POLICY BRIEF

CONVERSION OF FALLOW LAND IN BHUTAN – A NATIONAL FOOD SECURITY CHALLENGE

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POLICY MESSAGE

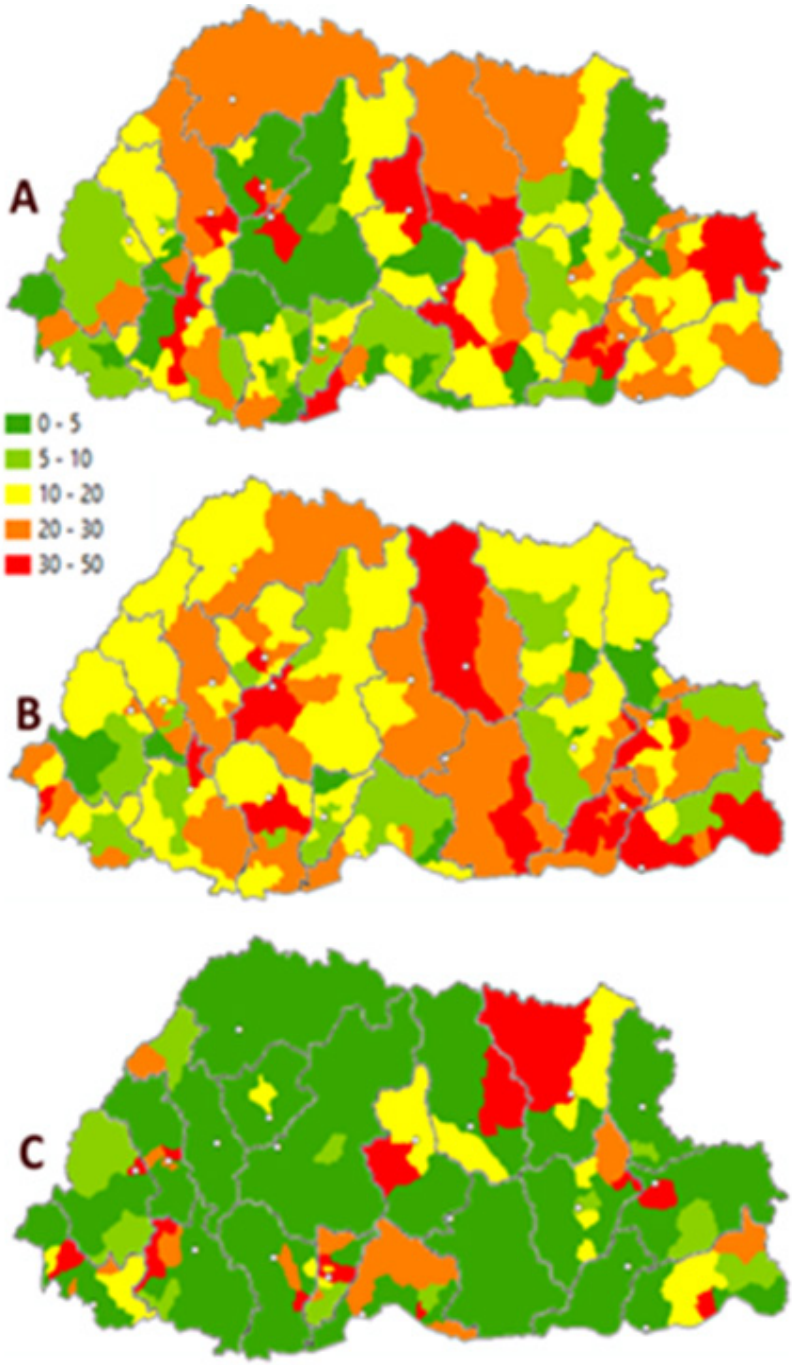
Between 15 and 20% of farmland in Bhutan is currently lying idle. This fallow land is composed of shrubland, degraded pasture, over-mature orchards, and by invasive species of weeds.

The figure reaches 60% in some Gewogs, with some fallow land that has been standing abandoned for more than ten years.

A wide range of pressures leads to land abandonment. These factors include: (1) a shortage of farm labor and the out-migration of rural youth; (2) the feminization of households; (3) the aging of the farmer population; and (4) the increasing proportion of absentee landowners in farming communities.

A key socio-economic issue is that the incomes that can be earned from off-farm sources, are often higher than the incomes gained from farming alone.

Communities also face a widespread lack of irrigation water; frequent crop damage by wildlife; low yields of crops due to soil erosion and the depletion of fertility; and difficulties in clearing land, due to the significant lack of tools and appropriate farm machinery.



Proportion of fallow farmland at Gewog level categorized as Wetlands (Image A); Drylands (B); or as Orchards (C).
Source: Agricultural Landscape - Fallow Land Study, EU-TACS for NSSC & PPD at MoAF, 2021

Research studies and statistical information shows that land abandonment is a significant obstacle to achieving food self-sufficiency, especially for critical commodities such as rice and maize.

Based on information from the RNR Statistical Division (RSD) for 2020, Bhutan has 109,000 hectares of agricultural land. This figure is consistent with earlier estimates developed by the Department of Forest and Parks Services (DoFPS) and the National Soil Services Centre (NSSC).

While national stakeholders have a core understanding of the leading causes of farmland fallowing, detailed quantification of the problem is limited in scope locally.

RSD indicates that approximately 27,000 hectares of fallow land are suitable for conversion, either to diversified cropping patterns or a diversity of agroforestry systems. While national stakeholders have a core understanding of the leading causes of farmland fallowing, detailed quantification of the problem is limited in scope locally.

Policies have not yet been implemented that could effectively address the problem.

Converting fallow land back to agricultural use will assist in achieving higher crop production, gaining self-sufficiency at community and farm levels, allowing diversification of farming systems. It will enable the substitution of food imports to improve national food security.

While bringing degraded fallow-land areas back into agricultural production is technically feasible, the costs for low-income farmers of land conversion may become an economic burden. The investments that would be expected to be made by small farmers in establishing agroecological farming systems, require external support.

DRIVERS OF CHANGE FOR FALLOW LAND CONVERSION

MAINSTREAMING FALLOW LAND CONVERSION

Fallow land conversion will require mainstreaming in the five-year planning process. A *Fallow Land Conversion Policy* will be needed, as well as an operational *