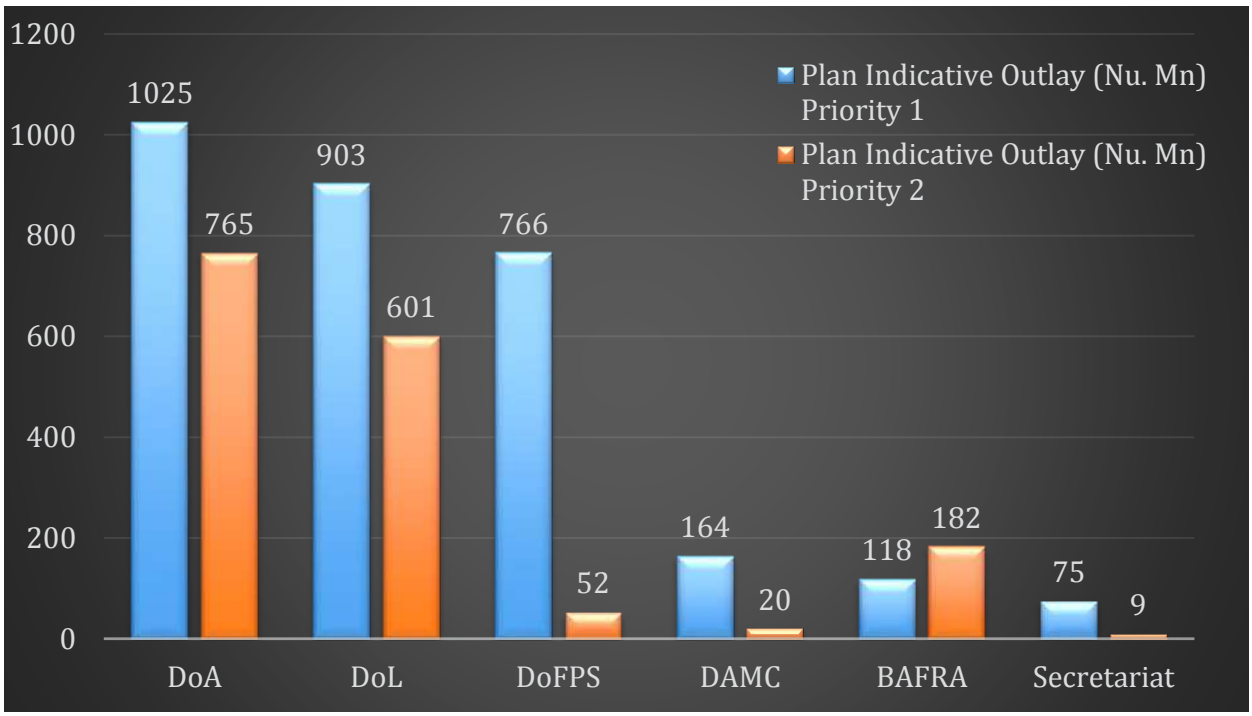


Figure 15: Allocation based on priority by agency

9.3 Programme wise investment for broad activities

Table 9: Food Self-sufficiency and Nutrition Security Programme

Activities	Plan Outlay in Nu (M) Capital		
	Priority 1 Activities	Priority 2 Activities	Total
Enhance Cereal production	30.00	0.00	30.00
Enhance Oil seed and grain legumes production	0.00	10.00	10.00
Enhance Horticulture production	55.00	8.00	63.00
Enhance Agriculture infrastructure & farm mechanization	371.93	497.00	868.93
Enhance School Agriculture Programme (SAP)	10.00	2.00	12.00
Enhance Meat Production	10.55	16.00	26.55

Enhance Egg Production	1.70	0.00	1.70
Enhance Dairy Production	10.36	7.50	17.86
Enhance Livestock Input Supply	404.19	218.96	623.15
Enhance Animal Health and Nutrition Services	206.52	191.92	398.44
Strengthen Plant and Animal Biosecurity and Bio-safety level	85.44	106.00	191.44
Enhance Food Quality and Safety	32.40	76.35	108.75
Promote National organic program and certification program	10.10	0.50	10.60
Total	**1228.19**	**1,134.23**	**2,362.42**

Table 10:Value Chain and Enterprise Development Programme

Activities	Plan Outlay in Nu (M) Capital		
	Priority 1 Activities	Priority 2 Activities	Total
Establish Commodity value chain for RNR produce	12.00	25.00	37.00
Increase domestic trade of RNR produce	30.00	0.00	30.00
Agro-based enterprises established including agriculture, livestock, NWFPs and ecotourism	186.09	11.45	197.54
Promote Viable Farmers' groups and cooperatives promoted	26.00	0.00	26.00
Facilitate and support Annual export of RNR products	23.19	0.00	23.19
Development of Infrastructure	20.00	20.00	40.00
Total	**297.28**	**56.45**	**353.73**

Table 11: Sustainable NR and Biodiversity Mgt. and Utilization Programme

Activities	Plan Outlay in Nu (M) Capital		
	Priority 1 Activities	Priority 2 Activities	Total
Sustainable management and utilization of timber	59.0	1.0	60.0
State of forest and carbon stock assessment	32.0	0.0	32.0
Enhance Community based forest management and conservation	15.0	1.6	16.6
Improve Professional capacity	55.0	10.0	65.0
Strengthen Protected and Conservation Area management	98.0	21.9	119.9
Reduce Forestry and wildlife offences/conflicts	41.0	0.0	41.0
Strengthen Nature based Eco-tourism	35.0	1.0	36.0
Enhance Conservation and sustainable utilization of biodiversity	24.97	0	24.97
Enhance Effective management of wetlands and watersheds	290.0	11.5	301.5
Enhance Natural capital accounting system	4.0	1.0	5.0
Enhance Urban ad agro forestry landscape management	2.0	3.0	5.0
Grand Total	**655.97**	**51.00**	**706.97**

Table 12: Research and Extension Services Program

Activities	Plan Outlay in Nu (M) Capital		
	Priority 1 Activities	Priority 2 Activities	Total
Conduct Policy Research	8.10	5.90	14.00
Enhance generation of RNR technologies	139.91	174.90	314.81
Enhance adoption of RNR Technologies	37.600	38.700	76.300
Enhance Research knowledge and information	38.47	0.00	38.47
Total	**224.080**	**219.500**	**443.580**

Table 13: Climate Smart and Disaster Resilient Development Program

Activities	Plan Outlay in Nu (M) Capital		
	Priority 1 Activity	Priority 2 Activities	Total
Promote Climate Resilient Livestock Farming	77.11	0.00	77.11
Enhance Livelihood Choices for Marginalized Farmers	10.20	0.00	10.20
Climate Smart irrigation and water efficient technologies	270.00	100.00	370.00
Climate smart technologies released and adopted	73.00	0.00	73.00
Strengthen RNR Disaster management institution	3.00	0.00	3.00
Enhance Knowledge management, education and awareness in DM	8.00	0.00	8.00
Strengthen Pest and diseases risk reduction on RNR hazards	5.00	0.00	5.00
Reduce Forest fire incidences (management)	36.10	0.00	36.10
National REDD+ Readiness phase for mitigation of climate change impacts	53.27	0.00	53.27
Total	**535.684**	**100.000**	**635.684**

Table 14: Highland Development Program

Activities	Plan Outlay in Nu (M) Capital		
	Priority 1 Activities	Priority 1 Activities	Total
Promote Highland enterprise	22.20	14.300	36.50
Promote Highland agriculture and livestock farming	30.29	15.60	45.89
Enhance Highland habitat conservation and management	4.13	0.00	4.13
Total	**56.620**	**29.900**	**86.52**

Table 15: Coordination and Support Service Program

Activities	Plan Outlay in Nu (M) Capital		
	Priority 1 Activities	Priority 2 Activities	Total
Strengthen Information System and ICT services	31.28	3.65	34.93
Strengthen Planning and monitoring and coordination system	7.07	0.00	4.07
Strengthen Policy and legislation	3.91	12.50	16.41
Strengthen Human Resource Development and Management Services	10.32	2.00	12.32
Total	**52.58**	**18.15**	**70.73**

CHAPTER TEN

MONITORING AND EVALUTION

10.1 Introduction

Monitoring and evaluation is the cornerstone of strategic planning and an important aspect in achieving the development performance and results. Therefore, all the development plans has recognized its importance for a long time. In 2014, RGoB instituted a Government Performance Management Division (GPMD) as an independent institution under the Prime Minister's Office to ensure efficient and effective monitoring and evaluation of development policies, programmes and projects of ministries, agencies, *Dzongkhags* and *Gewogs* through the Government Performance Management System (GPMS). The 12th Plan will be monitored using GPMS as depicted below.

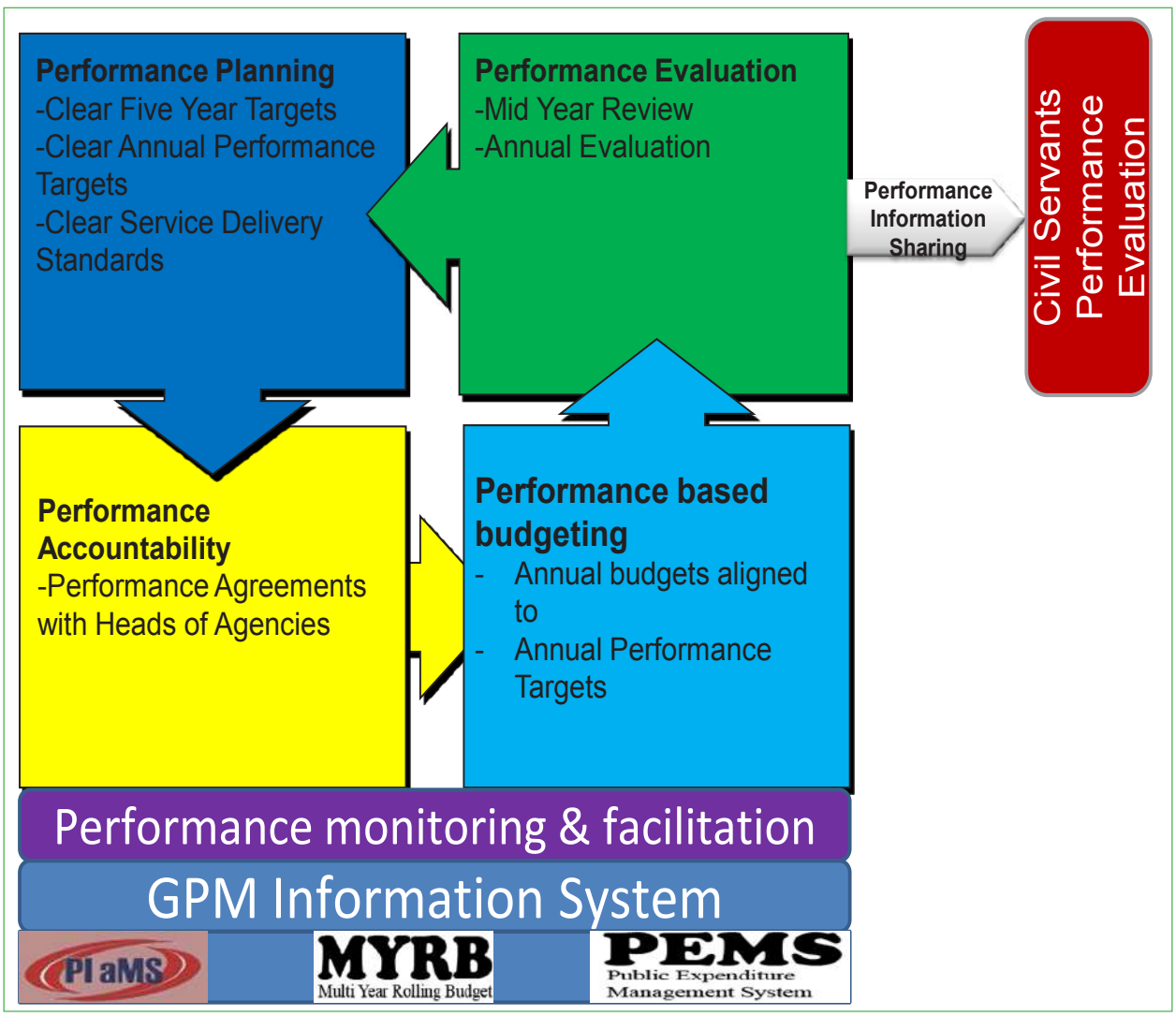


Figure 16: Integrated GPMS (Source: GPMD)

GPMS is the systemic process of formalizing performance agreements between the Cabinet Secretariat and all government organizations. The system allows alignment of sectoral plans and programs with the overall national strategic plans and objectives. It includes planning and setting targets at the beginning of the year, mid-term monitoring and review, evaluating performance at the end of the year and finally linking them to appropriate incentives. It is designed, specifically; to improve organizational effectiveness by making them focus on their core mandates, prioritize plans and programme activities and execute operational strategies. Performance Agreement provides a summary of the most important results that an organization is expected to achieve during a financial year. It is the primary document that formalizes performance agreements between the Cabinet Secretariat and the organizations. The main objectives of GPMS are to:

1. Provide clarity on the focus area;
2. Enhance accountability and performance; and
3. Allow efficient resource allocation/utilization.

10.2 GPMS Cycle

The performance management cycle is a continuous process that involves the following four phases:

A. Planning and target setting

B. Monitoring and coaching

C. Review and evaluation

D. Rewards and support programs

The cycle is illustrated in figure below and explained in the sections following.

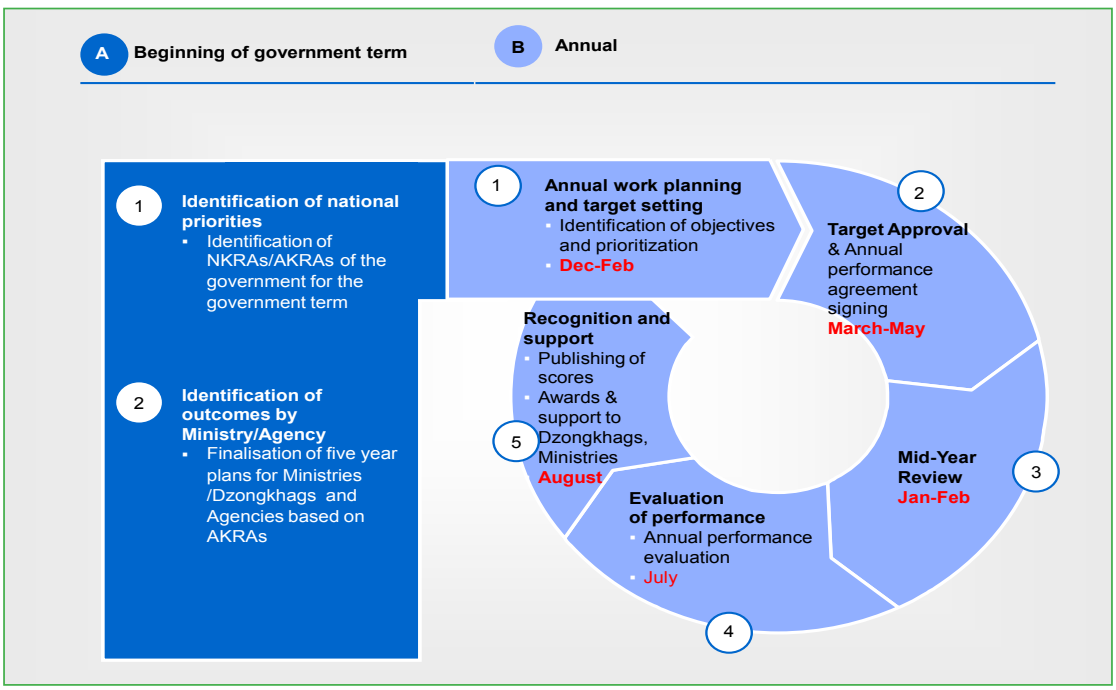


Figure 17: GPMS Cycle (Source: GPMD)

The monitoring and evaluation will be done at three levels including all stakeholders. At the National Level, the RNR sector performance shall be monitored and evaluated based on the Key Performance Indicators (KPIs) of Agency Key Result Areas (AKRAs).

Similarly the Departments and Agencies shall be monitored and evaluated based on the outcomes and outputs. The RNR sector shall follow the GPMS for M&E. All the data shall be entered in the central database electronically through the web-based GPMS. Monitoring and Evaluation Plan shall be therefore the basis for monitoring and evaluation of sector/agencies/local government's performance in terms of achievement of key result areas.

10.3 Primary Roles and Responsibilities of office bearers

The RNR-GNH Committee will be the M&E Review Committee at the Ministerial level:

i The Secretary of the Ministry- shall chair the Committee meetings.

ii Heads of the Departments/Agencies within the Ministry will be the members of the RNR-GNH Committee.

iii The RNR-GNH Committees shall meet at least bi-annually to review the progress of the plans within the Ministry/Agency.

The Departments, Agencies and Projects within the Ministry may set up appropriate internal management structures and procedures for efficient management and day-to- day monitoring of their programs and projects. The donors shall also be encouraged to harmonize their M&E systems with the National M&E system to minimize duplications and streamline the M&E System.

10.4 Basis for Monitoring

i. The annual performance agreement and targets of the respective Departments and Agencies for the given fiscal year shall form the main basis for monitoring.

ii. The AWPB shall be prepared based on the 12th FYP programs of the sector.

iii. The implementing entities of central Departments and Agencies within the Ministry shall be responsible for implementing the budgeted activities for the year.

10.5 Data Collection, Verification and Reporting

i. The implementing entities of central Departments and Agencies within the Ministry shall be responsible for collecting and recording data on implementation status of their programs and projects.

ii. The data shall be entered in the GPMS on a regular basis (weekly or monthly as appropriate).

iii. The data shall include physical and financial data of completed activities and results and other related information.

iv. The implementing entities shall enter the data in collaboration with Policy and Planning Division.

v. The PPD, Finance Division/Section and RSD shall monitor /verify the accuracy of data and ensure that the implementing agencies enter the data in the system regularly.

10.6 Data Analysis and Preparation of Progress Report

i. The PPD and RSD shall process and analyze the data received from the implementing agencies. The system can be used to do the pre-determined data analysis. Additional analysis and interpretations may be done if necessary using the data from the system and prepare consolidated progress report to be presented to RNR-GNH committee.

ii. The implementing entities under the Ministry/Agency shall prepare detailed progress report of their respective sectors annually. Reports can be generated from the GPMS.

iii. The 1st Semi-Annual Progress Report for the period July-December shall be completed by 31st January and the 2nd Semi-Annual Progress Report for the period January-June shall be completed by 31st July.

10.7 Progress Review and Feedback Mechanisms

i. The RNR-GNH Committee shall review the status of plan implementation at the Ministry or Agency level on a semi-annual basis.

ii. However, the PPDs or Departments and other entities within the Ministry/Agency are recommended to organize internal reviews more frequently (monthly or quarterly) to facilitate efficient decisions-making.

iii. Ministries and autonomous agencies are recommended to organize the 1st Semi-Annual Review Meeting within March/April and 2nd Semi-Annual Review Meeting within September/October.

iv. The Chief Planning Officer of the PPD shall table the progress reports to GNH Committee for review and decision making.

10.8 Evaluation

Evaluation is a periodic assessment, as systematic and objective as possible, of on-going or completed development interventions, their designs, implementation and results. Evaluation is a useful management tool for policy-makers, implementers and other stakeholders.

The main purposes of evaluation are:

i. To determine the relevance, efficiency, effectiveness, impact and sustainability.

ii To identify remedial measures to improve the performance of on-going development interventions.

iii. To provide lessons from the past experience for future planning and decision-making.

iv. Evaluations can be conducted for lessons regarding replications or sustainability, identifying what methods and strategies work best over time.

v. To ensure accountability. Evaluations may be conducted to account for the use of resources by the implementing entities to the government and funding agencies.

PART 2

PROGRAMME PROFILES

CHAPTER ELEVEN

RNR SECTOR PROGRAMMES

11.1 Programmatic Framework

The part-II focuses on the program result matrix and the corresponding Key Performance Indicators (KPIs), program activities and budget, Monitoring and Evaluation plan and indicator descriptions. Based on the principles of coordination, consolidation and collaboration, the RNR sector had identified and developed seven programmes for the 12th five year plan. These programmes are cross sectorial in nature and can be interpreted as a group of independent activities that needs to be implemented to realize the sector's Goal and AKRAs.

The seven programmes that have been identified are:

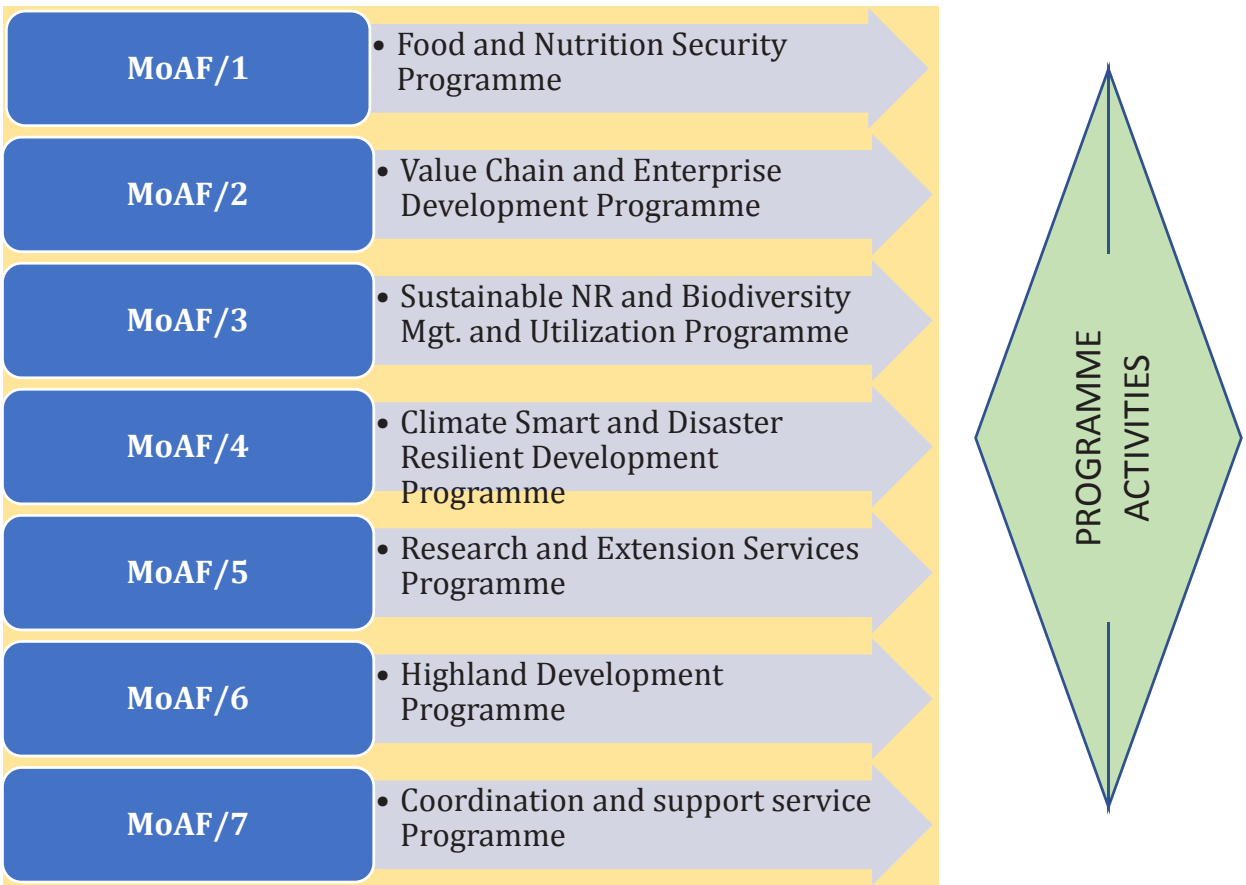


Figure 18: 12th FYP Programmes

MOAF/1: FOOD SELF-SUFFICIENCY AND NUTRITION SECURITY PROGRAMME

A. PROGRAMME SUMMARY

1. Programme Title: Food and Nutrition Security Programme

2. Link to NKRAs: NKRA 8 [Food and Nutrition Security Ensured];
NKRA 17[Sustainable Water Ensured];
NKRA 3 [Poverty Eradicated and Inequality Enhanced]

3. Linkage to AKRA: National Food Self-sufficiency Enhanced, Organic Farming for Sustainable Development Enhanced

B. PROGRAMME DESCRIPTION

The constitution of the Kingdom of Bhutan requires the State to promote circumstances that would enable the citizens to have secured livelihood. Vision 2020 underscores on the improvement of nutritional status of the rural population and Food act of Bhutan 2005 provides protection to human health through trade of food. Enhancing the Food self-sufficiency and Nutrition Security is also the primary objective of the RNR Sector in the 12th FYP.

While achievement of food and nutrition security is high on the national policy agenda, the task of achieving the inter-related objectives of food and nutrition security, national food self-sufficiency, and rural poverty reduction entails overcoming a host of issues and challenges. The food and nutritional security program will enhance self-sufficiency in rice, vegetable, meat, eggs, chicken and dairy products. The program will increase area under assured irrigation and reduce fallow land, strengthen animal and plant bio-security and safety, enhance food safety and strengthen organic agriculture production. Overall, implementation of this program in the 12th FYP will contribute to GNH with specific impact in the 3 domains of Health, Psychological well-being, Standard of living, community vitality, and culture.

Table 16: MoAF/01 – Programme Budget by Agencies

Agency	Resource Allocation (Nu. Mn)		
	Priority 1 Budget	Priority 2 Budget	Total
Department of Agriculture	472.93	517.00	989.93
Department of Livestock	637.42	434.88	1072.30
Bhutan Agriculture and Food Regulatory Authority	117.84	182.35	300.19
Total	**1228.19**	**129.17**	**1357.36**

Table 17: MoAF/01 – Programme Result Matrix

[No. of Outcome: 2; No. of Outputs: 16; No of activities: 95]

Results (Outcome)	KPIs	Unit	Baseline (Base year)	Projected Annual Target					Plan Target
				2018-19	2019-20	2020-21	2021-22	2022-23	
Outcome 1: Food Self-sufficiency and Nutrition Security Enhanced	Rice self-sufficiency	Percent	46.7 (Avg. 2015-'17)	49	51	54	57	60	60
	Maize self-sufficiency	Percent	86 (Avg. 2015-'17)	87	88	89	90	92	92
	Vegetable self-sufficiency	Percent	86 (Avg. 2015-'17)	87	89	93	95	100	100
	Fruit production	MT	53961 (Avg. 2015-'17)	58,340	62,719	67,097	71,476	75,855	75,855
	Area under assured irrigation	Acre	39,163 (2017)	39,363	39,663	39,963	40,463	48,350	48,350
	Fallow-land brought under cultivation	Acre	120 (2017)	500	700	1,500	2,639	5,339	5,339
	Meat self-sufficiency	Percent	37 (2016)	38.0	40.0	44.0	45.0	47	47
	Egg self-sufficiency	Percent	100 (2016)	100	100	100	100	100	100
	Fish Self-Sufficiency	Percent	12.9 (2016)	13.5	15	16	17	18	18
	Dairy Product self-sufficiency	Percent	88 (2016)	88	89	89	90	91	91
	National Bio-security index	Percent	n/a	≥80	≥80	≥80	≥80	≥80	≥80
	National food safety index	Percent	n/a	≥80	≥80	≥80	≥80	≥80	≥80
Outcome 2: Organic Farming for Sustainable Development Enhanced	Area under organic management (agriculture, livestock, NWFPs)	Acre	25,719 (2016)	26,513	26,909	29,687	31,671	33,655	33,655
	Certified organic products developed	Number	4 (2016)	5	6	11	14	17	17
	Annual national income from the sale of organic products	Nu. Mil	2.5 (2016)	3	3	4	4	5	5

Results (Outcome)	KPIs	Unit	Baseline (Base year)	Projected Annual Target					Plan Target
				2018-19	2019-20	2020-21	2021-22	2022-23	
Output 1.1: Cereal Production Enhanced	Paddy production (including spring paddy)	MT	83,913 (Avg. 2015-'17)	87,696	91,479	95,261	99,044	102,827	102,827
	Maize production (including spring maize)	MT	86,298 (Avg. 2015-'17)	88,338	90,387	92,437	94,486	96,535	96,535
	Quiona production	MT	2.3 (2017)	64	126	188	249	311	311
	Wheat production	MT	3,086 (Avg. 2015-'17)	3,270	3,454	3,638	3,822	3,526	3,526
	Buckwheat production	MT	3,091 (Avg. 2015-'17)	3,162	3,232	3,302	3,372	3,442	3,442
	Millet production	MT	1,541 (Avg. 2015-'17)	1,657	1,774	1,890	2,007	2,123	2,123
	Barley production	MT	1,684 (Avg. 2015-'17)	1,715	1,746	1,777	1,808	1,839	1,839
Output 1.2: Oil Seeds and Legumes Production Enhanced	Oil seeds production (mustard, sunflower, soyabean)	MT	818 (Avg. 2015-'17)	965	1012	1,059	1,106	1,153	1,153
	Legumes production (Rajma, Mungbean, Lentil)	MT	1,565 (Avg. 2015-'17)	1,694	1,824	1,954	2,083	2,213	2,213
Output 1.3: Horticulture Production Enhanced	Vegetables production	MT	58,697 (Avg. 2015-'17)	60,845	62,992	65,140	67,287	69,435	69,435
	Fruits production and nuts	MT	25,063 (Avg. 2015-'17)	26,073	27,083	28,094	29,104	30,114	30,114
	Potato production	MT	55,134 (Avg. 2015-'17)	57,350	59,565	61,780	63,996	66,211	66,211
	Citrus production	MT	28,898 (Avg. 2015-'17)	32,267	35,635	39,004	42,372	45,741	45,741
	Medicinal Aromatic Plants and Spices (MAPS) production (cardamom, ginger, black pepper, turmeric, medicinal plants)	MT	10,804 (Avg. 2015-'17)	10,398	10,802	11,216	11,630	12,044	12,044
	Mushroom production	MT	201 (Avg. 2015-'17)	130	148	166	183	201	201
	Ornamentalplant productions	Number	150, 000 (2017)	50,000	50,000	50,000	50,000	50,000	250,000

Output 1.4: Agriculture Infrastructure & Farm Mechanization Enhanced	Irrigation channels constructed/renovated	KM	2617 (2016)	36	36	36	36	36	2797
	Farm roads constructed/ maintained	KM	1300 (2016)	1,420	1,480	1,900	2,200	2,500	2,500
	Electric/solar fencing established	KM	3200 (2016)	3,300	3,350	3,700	3,950	4,200	4,200
	Area under farm mechanization	Acre	2600 (2016)	3,120	3,640	4,160	4,680	5,200	5,200
	Agriculture service delivery facilities established/improved (lab facilities, RNR office structure)	Number	10 (2016)	12	13	19	24	28	28
Output 1.5: Agriculture Land Developed	Fallow land brought under cultivation	Acre	120 (2016)	500	700	1,500	2,639	5,339	5,339
	Agriculture land developed	Acre	1,240 (2016)	500	2,000	3,000	3,000	1,500	10,000
Output 1.6: School Agriculture Programme Enhanced	Schools with Agriculture Programme	Number	310 (2016)	20	20	20	20	20	410
Output 1.7: Meat Production Enhanced	Pork production	MT	740	798	914	1,030	1,146	1,204	1,204
	Chicken production	MT	1,209	1,299	1,478	1,657	1,836	1,926	1,926
	Fish production	MT	187	222	292	363	433	468	468
	Chevon production	MT	191	196	207	218	229	234.4	234
Output 1.8: Egg Production Enhanced	Egg production	Million	105	107.5	112.5	117.5	122.5	125	125

Output1.9: Dairy Production Enhanced	Milk production	MT	47,270	48,399	50,656	52,914	55,171	56,300	56,300
	Butter production	MT	1709	1,731	1,774	1,817	1,860	1,881	1,881
	Cheese production	MT	3664	3,746.5	3,911.5	4,076.5	4,241.5	4,324	4,324
Output 1.10: Livestock Input Production Enhanced	Milking cattle	Number	83,404	83,404	83,404	83,404	83,404	83,404	83,404
	Layers (DOC)	Number	255,000	281,000	333,000	385,000	437,000	463,000	463,000
	Broilers (DOC)	Number	213,350	312,431	510,594	708,756	906,919	1,006,000	1,006,000
	Piglets	Number	3,153	4,634	7,596	10,557	13,519	15,000	15,000
	Fingerlings	Number	750,000	773,250	819,750	866,250	912,750	936,000	936,000
Output1.11: Animal Nutrition and Health Services Enhanced	Area under Legume Fodder	Acres	468	586	822	1,059	1,295	1,414	1,414
	Conserved Forage availability	MT	8,838	13,175	21,855	30,536	39,216	43,556	43,556
	Feed Quality Test Parameters	Number	6	7	8	10	11	12	12
	Disease outbreaks	Number	65 (2016)	63	61	59	57	55	55
	Client satisfaction rate (Clinical services)	Percent	80 (2016)	83	86	89	92	95	95
	Zoonotic diseases	Number	35 (2016)	33	31	29	27	25	25
Output 1.12: Plant and Animal Bio-security and Bio-safety level Strengthened	Exotic plant pests, diseases and invasive alien species prevented	Percent	>60 (2016)	>70	>80	>90	>90	>90	>90
	Exotic animal diseases and invasive species prevented	Percent	>80 (2016)	>90	>90	>90	>90	>90	>90
	Notifiable plant pest and diseases contained	Percent	100 (2016)	100	100	100	100	100	100
	Notifiable Animal diseases contained	Percent	100 (2016)	100	100	100	100	100	100
	GMOs/LMOs entry prevented	Percent	NA (2016)	>80	>80	>80	>80	>80	>80
	Unauthorised /Invasive GMOs/ LMOs incidents containment	Percent	100 (2016)	100	100	100	100	100	100
	Timeline by which BAFRA's components of One Health Strategy of Bhutan implemented	Date	n/a (2016)	-	-	-	2022	-	2022
	Timeline by which veterinary public health system component of BAFRA is implemented	Date	n/a (2016)	-	-	-	2022	-	2022

Output 1.13: Food Quality and Safety Enhanced	Food import control system implemented on prioritized food commodities	No.	4 (2016)	NA	NA	2	5	10	10
	Domestic food establishment licensed based on GMP and GHP Criteria	No.	10	20	30	40	60	90	90
	Food borne diseases and safety incidence managed effectively	Percent	100 (2016)	100	100	100	100	100	100
	Accredit BAFRA's inspection services for ISO/IEC 17020:2012	Number	n/a (2016)			1			1
	Quality assurance and certification for agricultural produces and inputs implemented	Number	3 (2016)	3	4	8	10	10	10
	National Food Testing Laboratory fully equipped and functional	No.	39 (2016)	4	4	3	3	3	56
Output 2.1: Organic Agriculture Promoted	Area under organic agriculture management	Acre	5,560 (2016)	5,892	6,059	7,222	8,053	9,039	9,039
	Quantity of organic agriculture products	MT	972 (2016)	1,321	1,495	2,716	3,587	4,459	4,459
Output2.2: Organic Livestock Promoted	Organic livestock products	Number	n/a (2016)	0	0	1	1	1	3
Output 2.3: Organic Guarantee and Certification System Developed	Organic guarantee and certification system developed	Date	2016	n/a	2019	-	-	-	2019

Table 18: MoAF/01 – Programme Activities

Program Outputs	Programme Activities	Lead Implementing Agency	Collaborating Agency	Plan Outlay in Nu (M) Capital			Priority (High/ Medium)
				Priority 1 Activities	Priority 2 Activities	Total	
Output1.1: Cereal Production Enhanced	Commercialization through contract farming/PPP/FDI/SoE model	DoA	DoA, FMCL, BLDC, Private Sectors, DAMC	20.00		20.00	High
	Production Support to improved seeds	DoA	ARDCS, Dzongkhags	10.00		10.00	High
Output 1.2: Oil seed and Grain Legumes Production Enhanced	Adaptation of improved post-harvest technologies for grain legumes and oil seed	DoA	Dzongkhags/AMC/FMCL/ ARDCs		10.00	10.00	Medium
Output 1.3: Horticulture Production Enhanced	Establishment of germplasm repositories	DoA	APD		8.00	8.00	Medium
	Support and promote vegetable production	DoA	LGs, ASSR, SoE, Private sector	10.00		10.00	High
	Area brought under large scale commercial fruit production (500 ac)	DoA	FMCL, APD, ARDCs, Dzongkhags	30.00		30.00	High
	Promotion of intensive cultivation and enterprising agriculture technologies	DoA	ARDCS, RDTCs, Dzongkhags and private sectors	10.00		10.00	High
	Production of ornamental plants	DoA		5.00		5.00	High
Output 1.4: Agriculture Infrastructure & Farm Mechanization Enhanced	Maintenance of pressurized irrigation systems	DoA	Dzongkhags	10.00		10.00	High
	Maintenance and Establishment of citrus repository	DoA	APD	10.00		10.00	High
	Strengthening of seed production facilities	DoA	ARDCs, Dzongkhags, private sectors	7.00		7.00	High
	Strengthening of lab facilities and equipment	DoA	Private, Central Agencies	25.00		25.00	High

	Capacity Building of farm machinery operators	DoA	ARDCs, Dzongkhags, FMCL, private sector, TTI	8.00		8.00	High
	Promote farm mechanization through supply of machineries and hiring services	DoA	FMCL/AMC/ARDCs/Dzokhags	50.00		50.00	High
	Construction of irrigation (Zhungkhar and Yabrang, (Spill over budget)	DoA	Dzongkhags	48.93		48.93	High
	Construction and maintenance of agriculture service delivery infrastructures	DoA	AED, ARDCs, CPs	185.00		185.00	High
	Renovation of late Dasho Nishoka's office at ARDSC Panbang	DoA	AED, Private sector	8.00		8.00	High
	Operationalization of National Food Security Reserve	DoA	FCBL		497.00	497.00	Medium
Output 1.5: Agriculture Land Developed.	Maintenance of CMU machines for land development	DoA	Dzongkhags	20.00		20.00	High
	Develop Agriculture land	DoA	Dzongkhags	50.00			High
Output1.6: School Agriculture Programme (SAP) Enhanced	Promotion programme on integrated approach (Gardens, Wash & Nutrition)	DoA	CS/Dzongkhags/DSE/SAP	4.00		4.00	High
	Promotion of EM technology for organic farming	DoA	DoA		2.00	2.00	Medium
	Establishment of blending facility for fortified rice	DoA	FCBL, MoE, WWF,	1.00		1.00	High
	Training of FAT teachers on SAP	DoA	DSE, CS, CNR, RDTC	5.00		5.00	High
Output 1.7: Meat Production Enhanced	Promote Chicken Commercialization and Improved efficiency	DoL	RLDCs	5.300		5.30	High
	Promote Fish Farming and provide specialized technical backstopping to fishery potential areas	DoL	RLDC-W & RLDC-Z	4.100		4.10	High
	Strengthen existing fish rearing facility in Centres and Regional Units	DoL	NRDCR&LF/RCA		16.000	16.00	Medium
	Promote Goat farming and enhance chevon production in the country	DoL	LPD+RLDCs	1.150		1.15	High

Output 1.8: Egg Production Enhanced	Promote organized egg production and provide specialized technical support	DoL	RLDC-T/W/Z	1.700		1.70	High
Output 1.9: Dairy Production Enhanced	Promote organised milk production and provide specialized technical support	DoL	NJBC/BSCBF/RCRF	10.360		10.36	High
	Establishment of service delivery facilities	DoL	RLDC-K/RCRF		7.500	7.50	Medium
Output 1.10: Livestock Input Production Enhanced	Enhance input production capacity and efficiency for milking cattle	DoL	BSCBF/NDRDC/RMBF/RCRF/ RMBC	120.790		120.79	High
	Infrastructure development of dairy sector and procurement of equipment	DoL	BSCBF/NDRDC/RMBF/RCRF/ RMBC		122.560	122.56	Medium
	Enhance input production capacity and efficiency for Layers (DOC)	DoL	RPPBC, RPBC, NPRDC	114.500		114.50	High
	Up-gradation of existing government owned poultry sheds and provision of mobility vehicles at Poultry Units	DoL	RPPBC, RPBC, NPRDC		32.800	32.80	Medium
	Enhance input production capacity and efficiency for Broilers (DOC)	DoL	NPRDC	107.120		107.12	High
	Develop professionalism in Broiler production	DoL	RLDC-Z		0.500	0.50	Medium
	Enhance input production capacity and efficiency for piglets	DoL	NPiRDC	18.700		18.70	High
	Develop subject matter experts on pig breeding and infrastructure development in piggery sector	DoL	NPPBC, NPiRDC, RPBC		44.600	44.60	Medium
	Enhance input production capacity and efficiency fingerling	DoL	NRDCA, RCA	43.078		43.08	High
	Mobilize essential aquaculture inputs and restructuring of ponds	DoL	NRDCA, RCA		18.500	18.50	Medium

Output 1.11: Animal Health and Nutrition Services Enhanced	Enhance input production capacity and efficiency for legume production	DoL	NRDCAN	4.800		4.80	High
	Support on fencing and packaging materials for feed and fodder	DoL	NRDCAN		15.000	15.00	Medium
	Enhance input production capacity and efficiency for forage availability	DoL	NJBC/BSCBF/RMBF, RMBC, RCRF, NRDCAN	23.950		23.95	High
	Infrastructure development for fodder conservation and procurement of equipment	DoL	NJBC/BSCBF/RMBF, RMBC, RCRF, NRDCAN		21.100	21.10	Medium
	Enhance input production capacity and efficiency for feed quality tests	DoL	NRDCAN	34.700		34.70	High
	Develop Disease outbreaks containment strategies and prevention measures	DoL	NCAH, NVH, LCS, RLDC	63.560		63.56	High
	Conduct risk based surveillances for emerging and re-emerging diseases in livestock animals	DoL	NCAH, NVH, LCS, RLDC		63.520	63.52	Medium
	Provide effective veterinary services in clinical cases	DoL	NCAH, NVH, RLDC	61.410		61.41	High
	Support public health friendly animal treatment services	DoL	NCAH, NVH, RLDC		45.601	45.60	Medium
	Containment of country's prioritized zoonotic disease and institution of surveillance system for border diseases	DoL	NCAH, NVH	18.100		18.10	High
	Implement dog population management and control strategies of zoonotic and modifiable diseases at national level	DoL	NCAH, NVH		46.700	46.70	Medium

Output 1.12: Plant and Animal Bio-security and Bio-safety Level Strengthened	Construction of bio-security infrastructures (Nganglam)	BAFRA	DoA and Nganglam Dungkhag Engineering sections	11.00		11.00	High
	Construction of bio-security infrastructures (Phuentsholing, Paro, Haa and Sibsoo)	BAFRA	DoA and Nganglam Dungkhag Engineering sections		79.00	79.00	Medium
	Develop and amend enabling legal and tertiary instruments	BAFRA	NA		7.00	7.00	Medium
	Equip existing quarantine stations with basic quarantine facilities	BAFRA	NA	14.00		14.00	High
	Equip bio-security offices with bio-security and food safety emergency management tools and equipment	BAFRA	NA	15.74		15.74	High
	Initiate regulation to improve commercial farm bio-security level	BAFRA	NA	5.00		5.00	High
	Initiate enforcement of animal welfare measures	BAFRA	NA		5.00	5.00	Medium
	BAFRA's components of One Health Strategy and Vet. Public Health of Bhutan implemented	BAFRA	NA	6.00		6.00	High
	Improve the Veterinary Public Health System component of BAFRA	BAFRA	DoL		10.00	10.00	Medium
	Improve technical capacity for detection and identification of quarantined pests and diseases and management (x-ray screening, pest identification)	BAFRA	Line Departments	1.00		1.00	High
	Establish and maintain international linkages (EIC, FSSAI, ACFS, NPPOs, DAE, KRIBB, DAHD) and participation in obligated international meetings (CODEX, IPPC, COPMOP)	BAFRA	Line Departments	5.00		5.00	High

	Strengthen Plant and Animal Bio-security capacity to contain outbreaks of modifiable diseases effectively	BAFRA	Line Departments	11.00		11.00	High
	Increase scope of e-plant bio-security services	BAFRA	Line Departments	1.20		1.20	High
	Develop plant quarantine pests and diseases landscape maps and database	BAFRA	Line Departments	1.00		1.00	High
	Accredit organic inspection and certification system for Bhutan Organic Standards 2018	BAFRA	Line Departments	2.00		2.00	High
	Accredit GAP certification system for Bhutan GAP Standards 2017	BAFRA	Line Departments	2.00		2.00	High
	Develop guidelines for inspection and certification of agricultural produces and NWFPs	BAFRA	Line Departments	0.50		0.50	High
	Establish national capacity and equip entry-point offices with technical kits for bio-safety regulation and inspection	BAFRA	Line Departments	5.00		5.00	High
	Capacity building on GMO food safety assessment	BAFRA	Line Departments		5.00	5.00	Medium
	Make Bio-safety Clearing House fully functional through capacity development	BAFRA	Line Departments	2.50		2.50	High
	Prevent and containment of any unauthorized/invasive/emergency GMOs/LMOs	BAFRA	Line Departments	2.50		2.50	High

Output 1.13: Food Quality and Safety Enhanced	Establish facilities for implementation of food import and export inspection and certification at official entry points	BAFRA	Line Departments	8.00		8.00	High
	Develop linkages for mutual recognition of certification	BAFRA	Line Departments		1.00	1.00	Medium
	Develop a database for food import, export, food quality and safety	BAFRA	Line Departments		2.00	2.00	Medium
	Implement food safety licensing system (GMP and GHP criteria)	BAFRA	Line Departments		1.20	1.20	Medium
	Mainstream national and international food standard setting, review and feedback system for standards, and codex participation	BAFRA	Line Departments		2.00	2.00	Medium
	Conduct training and awareness and education on food safety for food business operators	BAFRA	Line Departments	1.00		1.00	High
	Develop technical capacity for food safety investigation and response	BAFRA	Line Departments		0.50	0.50	Medium
	Equip field offices with food safety incident investigation and response kits	BAFRA	Line Departments		1.50	1.50	Medium
	Accredit BAFRA's inspection services for ISO/IEC 17020:2012 (conformity assessment-requirements for the operations of various types of bodies performing inspection)	BAFRA	Line Departments	2.50		2.50	High
	Upgrade laboratory infrastructure, purchase state-of-the-art analytical equipment (Digester)	BAFRA	Line Departments	6.00		6.00	High
	Upgrade laboratory infrastructure, purchase state-of-the-art analytical equipment (ICPMSMS, GCMSMS, ICPMS and Radio Isotope detector)	BAFRA	Line Departments		58.15	58.15	Medium

	Introduce new laboratory test parameters in Micro, GMO, Nutrition, Residue and Contaminant laboratories including AMR)	BAFRA	Line Departments	1.50		1.50	High
	Generate baseline data on food quality and safety for priority foods	BAFRA	Line Departments		2.00	2.00	Medium
	Ensure maintenance of ISO 17025 accreditation	BAFRA	Line Departments	1.20		1.20	High
	Ensure maintenance of ISO 17020 and 17065 accreditation	BAFRA	Line Departments	1.20		1.20	High
	Increase testing scope under ISO 17025 accreditation system	BAFRA	Line Departments	4.00		4.00	High
	Implementation of organic and GAP practices (Bhutan GAP) and certifications	BAFRA	DoA, DoL, DoFPS		8	8.00	Medium
	Ensure reliability and accuracy through calibration and proficiency testing	BAFRA	Line Departments	7.00		7.00	High
Output2.1: Organic Agriculture Promoted	Promote organic agriculture production inputs	DoA	ARDCs, CPs and Dzongkhgs	5.00		5.00	High
Output 2.2: Organic Livestock Farming Promoted	Promote Certified Organic Livestock Products	DoL	RLDC	4.100		4.10	High
	Capacity and skill development on organic production	DoL	RLDC		0.500	0.50	Medium
Output 2.3: Organic Guarantee and Certification System Developed	Develop organic guarantee and certification system	DoA	BAFRA	1.00		1.00	High
Total				**1228.19**	**1134.23**	**2362. 42**	

Table 19: MoAF/01 – Programme Monitoring & Evaluation Matrix

Results (Outcome)	Indicators	Unit	Baseline (year)	12 FYP Target	Data Source	Reporting Frequency	Reporting Responsibility
Outcome 1. Food Self-sufficiency Enhanced	Rice self-sufficiency	Percent	46.7 (Avg. 2015-'17)	60	SSR report	Annually	DoA
	Maize self-sufficiency	Percent	86 (Avg. 2015-'17)	92	SSR report	Annually	DoA
	Vegetable self-sufficiency	Percent	86 (Avg. 2015-'17)	100	SSR report	Annually	DoA
	Fruit production	MT	53,961 (Avg. 2015-'17)	75,855	Agriculture Statistic	Annually	DoA
	Area under assured irrigation	Acre	39,163 (2017)	48,350	Agriculture Statistic	Annually	DoA
	Fallow-land brought under cultivation	Acre	120 (2017)	5,339	Agriculture Statistic	Annually	DoA
	Meat self-sufficiency	Percent	37 (2016)	47	Livestock statistics	Annual	DoL
	Egg self-sufficiency	Percent	100 (2016)	100	Livestock statistics	Annual	DoL
	Fish Self-Sufficiency	Percent	12.9 (2016)	18	Livestock statistics	Annual	DoL
	Dairy Product self-sufficiency	Percent	88 (2016)	91	Livestock statistics	Annual	DoL
	National Bio-security index	Percent	2016	≥80	BAFRA Report	Annually	BAFRA
	National food safety index	Percent	2016	≥80	BAFRA Report	Annually	BAFRA
Outcome 2: Organic Farming for Sustainable Development Enhanced	Area under organic management (agriculture, livestock, NWFPs)	Acre	25719 (2016)	33,655	Administrative Data/Report	Annually	DoA
	Certified organic products developed	Number	4 (2016)	17	Administrative Data/Report	Annually	DoA
	Annual national income from the sale of organic products	Nu. Mil	2.5 (2016)	5	Administrative Data/Report	Annually	DoA

Results (Output)	Indicators	Unit	Baseline (year)	12 FYP Target	Data Source	Reporting Frequency	Reporting Responsibility
Output 1.1: Cereals Production Enhanced	Paddy production (including spring paddy)	MT	83,913 (Avg. 2015-'17)	102,827	Agriculture Statistic	Annually	DoA
	Maize production (including spring maize)	MT	86,289 (Avg. 2015-'17)	96,535	Agriculture Statistic	Annually	DoA
	Quiona production	MT	2.3 (Avg. 2015-'17)	311	Agriculture Statistic	Annually	DoA
	Wheat production	MT	3,086 (Avg. 2015-'17)	3,526	Agriculture Statistic	Annually	DoA
	Buckwheat production	MT	3,091 (Avg. 2015-'17)	3,442	Agriculture Statistic	Annually	DoA
	Millet production	MT	1,541 (Avg. 2015-'17)	2,123	Agriculture Statistic	Annually	DoA
	Barley production	MT	1,884 (Avg. 2015-'17)	1,839	Agriculture Statistic	Annually	DoA
Output 1.2: Oil seed and Legumes Production Enhanced	Oil seeds production (mustard, sunflower, soyabean)	MT	918 (Avg. 2015-'17)	1,153	Agriculture Statistic	Annually	DoA
	Legumes production (Rajma, Mungbean, Lentil)	MT	1565 (Avg. 2015-'17)	2,213	Agriculture Statistic	Annually	DoA
Output 1.3: Horticulture Production Enhanced	Vegetables production	MT	58,697 (Avg. 2015-'17)	69,435	Agriculture Statistic	Annually	DoA
	Fruits production and nuts	MT	25,063 (Avg. 2015-'17)	30,114	Agriculture Statistic	Annually	DoA
	Potato production	MT	55,134 (Avg. 2015-'17)	66,211	Agriculture Statistic	Annually	DoA

	Citrus production	MT	28,898 (Avg. 2015-'17)	45,741	Agriculture Statistic	Annually	DoA
	Medicinal Aromatic Plants and Spices (MAPS) production (cardamom, ginger, black pepper, turmeric, medicinal plants)	MT	10,804 (Avg. 2015-'17)	12,044	Agriculture Statistic	Annually	DoA
	Ornamental plant productions	Number	150,000 (2017)	250,000	DoA Administrative Data/Report	Annually	DoA
	Mushroom production	MT	112 (Avg. 2015-'17)	201	Agriculture Statistic	Annually	DoA
Output 1.4: Agriculture Infrastructure & Farm Mechanization Enhanced	Irrigation channels constructed/renovated	KM	2617 (2016)	2797	Agriculture Statistic	Annually	AED
	Farm roads constructed/ maintained	KM	1300 (2016)	2,500	Agriculture Statistic	Annually	AED
	Electric/solar fencing established	KM	3200 (2016)	4,200	Agriculture Statistic	Annually	DoA
	Area under farm mechanization	Acre	2600 (2016)	5,200	Agriculture Statistic	Annually	DoA
	Agriculture service delivery facilities established/ improved (lab facilities, RNR office structure)	Number	10 (2016)	28	Annual report/ Agriculture Statistic	Annually	DoA
Output 1.5: Agriculture Land Developed	Fallow land brought under cultivation	Acre	120 (2016)	5,339	Agriculture Statistic	Annually	DoA
	Agriculture land developed	Acre	1240 (2016)	10,000	Agriculture Statistic	Annually	DoA
Output 1.6: School Agriculture Programme Enhanced	Schools with Agriculture Programme	Number	310 (2016)	410	Administrative Data/Report	Annually	DoA

Output 1.7: Meat Production Enhanced	Pork production	MT	740 (2016)	1204	Livestock statistics	Annual	DoL
	Chicken production	MT	1209 (2016)	1926	Livestock statistics	Annual	DoL
	Fish production	MT	187 (2016)	468	Livestock statistics	Annual	DoL
	Chevon production	MT	191 (2016)	234.4	Livestock statistics	Annual	DoL
Output 1.8: Egg Production Enhanced	Egg production	Million	105 (2016)	125	Livestock statistics	Annual	DoL
Output 1.9: Dairy Production Enhanced	Milk production	MT	47270 (2016)	56300	Livestock statistics	Annual	DoL
	Butter production	MT	1709 (2016)	1881	Livestock statistics	Annual	DoL
	Cheese production	MT	3664 (2016)	4324	Livestock statistics	Annual	DoL
Output 1.10: Livestock Input Production Enhanced	Milking cattle	Number	83404 (2016)	83404	Livestock statistics	Annual	DoL
	Layers (DOC)	Number	255000 (2016)	463000	Livestock statistics	Annual	DoL
	Broilers (DOC)	Number	213350 (2016)	1006000	Livestock statistics	Annual	DoL
	Piglets	Number	3153 (2016)	15000	Livestock statistics	Annual	DoL
	Fingerlings	Number	750000 (2016)	936000	Livestock statistics	Annual	DoL
Output 1.11: Animal Nutrition and Health Services Enhanced	Area under Legume Fodder	Acres	100 (2016)	1414	Livestock statistics	Annual	DoL
	Conserved Forage availability	Acres	8838 (2016)	43556	Livestock statistics	Annual	DoL
	Feed Quality Test Parameters	Number	6 (2016)	12	Livestock statistics	Annual	DoL
	Disease outbreaks	Number	102 (2016)	99	Livestock statistics	Annual	DoL

	Client satisfaction rate (Clinical services)	Number	80 (2016)	95	Livestock statistics	Annual	DoL
	Zoonotic diseases	Number	35 (2016)	25	Livestock statistics	Annual	DoL
Output 1.12: Plant and Animal Bio-Security Level Strengthened	Entry of significant exotic animal pests and diseases prevented	Percent	>80 (2016)	>90	BAFRA Report	Annually	BAFRA
	Notifiable plant and animal diseases contained	Percent	>100 (2016)	100	BAFRA Report	Annually	BAFRA
	Timeline by which BAFRA's components of One Health Strategy of Bhutan implemented	Date	NA (2016)	2022	BAFRA Report	Annually	BAFRA
	Timeline by which veterinary public health system component of BAFRA is implemented	Date	NA (2016)	2022	BAFRA Report	Annually	BAFRA
	Entry of significant exotic plant pests and diseases prevented	Percent	>80 (2016)	>90	BAFRA Report	Annually	BAFRA
	Notifiable plant pests and diseases contained	Percent	>100 (2016)	100	BAFRA Report	Annually	BAFRA
	Quality assurance and certification implemented for agricultural products and inputs	Percent	10% (2016)	90	BAFRA Report	Annually	BAFRA
	Entry of GMOs/LMOs prevented	Percent	n/a. (2016)	>80	BAFRA Report	Annually	BAFRA
	Unauthorized /Invasive GMOs/LMOs incidents contained	Percent	>100 (2016)	100	BAFRA Report	Annually	BAFRA

Output 1.13: Food Quality and Safety Enhanced	Food import control system implemented on prioritized food commodities	No.	4 (2016)	10	BAFRA Report	Annually	BAFRA
	Domestic food establishment licensed based on GMP and GHP Criteria	Percent	10 (2016)	90	BAFRA Report	Annually	BAFRA
	Food borne diseases and safety incidence managed effectively	Percent	100 (2016)	100	BAFRA Report	Annually	BAFRA
	BAFRA established as an accredited Inspection Body as per ISO 17020	Number	0 (2016)	1	BAFRA Report	Annually	BAFRA
	National Food Testing Laboratory fully equipped and functional	Number	39 (2017)	17	BAFRA Report	Annually	BAFRA
	Quality assurance and certification for agricultural produces and inputs implemented	Number	3(2019)	10	BAFRA Report	Annually	BAFRA
Output 2.1: Organic Agriculture Promoted	Area under organic agriculture management	Acre	5560 (2016)	8,884	Administrative Data/Report	Annually	DoA
	Quantity of organic agriculture products	MT	972 (2016)	4,459	Administrative Data/Report	Annually	DoA
Output 2.2: Organic Livestock Farming Promoted	Certified Organic Livestock products	Number	0 (2016)	3	Livestock statistics	Annual	DoA
Output 2.3: Organic Guarantee and Certification System Developed	Organic guarantee and certification system developed	Date	n/a. (2016)	2019	Administrative Data/Report	Annual	DoA
	Organic product certified	Number	4 (2016)	5	Administrative Data/Report	Annual	DoA

Table 20: MoAF/01 – Indicator Description

Outcome	Indicators	Unit	Description
Outcome 1: National Food Self-sufficiency and Nutrition Security Enhanced	Rice self-sufficiency	Percent	The indicator measures the volume of rice produced in the country as a proportion of requirement for national consumption (inclusive of population aged between age of 5-80 years)
	Maize self-sufficiency	Percent	The indicator measures the volume of maize produced in the country as a proportion of requirement for national consumption
	Vegetable self-sufficiency	Percent	The indicator measures the volume of vegetables (13 different vegetables identified) produced in the country as a proportion of requirements for national consumption
	Fruits production	MT	The indicator measures the annual production of fruits produced in the country with focused investment in prioritized fruits like apple, citrus, avocado, kiwi, pear, persimmon, walnut, passion fruit, banana, mango, watermelon, strawberry and peach
	Meat self-sufficiency	Percent	This indicator measures the volume of meat (pork, fish, chicken, chevon) produced in the country as a proportion of requirement for national consumption
	Egg self-sufficiency	Percent	The indicator measures the quantity of eggs produced in the country as proportion of requirement for national consumption
	Dairy products self-sufficiency	Percent	The indicator measures the volume of dairy products (milk, butter, cheese) produced in the country as a proportion of requirement for national consumption
	Area under assured irrigation	Acre	The indicator measures the total area of Chhuzhing under assured irrigation with perennial water source (reliable water source, intake and stable irrigation channels and an irrigable command area)
	Fallow-land brought under cultivation	Acres	The indicator measures the total area of *fallow-Chhuzhing* (Wet-land) brought back to cultivation
	National Bio-security level	Percent	The indicator measures the proportion of exotic pests, diseases, alien species and GMOs of plants and animals prevented and/or contained
	National food safety and quality system	Date	The indicator measures the timeline by, which robust food safety system (licensing for food businesses, food import control, inspection and certification) is institutionalized
Outcome 2: Organic Farming for Sustainable Development Enhanced	Area under organic management	Acres	The indicator measures the total area under organic management (Agriculture, Forestry-lemon grass)
	Certified organic products developed	Number	The indicator measures the number of RNR products (Agriculture, Livestock and Forestry products) certified as organic for domestic and international markets
	Household income from the sale of organic products	Nu. Mil	The indicator measures the household income generated through the sale of certified organic products

Output	Indicators	Unit	Description
Output 1.1: Cereal Production Enhanced	Rice production (including spring rice)	MT	The indicator measures the quantity of rice production at National level
	Maize production (including spring maize)	MT	The indicator measures the quantity of maize production at National level
	Quinoa production	MT	The indicator measures the quantity of quinoa production at National level
	Wheat production	MT	The indicator measures the quantity of wheat production at National level
	Buckwheat production	MT	The indicator measures the quantity of buckwheat production at National level
	Millet production	MT	The indicator measures the quantity of millet production at National level
	Barley production	MT	The indicator measures the quantity of barley production at National level
Output 1.2: Oil Seeds and Legumes Production Enhanced	Oil seeds production	MT	The indicator measures the quantity of mustard, soya bean, sunflower and pyrilla production at National level
	Legumes production	MT	The indicator measures the quantity of rajma beans, mung bean and lentils production at National level
Output 1.3: Horticulture Production Enhanced	Vegetables production	MT	The indicator measures the quantity of vegetables production at National level
	Fruits production and nuts	MT	The indicator measures the quantity of fruit production at National level
	Potato production	MT	The indicator measures the quantity of potato production at National level
	Citrus production	MT	The indicator measures the quantity of citrus production at National level
	Medicinal Aromatic Plants and Spices (MAPS) production	MT	The indicator measures the quantity of MAPs production at National level
	Mushroom production	MT	The indicator measures the quantity of mushroom production at National level
	Ornamental plant productions	Number	The indicator measures annual production of ornamental plants
Output 1.4: Agriculture Infrastructure & Farm Mechanization Enhanced	Major irrigation channels constructed/renovated	KM	The indicator measures the length of irrigation channels constructed/renovated (actual targets for multi-year, while plan target as cumulative of baseline)
	Farm roads constructed/ maintained	KM	The indicator measures the length of farm roads constructed/renovated
	Electric/solar fencing established	KM	The indicator measures the length of electric/solar fencing installed
	Area under farm mechanization	Acre	The indicator measures the total area brought under farm mechanization

Output 1.5: Agriculture Land Developed	Fallow land cultivation	Acre	The indicator measures the area of fallow land brought under cultivation
	Agriculture land developed	Acre	The indicator measures the land brought under land development
Output 1.6: School Agriculture Programme (SAP) Enhanced	Schools with Agriculture Programme	Number	The indicator measures the number of both general and central schools supported with SAP
Output 1.7: Meat Production Enhanced	Pork production	MT	The indicator measures the quantity of pork produced at National level
	Chicken production	MT	The indicator measures the quantity of chicken produced at National level
	Fish production	MT	The indicator measures the quantity of fish produced at National level
	Chevon production	MT	The indicator measures the quantity of chevon produced at National level
Output 1.8: Egg Production Enhanced	Egg production	Million	The indicator measures the number of eggs produced at National level
Output 1.9: Dairy Production Enhanced	Milk production	MT	The indicator measures the quantity of milk produced at National level
	Butter production	MT	The indicator measures the quantity of butter produced at National level
	Cheese production	MT	The indicator measures the quantity of cheese produced at National level
Output 1.10: Livestock Input Production Enhanced	Milking cattle	Number	The indicator measures the number milking cattle produced and distributed in the country
	Layers (DOC)	Number	The indicator measures the number of layer DOC produced and distributed in the country
	Broilers (DOC)	Number	The indicator measures the number of broiler DOC produced and distributed in the country
	Piglets	Number	The indicator measures the number of piglets produced and distributed in the country
	Fingerlings	Number	The indicator measures the number of fingerlings produced and distributed in the country
Output 1.11: Animal Nutrition and Health Services Enhanced	Area under Legume Fodder	Acre	The indicator measures the acres of fodder available for livestock production
	Conserved Forage availability	MT	The indicator measures the metric tonnes of crop residues utilized as fodder
	Feed Quality Test Parameters	Number	The indicator measures the number of test parameters used to assess feed quality
	Disease outbreaks	Number	The indicator measures the number of reported notifiable disease outbreaks
	Client satisfaction rate	Number	The indicator measures the client satisfaction rate of clinical services
	Zoonotic diseases	Number	The indicator measures the number of zoonotic disease outbreaks

Output 1.12: Plant and Animal Bio-security Level Strengthened	Exotic plant pests, diseases and invasive alien species prevented	Percent	The indicator measures the percentage of known and reported exotic plant pests and diseases prevalent in our neighbouring countries (posing high risk of introduction) prevented from entry into Bhutan.
	Exotic animal diseases and invasive species prevented	Percent	The indicator measures the percentage of exotic animal pest and diseases prevented from incursion.
	Notifiable plant pest and diseases contained	Percent	The indicator measures the percentage of notifiable disease outbreaks contained in the country.
	Notifiable animal diseases contained	Percent	The indicator measures the percentage of notifiable animal disease outbreaks successfully contained in the country in the specified period as per the specific disease prevention and containment plan.
	GMOs/LMOs entry prevented	Percent	The indicator measures the percentage of known and reported GMOs/LMOs prevalent in our neighboring countries that are prevented from entry into Bhutan through appropriate surveillance and prevention activities.
	Unauthorized /Invasive GMOs/LMOs incidents containment	Percent	The indicator measures the percentage of unauthorized/invasive GMOs/LMOs incidents within Bhutan that are successfully contained through development and implementation of appropriate incident management responses (installation of emergency management tools and equipment, and capacity development for emergency incident management).
	Timeline by which BAFRA's components of One Health Strategy of Bhutan implemented	Number	The indicator measures the number of BAFRA component of One Health Activity carried out by BAFR as per the Bhutan One Health Strategy Plan 2017 - 2021.
	Timeline by which veterinary public health system component of BAFRA is implemented	Percent	The indicator measures the percentage of veterinary public health components implemented by BAFRA. It can be measured by calculating the number of activities concerning to veterinary public health activities implemented. The OIE - PVS mission recommendation such as developing of Import Risk Analyses guidelines for import of all livestock products, training of veterinarians in field of meat inspection and certification and training of livestock inspectors in post-mortem and meat inspection.

Output 1.13: Food Quality and Safety Enhanced	Food import control system implemented on prioritized food commodities	Number	The indicator measures the number of procedure documents and manuals developed including procedure for application handling, inspection and sampling manual and food importer licensing procedures.
	Domestic food establishment licensed based on GMP and GHP Criteria	Percent	The indicator measures the aggregated scores of number of food safety licenses issued to food business in the country and the number of food handlers trained.
	Food borne diseases and safety incidence managed effectively	Percent	The indicator measures the percentage of food safety incidents effectively contained.
	Accredit BAFRA's inspection services for ISO/ IEC 17020:2012	Date	The indicator measures the timeline by which BAFRA Inspection services accredited for ISO/IEC 17020:2012 (conformity assessment-requirements for the operations of various types of bodies performing inspection)
	National Food Testing Laboratory fully equipped and functional	Number	The indicator measures introduction of new test parameters and number of test parameters accredited for ISO:IEC17025 under chemical, microbiological and bio-safety disciplines to enhance food safety and facilitate trade.
	Quality assurance and certification for agricultural produces and inputs implemented	Number	The indicator measures the number of organic and GAP agricultural produces/ products certified
Output 2.1: Organic Agriculture Promoted	Area under organic agriculture	Acres	The indicator measures the acreage of land brought under organic cultivation
	Accreditation of organic and GAP system (ISO standard)	Percent	The indicator measure the number of certification systems accredited and equipped with required capacities. Accreditation of internationally recognized systems will facilitate trade and at the same time provide quality and safe food.
	Quantity of organic agriculture products	MT	The indicator measures the number of certified agriculture organic products in the market
Output 2.2 :Organic Livestock Farming Promoted	Quantity of organic livestock products	MT	The indicator measures the number of certified organic livestock products in the market (Honey, dairy and egg)

MOAF/02: VALUE CHAIN AND ENTERPRISE DEVELOPMENT PROGRAMME

A. PROGRAMME SUMMARY

1. Program Title: Value Chain and Enterprise Development Programme

2. Link to NKRAs: NKRA 2 [Economic Diversity and Productivity Enhanced];NKRA 8 [Food and Nutrition Security Ensured]; NKRA 17 [Sustainable Water Ensured]; and NKRA 11[Productive and Gainful Employment Created]

3. Linkage to AKRA: [RNR marketing and value chain development enhanced; Increased RNR Sector Contribution to National Economy]

B. PROGRAMME DESCRIPTION

Value chain in the agriculture sector provides opportunities for inclusive business opportunities for the entrepreneurs. With the shift in focus from subsistence to commercial farming, a proper marketing system and other support for commercialization of agriculture sector has become a necessity. Measures such as enhanced market information and infrastructure facilities; product processing and value addition facilities and enterprise development will be the core elements of this program. Such enterprises can be established based on community approaches such as farmer groups and cooperatives or based on PPP approach and enterprise framework.

Major issues that face the sector in value chain of RNR products are:

1. Technical Skills – The RNR sector's technical expertise comprise of human resource skills for a production-oriented system. Entrepreneurial skills, business management, product development and marketing are skills that are necessary to realize a shift from production based to a value chain based approach. There is need for technical and financial assistance to strengthen the forward and backward linkages, entrepreneurial skills, easier accessibility to finance (Bhutan Living Standards Survey, 2012), and marketing, networking and overall business management.

2. Access to credit - The high interest rates on credit from financial institutions and requirement of collaterals are considered to be hindering access to credit. There is also limited financial products and services targeting youth and agri-business.

3. Weak market linkages and market information - Farmers continue to complain about lack of market for products especially during the peak seasons. On the contrary, some market infrastructures remains underutilized. There is fundamental disparity between market demand in terms of quantity, type, size, taste and prices.

4. Post-harvest losses - Past studies have pointed out that inadequate and proper storage systems result in huge post-harvest loses of fruits (apple and orange) by 26 to 37 %, vegetables by 25 – 45 %, rice by 22% and maize by31%.Packaging and handling practices are very rudimentary affecting quality and post-harvest loss. Post-harvest loss accounts for as high as 20-35 per cent (CoRRB 2006).

5. Access to land for enterprise development – The limited land holding at household level supports only subsistence farming. Saleable and market based enterprise development requires land/space for such enterprises that conflict with land required for household and subsistence based production needs. The Land Use Certificate (LUC) land reform will facilitate the allotment of state lands for agricultural and economic purposes in rural areas; change the mindset of youth about agriculture as a career option and improve the environment for agri-business in terms of accessibility to financial services, technology and market.

6. Poor coordination - Many studies have been done in the past through different projects on value chain. However, such studies were confined to specific project areas. Due to lack of ownership, follow up actions, accountability, coordination among different stakeholders including the private sector and inadequate resources to implement recommendations, impact from such studies have been limited.

7. Limited agro-enterprises and commercial farming - Despite huge demand and potential for processed foods, major proportion of processed agricultural and livestock products are being imported as not much has been achieved in local processing and value addition sector. While collection and trade of Non-Wood Forest Products contributes immensely to the income generation of the rural households, value added products would significantly increase their income levels.

Thus in 12th FYP the focus shall be given to strengthen establishment of agro-enterprise, processing plants, product development and marketing of agriculture, livestock and NWFP products through this program.

Table 21: MoAF/02 – Programme Budget by Agencies

Agency	Resource Allocation (Nu. Mn)		
	Priority 1 Budget	Priority 2 Budget	Total
Department of Agriculture	82.04	25	107.04
Department of Livestock	53.05	11.45	64.50
Department of Agricultural Marketing and Cooperatives	162.19	20.00	182.19
Total	**297.28**	**56.45**	**353.73**

Table 22: MoAF/02 – Programme Result Matrix

[No. of Outcome: 2; No. of Outputs: 6; No of activities: 45]

Results (Outcome)	Indicator	Indicator Unit	Baseline (year)	Projected Annual Target					Plan Target
				2018-19	2019-20	2020-21	2021-22	2022-23	
Outcome 1.RNR Marketing & Value Chain Enhanced	Commodity value chain for RNR products established	Number	6	1	2	2	2	2	15
	Volume of RNR products traded domestically	MT	24612	26621	27686	28793	29945	32388	32388
	RNR-based enterprises established (Agriculture, Livestock, Forestry)	Number	n/a	4	4	4	4	4	20
Outcome 2. Increased RNR Sector Contribution to National Economy	RNR sector contribution to national GDP	Nu. Mil	22008 (2016)	23700	25400	27100	28800	30900	30900
	Annual RNR Sector growth rate	Percentage	2.9 (Avg. 2013-,15)	3	3.1	3.5	3.5	4	4
	Annual export of RNR products	Nu in Mn.	2132 (2016)	2390	2520	2660	2790	3050	3050
	Increased productive and gainful employment generated in RNR Sector	Number	3906 (2016)	4400	4900	5400	5900	6600	6600
Results (Output)	**Indicator**	**Indicator Unit**	**Baseline (Year)**	**Projected Annual Target**					**Plan Target**
				2018-19	2019-20	2020-21	2021-22	2022-23	
Output 1.1. Commodity Value Chain for RNR Products Established	Formalize Dairy Value Chains	Number	n/a (2016)	0	2	3	2	2	9
	Formalize Egg Value Chain	Number	n/a (2016)	0	0	4	0	0	4
	Formalize Meat Value Chain	Number	n/a (2016)	0	2	2	2	0	6
	Formalize Honey Value Chain	Number	n/a (2016)	0	1	1	0	0	2
	Agriculture Product Value Chain	Number	6	1	1	1	1	1	11
Output 1.2. Increased Domestic Trade of RNR Produce	RNR products traded domestically	MT	24612	26621	27686	28793	29945	32388	32388

Output 1.3. RNR-based Enterprises Established	Livestock enterprise established	Number	n/a (2016)	0	2	2	2	1	7
	Agriculture Enterprises established	Number	n/a (2016)	1	1	2	2	2	8
	Post harvest infrastructures developed	Number	11 (2016)	4	7	7	7	4	29
	Value added products developed	Numbers	90 (2016)	92	94	96	98	100	100
	Forestry Enterprise established	Number	n/a	1	1	1	1	1	5
Output 1.4. Farmers' Groups and Cooperatives Strengthened	Functional FGs and Coops in place with positive annual turnover	Number	50	30	30	30	30	30	200
Output 2.1. Annual Export of RNR Products Increased (trend analysis to be used)	Value of RNR products exported	Nu in Mn.	2132.95 (2016)	2390	2516	2658	2783	2916	3049
Output 2.2. Employment Created	Employment under Farm shops maintained	Number	410	410	410	410	410	410	410
	Employment generated through FGs and Coops	Number	40	50	50	50	50	50	250
	Employment generated through B-coop shops	Number	12	5	5	5	6	7	28
	Livestock Enterprise based Employment	Number	1155	200	350	450	750	821	821
	Agriculture Enterprise based Employment	Number	0	28	56	84	112	140	140
	Forestry Enterprise based Employment	Number	902	1009	1116	1223	1330	1140	1440
	Employment generated through SoEs (FMCL, GBCL, BLDCL)	Number	588	107	107	108	108	108	538
	Employment through FDI (MHV)	Number	799	40	40	40	40	41	201

Table 23: MoAF/02 - Programme Activities

Programme Output	Program Activities	Lead Implementing Agency	Collaborating Agency	Plan Outlay in Nu (M) Capital			Priority (High/ Medium)
				Priority 1 Activities	Priority 2 Activities	Total	
Output 1.1. Commodity Value Chain for RNR Produce Established	Establish Value Chain for selected commodities	DAMC	DoA/DoL/DoFPs/ Dzongkhags	10		10	High
	Capacity building of value chain actors/ facilitators (90 individuals-post harvest handling, certification etc.)	DAMC	DoL/DoA/DoFPS/RDTC	1		1	High
	Support quality standards formulation and compliance to the standards.	DAMC	DoL/DoA/DoFPS/BAFRA	1		1	High
	Develop Value Chain for prioritized commodities	DoA	DAMC/FMCL		10	10	Medium
	Improve commodity value chain of potato, cardamom, citrus, ginger, areca nut and maize	DoA	DAMC/ARDCs		15	15	Medium
Output 1.2 Increased Domestic Trade of RNR Produce	Establish market linkages (East- West & North-South and facilitation of auction)	DAMC	DoA/DoL/DoFPs/ Dzongkhags	10		10	High
	Develop strategy for domestic trading	DAMC	DoA/DoL/DoFPs/ Dzongkhags	10		10	High
	Buy-back of priority commodities in times of market distress	DAMC	DoA/DoL/DoFPs/ Dzongkhags	5		5	High
	Product Enhancement and Promotion	DAMC	DoA/DoL/DoFPs/ Dzongkhags	5		5	High
Output 1.3. Agro-Based Enterprises Established Including Agriculture, Livestock, NWFPs and Ecotourism	Support and establish Agro-based enterprises	DAMC	DoL/DoA/DoFPS/SoEs/ MoEA/BCCI/Dzongkhags	45		45	High
	Capacity building of stakeholders on enterprise development	DAMC	DoL/DoA/DoFPS/SoEs/ MoEA/BCCI/RDTC	3		3	High
	Domestic market promotion of new products and linkages	DAMC	DoL/DoA/DoPFS/SOEs/ BEA/MoEA/BCCI	3		3	High

	Support to private sector, enterprises, NGOs for product development	DoA	DoA, Dzongkhags, Central Programs	5		5	High
	National Events and exhibitions (Flower shows and displays, mushroom exhibition, Organic food festival, World food day)	DoA	Central Programs & Dzongkhags, LG, SAP	22		22	High
	Strengthening of food incubation canters	DoA	AED, Dzongkhags, Central Programs	9		9	High
	Establish Agriculture Enterprise	DoA	Dzongkhags/FMCL	46.04		46.04	High
	Develop formal dairy value chain by linking the relevant actors and stakeholders	DoL	RLDC, NDRDC	2.900		2.9	High
	Develop dairy based products/value addition/diversification	DoL	RLDC, NDRDC		1.000	1	Medium
	Develop formal egg value chain by linking relevant actors and stakeholders	DoL	RLDC, NPRDC	0.350		0.35	High
	Develop formal meat value chain by linking the relevant actors and stakeholders	DoL	RLDC	0.600		0.6	High
	Develop formal honey value chain by linking the relevant actors and stakeholders	DoL	RLDC	0.400		0.4	High
	Promotion of Dairy enterprises in the country	DoL	RLDC	27.300		27.3	High
	Develop dairy product diversification	DoL	RLDC		3.150	3.15	Medium
	Promotion of poultry enterprises in the country	DoL	RLDC, NPRDC	8.200		8.2	High
	Strengthen commercial egg production	DoL	RLDC, NPRDC		1.400	1.4	Medium
	Promotion of Chevon enterprises in the country	DoL	RLDC	0.500		0.5	High
	Develop commercial chevon production	DoL	RLDC		1.500	1.5	Medium

	Promotion of Piggery enterprise in the country	DoL	RLDC	1.550		1.55	High
	Develop fishery enterprise in the country	DoL	RLDC	1.950		1.95	High
	Commercial trout and warm water fishery	DoL	RLDC		1.000	1	Medium
	Develop honey product diversification	DoL	RLDC		1.900	1.9	Medium
	Develop forage enterprise in the country	DoL	RLDC	4.300		4.3	High
	Develop contract forage production	DoL	RLDC		1.500	1.5	Medium
	Establishment of Livestock based employment	DoL	RLDC	5.000		5	High
Output 1.4: Viable Farmers' Groups and Cooperatives Promoted	Establish online FG/Coop registration system and advocacy/capacity building of stakeholders	DAMC	DoA/DoL/DoFPs/ Dzongkhags	1		1	High
	Support formation of viable FGs/Coop and strengthen existing FGs and Coops	DAMC	DoA/DoL/DoFPs/ Dzongkhags	20		20	High
	Review and Draft the Cooperative Act, 2009 & Rules and Regulations for amendment	DAMC	Legal Services/DoL/ DoA/DoFPS	3		3	High
	Collaboration with regional and international cooperative institutions	DAMC	DoA/DoL/DoFPS	2		2	High
Output 2.1.Annual Export of RNR Products	Participation in trade (RNR produce) negotiations- bilateral and multilateral meetings and trade fairs	DAMC	MoEA/BCCI/BEA/FCBL/ SOEs	8		8	High
	Undertake market exploration of potential market(s) and create business linkage	DAMC	MoEA/BCCI/BEA/FCBL/ SOEs	7		7	High
	Product Enhancement and Promotion	DAMC	DoL/DoA/DoFPs/BCCI/ MoEA/BEA	8.19		8.19	High

Output 2.2. Employement Created	Generate employment through Farm shops	DAMC	DoL/DoA/DoFPS/ Dzongkhags			0	High
	Generate employment through B-coop shops	DAMC	DoL/DoA/DoFPS/ Dzongkhags			0	High
	Generate employment through Agro-Enterprise	DAMC	DoL/DoA/DoFPS/ Dzongkhags			0	High
Output 2.3. Development of Infrastructure	Construction of regional offices	DAMC		20	20	40	1 High & 1 Medium
Total				297.28	56.45	353.73	

Table 24: MoAF/02 – Monitoring and Evaluation Matrix

Results (Outcome)	Indicator	Unit	Baseline (Year)	12 FYP Target	Data Source	Reporting Frequency	Reporting Responsibility
Outcome 1.RNR Marketing & Value Chain Enhanced	Commodity value chain for RNR products established	Number	6	15	DAMC annual report/ RNR Statistics	Annually	DAMC
	Volume of RNR products traded domestically	MT	24612	32388	DAMC annual report/ RNR Statistics	Annually	DAMC
	RNR-based enterprises established (Agriculture, Livestock, Forestry)	Number	n/a	20	DAMC annual report/ RNR Statistics	Annually	DAMC
Outcome 2. Increased RNR Sector Contribution to National Economy	RNR sector contribution to national GDP	Nu in Mn.	22008 (2016)	30900	DAMC annual report/ RNR Statistics	Annually	DAMC
	Annual RNR Sector growth rate	Percent	2.9 (Avg 2013-,15)	4	DAMC annual report/ RNR Statistics	Annually	DAMC
	Annual export of RNR products	Nu in Mn.	2132 (2016)	3050	DAMC annual report/ RNR Statistics	Annually	DAMC
	Increased productive and gainful employment generated in RNR Sector	Number	3906 (2016)	6600	DAMC annual report/ RNR Statistics	Annually	DAMC

Results (Output)	Indicator	Unit	Baseline (Year)	12 FYP Target	Data Source	Reporting Frequency	Reporting Responsibility
Output 1.1. Commodity Value Chain for RNR Products Established	Formalize Dairy Value Chains	Number	0	9	Livestock Statistics	Annually	DAMC
	Formalize Egg Value Chain	Number	0	4	Livestock Statistics	Annually	DAMC
	Formalize Meat Value Chain	Number	0	6	Livestock Statistics	Annually	DAMC
	Formalize Honey Value Chain	Number	0	2	Livestock Statistics	Annually	DAMC
	Agriculture Product Value Chain	Number	6	5	DAMC annual report/ RNR Statistics	Annually	DAMC
Output 1.2. Volume of RNR Products Traded Domestically Increased	RNR products traded domestically	MT	24612	32388	DAMC annual report/ RNR Statistics	Annually	DAMC
Output 1.3. RNR-based Enterprises Established	Livestock enterprise established	Number	0	7	Livestock Statistics/ RNR Statistics	Annually	DAMC
	Post harvest infrastructures developed	Number	11 (2016)	29	DAMC annual report/ RNR Statistics	Annually	DAMC
	Value added products developed	Numbers	90 (2016)	100	DAMC annual report/ RNR Statistics	Annually	DAMC
	Agriculture Enterprise established	Number	n/a	10	DAMC annual report/ RNR Statistics	Annually	DAMC
	Forestry Enterprise established	Number	n/a	1	RNR Statistics	Annually	DAMC
Output 1.4: Viable Farmers' Groups and Cooperatives Promoted	Functional FGs and Coops in place with positive annual turnover	Number	50	150	DAMC Annual Report	Annually	DAMC

Output 2.1. Annual Export of RNR Products	Value of RNR products exported	Nu in Mn.	2132.95 (2016)	3048.64	DAMC Annual Report	Annually	DAMC
Output 2.1. Increased Productive and Gainful Employment Generated in RNR Sector	Employment under Farm shops maintained	Number	410	410	DAMC Annual Report	Annually	DAMC
	Employment generated through FGs and Coops	Number	40	250	DAMC Annual Report	Annually	DAMC
	Employment generated through B-coop shops	Number	12	28	DAMC Annual Report	Annually	DAMC
	Livestock Enterprise based Employment	Number	1155	735	DAMC Annual Report	Annually	DAMC
	Agriculture Enterprise based Employment	Number	0	140	DAMC Annual Report	Annually	DAMC
	Forestry Enterprise based Employment	Number	902	1440	DAMC Annual Report	Annually	DAMC
	Employment generated through SoEs (FMCl, GBCL, BLDCL)	Number	588	538	DAMC Annual Report	Annually	DAMC
	Employment through FDI (MHV)	Number	799	201	DAMC Annual Report	Annually	DAMC

Table 25: MoAF/02 - Indicator Description

Results (Outcome)	Indicator	Unit	Description
Outcome 1.RNR Marketing & Value Chain Enhanced	Commodity value chain for RNR products established	Number	The indicator measures the number of value chains for RNR commodities established for RNR products with required logistics chains.
	Volume of RNR products traded domestically	MT	The indicator measures quantity of RNR products produced and marketed domestically for income generation
	RNR-based enterprises established (Agriculture, Livestock, Forestry)	Number	The indicator measures the number of agro-based enterprises established
Outcome 2. Increased RNR Sector Contribution to National Economy	RNR sector contribution to national GDP	Nu in Mn.	The indicator measures the absolute value of RNR Sector (Crops, livestock, Forestry and Logging) contribution to the national GDP at current prices
	Annual RNR Sector growth rate	Percent	The indicator measures the average rate at which in the RNR Sector annual growth rate changes/grows from one year to another by taking into account of inflation
	Annual export of RNR products	Nu in Mn.	The indicator measures the annual value of RNR products (both raw and processed) exported
	Increased productive and gainful employment generated in RNR Sector	Number	The indicator measures the total number of employment generated through RNR Sector based activities
Results (Outputs)	**Indicator**	**Unit**	**Description**
Output 1.1. Commodity Value Chain for RNR Produce Established	Formalize Dairy Value Chains	Number	The indicator measures the number of formal dairy value chains established
	Formalize Egg Value Chain	Number	The indicator measures the number of formal egg value chain established
	Formalize Meat Value Chain	Number	The indicator measures the number of formal meat value chain (chicken) established
	Formalize Honey Value Chain	Number	The indicator measures the number of formal honey value chain established
	Agriculture Product Value Chain	Number	The indicator measures the number of agricultural products having a systematic line of movement across the entire value chain i.e., from production till end market with identified actors with defined roles and responsibilities
Output 1.2. Increased Domestic Trade of RNR Produce	RNR products traded domestically (at 4 % growth annually)	MT	The indicator measures the volume of agricultural products(either processed or raw) traded within the country through formal channels

Output 1.3. Agro-based Enterprises Established	Livestock enterprise established	Number	The indicator measures the number of livestock enterprises established (dairy, poultry, chevon, piggery, fishery, honey and forage)
	Post-harvest infrastructures developed	Number	The indicator measures the number of post-harvest infrastructures put in place
	Value added products developed	Numbers	The indicator measures the number of value added products developed
	Agriculture Enterprise established	Number	The indicator measures the number of agriculture enterprise established as per the CSMI Policy (cottage, small and medium)
	Forestry Enterprise established	Number	The indicator measures number of forestry enterprise established as per the CSMI Policy (cottage, small and medium)
Output 1.4. Viable Farmers' Groups and Cooperatives Promoted	Functional FGs and Coops in place with positive annual turnover	Number	The indicator measures the cumulative number of FGs/Coops with positive annual turnover
Output 2.1. Annual Export of RNR Products Increased (trend analysis to be used)	Value of RNR products exported	Nu in Mn.	The indicator measures the total monetary value of RNR products exported in fresh or unprocessed form
Output 2.2. Increased Productive and Gainful Employment Generated in RNR Sector	Employment generated through FG's/Coops	Number	The indicator measures the number of people employed with paid regular monthly salary (equivalent to at least daily minimum wage rate of RGOB) by FGs/Coops whether or not he/she is a member of the group
	Employment generated through Farm shops	Number	The indicator measures the number of people employed with paid regular monthly salary (equivalent to at least daily minimum wage rate of RGOB) by farm shops
	Employment generated through B-coop shops	Number	The indicator measures the number of people employed with paid regular monthly salary (equivalent to at least daily minimum wage rate of RGOB) by B-coop shops

	Livestock Enterprise based Employment	Number	The indicator measures the number of people employed with paid regular monthly salary (equivalent to at least daily minimum wage rate of RGOB) by livestock enterprises
	Agriculture Enterprise based Employment	Number	The indicator measures the number of people employed with paid regular monthly salary (equivalent to at least daily minimum wage rate of RGOB) by agricultural enterprises
	Forestry Enterprise based Employment	Number	The indicator measures the number of people employed with paid regular monthly salary (equivalent to at least daily minimum wage rate of RGOB) by forestry related enterprises
	Employment generated through SoEs (FMCl, GBCL, BLDCL)	Number	The indicator measures the number of people employed with paid regular monthly salary (equivalent to at least daily minimum wage rate of RGOB) by SoEs (FMCl, GBCL, BLDCL)
	Employment through FDI (MHV)	Number	The indicator measures the number of people employed with paid regular monthly salary (equivalent to at least daily minimum wage rate of RGOB) through FDI (MHV)

MOAF/03: SUSTAINABLE NATURAL RESOURCES MANAGEMENT AND BIO-DIVERSITY UTILIZATION PROGRAMME

A. PROGRAMME SUMMARY

Program Title: Sustainable Natural Resources Management and Utilization Programme

Link to NKRAs: **NKRA 2** [Economic Diversity and Productivity Enhanced]; NKRA 5 [Healthy Eco-system Maintained]; **NKRA 6** [Carbon Neutral, Climate and Disaster Resilient Development Improved];**NKRA 8** [Food and Nutrition Security Ensured], **NKRA 17** [Sustainable Water Ensured).

Linkage to AKRAs: Management of Natural Resources for sustainable utilization of ecosystem goods and services Enhanced, Air quality monitoring system strengthened, Land use planning and Management improved

B. PROGRAMME DESCRIPTION

Conservation of environment, natural resources and biodiversity has always played a central role in Bhutan's approach to economic development. However, with the continued rapid pace of socio-economic development, there are emerging challenges for environmental obligations in the constitutional mandate to secure ecologically balanced sustainable development. The challenges facing the natural resources include: Increasing Pressures on Biodiversity and natural resources–LosS of forest and land use conversion for various purposes is a concern that could lead to biodiversity and habitat degradation. The conversion of forests into other land uses is increasing at an alarming rate. Between 2008 and 2014, 9426.16 Ha of state reserved forest land was lost to construction of transmission lines, 5462.04 Ha to farm roads and 5207.67 Ha to long term land lease (Bhutan State of the Environment, 2016). Moreover, between 2011-12, 152.7 Ha of state land was allocated from protected areas and 2561.4 Ha of land from other state land for developmental purposes leading to habitat fragmentation. Similarly, pressure on water and biodiversity are some of the serious challenges. While the fuel wood accounts for 21% of total household energy consumption at the national level, 94% of rural household energy consumption is met from wood. Annual extraction of timber resources stand 161,008 cubic meters of timber (2008-2015) and predicted at about 805,042 m3 between now and 2020. In 2015, there were 76,118 vehicles, which directly contributed to emission of over 400 Giga-grams of CO2 (Bhutan State of the Environment, 2016). Such pressures may lead to extinction of 24 globally threatened species and other biodiversity resources thus creating imbalance in the ecology. Illegal harvesting and wildlife poaching further compound pressure on forest resources and biodiversity. Nu. 36.48 million worth of forestry offences was apprehended by forestry official in 2016 alone. The most common offences committed are "hunting and poaching of wild animals and its parts, smuggling and illegal sale & misuse of Timber products, collection of Non-wood Forest Products without permit." (DoFPS 2016); Overall challenge to natural resources and biodiversity conservation includes threats from – The National Biodiversity Strategic Action Plan for Bhutan, 2011 identifies the following drivers as the overall threat to natural resources and biodiversity conservation in Bhutan - Land use conversion, Over exploitation of timber and fuel wood, Forest Offences and wildlife poaching, Unsustainable Agricultural Practices, Pollution, Invasive species, Human wildlife conflict, Climate Change, Population, Over grazing, Waste and ppoverty.

Therefore, this program is designed to largely address these threats and enable continued provision of critical ecosystem services to social, economic, cultural and environmental functions of Bhutan.

Table 26: MOAF/03 - Programme Budget by Agencies

Agency	Resources Allocation (Nu. Mn)		
	Priority 1 Budget	Priority 2 Budget	Total
Department of Forests and Park Services	631.00	51.00	682.00
National Biodiversity Centre	24.97		24.97
Total	**655.97**	**51.00**	**706.97**

Table 27: MoAF/03 - Programme Result Matrix

[No. of Outcome: 1; No. of Outputs: 11; No of activities: 80]

Results (Outcome)	Indicators	Indicators Unit	Baseline (Year)	Annual Plan Targets					Plan Target
				2018-19	2019-20	2020-21	2021-22	2022-23	
Outcome 1: Management of Natural Resources for Sustainable Utilization of Ecosystem Goods and Services Enhanced	Population estimates of Tiger	Number	103					123	123
	Population estimates of Snow Leopard	Number	96					96	96
	Ecotourism products developed	Number	0	4	8	12	16	20	20
	National Heritage forest	Number	n/a	0	5	5	5	5	20
	Access and Benefit Sharing initiatives	Number	8	1	1	1	1	1	13
	Areas brought under effective wetland management	Hectares	0	0	0	0	0	1463	1463
	Status of aquatic ecosystem	Number	411	411	411	411	411	411	411
	Area brought under effective watershed management	Hectares	n/a	0	0	0	0	145000	145000
	Forest area under sustainable management regime	Hectares	357915	17580	20140	15580	8260	6020	425495
Results (Output)	**Indicators**	**Unit**	**Baseline (Year)**	**Annual Plan Targets**					**Plan Target**
				2018-19	**2019-20**	**2020-21**	**2021-22**	**2022-23**	
Output 1.1. Sustainable Management and Utilization of Timber Enhanced	Sustainable forest management plans	Number	46 (2016)	20	26	16	13	17	92
	Forest area under scientific thinning	Hectares	381	592	340	340	340	340	1952
Output 1.2. State of Forest and Carbon Stock Assessment for Forests of Bhutan Completed	National Forest Inventory cluster plots enumerated	Number	1685			1295	1129		2424
	State of National Forest report produced	Date	2017	n/a				2023	2023
	Forest carbon stock of Bhutan reported	Date	2017	n/a				2023	2023
Output 1.3. Community Based Forest Management and Conservation Enhanced	Community Forest (CF) Management Plans	Number	750	69	89	92	109	74	433
	CF Network Group	Number	6	2	2	2	2	2	10
	NWFP Management Plans	Number	140	20	17	25	16	26	104

Output 1.4. Professional Capacity Enhanced	Forestry certificate courses	Number	741	25	25	25	25	25	125
	Forestry up-gradation and theme based trainings	Number	2545	230	230	230	230	230	1150
Output 1.5: Protected and Conservation Area Management Strengthened	Management effectiveness of Protected areas maintained	Percent/ Score	66.1	66.1	66.1	66.1	66.1	66.1	66.1
	Protected area management plans	Number	13	6	6	2	0	2	16
	Area under habitat management	Hectare	n/a	373	698	1025	1350	1675	1675
	Conservation action plans for key species	Number	2		2	0	3	2	7
	Bhutan wildlife health strategy	Date	0		2020				
Output 1.6. Forestry and Wildlife Offences/ Conflicts Reduced	Zero Poaching Strategy adopted in all field offices	Date	n/a	n/a	n/a	n/a	n/a	2023	2023
	Innovative and effective HWC mitigation measures up-scaled	Number	8	0	1	1	2	1	5
	Rescue and rehabilitation institutions/ facilities	Number	2	4	6	6	3	0	19
Output 1.7. Nature Based Eco-tourism Strengthened	Innovative nature based business plans	Number	0	0	2	1	1	1	5
	Unique eco-tourism products	Number	15	4	6	6	4	2	22
	Nature recreational areas	Number	5	0	1	1	1	1	4
Output 1.8. Ex-situ Conservation and Sustainable Utilization of Biodiversity Enhanced.	Diversity of biological resources	Number	852	42	42	42	42	42	210
	On-farm conservation of biological resources	Number	4		1	1		1	3
	Bio-prospecting initiatives	Number	8	0	0	1	1	1	3
	Botanical information generated and access improved	Percent	34 (2016)	5	5	5	5	5	59
Output 1.9: Effective Management of Wetlands and Watersheds Enhanced	Watersheds assessment	Number	120	140	159	186	0	0	186
	Drying water sources assessed	Number	0	5	5	10	0	0	20
	Watershed management plans	Number	8	1	3	1	0	1	6
	Wetland management plans	Number	2	1	0	1	2	1	5
	Area under climate smart restoration	Hectare	18695	19,095	19495	19,895	20,295	20,695	20,695
	National wet-land inventory	Date	n/a	n/a	n/a	n/a	n/a	2023	2023

Output 1.10. Natural Capital Accounting System Enhanced	Valuation of Ecosystem Services	Date	n/a		2020				2020
	PES schemes	Number	3	0	6	7	0	0	7
Output 1.11. Urban and Agro Forestry Landscape Management Strengthened	Urban and agro-forestry strategy	Date	n/a			2020			2020
	Landscaping in urban areas	Hectares	n/a	0	5	5	5	5	20
	Avenue plantation	KM	22	42	48	54	60	66	66

Table 28: MoAF/03 - Programme Activities

Programme Outputs	Program Activities	Lead Implementing Agency	Collaborating Agencies	Plan Outlay in Nu (M) Capital			Priority (High/ Medium)
				Priority 1 Activities	Priority 2 Activities	Total	
Output 1.1. Sustainable Management and Utilization of Timber Enhanced	Establish Forest Management Units (FMUs)/ Working Schemes (WS)	DoFPS	LGs	2.0		2.0	High
	Support to enhance capacity and facilities (infrastructure & mobility) for effective sustainable forest management	DoFPS	LGs	5		5.0	High
	Revise FMUs/WS plans	DoFPS	LGs	5.0		5.0	High
	Prepare Local Forest Management (LFM) plans	DoFPS	LGs	10.0		10.0	High
	Revise LFM Plans	DoFPS	LGs	2.0		2.0	High
	Implement sustainable forest management regime plans	DoFPS	LGs, NRDCL	30.0		30.0	High
	Revise and update LFMP Guidelines	DoFPS	LGs , NRDCL		1.0	1.0	Medium
	Carry out scientific thinning	DoFPS	LGs , NRDCL	5		5.0	High
Output 1.2: State of Forest and Carbon Stock Assessment Completed	Enumerate National Forest Inventory cluster plots	DoFPS	LGs	30.0		30.0	High
	Produce State of National Forest report	DoFPS	PPD, NSB	1.0		1.0	High
	Produce report on Forest carbon stock of Bhutan	DoFPS	NECS	1.0		1.0	High

Output 1.3: Community Based Forest Management and Conservation Increased	Revise National Community Forestry Strategy	DoFPS	LGs		0.5	0.5	Medium
	Revise NWFP Strategy and interim framework	DoFPS	LGs, DAMC		0.5	0.5	Medium
	Develop and revise CF and NWFP Management plans	DoFPS	LGs, DAMC	15.0		15.0	High
	Revise CF record keeping books and systems	DoFPS	LGs		0.5	0.5	Medium
	Develop CF Network Groups	DoFPS	LGs		0.1	0.1	Medium
Output 1.4: Professional Capacity Enhanced	Conduct forestry certificate course	DoFPS	RUB	20.0		20.0	High
	Conduct national seminars and training workshop on natural resources management	DoFPS	RUB		5.0	5.0	Medium
	Conduct prospective trainings for employment generation in eco-tourism and wood based sector	DoFPS	RUB, TCB		5.0	5.0	Medium
	Conduct arms training for forestry staffs	DoFPS	RBA	5.0		5.0	High
	Supply Forestry Uniform and accessories	DoFPS	MoF	20.0		20.0	High
	Establish training facilities for professional capacity building	DoFPS	NLCS, LGs	10.0		10.0	High
Output 1.5: Protected and Conservation Area Management Strengthened	Revise and update PA management plan guidelines/framework	DoFPS	LGs		1.9	1.9	Medium
	Develop Management plans for BCs	DoFPS	LGs, NBC	5.0		5.0	High
	Revise Management plans for PAs	DoFPS	LGs	5.0		5.0	High
	Implement PA management plans	DoFPS	LGs	50.0		50.0	High
	Support to enhance capacity and facilities (infrastructure & mobility) for effective management of PAs	DoFPS	LGs	10.0		10.0	High
	Prepare state of Protected Area report	DoFPS	LGs	1.0		1.0	High
	Institute local stewardship for park resources	DoFPS	LGs		1.0	1.0	Medium
	Carry out climate vulnerability assessment of PAs	DoFPS	LGs		1.0	1.0	Medium
	Develop Heritage forest management guidelines	DoFPS	LGs		1.0	1.0	Medium
	Develop management plan for new heritage forests	DoFPS	LGs		5.0	5.0	Medium
	Develop Waste management plans	DoFPS	LGs		5.0	5.0	Medium

	Implement waste management plan in parks and territorial divisions	DoFPS	LGs		1.0	1.0	Medium
	Conduct biodiversity inventory to update flora and fauna of Bhutan	DoFPS	LGs, NBC		1.0	1.0	Medium
	Establish and strengthen conservation arts workshop	DoFPS	LGs		1.0	1.0	Medium
	Observe global significant days on forestry and conservation	DoFPS	LGs		1.0	1.0	Medium
	Carry out re-validation survey of Tiger and Snow Leopard	DoFPS	LGs	10.0		10.0	High
	Conduct national population estimate of other high profile species (takin, red panda, rufous necked hornbill, musk deer, black bear, elephant, Common Leopard, pallas fish eagle)	DoFPS	LGs	10.0		10.0	High
	Develop and implement conservation action plans for restoration of key species	DoFPS	LGs, NBC	5.0		5.0	High
	Develop Bhutan wildlife health strategy	DoFPS	LGs, DoL		1.0	1.0	Medium
	Develop national protocols for identifying and monitoring key habitats/ecosystems (by integrating international KBA guidelines into national context)	DoFPS	LGs, NBC		1.0	1.0	Medium
	Conduct survey and screening of diseases in wildlife species	DoFPS	DoL, MoH, LGs	2.0		2.0	High
	Initiate Trans-boundary conservations actions	DoFPS	MoHCA		1.0	1.0	Medium
Output 1.6: Forestry and Wildlife Offences/ Conflicts Reduced	Revise National HWCM strategy	DoFPS	DoA, LGs	1.0		1.0	High
	Assess and upscale innovative & effective HWC mitigation measures	DoFPS	DoA, LGs	5.0		5.0	High
	Establish/strengthen new rescue and rehabilitation centres	DoFPS	NLCS, LGs	15.0		15.0	High
	Adopt Zero Poaching Strategy	DoFPS	RBA, RBP, BAFRA, Judiciary, LGs	10.0		10.0	High
	Implement SMART Patrolling	DoFPS	RBA, RBP, BAFRA, Judiciary, LGs	10.0		10.0	High

Output 1.7: Nature Based Eco-tourism Strengthened	Develop Eco-tourism strategy	DoFPS	TCB, DAMC, MoEA, LGs	1.0		1.0	High
	Develop and implement Innovative nature based business plans and eco-tourism products	DoFPS	TCB, DAMC, MoEA, LGs	20.0		20.0	High
	Revise and sensitize PA ecotourism infrastructure guidelines	DoFPS	MoWHS, LGs		1.0	1.0	Medium
	Establish new nature recreational areas	DoFPS	DAMC, TCB, LGs	10.0		10.0	High
	Strengthen existing nature recreational areas	DoFPS	DAMC, TCB, LGs	1.0		1.0	High
	Develop biking trails	DoFPS	DAMC, TCB, LGs	1.0		1.0	High
	Develop and implement Management Plan for the Royal Takin Preserve	DoFPS	NBC	2.0		2.0	High
Output 1.8: Conservation and Sustainable Utilization of Biodiversity Enhanced.	Diversification of ex-situ conservation of biodiversity	NBC	DoA; DoL; DoFPS; LGs	10		10.0	High
	On-farm conservation and sustainable utilization including bi-prospecting and bio-exploration of biological resources and associated traditional knowledge.	NBC	DoL; DoFPS; LGs; International agencies	9		9.0	High
	Capacity development for local communities	NBC	Dzongkhag and Gewog Agriculture Sector,	0.47		0.5	High
	Generate biodiversity information, strengthen biodiversity portal and improve access	NBC	RUB, DoFPS, NPPC, Hydro-power sector, KGUMS, ICTD, ITMS, International Agencies; DoA; MoIC, NGOs, private companies	5.5		5.5	High

Output 1.9: Effective Management of Wetlands and Watersheds Enhanced	Carryout assessment of watersheds	DoFPS	NCHM, LGs	5.0		5.0	High
	Carryout assessment of drying water sources in Dzongkhags	DoFPS	NCHM, LGs	5.0		5.0	High
	Develop framework, strategies for water sources management	DoFPS	NCHM, LGs	1.0		1.0	High
	Develop watershed management plans	DoFPS	NCHM, LGs	5.0		5.0	High
	Carryout assessment of degraded area in Dzongkhags	DoFPS	LGs	1.0		1.0	High
	Establish three regional nurseries	DoFPS	LGs		1.0	1.0	Medium
	Carry out plantation works including habitat enrichment plantations	DoFPS	LGs	250.0		250.0	High
	Maintain existing plantations	DoFPS	LGs	20.0		20.0	High
	Carryout wetlands inventory in Dzongkhags	DoFPS	LGs		10.0	10.0	Medium
	Develop wetland management plans	DoFPS	LGs	3.0		3.0	High
	Fulfil reporting and implementation obligation to the Ramsar CoP and SDGs	DoFPS	MoFA, NCHM		0.5	0.5	Medium
Output 1.10: Natural Capital Accounting System Enhanced	Conduct valuation of Ecosystem Services	DoFPS	LGs, NSB		1.0	1.0	Medium
	Conduct PES feasibility studies	DoFPS	LGs	1.0		1.0	High
	Establish PES schemes	DoFPS	LGs	2.0		2.0	High
	Renew existing PES schemes	DoFPS	LGs	1.0		1.0	High
Output 1.11: Urban and Agro Forestry Landscape Management Enhanced	Develop National Agro-forestry Framework	DoFPS	LGs, DoL, DoA	1.0		1.0	High
	Document indigenous agro-forestry practices in Bhutan	DoFPS	LGs, DoL, DoA		1.0	1.0	Medium
	Develop National Urban forestry strategy	DoFPS	LG, DoL, DoA	1.0		1.0	High
	Initiate agro-forestry practices	DoFPS	LGs, DoL, DoA		1.0	1.0	Medium
	Carry out landscaping in Urban areas	DoFPS	LGs, DoL, DoA, Thromde		1.0	1.0	Medium
Grand Total				**655.97**	**51.00**	**706.97**	

Table 29: MoAF/03 - Monitoring and Evaluation Matrix

Results (Outcome)	Indicator	Unit	Baseline (year)	12 FYP Target	Data Source	Reporting Frequency	Reporting Responsibility
Outcome 1: Management of Natural Resources for Sustainable utilization of Ecosystem Goods and Services Enhanced	Population estimates of Tiger	Number	103	123	RNR Annual Reports/ Forestry Facts and Figures/ other publications	Annually	DoFPS
	Population estimates of Snow Leopard	Number	96	96	RNR Annual Reports/ Forestry Facts and Figures/ other publications	Annually	DoFPS
	Ecotourism products	Number	0	20	RNR Annual Reports/ Forestry Facts and Figures/ other publications	Annually	DoFPS
	National Heritage forest	Number	n/a	20	RNR Annual Reports/ Forestry Facts and Figures/ other publications	Annually	DoFPS
	Access and Benefit Sharing initiatives	Number	8	13	RNR Annual Reports/ Forestry Facts and Figures/ other publications	Annually	DoFPS
	Areas brought under effective wetland management	Hectares	0	1463	RNR Annual Reports/ Forestry Facts and Figures/ other publications	Annually	DoFPS
	Status of aquatic ecosystem	Number	411	411	RNR Annual Reports/ Forestry Facts and Figures/ other publications	Annually	DoFPS
	Area brought under effective watershed management	Hectares	n/a	145000	RNR Annual Reports/ Forestry Facts and Figures/ other publications	Annually	DoFPS
	Forest area under sustainable management regime	Hectares	357915	425495	RNR Annual Reports/ Forestry Facts and Figures/ other publications	Annually	DoFPS

Results (Output)	Indicator	Unit	Baseline (Year)	12 FYP Target	Data Source	Reporting Frequency	Reporting Responsibility
Output 1.1. Sustainable Management and Utilization of Timber Enhanced	Sustainable forest management plans	Number	46 (2016)	92	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
	Forest area under scientific thinning	Hectares	381	1952	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
Output 1.2. State of Forest and Carbon Stock Assessment for Forests of Bhutan Completed	National Forest Inventory cluster plots enumerated	Number	1685	2424	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
	State of National Forest report produced	Date	2017	2023	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
	Forest carbon stock of Bhutan reported	Date	2017	2023	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
Output 1.3. Community Based Forest Management and Conservation Enhanced	Community Forest (CF) Management Plans	Number	750	433	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
	CF Network Group	Number	6	10	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
	NWFP Management Plans	Number	140	104	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
Output 1.4. Professional Capacity Enhanced	Forestry certificate courses	Number	741	150	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
	Forestry up-gradation and theme based trainings	Number	2545	1150	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS

Output 1.5: Protected and Conservation Area Management Strengthened	Management effectiveness of Protected areas maintained	Percent	66.1	66.1	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
	Protected area management plans	Number	13	16	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
	Area under habitat management	Hectare	n/a	1675	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
	Conservation action plans for key species	Number	2	7	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
	Bhutan wildlife health strategy	Date	n/a	2020	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
Output 1.6. Forestry and Wildlife Offences/ Conflicts Reduced	Zero Poaching Strategy adopted in all field offices	Date	n/a	2023	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
	Innovative and effective HWC mitigation measures up-scaled	Number	8	5	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
	Rescue and rehabilitation institutions/facilities	Number	2	19	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
Output 1.7. Nature Based Eco-tourism Strengthened	Innovative nature based business plans	Number	0	5	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
	Unique eco-tourism products	Number	15	22	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
	Nature recreational areas	Number	5	4	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS

Output 1.8. Ex-situ Conservation and Sustainable Utilization of Biodiversity Enhanced.	Diversity of biological resources	Number	852	210	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	NBC
	On-farm conservation of biological resources	Number	4	3	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	NBC
	Bio-prospecting initiatives	Number	8	3	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	NBC
	Botanical information generated and access improved	percent	34	59	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	NBC
Output 1.9: Effective Management of Wetlands and Watersheds Enhanced	Watersheds assessment	Number	120	186	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
	Drying water sources assessed	Number	0	20	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
	Watershed management plans	Number	8	6	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
	Wetland management plans	Number	2	5	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
	Area under climate smart restoration	Hectare	18695	20695	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
	National wetland inventory	Date	n/a	2023	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
Output 1.10. Natural Capital Accounting System Enhanced	Valuation of (Forests) Ecosystem Services	Date	0	2020	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
	PES schemes	Number	3	7	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS

Output 1.11. Urban and Agro Forestry Landscape Management Strengthened	Urban and agro forestry strategy	Date	0	2020	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
	Landscaping in urban areas	Hectares	0	20	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS
	Avenue plantation	KM	22	66	RNR Annual Reports/ Forestry Facts and Figures/RNR Statistics/other publications	Annually	DoFPS

Table 30: MoAF/03 - Indicator Description

Results (Outcome)	Indicator	Unit	Description
Outcome 1: Management of Natural Resources for Sustainable Utilization of Ecosystem Goods and Services Enhanced	Population estimates of Tiger	Number	The indicator measures mean population of Tigers within the 95 percent Confident Interval
	Population estimates of Snow Leopard	Number	The indicator measures mean population of Snow Leopard within the 95 percent Confident Interval
	Ecotourism products developed	Number	The indicator measures the number of ecotourism products identified, developed and implemented
	National Heritage forest	Number	The indicator measures the number of heritage forests operationalized/ established
	Access and Benefit Sharing initiatives	Number	The indicator measures the number of new ABS products developed for commercial purpose based on the natural resources available in the country
	Areas brought under effective wetland management	Hectares	The indicator measures the area of wetlands to be surveyed, mapped and brought under protection
	Status of aquatic ecosystem	Number	The indicator measures the recorded number of macro-invertebrate's species indicating health of aquatic eco-systems
	Area brought under effective watershed management	Hectares	The indicator measures the total area under watershed management. The total area covered in the watershed management planning in the 11th FYP along with new areas will be taken up for watershed management
	Forest area under sustainable management regime	Hectares	The indicator measures the area of Forests land brought under sustainable forest management regime through Community Forests, Forest management Units, Local Area Forest Management Plans and CBNRM sites.

Results (Output)	Indicator	Unit	Description
Output 1.1. Sustainable Management and Utilization of Timber Enhanced	Sustainable forest management plans	Number	The indicator measures the development of new sustainable forest management plans such as plans for Forest Management Units, Working Schemes and Local Forest Management Plans and also revision of plans that might be expiring in the 12 FYP.
	Forest area under scientific thinning	Hectares	The indicator measures the areas identified for thinning. This can either be area identified for thinning to meet the demand of the people by the Department or based on technical thinning plans carried out by NRDCL and DoFPS. Thinning can be part of FMUs, WS , LFMPs or outside this/other management regimes.
Output 1.2. State of Forest and Carbon Stock Assessment for Forests of Bhutan Completed	National Forest Inventory cluster plots enumerated	Number	The indicator measures the number of NFI clusters plots to be inventoried.
	State of National Forest report produced	Date	The indicator measures the year by which the state of the National Forests is reported
	Forest carbon stock of Bhutan reported	Date	The indicator measures the compilation and analysis of the National Forest Inventory Data and carbon stock data of forests and to generate reports (state of forest and carbon stock report)
Output 1.3. Community Based Forest Management and Conservation Enhanced	Community Forest (CF) Management Plans	Number	The indicator measures the number of CF management plan developed or revised
	CF Network Group	Number	The indicator measures the number of CFs networks established
	NWFP Management Plans	Number	The indicator measures the number of new NWFP management plans developed or revised for NWFP groups
Output 1.4. Professional Capacity Enhanced	Forestry certificate courses	Number	The indicator measures the number of graduates who has successfully completed the certificate course
	Forestry up-gradation and theme based trainings	Number	The indicator measures the actual number of people trained (both in-service forestry professionals and professionals from other relevant fields
Output 1.5: Protected and Conservation Area Management Strengthened	Management effectiveness of Protected areas maintained	Percent/ Score	The indicator measures the average management effectiveness scores of the NPs, WS and SNR (average the scores of the 6 elements (context 82%, planning 64%, inputs 55%, process 62%, outputs 61% and outcome 73%)
	Protected area management plans	Number	The indicator describes the preparation of new management plans for PAs and revision of the existing MPs which has/will expire within the plan period
	Area under habitat management	Hectare	The indicator measures the total area (in ha) of habitat managed (such as grassland, alpine meadows, etc) through activities such as habitat enrichment, plantation, salt licks, water holes, etc. The total area covered by salt licks or water holes would be based on average area expected to be covered it.

	Conservation action plans for key species	Number	The indicator measures the conservation action plans developed for key species
	Bhutan wildlife health strategy	Date	The indicator measures the year by which the Bhutan wildlife health strategy/plan is developed
Output 1.6. Forestry and wildlife Offences/Conflicts Reduced	Zero Poaching Strategy adopted in all field offices	Date	The indicator measures the number of PAs and TDs adopting Zero poaching strategy through implementation of the Internationally recognized six pillars (1) Assessment, 2) Technology, 3) Capacity, 4) Community, 5) Prosecution and 6) Cooperation.
	Innovative and effective HWC mitigation measures up-scaled	Number	The indicator measures the number of innovative mitigation measures implemented to mitigate HWC
	Rescue and rehabilitation institutions/facilities	Number	The indicator measures the number of existing/new regional rescue centres and small rescue units operationalized
Output 1.7. Nature Based Eco-tourism Strengthened	Innovative nature based business plans	Number	The indicator measures the number of innovative nature based business plans developed including forestry and conservation business master plan
	Unique eco-tourism products	Number	The indicator measures the number of viable ecotourism product developed and promoted
	Nature recreational areas	Number	The indicator measures the number of new nature recreational area developed for public recreation and education and further strengthening of the existing nature parks
Output 1.8. Ex-situ Conservation and Sustainable Utilization of Biodiversity Enhanced.	Diversity of biological resources	Number	The indicator measures the number of germplasm accession/species conserved
	On-farm conservation of biological resources	Number	The indicator measures the number of On-farm conservation initiatives
	Bio-prospecting initiatives	Number	The indicator measures any Initiatives related to Bio-prospecting and Bio-exploration
	Botanical information generated and access improved	Percent	The indicator measures the percent of botanical information generated in relation to the species absent currently in the National Herbarium, referring Flora of Bhutan.
Output 1.9: Effective Management of Wetlands and Watersheds Enhanced	Watersheds assessment	Number	The indicator measures the number of watershed assessed as per the classification guidelines.
	Drying water sources assessed	Number	The indicator measures the number of Dzongkhags, in which the inventory of drying water sources is carried out and a detailed assessment of few sites (spring sheds approach) conducted.

	Watershed management plans	Number	The indicator measures the number of watershed management plans developed or implemented after proper delineation of watershed boundary and will compose of several water sources, springs or wetlands.
	Wetland management plans	Number	The indicator measures the number of wetlands management plans developed or implemented.
	Area under climate smart restoration	Ha	The indicator measures the area brought under climate smart restoration activities such as plantation, bioengineering, etc.
	National wet-land inventory	Date	The indicator measures the timeline by which the wetlands being inventoried, surveyed, classified and mapped in all Dzongkhags
Output 1.10. Natural Capital Accounting System Enhanced	Valuation of Ecosystem Services	Date	The indicator measures the timeline by which the valuation of ecosystem are completed
	PES schemes	Number	The indicator measures the number of PES schemes established and renewed
Output 1.11. Urban and Agro forestry Landscape Management Strengthened	Urban and agro forestry strategy	Date	The indicator measures the timeline by which the Strategy/ Framework for Urban Forestry and Agro-forestry in Bhutan is developed
	Landscaping in urban areas	Hectares	The indicator measures the area under landscaping and recreation carried out
	Avenue plantation	KM	The indicator measures the length of plantation carried as part of avenues such as roadside, pathways etc

1.4 MOAF/04: RESEARCH AND EXTENSION SERVICES PROGRAM

A. PROGRAMME SUMMARY

1. Program Title: Research and Extension Services Programme

2. Link to NKRAs: **NKRA 8** [Water, Food and Nutrition Security Ensured]

3. Linkage to AKRAs: RNR Research Strengthened

B. PROGRAMME DESCRIPTION

Agriculture research and extension services are major driving force in agriculture development mainly by developing suitable farming technology options and transferring technologies to the client - farmers. The research services, mostly focused to adaptive and applied researches will be delivered through the four Agriculture Research and Development Centres in the country namely ARDC Yusipang, Bajo, Samtenling and Wengkhar located strategically in the four regions. These ARDCs are institutionalized with a regional mandate common across regions and a nationally mandated commodity programs assigned on the basis of agro-ecological potentials and suitability based on which these respective center operates. Other services such as soil fertility, plant protection, Mushroom and Post-harvest research services will be integrated into ARDCs concerned central Program Agencies as the lead. Agriculture machinery research and development and farm machinery services will be coordinated through the Agriculture Machinery Centre, Regional Agriculture Machinery Centres and Central Machinery Unit of the ED, DoA, MoAF.

The Agriculture extension services will facilitate agriculture development programs, transfer research technologies, provide technical assistance, carry out surveys, follow ups, data collection and monitor development programs through the 20 Dzongkhag and 205 gewogs Agriculture Extension Centres (AECs) with technical backstopping from the ARDCs and Central Program Agencies. Despite R&D being the main implementation arms of the DoA there are some key challenges faced by research and extension services such as:

- Poor Coordination between R& D and Central programs despite having common AKRA and KPIs
- Poor translation of commodity development strategies of DoA at the Dzongkhag work plans and targets
- Multitasking of extension staff and dilution of attention to extension services

Table 31: MoAF/04 – Programme Budget by Agencies

Agency	Resources Allocation (Nu. Mn)		
	Priority 1 Budget	Priority 2 Budget	Total
Department of Agriculture	103.86	95.00	198.86
Department of Livestock	84.15	124.50	208.65
Department of Forests and Park Services	36.07		36.07
Total	**224.08**	**219.50**	**443.58**

Table 32: MoAF/04 - Programme Result Matrix

[No. of Outcome: 1; No. of Outputs: 4; No of activities: 78]

Results (Outcome)	Key Performance Indicators	Indicator Unit	Baseline (year)	Projected Annual Target					Plan Target
				2018-19	2019-20	2020-21	2021-22	2022-23	
Outcome 1: RNR Research Services Strengthened	Policy research on RNR sector	Number	n/a (2016)	2	3	2	3	3	13
	RNR technologies adoption	Number	n/a (2016)	5	75	110	145	180	200
	RNR research conducted	Number	n/a (2016)	85	170	255	340	427	427
Results (Output)	**Key Performance Indicators**	**Indicator Unit**	**Baseline (year)**	**Projected Annual Target**					**Plan Target**
				2018-19	**2019-20**	**2020-21**	**2021-22**	**2022-23**	
Output 1.1. Policy Research Enhanced	Agriculture policy research	Number	0 (2016)	1	1	1	2	1	6
	Forestry policy research	Number	0 (2016)	0	1	0	1	1	3
	Biodiversity policy research	Number	0 (2016)	1	0	1		1	3
	Livestock policy research	Number	0 (2016)	0	1	0	0	0	1
Output 1.2. Enhanced Generation of RNR Technologies	Agriculture production research	Number	307 (2016)	85	170	255	340	427	427
	Livestock production research	Number	n/a (2016)	17	17	17	17	17	85
	Forest technology research	Number	n/a (2016)	0	2	2	3	3	10
	Agriculture post-production research	Number	20 (2016)	20	20	20	20	20	100
	Livestock post-production research	Number	2016	1	1	1	1	1	5
	Socio-economic research	Number	2016	2	2	2	2	2	10

	Climate smart and disaster resilient research	Number	2016	2	2	2	2	2	10
	Plant extracts	Number	25 (2016)	0	0	3	3	3	9
Output 1.3. Enhanced Adoption of RNR Technologies	RNR technologies	Number	n/a	5	5	5	5	5	25
Output 1.4. Research Knowledge and Information Enhanced	Demonstration trails	Number	n/a	110	165	220	283	283	1061
	Long term experimental plots in different ecological zones	Number	7	0	1	1	1	2	5
	Biodiversity Species research	Number	0	0	2	2	3	2	9
	Research on HWC and Conflict Species	Number	0	0	1	2	1	2	6
	Research on climate change impact on forests, biodiversity and ecosystems	Number	0	1	1	1	2	2	7

Table 33: MoAF/04 - Programme Activities

Programme Outputs	Program Activities	Lead Implementing Agency	Collaborating Agency	Plan Outlay in Nu (M) Capital			Priority (High/ Medium)
				Priority 1 Activities	Priority 2 Activities	Total	
Output 1.1 Policy Research Enhanced	Research on socio-economic impacts of wild fisheries on fisher communities and aspects of aquaculture	DoL	LGs, DoFPS	3.500		3.500	High
	Conduct research on farmers' perception on improved technologies and practices	DoL	LGs		0.400	0.400	Medium
	Research on development of climate resilient livestock breeds	DoL	LGs	3.000		3.000	High
	Research on improved dairy management	DoL	LGs		5.500	5.500	Medium

	Carry out Forestry policy research	DoFPS	PPD	0.80		0.800	High
	Study effectiveness of water related policies and regulations	DoFPS	NECS, RUB, NCHM, MoWHS, MoH	0.80		0.800	High
Output 1.2. Enhanced Generation of RNR Technologies	Conduct research on rice and maize	DoA	Dzongkhags	20.00		20.000	High
	Conduct research on wheat and other cereals	DoA	Dzongkhags		20.00	20.000	Medium
	Conduct research on vegetables, potato, citrus, fruits and nuts	DoA	Dzongkhags	15.00		15.000	High
	Conduct Organic Agriculture Research	DoA	Dzongkhags	9.86		9.860	High
	Conduct Farm mechanization research	DoA	Dzongkhags	5.00		5.000	High
	Conduct Plant Protection Research on rice and maize, vegetable, potato, citrus, fruits and nuts	DoA	Dzongkhags	5.00		5.000	High
	Conduct Plant Protection Research on other horticulture crops	DoA	Dzongkhags		10.00	10.000	Medium
	Conduct Soil fertility and nutrient management research on rice, maize, vegetable, citrus, potato, fruits and nuts	DoA	Dzongkhags	2.00		2.000	High
	Conduct Soil fertility and nutrient management research on other crops	DoA	Dzongkhags		10.00	10.000	Medium
	Conduct floriculture and amenity landscape research	DoA	Dzongkhags	3.00		3.000	High
	Conduct Post-Harvest research on rice and maize, vegetable, potato, citrus, fruits and nuts	DoA	Dzongkhags	3		3.000	High
	Conduct Post-Harvest research on other crops	DoA	Dzongkhags		10	10.000	Medium
	Conduct seed research on rice and maize, vegetable, potato, citrus, fruits and nuts	DoA	Dzongkhags	3		3.000	High
	Conduct seed research on other crops	DoA	Dzongkhags		10	10.000	Medium
	Conduct socio economic research	DoA	Dzongkhags	3		3.000	High

	Livestock production and management research on different livestock components (Dairy, Poultry, Fishery, Piggery)	DoL	LGs	49.800		49.800	High
	Research on different techniques to artificially propagate important native livestock species	DoL	LGs		102.900	102.900	Medium
	Animal Nutrition Research on performance of different commercial feeds	DoL	LGs, Feed Companies	5.500		5.500	High
	Research on comparison of effects of different feeds on animal production and evaluation of effect of different feeds	DoL	LGs, Feed Companies		11.000	11.000	Medium
	Research on prevalence and risk factors of different livestock diseases and its effect on production	DoL	LGs	4.000		4.000	High
	Research on goat diseases and priority equine diseases	DoL	LGs		1.000	1.000	Medium
	Research on livestock technology packaging and dissemination methods and evaluate gaps in service delivery	DoL	LGs	2.750		2.750	High
	Carry out propagation trials on NWFPs (4 species)	DoFPS	DAMC, LGs	2.00		2.000	High
	Conduct research on Ornamental Conifer tree species	DoFPS	DAMC, LGs	1.00		1.000	High
	Carry out propagation trials on various wild fruits	DoFPS	DAMC, LGs	1.00		1.000	High
	Carry out propagation trials on various orchids	DoFPS	DAMC, LGs	1.00		1.000	High
	Carry out propagation of Sandal wood	DoFPS	DAMC, LGs	1.00		1.000	High
	Carry out research on Agar-wood	DoFPS	DAMC, LGs	1.00		1.000	High
	Carry out research on *Chem-shing*	DoFPS	DAMC, LGs	1.00		1.000	High
	Promote utilization of less preferred timber species and other forest resources	DoFPS	NRDCL, WBI, LGs	1.00		1.000	High

Output 1.3: Enhanced Adoption of RNR Technologies	Adopt technologies on rice and maize, vegetable, potato, citrus, fruits and nuts	DoA	Dzongkhags	3		3.000	High
	Adopt technologies on other crops	DoA	Dzongkhags		10	10.000	Medium
	Adopt Organic Agriculture technologies	DoA	Dzongkhags	1		1.000	High
	Adopt farm mechanization technologies	DoA	Dzongkhags	3		3.000	High
	Adopt Plant Protection technologies on rice and maize, vegetable, potato, citrus, fruits and nuts	DoA	Dzongkhags	3		3.000	High
	Adopt Plant Protection technologies on other crops	DoA	Dzongkhags		10	10.000	Medium
	Adopt Soil fertility and nutrient management technologies on rice and maize, vegetable, potato, citrus, fruits and nuts	DoA	Dzongkhags	5		5.000	High
	Adopt Soil fertility and nutrient management technologies on other crops	DoA	Dzongkhags		5	5.000	Medium
	Adopt post harvest technologies rice and maize, vegetable, potato, citrus, fruits and nuts	DoA	Dzongkhags	3		3.000	High
	Adopt post harvest technologies on other crops	DoA	Dzongkhags		5	5.000	Medium
	Adopt seed technologies on rice and maize, vegetable, potato, citrus, fruits and nuts	DoA	Dzongkhags	3		3.000	High
	Adopt seed technologies on other crops	DoA	Dzongkhags		5	5.000	Medium
	Adopt floriculture and landscaping technologies	DoA	Dzongkhags	1		1.000	High
	Post production and market research-comparison of different processing technologies and application	DoL	DAMC, LGs	15.600		15.600	High
	Research on development of cost-effective processing technologies	DoL	DAMC, LGs		3.700	3.700	Medium

Output 1.4: Research Knowledge and Information Enhance	Awareness on improved agricultural technologies	DoA	Dzongkhags	3		3.000	High
	Agricultural knowledge and information management	DoA	Dzongkhags	3		3.000	High
	Knowledge on HWC and mitigation measures	DoA	Dzongkhags	2		2.000	High
	Knowledge on impacts of climate change on forest, crops biodiversity and ecosystem	DoA	Dzongkhags	5		5.000	High
	Establish long term experimental plots in different ecological zones	DoFPS	LGs	1.00		1.000	High
	Conduct research on Tiger	DoFPS	LGs, DoL	1.00		1.000	High
	Conduct research on Takin	DoFPS	LGs, DoL	1.00		1.000	High
	Assess dietary overlap between Snow leopard and dhole	DoFPS	LGs, DoL	0.80		0.800	High
	Conservation Research of Himalayan Musk Deer in Bhutan	DoFPS	LGs, DoL	0.60		0.600	High
	Conservation Research of lesser-known small & medium sized mammal species	DoFPS	LGs, RUB	1.00		1.000	High
	Conduct research on birds	DoFPS	LGs, RUB	1.00		1.000	High
	Documentation of Butterflies and Moths in Bhutan	DoFPS	LGs, RUB	0.60		0.600	High
	Bhutan Biodiversity Phenology Acoustics Documentation	DoFPS	LGs, RUB	0.60		0.600	High
	Conduct study on fern and fern allies diversity	DoFPS	LGs, RUB	0.60		0.600	High
	Study on predator prey dynamics with camera trapping exercise (long term)	DoFPS	LGs, RUB	1.00		1.000	High
	Study on Human-Primate conflicts through divisional feeding and animal behaviour along the road sides	DoFPS	LGs, RUB	0.80		0.800	High
	Assess people's perceptions of Carnivores in Bhutan	DoFPS	LGs, RUB	0.60		0.600	High

	Assess fodder competition between livestock and wild ungulates	DoFPS	LGs, RUB	1.00		1.000	High
	Assess of extent of Human-wildlife conflicts in Bhutan and its trend	DoFPS	LGs, RUB	0.60		0.600	High
	Monitor population trend for problem species such as wild pig, deer, Wild dog	DoFPS	LGs, RUB	1.50		1.500	High
	Relationship between poaching and human wildlife conflicts	DoFPS	LGs, RUB	0.60		0.600	High
	Conduct research on Climate change impact on forest biodiversity	DoFPS	LGs, RUB	4.00		4.000	High
	Conduct research on Climate change impact on aquatic biodiversity	DoFPS	LGs, RUB	2.00		2.000	High
	Conduct research on forest fire and link to climate change	DoFPS	LGs, RUB	1.00		1.000	High
	Conduct research on forest pest and diseases with respect to climate change	DoFPS	LGs, RUB	1.13		1.130	High
	Carry out satellite based studies on climate change in Bhutan	DoFPS	LGs, RUB	1.20		1.200	High
	Conduct hydrological and climate biological, socio-cultural, and economic assessments of stretch of river within PA system to declare it as free flowing	DoFPS	LGs, RUB	0.77		0.770	High
	Conduct research on impact of hydropower dams on ecosystem	DoFPS	LGs, DoHPS, DGPC	1.07		1.070	High
Total				**224.080**	**219.500**	**443.580**	

Table 34: MoAF/04 - Monitoring and Evaluation Matrix

Results (Outcome)	Indicator	Unit	Baseline (year)	12 FYP Target	Data Source	Reporting Frequency	Reporting Responsibility
Outcome 1: RNR Research Services Strengthened	Policy research on RNR sector	Number	2015	13	RNR Annual Reports/ GPMS Report	Annually	PPD, MoAF
	RNR technologies adoption	Number	2015	200	RNR Annual Reports/ GPMS Report	Annually	DoA
	RNR research conducted	Number	n/a	427	RNR Annual Reports/ GPMS Report	Annually	DoA
Results (Output)	**Indicator**	**Unit**	**Baseline (year)**	**12 FYP Target**	**Data Source**	**Reporting Frequency**	**Reporting Responsibility**
Output 1.1. Policy Research Enhanced	Agriculture policy research	Number	0 (2016)	6	DoA/RNR Annual reports/ GPMS reports	Annually	PPD; MoAF
	Forestry policy research	Number	0 (2016)	3	DoA/RNR Annual reports/ GPMS reports	Annually	PPD; MoAF
	Biodiversity policy research	Number	0 (2016)	3	DoA/RNR Annual reports/ GPMS reports	Annually	PPD; MoAF
	Livestock policy research	Number	0 (2016)	1	DoA/RNR Annual reports/ GPMS reports	Annually	PPD; MoAF
Output 1.2. Enhanced Generation of RNR Technologies	Agriculture production research	Number	307 (2016)	427	DoA/RNR Annual reports/ GPMS reports	Annually	DoA
	Livestock production research	Number	2016	85	DoA/RNR Annual reports/ GPMS reports	Annually	DoL
	Forest technology research	Number	n/a (2016)	10	DoFPS Reports	Annually	DoFPS
	Agriculture post-production research	Number	2016		DoA/RNR Annual reports/ GPMS reports	Annually	DoA
	Livestock post-production research	Number	2016	5	DoA/RNR Annual reports/ GPMS reports	Annually	DoL
	Socio-economic research	Number	2016	10	DoA/RNR Annual reports/ GPMS reports	Annually	DoL/DoA/PPD
	Climate smart and disaster resilient research	Number	2016	10	DoA/RNR Annual reports/ GPMS reports	Annually	DoA/DoL/PPD
	Plant extracts	Number	25 (2016)	9	DoA/RNR Annual reports/ GPMS reports	Annually	NBC

Output 1.3. Enhanced Adoption of RNR Technologies	RNR technologies	Number	n/a	25	DoA/RNR Annual reports/ GPMS reports	Annually	DoA
Output 1.4. Research Knowledge and Information Enhanced	Demonstration trails	Number	n/a	1061	DoA/RNR Annual reports/ GPMS reports	Annually	DoA
	Long term experimental plots in different ecological zones	Number	7	5	DoFPS Reports	Annually	DoFPS
	Biodiversity Species research	Number	n/a (2016)	9	DoFPS Reports	Annually	DoFPS
	Research on HWC and Conflict Species	Number	n/a (2016)	6	DoFPS Reports	Annually	DoFPS
	Research on climate change impact on forests, biodiversity and ecosystems	Number	n/a (2016)	7	DoFPS Reports	Annually	DoFPS

Table 35: MoAF/04 - Indicator Description

Results (Outcome)	Indicator	Unit	Description
Outcome 1: RNR Research Services Strengthened	Policy research on RNR sector	Number	The indicator measures the number of RNR related policy research conducted to provide policy recommendation to the ministry to achieve desired goal/objectives or to make informed decisions
	RNR technologies adoption	Number	The indicator measures the timeline by, which research on different approaches to reduce human wildlife conflict is conducted
	RNR research conducted	Number	The indicator measures the number of RNR technologies that has been generated and adopted by farmers to improve productivity and production of RNR commodities (technologies includes crop varieties, livestock/crop management practices)

Results (Output)	Indicator	Unit	Description
Output 1.1. Policy Research Enhanced	Agriculture policy research	Number	The indicator measure the number of agriculture related policy research conducted to provide policy recommendations.
	Forestry policy research	Number	The indicator measures the number of policy research conducted on various aspects of forestry
	Biodiversity policy research	Number	The indicator measures the number of policy research conducted on various aspects of biodiversity and other studies such as invertebrate inventory
	Livestock policy research	Number	The indicator measures the number of livestock related policy research conducted to provide policy recommendations.
Output 1.2. Enhanced Generation of RNR Technologies	Agriculture production research	Number	The indicator measures the number of agriculture researches conducted by the ARDCs and Central Program agencies to improve productivity and production of agriculture commodities (technologies includes crop varieties and crop management practices)verified from the AWPB and Annual Reports of the ARDCs and Central Program Agencies.
	Livestock production research	Number	The indicator measures the number of production related research such as breeding, genetics, nutrition, health and farm management conducted
	Agriculture post-production research	Number	The indicator measures the number of post-production, marketing and value chain related research conducted
	Livestock post-production research	Number	The indicator measures the number of post-production, marketing and value chain related research conducted
	Socio-economic research	Number	The indicator measures the number of socio-economic and legislative related research conducted
	Climate smart and disaster resilient research	Number	The indicator measures the number of climate smart and disaster resilient livestock related research conducted
	Plant extracts	Number	The indicator measures the number of Phyto-chemical analysis for identified plants (9) and development of chemical profile
Output 1.3. Enhanced Adoption of RNR Technologies	RNR technologies	Number	The indicator measures the agriculture research technologies generated particularly crop varieties developed/introduced, packaged and released by the research and central program agencies during the plan period which will be verified from the Annual Reports of the ARDCs, Central Program agencies, minutes of the Variety Release Committee Meeting and the updated list of released crops.
	Forestry Technology research	Number	The indicator measures the number of forestry technology development research conducted.

Output 1.4. Research Knowledge and Information Enhanced	Demonstration trails	Number	The indicator measures the number of demonstration sites and research outreach programs established on improved varieties of field crops and horticultural crops, soil and nutrient management and organic agriculture farming sites which can be verified from annual reports of ARDCs and central programs.
	Long term experimental plots in different ecological zones	Number	The indicator measures the number of long term experimental plots established in different ecological zones as reference plot for monitoring changes over time.
	Biodiversity Species research	Number	The indicator measures number of studies on floral and faunal species conducted.
	Research on HWC and Conflict Species	Number	The indicator measures number of studies conducted on HWC, conflict species and practical mitigation measures.
	Research on climate change impact on forests, biodiversity and ecosystems	Number	The indicator measures the number of research on the impact of climate change on forests, biodiversity and ecosystems

1.5 MoAF/05: CLIMATE SMART AND DISASTER RESILIENT DEVELOPMENT PROGRAMME

A. PROGRAMME SUMMARY

Program Title: Climate Smart and Disaster Resilient Development Programme

Link to NKRAs: NKRA 6 [Carbon Neutral, Climate and Disaster Resilient Development Enhanced]; NKRA 8[Food and Nutrition Security Ensured]; NKRA 17 [Sustainable Water Ensured]

Linkage to AKRAs: Enhanced Climate Smart and Disaster Resilient Development

B. PROGRAMME DESCRIPTION

Bhutan submitted NDCs to remain carbon neutral by ensuring that emission of GHGs does not exceed the sinking capacity of our forests. This commitment was made with the view that there is no greater need, or more important, than keeping the planet safe for life to continue. As landlocked country in a fragile mountainous environment, Bhutan remains highly vulnerable to the impacts of CC and will disproportionately bear the impacts of CC. The climate smart and disaster resilient development program in the 12th FYP is appropriately linked with global effect to CC and importantly it gives more focus on small farmers who are vulnerable to climate and disaster impacts.

According to the 2nd GHG inventory, Bhutan is a net sink for greenhouse gases. The estimated sequestration capacity of our forest is 6.3 million tons of CO2 while the emission for year 2000 is only 1.6 million tons of CO2 equivalent. Although the highest emission are from the agriculture sector they have more or less remained constant, but emissions from other sectors such as industrial and transport sectors are rapidly increasing over years.

Efforts will also be made to maintain current levels of forest cover (71%) through sustainable management and utilization of NR. To this, the government has put various measures like afforestation and reforestation programs. Livestock is considered to be one of the main GHG contributor, however the sector has efficiently mitigated through biogas technology to reduce direct GHG emission in the air. The other important strategy in the 12th plan would be to promote climate smart livestock husbandry and increase the production efficiency.

However, challenges that lie ahead include;

- Low priority of local development forums on climate interventions. The local development priorities lie in infrastructure development.
- Forest pest and disease will pose major threats to environmental conditions. Bhutan's focus in the past on pest management has been on agriculture and livestock pest. There is limited technical and institutional capacity for forest pest management.
- Low level of technologies adoption on efficient use of water and natural resources. Hence there is need to generate appropriate technologies that suit impacts of changing climatic conditions drought, flood, extreme temperatures and other natural disasters.

- Forest fires is a common problem every winter throughout the country, especially in the chirpine and mixed conifer forests. Floods and storms often create havoc throughout the country. There is need for disaster management and contingency plan to combat and mitigate these risks.

This program, therefore, focuses on climate change responsive policies, technologies, pests and disease management, information management and disaster management.

Table 36: MoAF/05 – Programme Budget by Agencies

Agency	Resources Allocation (Nu. Mn)		
	Priority 1 Budget	Priority 2 Budget	Total
Department of Agriculture	357.00	120.00	477.00
Department of Livestock	87.31	0.00	87.31
Department of Forests and park Services	91.37	0.00	91.37
Total	**535.68**	**120.00**	**655.68**

Table 37: MoAF/05 - Programme Results Matrix

[No. of Outcome: 1; No. of Outputs: 10; No of activities: 41]

Result Level (Outcome)	Indicators	Unit	Baseline (Year)	Annual Plan Targets					Plan Target
				2018-19	2019-20	2020-21	2021-22	2022-23	
Outcome 1: Climate Smart and Disaster Resilient Development Enhanced	Climate resilient technologies released and adopted	Number	24	26	28	31	33	35	35
	Area brought under improved pasture and winter fodder development	Acre	n/a	20507	22007	23507	25007	26614	26614
	Area brought under sustainable land management	Acre	7321	7431	7731	7931	8131	8231	8231
	Area brought under micro-efficient irrigation schemes	Acre	875	1275	1675	2075	2475	2875	2875
	Functional RNR sector DMU instituted	Date	n/a	n/a	2019	n/a	n/a	n/a	2019
	Forests capacity for carbon sequestration maintained	Mn./tons	6.3	6.3	6.3	6.3	6.3	6.3	6.3
Result Level (Output)	**Indicators**	**Unit**	**Baseline (2016)**	**Annual Plan Targets**					**Plan Target**
				2018-19	**2019-20**	**2020-21**	**2021-22**	**2022-23**	
Output 1.1. Climate Resilient Livestock Farming Promoted	Households adopting stall feeding	Number	n/a	2000	2000	2000	2000	2000	20000
	Biogas plant	Number	3500	880	880	880	880	880	4400
	Winter Fodder	Acres	n/a	1500	2000	2500	3000	3468	3468
	Improved Pasture	Acres	18507	19007	20007	21007	22007	23146	23146
	Native pig population	Number	5487	5761	6049	6351	6669	7002	7002
	Native Cattle population	Number	203194	213353	224021	235222	246983	259332	259332
	Native poultry population	Number	123146	129303	135768	142556	149684	157169	157169

Output 1.2. Livelihood Choices for Marginalized Farmers Enhanced	Vulnerable Households covered under pro-poor livestock scheme	Household	n/a	200	300	400	500	689	689
	climate resilient Honey producing households	Household	n/a	500	700	900	1100	1356	1356
	Capture fishery	Number	4	6	8	10	12	13	13
Output 1.3. Alternate Water Source Explored	Ground water assessment	Number	n/a	1	2	3	4	5	5
Output 1.4 Climate Smart Irrigation and Water Efficient Technologies Adopted	Water use efficient technology	Number	2	2	2	3	4	5	5
	Water harvesting structure	Number	7	7	9	11	13	17	17
Output 1.5. Climate Smart Technologies Promoted and Adopted	Bio-digester and composting (biogas)	Number	3554 (2016)	1000	1000	1000	1000	1000	5000
	Climate smart crop technologies adopted	Number	24	26	28	31	33	35	35
Output 1.6. RNR Disaster Management Institution/ICS Strengthened	RNR DM Committees at various levels formalized	Number		3	n/a	n/a	n/a	n/a	3
	SOP for all RNR Hazards in place	Number		1	1	1	1		4
Output 1.7 Knowledge Management, Education and Awareness in DM Enhanced	Sensitization/advocacy on DM and CP	Date	n/a	n/a	n/a	2020	n/a	n/a	2020
	Frequency of simulation exercises for priority hazards	Number		1	1	1	1	1	5
	Disaster management information system	Date		Jan-19					2019
	Agro-met Advisory Unit	Date	n/a	n/a	n/a	2019	N/a	n/a	2019

Output 1.8. Pest and Diseases Risk Reduction on RNR Hazards Strengthened	E-pest and diseases surveillance system	Number	1	0	0	1	1	0	2
Output 1.9. Incidences of Forest Fire Reduced	Forest fire prone area assessed	Number	0	5	5	5	5	0	20
	Forest fire management groups	Number	47	11	19	11	14	12	114
	Forest fire line	KM	62	5	40	43	38	35	161
Output 1.10 National REDD+ Readiness Phase for Mitigation of Climate Change Impact Completed	National REDD+ strategy and Action Plans	Date	0			2020			2020
	REDD+ Safeguard framework and information system	Number	0	0	1	1	0	0	2
	NFMS and MRV for REDD+	Number	0		0	0	1	1	2
	Emission Reference Level established	Date	0					2023	1
	Biomass and volume equation developed	Number	20	11	3	0	0	0	34

Table 38: MoAF/05 - Programme Activities

Programme Outputs	Programme Activities	Lead Implementing Agency	Collaborating Agency	Plan Outlay in Nu (M) Capital			Priority (High/ Medium)
				Priority 1 Activity	Priority 2 Activities	Total	
Output 1. Climate Resilient Livestock Farming Promoted	Strengthen the native population of poultry through establishment of semi-commercial Hatchery unit and provision of equipment like incubator	DoL	LPD/NPHBC/NPRDC	7.240		7.24	High
	Establishment of nucleus farm for native pigs	DoL	RLDCs/NPiRDC	1.000		1.00	High
	Promote Native cattle genetic utilization and preparation of Nublang conservation plan	DoL	RLDC-K/NPHBC	2.550		2.55	High

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	Conduct capacity building on biogas technology for relevant stakeholders	DoL	Bhutan Biogas Project/RLDC	34.335		34.34	High
	Develop indigenous fodder germplasm/ pasture for winter fodder	DoL	NRDCAN/RLDC	17.125		17.13	High
	Conduct fodder plantations of improved pasture	DoL	NRDCAN/RLDC	14.864		14.86	High
Output 2. Livelihood Choices for Marginalized Farmers Enhanced	Monitoring of existing community based capture and recreational fisheries program and Documentation of indigenous fishing gears/methods in Bhutan	DoL	NRDCRF	10.200		10.20	High
Output 3. Alternative Water Source Explored	Conduct study on groundwater extraction in potential Dzongkhags	DoA	Private sector		10	10.00	Medium
	Construct water harvesting in catchment area	DoA	Dzongkhags, DoFPS, Private sector		10	10.00	Medium
Output 4. Climate Smart Irrigation and Water Efficient Technologies Adopted	Promote water efficient irrigation technologies	DoA	Private sector	270		270.00	High
	Promote pressurized irrigation systems	DoA	Dzongkhags, private sector		100	100.00	Medium
Output 5. Climate Smart Technologies Released and Adopted	Release and promote climate resilient agriculture technologies	DoA	Dzongkhag	21		21.00	High
	Improvement of crop land races through breeding	DoA	Dzongkhag	4		4.00	High
	Release and promote climate resilient crop varieties	DoA	Dzongkhag	13		13.00	High
	Characterization of indigenous fruit crops (walnut, pear, peach, kiwi & berries)	DoA	Dzongkhag	5.00		5.00	High
	Establishment and conservation of indigenous fruit crops in germplasm	DoA	Dzongkhag	5.00		5.00	High

	Characterization and purification of crop land races	DoA	NBC/ Dzongkhag	5.00		5.00	High
	Conduct study on crop phenology due to impact of climate change	DoA	Dzongkhag	5.00		5.00	High
	Establish functional agro-met advisory unit	DoA	Private sector, NCHM	15		15.00	High
Output 6. RNR Disaster Management Institution Strengthened	SOPs for crop diseases	DoA	ARDCs	3		3.00	High
Output 7. Knowledge Management, Education and Awareness in DM Enhanced	Provide agro-met advisory services	DoA	ARDCs, Dzongkhag	8		8.00	High
Output 8. Pest and Diseases Risk Reduction on RNR Hazards Strengthened	Functional e-pest surveillance system	DoA	ARDCs, Dzongkhag	3		3.00	High
	Develop forest pest and disease prevention and control measures	DoFPS	LGs	2		2.00	High
Output 9. Forest Fire Incidences Reduced	Develop Forest fire management guidelines	DoFPS	LGs	2		2.00	High
	Carry out prescribed burning	DoFPS	LGs	2		2.00	High
	Conduct survey and mapping of forest fire prone area in Dzongkhags	DoFPS	LGs	4		4.00	High
	Operationalize forest fire management groups	DoFPS	LGs	10		10.00	High
	Implementation of SOP for forest fire management	DoFPS	RBA, RBP, LGs	10		10.00	High
	Construct forest fire line	DoFPS	LGs	5.5		5.50	High
	Carry out post forest fire management of the burnt area	DoFPS	LGs	2.6		2.60	High

Output 10: National REDD+ Readiness Phase for Mitigation of Climate Change Impacts Completed	Carry out forest type and crown cover mapping of Bhutan	DoFPS	PPD, NLCS	3.4		3.40	High
	Develop Biomass and Volume Equation	DoFPS	LGs	7		7.00	High
	Refine National REDD+ Strategy	DoFPS	LGs	10.0		10.00	High
	Develop sub-national REDD+ Action Plans	DoFPS	LGs	4.0		4.00	High
	Develop Environmental and Social Management Framework	DoFPS	LGs	5.0		5.00	High
	Develop REDD+ Safeguard framework and information system	DoFPS	LGs	4.0		4.00	High
	Develop feedback and grievance redress mechanism for REDD+	DoFPS	LGs	1.0		1.00	High
	Develop NFMS and MRV for REDD+	DoFPS	LGs	15.0		15.00	High
	Strengthen and maintain Forest Information Reporting & Management System	DoFPS	LGs	2.4		2.37	High
	Develop Forest Reference Level	DoFPS	NECS	1.0		1.00	High
	Submit Forest Reference Emission level and summary of information on REDD+ Safeguards to UNFCCC	DoFPS	NECS, MoFA	0.5		0.50	High
Total				**535.684**	**120.000**	**655.684**	

Table 39:MoAF/05 - Programme Monitoring & Evaluation Matrix

Results (Outcome)	Indicators	Unit	Baseline (year)	12 FYP Target	Data Source	Reporting Frequency	Reporting Responsibility
Outcome 1: Climate Smart and Disaster Resilient Development Enhanced	Climate resilient technologies released and adopted	Number	24 (2016)	24	Livestock Statistics	Annually	RED
	Area brought under improved pasture and winter fodder development	Acre	n/a (2016)	26614	Livestock Statistics	Annually	NRCAN
	Area brought under sustainable land management	Acre	7231 (2016)	1000	DoA/RNR Statistics	Annually	NSSC, DoA
	Functional RNR sector DMU instituted	Date	n/a (2016)	2019	DS, Annual Report	Annually	Directorate Services
	Forests capacity for carbon sequestration maintained	Mn./tons	6.3 (2016)	6.3	DoFPS report	Annually	FRMD, DoFPS
Results (Output)	**Indicators**	**Unit**	**Baseline (year)**	**12 FYP Target**	**Data Source**	**Reporting Frequency**	**Reporting Responsibility**
Output 1.1. Climate Resilient Livestock Farming Promoted	Households adopting stall feeding	Number	n/a (2016)	10000	Livestock Statistics	Annually	NRCAN
	Biogas plant established	Number	3500 (2016)	6519	Livestock Statistics	Annually	Biogas Project
	Winter fodder	Acres	n/a (2016)	3467.6	Livestock Statistics	Annually	NRCAN
	Improved Pasture	Acres	18507 (2016)	23146	Livestock Statistics	Annual	NRCAN
	Native Poultry Population	Number	123146 (2016)	157169	Livestock Statistics	Annually	DoL
	Native Pig Population	Number	5487 (2016)	7002	Livestock Statistics	Annually	DoL
	Native Cattle population	Number	203194 (2016)	259332	Livestock Statistics	Annually	DoL

Output 1.2. Livelihood Choices for Marginalized Farmers Enhanced	Vulnerable Households covered under pro-poor livestock scheme	Household	n/a (2016)	689	Livestock Statistics	Annually	LPD
	Climate resilient honey producing households	Household	n/a (2016)	1356	Livestock Statistics	Annually	RLDC
	Capture fishery	Number	0 (2016)	13	Livestock Statistics	Annually	NCRLF
Output 1.3. Alternate Water Source Explored	Ground water assessment	Number	n/a (2016)	10	DoA Statistics	Annually	AED
	Revival of water sources for irrigation	Number	n/a (2016)	5	DoA Statistics	Annually	AED
Output 1.4 Climate Smart Irrigation and Water Efficient Technologies Adopted	Water use efficient technology	Number	n/a (2016)	5	DoA Statistics	Annually	AED
	Water harvesting structure	Number	n/a (2016)	20	DoA Statistics	Annually	AED
Output 1.5. Climate Smart Technologies Promoted and Adopted	Bio-digester and composting (biogas)	Number	3554 (2016)	0	DoA Statistics	Annually	DoA
	Climate smart crop technologies adopted	Number	24 (2016)	35	DoA Statistics	Annually	NSSC, DoA
Output 1.6. RNR Disaster Management Institution/ICS Strengthened	RNR DM Committees at various levels formalised	Number	n/a (2016)	3	DS, MoAF	Annually	DS, MoAF
	SOP for all RNR Hazards in place	Number	n/a (2016)	4	DS, MoAF	Annually	DS, MoAF
Output 1.7 Knowledge Management, Education and Awareness in DM Enhanced	Sensitization/advocacy on DM and CP	Date	n/a (2016)	2020	DS, MoAF	Annually	DS, MoAF
	Frequency of simulation exercises for priority hazards	Number	n/a (2016)	5	DS, MoAF	Annually	DS, MoAF
	Disaster management information system	Date	n/a (2016)	2019	DS, MoAF	Annually	DS, MoAF
	Agro-met Advisory Unit	Date	n/a (2016)	2019	DoA	Annually	DS, MoAF

Output 1.8. Pest and Diseases Risk Reduction on RNR Hazards Strengthened	E-pest and diseases surveillance system	Number	1 (2016)	2	DS, MoAF	Annually	NPPC, DoA
Output 1.9. Incidences of Forest Fire Reduced	Forest fire prone area assessed	Number	0 (2016)	20	FPED, DoFPS	Annually	TFD, FPED, DoFPS
	Forest fire management groups	Number	47 (2016)	114	FPED, DoFPS	Annually	TFD, FPED, DoFPS
	Forest fire line	Km	62 (2016)	161	FPED, DoFPS	Annually	TFD, FPED, DoFPS
Output 1.10 Forests Conditions, Biodiversity Status and Carbon Stock Strengthened	National REDD+ strategy and Action Plans	Date	0 (2016)	2020	Admin. DoFPS	Annually	WMD, FRMD
	REDD+ Safeguard framework and information system	Number	0 (2016)	2	Admin. DoFPS	Annually	WMD, FRMD
	NFMS and MRV for REDD+	Number	0 (2016)	2	Admin. DoFPS	Annually	FRMD, NCD, TFDs
	Emission Reference Level established	Date	0 (2016)	1	Admin. DoFPS	Annually	FRMD
	Biomass and volume equation developed	Number	20 (2016)	34	Admin. DoFPS	Annually	TFD

Table 40: MoAF/05 - Indicator Description

Outcome	Indicator	Unit	Description
Outcome 1: Climate Smart and Disaster Resilient Development Enhanced	Climate resilient technologies released and adopted	Number	The indicator measures the number of RNR technologies released and adopted
	Area brought under improved pasture and winter fodder development	Acre	The indicator measures the land area (both registered and SRF land leased) brought under improved pasture
	Area brought under sustainable land management	Acre	The indicator measures the total land area within the country developed and managed through sustainable land management regimes and practices
	Functional RNR sector DMU instituted	Date	The indicator measures timeline by which a disaster management unit (DMU) within the Ministry that takes over all DM/CP work for MoAF is established and formalization of various DM committee for the MoAF
	Forests capacity for carbon sequestration maintained	Mn./tons	The indicator measures the amount of carbon sequestered by forests of Bhutan
Output 1.1. Climate Resilient Livestock Farming Promoted	Households adopting stall feeding	Number	The indicator measures the number of new households adopting stall feeding for cattle
	Biogas plant established	Number	The indicator measures the number of additional/new biogas plants established
	Winter fodder	Acres	The indicator measures the total area brought under winter fodder production
	Improved Pasture	Acres	The indicator measures the total area under improved pasture development
	Native Poultry Population	Number	The indicator measures the total number of native poultry
	Native Pig Population	Number	The indicator measures the total number of native pigs
	Native Cattle population	Number	The indicator measures the total number of native cattle
Output 1.2. Livelihood Choices for Marginalized Farmers Enhanced	Vulnerable Households covered under pro-poor livestock scheme	Household	The indicator measures the total households covered under pro-poor livestock scheme
	Climate resilient honey producing households	Household	The indicator measures the total households undertaking bee keeping of native species
	Capture fishery	Number	The indicator describes the total number of capture fisheries established with a management plan and MoU
Output 1.3. Alternate Water Source Explored	Ground water assessment	Number	The indicator measures the study conducted for availability of ground water for irrigation purposes

Output 1.4 Climate Smart Irrigation and Water Efficient Technologies Adopted	Water use efficient technology	Number	The indicator measures the number of water efficient technology adopted in smart irrigation
	Water harvesting structure	Number	The indicator measures the number of water structures for irrigating crops
Output 1.5. Climate Smart Technologies Promoted and Adopted	Bio-digester and composting (biogas)	Number	The indicator measures the number of bio-digester constructed.
	Soil fertility improvement technologies	Number	The indicator measures the number of technologies which contributes to soil structure and fertility improvement
	Crop production technologies	Number	The indicator measures the number of climate smart technologies adopted
	Resilient local crop varieties	Number	The indicator measures the number of climate resilient crop varieties adopted
Output 1.6. RNR Disaster Management Institution/ICS Strengthened	RNR DM Committees at various levels formalized	Number	The indicator measures the formalization of Disaster Management Committees at various levels
	SOP for all RNR Hazards in place	Number	The indicator measures the development of SOP for RNR Hazards
Output 1.7 Knowledge Management, Education and Awareness in DM Enhanced	Sensitization/advocacy on DM and CP	Date	The indicator measures the date by which sensitization/advocacy on DM and CP are conducted
	Frequency of simulation exercises for priority hazards	Number	The indicator measures the number of simulation exercises carried out for priority hazards
	Disaster management information system	Date	The indicator measures the development of Disaster management information system
	Agro-met Advisory Unit	Date	The indicator measures the timeline by which the Agro-met Advisory Unit is established
Output 1.8. Pest and Diseases Risk Reduction on RNR Hazards Strengthened	E-pest and diseases surveillance system	Number	The indicator measures the functional e-pest surveillance put in place.
Output 1.9. Incidences of Forest Fire Reduced	Forest fire prone area assessed	Number	The indicator measures the number of fire prone Dzongkhags assessed and mapped
	Forest fire management groups	Number	The indicator measures forest fire management groups formed in the fire prone areas.
	Forest fire hazard reduction	Km	The indicator measures the creation of fire line and fuel load reduction

Output 1.10 Forests Conditions, Biodiversity Status and Carbon Stock Strengthened	National REDD+ Strategy & Action Plan	Date	The indicator measures the date by which the REDD+ strategy and action plan is developed.
	REDD+ Safeguard framework and information system	Number	The indicator measures the establishment of REDD+ Safeguard Information System (SIS) and Environmental and Social Management Framework
	NFMS and MRV for REDD+	Number	The indicator measures the establishment of National Forest Monitoring Systems and Monitoring, Reporting and Verification System for REDD+
	Emission Reference Level established	Date	The indicator measures the timeline by which Forest Reference Emission Level for implementing REDD+ is established
	Biomass and volume equation developed	Number	The indicator measures the number of biomass and volume equation developed for assessing carbon content of trees in forests

MOAF/06: HIGHLAND DEVELOPMENT PROGRAMME

A. PROGRAMME SUMMARY

1. **Program Title:** Highland Development Programme

2. **Link to NKRAs:** NKRA 8 [Food, Food and Nutrition Security Enhanced]; NKRA 2 [Economic Diversity and Productivity Enhanced]

3. Linkage to AKRAs: Livelihood of highlanders Improved and sustained

B. PROGRAMME DESCRIPTION

Although there is no definite surveys conducted, it has become common knowledge that the highlanders have started securing land assets in the lowlands. Such a trend could in the long run result in permanent migration from the highland. Such trends would lead to loss of indigenous genetic resources such as the yak breed, the Tibetan mastiff dog and associate indigenous knowledge and practice around the highland culture. Changes in conservation of medicinal plant resources and highland landscapes as a result would also impact national flagship wildlife such as snow leopard, takin and other key species. The importance of highlands in the overall development of the nation is well recognized. However, highland development was assigned low priority for many years due to remoteness, scattered settlements and low literacy rates, which are common characteristics of the highlands. Attempts were made earlier by implementing two highland development projects in 1980s but were limited to few selected pockets. Realizing the importance from traditional, socio-cultural, bio-diversity conservation and territorial integrity aspects, highland development is identified as one of the strategic flagship programs in the 12th FYP.

Therefore, the main objectives of the Highland Development Program in the 12th FYP are to promote sustainable livelihood of the highland communities, promote and preserve the socio-cultural traditions of the highlanders in consistence with GNH principles, ensure equitable access, sustainable management and utilization of natural resources, and promote traditional knowledge and generate technological innovations to enhance income generation and employment opportunities.

Table 41: MoAF/06 - Programme Budget Matrix

Agency	Resources Allocation (Nu. Mn)		
	Priority 1 Budget	Priority 2 Budget	Total
Department of Agriculture	8.84	0.00	8.84
Department of Livestock	41.17	29.90	71.07
Department of Forests and Park Services	6.63	0.00	6.63
Total	**56.64**	**29.90**	**86.54**

Table 42: MoAF/06 - Programme Result Matrix

[No. of Outcome: 1; No. of Outputs: 3; No of activities: 14]

Results (Outcome)	Indicators	Unit	Baseline (year)	Projected Annual Target					Plan Target
				2018-19	2019-20	2020-21	2021-22	2022-23	
Outcome 1: Livelihoods of Highlanders Improved and Sustained	Yak Herders Household	Number	2016	1039	1039	1039	1039	1039	1039
	Yak population	Household	2016	40438	40438	40438	40438	40438	40438
	Highland Enterprise established	Number	2016	0	3	2	1	0	6
	Sheep population	Number	11277 (2016)	11277	11277	11277	11277	11277	11070
Results (Output)	**Indicators**	**Indicator Unit**	**Baseline (year)**	**Projected Annual Target**					**Plan Target**
				2018-19	2019-20	2020-21	2021-22	2022-23	
Output 1.1: Highland Enterprise Promoted	Yak based enterprise	Number	2 (2016)		1	1			2
	Sheep based enterprise	Number	0 (2016)		1	1		1	3
	Medicinal and aromatic enterprise	Number	n/a (2016)	0	0	1	2	3	3
	Highland eco-tourism Products	Number	2016	1	2	1		1	5
	Community based highland NWFP group	Number	2016		1	1	2	1	5
	Horse Farmers' group	Number	1 (2016)	1	1				2
Output 1.2: Highland Agriculture and Livestock Farming Promoted and Sustained	Support highland protected agriculture (green house)	Number	100 (2016)	150	250	350	450	550	550
	Quinoa promotion	Acre	16.5 (2016)	18	20	22	24	25	25
	Sheep population	Number	10866 (2016)	10870	10910	10950	10990	11070	11070

Output 1.3: Highland Habitat Conservation and Management Enhanced	Household compensated for HWC incidences	Percentage	N/A (2016)	100	100	100	100	100	100
	Alpine Habitat management	Hectares	n/a (2016)	0	55	50	55	50	210

Table 43: MoAF/06 - Programme Activities

Program Outputs	Program Activities	Lead Implementing Agency	Collaborating Agency	Plan Outlay in Nu (M) Capital			Priority (High/ Medium)
				Priority 1 Activities	Priority 1 Activities	Total	
Output 1.1: Highland Enterprise Promoted	Promote Yak, sheep and bee based enterprise through product diversification strategies and exploration of potential areas	DoL	NHRDC	10.880		10.880	High
	Establishment of facilitating infrastructures and conduct study on market value chain on sheep wool products	DoL	NHRDC, RLDCs		14.300	14.300	Medium
	Establish highland eco-tourism packages	DoFPS	DoL, LGs	1.500		1.500	High
	Establish Community based NWFP enterprise	DoFPS	DAMC, LGs	1.000		1.000	High
	Support to medicinal and aromatic enterprise establishment	DoA	LGs, DoFPS, DoL	8.840		8.840	High
Output 1.2: Highland Agriculture and Livestock Farming Promoted and Sustained	Maintain the Yak population by strengthening the existing yak farms and assessing the yak breeds and their performances	DoL	NHRDC	11.050		11.050	High
	Conduct study on the suitable method of rangeland utilization	DoL	NHRDC		1.000	1.000	Medium
	Maintain sheep population by strengthening the sheep production diversification and promoting the sheep husbandry practices	DoL	NHRDC, RLDCs	7.738		7.738	High
	Establish sheep farm infrastructures	DoL	NHRDC, RLDCs		10.550	10.550	Medium
	Maintain horse population by establish improved infrastructures and provision of equipment	DoL	NHRDC, RLDC	11.500		11.500	High
	Strengthen capacity of staff on horse husbandry practices and horse riding	DoL	NHRDC, RLDC		4.050	4.050	Medium

Output 1.3. Highland Habitat Conservation and Management Enhanced	Initiate Highland HWC mitigation measures	DoFPS	LGs	2.000		2.000	High
	Carry out Alpine habitat management	DoFPS	DoL, LGs	1.000		1.000	High
	Carry out Watershed management	DoFPS	NEC	1.130		1.130	High
Total				**56.638**	**29.900**	**86.538**	

Table 44: MoAF/06 - Programme Monitoring and Evaluation

Results (Outcome)	Indicators (KPI)	Indicator Unit	Baseline (year)	Plan Target	Data Source	Reporting Frequency	Reporting Responsibility
Outcome 1: Livelihoods of Highlanders Improved and Sustained	Yak Herders Household	Number	2016	1039	Livestock Statistics/RNR Statistics	Annually	DoL
	Yak population	Household	2016	40438	Livestock Statistics/RNR Statistics	Annually	DoL
	Highland Enterprise established	Number	2016	6	Administrative	Annually	DoL/DoA/DoFPS
	Sheep population	Number	10866 (2016)	11070	Livestock Statistics/RNR Statistics	Annually	DoL
Results (Output)	**Indicators (KPI)**	**Indicator Unit**	**Baseline (year)**	**Plan Target**	**Data Source**	**Reporting Frequency**	**Reporting Responsibility**
Output 1.1: Highland Enterprise Promoted	Yak based enterprise	Number	2 (2016)	2	Administrative data DoL	Annually	DoL
	Sheep based enterprise	Number	0 (2016)	2	Administrative data DoL	Annually	DoL
	Medicinal and aromatic enterprise	Number	2016	3	Administrative data, MoAF	Annually	DoA
	Highland eco-tourism Products	Number	2016	5	Administrative data, MoAF	Annually	DoFPS
	Community based highland NWFP group	Number	2016	5	Administrative data, DoFPS	Annually	DoFPS
	Horse Farmers' group	Number	1 (2016)	2	Administrative data DoL	Annually	DoL

Output 1.2: Highland Agriculture and Livestock Farming Promoted and Sustained	Protected vegetable production	Number	2016	1039	Administrative Data, DoA	Annually	DoA
	Quinoa promotion	Acre	16.5 (2016)	25	Administrative Data, DoA	Annually	DoA
	Sheep population	Number	10866 (2016)	11070	RNR Statistics	Annually	DoL
Output 1.3: Highland Habitat Conservation and Management Enhanced	Household compensated for HWC incidences	Percentage	n/a (2016)	100	Administrative data, DoFPS	Annually	DoFPS
	Alpine habitat management	Hectare	n/a (2016)	210	Administrative data, DoFPS	Annually	DoFPS

Table 45: MoAF/06 - Indicator Description

Results (Outcome)	Indicator	Unit	Description
Outcome 1: Livelihoods of Highlanders Improved and Sustained	Yak Herders Household	Number	The indicator measures the population residing in the highland as yak herders
	Yak population	Household	The indicator measures the total yak population for the reference year
	Highland Enterprise established	Number	The indicator measures the number of enterprises established to enhance the cash income and livelihoods of highlanders (NWFP, *cordyceps*, ecotourism, handicrafts, trekking)
	Sheep population	Number	The indicator measures the total sheep population for the reference year
Results (Output)	**Indicator**	**Unit**	**Description**
Output 1.1: Highland Enterprise Promoted	Yak based enterprise	Number	The indicator measures the number of yak enterprises established
	Sheep based enterprise	Number	The indicator measures the number of sheep enterprises established
	Medicinal and aromatic enterprise	Number	The indicator measures the number of medicinal and aromatic enterprise established
	Highland eco-tourism products	Number	The indicator measures the number of highland specific eco-tourism products developed
	Community based highland NWFP group	Number	The indicator measures the number of communities based highland NWFP groups established
	Horse Farmers' group	Number	The indicator measures the number of horse farmers group established

Output 1.2: Highland Agriculture and Livestock Farming Promoted and Sustained	Protected vegetable production	Number	The indicator measures the number of households supported with protected agriculture facilities
	Quinoa promotion	Acre	The indicator measures the area promoted under quinoa production
	Sheep population	Number	The indicator measures the number of sheep in the highland areas
Output 1.3: Highland Habitat Conservation and Management Enhanced	Household compensated for HWC incidences	Percentage	The indicator measures the percentage of household compensated for HWC incidences
	Alpine Habitat management	Hectare	The indicator measures the area brought under alpine habitat management

MOAF/07: COORDINATION AND SUPPORT SERVICE PROGRAMME

A. PROGRAMME SUMMARY

Program Title: Coordination and Support Service Programme

Link to NKRAs: **NKRA 9** [Infrastructure, Communication and Public Service Delivery Improved]; **NKRA 11**[Economic Diversity and Productivity Enhanced, Healthy Eco-system Maintained]; **NKRA 6**[Carbon Neutral, Climate and Disaster Resilient Development Enhanced];**NKRA 8** [Food and Nutrition Security Ensured]; **NKRA 17** [Sustainable Water Ensured)

Linkage to AKRAs: Enhanced Efficiency and Effectiveness of RNR Service Delivery.

B. PROGRAMME DESCRIPTION

Strong coordination and provision of effective services is pre-requisite in achieving the plan targets of the 12th FYP. This program will therefore mainstream *'Triple C'* concept of Coordination, Consolidation and Collaboration into the programmes and cater towards providing strategic direction, enhancing cross-sectoral coordination and collaboration, disseminating timely information, supporting evidence-based decisions, and creating enabling environment for agencies by providing clear policy, legal and directional services. In addition, the program will also pursue mobilization of human resources in line with the 'Division of Responsibility Framework' and capacity enhancement for key players.

Table 46: *MoAF/07 -Programme Budget by Agencies*

Agency	Resources Allocation (Nu. Mn)		
	Priority 1 Budget	Priority 2 Budget	Total
Department of Agriculture	0.37	8.00	8.37
Department of Livestock			0.00
Department of Forest and Park Services	0.70	1.00	1.70
Department of Agricultural Marketing and Cooperatives	1.58		1.58
Secretariat (DS, NBC, RDTC, PPD)	0.75	1.00	1.75
Secretariat	49.93	9.15	59.08
Total	**52.58**	**18.15**	**70.73**

Table 47: MoAF/07 - Programme Result Matrix

[No. of Outcome: 1; No. of Outputs: 4; No of activities: 35]

Results (Outcome)	Indicator	Unit	Baseline (Year)	Projected Annual Target					
				2018-19	2019-20	2020-21	2021-22	2022-23	Plan Target
Outcome 1: Enhanced Efficiency and Effectiveness of RNR Service Delivery	Annual performance rating	Percent	83 (2016)	90	90	90	90	90	90
	RNR ICT services made available	Number	3 (2016)	2	2	2	2	2	13
	Timeline by which annual RNR statistics released	Date	n/a	June, 2019	Jun-20	Jun-21	Jun-22	Jun-23	June Every year
	RDTC upgraded to RNR based TVET	Date	n/a	n/a	2019	n/a	n/a	n/a	2019
	Timeline by which forestry services provided	Day	14	14	14	14	14	14	14
Results (Output)	**Indicator**	**Unit**	**Baseline (Year)**	**Projected Annual Target**					
				2018-19	**2019-20**	**2020-21**	**2021-22**	**2022-23**	**Plan Target**
Output 1.1. Information System and ICT Services Strengthened	RNR statistics releases	Number	n/a	20	20	20	20	20	100
	RNR ICT services developed	Number	NA, 2016	2	2	3	2	2	11
Output 1.2. Planning and Monitoring System Strengthened	Annual RNR Performance Report	Number	11 (2017)	2	2	3	2	2	22
	Budget utilization	Percentage	2016	>95	>95	>95	>95	>95	>95
Output 1.3. Policy and Legislation Strengthened	RNR policies and legislation developed and revised	Number	27 (2016)	3	4	5	5	4	21
Output 1.4. Human Resource Development and Management Services Strengthened	Human Resource Master Plan developed	Date	n/a	2018	n/a	n/a	n/a	n/a	2018
	Capacity of RNR-stakeholders enhanced	Number	3212 (2016)	570	570	570	570	570	6062

Table 48: MoAF/07 – Programme Activities

Programme Outputs	Programme Activities	Lead Implementing agency	Collaborating Agency	Plan Outlay in Nu (M) Capital			Priority (High/ Medium)
				Priority 1 Activities	priority 2 Activities	Total	
Output 1.1. Information System and ICT Services Strengthened	Conduct RNR Census	RSD	Line departments, LGs	20.66		20.66	High
	Conduct annual core and modular RNR surveys	RSD	Line departments, LGs	3.18		3.18	High
	Produce land-use maps	RSD	Line departments, LGs		2.50	2.50	Medium
	Develop and air IEC Radio, TV, TV spot MTV Program	ICTD	all agencies		1.00	1.00	Medium
	Publish IEC materials	ICTD	ICTD	1.59		1.59	High
	Develop policy archiving system	ICTD	PPD/Line departments	0.79		0.79	High
	Develop GIS maps of important quarantine pest and diseases (Severity zoning and spatial and temporal mapping)	ICTD	BAFRA		0.15	0.15	Medium
	Laboratory Information Management system for effective service delivery (LIMS)	ICTD	BAFRA	1.59		1.59	High
	Establish Forest research data repository	DoFPS	ICTD	0.10		0.10	High
	Operationalize Spatial decision system for forest clearance	DoFPS	ICTD	0.10		0.10	High
	Develop Forestry ICT and G2C services	DoFPS	ICTD	0.30		0.30	High
	Process forest resources utilization and clearance services	DoFPS	LGs	0.20		0.20	High
	Enhance Livestock G2C services	ICTD	DoL	1.19		1.19	High
	Set up comprehensive national level AMIS	DAMC	ICTD	1.58		1.58	High
Output 1.2. Planning and Monitoring System Strengthened	Coordination and monitoring of plans, programs and projects	PPD	Line departments/ agencies, external agencies	6.28		3.28	High
	Develop Agriculture Subsidy Policy	PPD	DoA, LGs, line departments & agencies, external ministries	0.79		0.79	High

Output 1.3. Policy and Legislation Strengthened	Develop Organic Sector Development Policy	PPD	DoA, LGs, line departments & agencies, external ministries		1.50	1.50	Medium
	Develop agriculture research and development strategy	DoA	Line agencies		1.00	1.00	Medium
	Develop agriculture vision 2045	DoA	APD/ARED/AED	0.37		0.37	High
	Develop need based agriculture frameworks and guidelines	DoA	APD/ARED/AED		5.00	5.00	Medium
	Develop standard for machineries, seeds and laboratories	DoA	All agencies		2.00	2.00	Medium
	Amendment Livestock Act 2001	Legal Services	Lines departments/ agencies, external agencies, LGs	0.50		0.50	Medium
	Amendment Livestock Rules and Regulation 2017	Legal Services	Lines departments/ agencies, external agencies, LGs	0.50		0.50	Medium
	Develop and amend enabling legal and tertiary instruments (Amendment of Food Act, Amendment of Plant Quarantine Acts, Seed Act and Pesticide Acts & Rules & Regulations)	Legal Services	Lines departments/ agencies, external agencies, LGs	1.00		1.00	Medium
	Review and strengthen an ABS monitoring network	NBC	PPD/HRD/Lines departments/agencies	0.25		0.25	High
	Revise Biodiversity Act of Bhutan 2003	NBC	PPD/Lines departments/agencies, external agencies, LGs	0.50		0.50	High
	Adopt draft regulation for the Biodiversity Act	NBC	Lines departments/ agencies, external agencies, LGs		1.00	1.00	Medium
	Revise implementation guidelines for Crop and Livestock conservation endowment fund	Legal Services	PPD, Lines departments/agencies, external agencies, LGs	0.79		0.79	High
	Revise Forests Act	Legal Services	DS, PPD, Lines departments/agencies, external agencies, LGs		1.00	1.00	Medium
	Revise Timber Pricing and subsidy Policy	DoFPS	DS, PPD, Lines departments/agencies, external agencies, LGs		1.00	1.00	Medium

Output 1.4. Human Resource Development and Management Services Strengthened	Develop HR master plan	HRD	HRD	0.79		0.79	High
	Farm Business Training	RDTC	RDTC	7.94		7.94	High
	Farmers Groups & cooperative	RDTC	RDTC	1.59		1.59	High
	School Agriculture Program	RDTC	RDTC		1.00	1.00	Medium
	Experience Exchange Program	RDTC	RDTC		1.00	1.00	Medium
Total				**52.58**	**18.15**	**70.73**	

Table 49: MoAF/07 - Programme Monitoring and Evaluation

Results (Outcome)	Indicator	Unit	Baseline (Year)	12 FYP Target	Data Source	Reporting Frequency	Reporting Responsibility
Outcome 1: Enhanced Efficiency and Effectiveness of RNR Eervice Delivery	Annual performance rating	Percent	83 (2016)	90	Annual Report	Annually	PPD
	RNR ICT services made available	Number	3 (2016)	13	Annual Report	Annually	ICTD
	Timeline by which annual RNR statistics released	Date	n/a	June Every year	Annual Report	Annually	RSD
	RDTC upgraded to RNR based TVET	Date	n/a	2019	Annual Report	End of 12th FYP	Ministry
	Timeline by which forestry services provided	Day	14 (2016)	14	Annual report	Annually	DoFPS
Results (Outcome)	**Indicator**	**Unit**	**Baseline (Year)**	**12 FYP Target**	**Data Source**	**Reporting Frequency**	**Reporting Responsibility**
Output 1.1. Information System and ICT Services Strengthened	RNR statistics releases	Number	n/a	195	Annual Report	Annually	RSD
	RNR ICT services developed	Number	NA, 2016	11	Annual Report	Annually	ICTD
Output 1.2. Planning and Monitoring System Strengthened	Annual RNR Performance Report	Number	11 (2017)	22	Annual Report	Annually	PPD
	Budget utilization	Percent	2016	>95			
Output 1.3. Policy and Legislation Strengthened	RNR policies and legislation developed and revised	Number	27 (2016)	21	Annual Report	Annually	PPD
Output 1.4. Human Resource Development and Management Services Strengthened	Human Resource Master Plan developed	Date	n/a	2018	Annual Report	Annually	HRD
	Capacity of RNR-stakeholders enhanced	Number	3212 (2016)	6062	Annual Report, HR report	Annually	RDTC/line Departments

Table 50: MoAF/07 – Indicator Description

Results (Outcome)	Indicator	Unit	Description
Outcome 1: Enhanced Efficiency and Effectiveness of RNR Service Delivery	Annual performance rating	Percent	The indicator will rate the performance of RNR sector against the plan target as per specifications of GPMD on an annual basis
	RNR ICT services made available	Number	The indicator will count number of new RNR ICT services made available in the public domain
	Timeline by which annual RNR statistics released	Date	This indicator will measure the timeline by which the RNR statistical releases made on a quarterly, bi-annually and annually basis by different departments and agencies of the ministry
	RDTC upgraded to RNR based TVET	Date	This indicator will assess the progress of upgrading RDTC, Zhemgang to a RNR bases vocational institute by the end of 12th Five Year Plan
	Timeline by which forestry services provided	Day	The indicator measures the timeline by which responds are provided for Forestry services
Results (Outcome)	**Indicator**	**Unit**	**Description**
Output 1.1. Information System and ICT Services Strengthened	RNR statistics releases	Number	This indicator will measure the number of RNR statistical releases made on a quarterly, bi-annually and annually basis by different departments and agencies of the ministry
	RNR ICT services developed	Number	This indicate describes the number of new RNR ICT services developed across all Departments and Agencies.
Output 1.2. Planning and Monitoring System Strengthened	Annual RNR Performance Report	Number	The indicators includes annual progress report, mid-term report, terminal report and state of the nation report of RNR sector
	Budget utilization	Percent	It describes the proportion of budget utilized against the total budget sanctioned against each departments and agencies
Output 1.3. Policy and Legislation Strengthened	RNR policies and legislation developed and revised	Number	This indicator describes on the need of RNR instruments from legal documents (Acts, Rules & Regulations, policies) required to execute the RNR activities consistently throughout the country. The indicator will be measured in number of such document developed and revised as indicated in the projected annual targets.
Output 1.4. Human Resource Development and Management Services Strengthened	Human Resource Master Plan developed	Date	Comprehensive analysis on RNR- capacity building requirement (short/long term trainings, succession planning, recruitment projection)
	Capacity of RNR-stakeholders enhanced	Number	This indicator measures the capacity of the number of Individuals, government/non government entities (farmers, entrepreneurs, cooperatives, extension officials etc) directly/indirectly involved in agricultural development activities build.

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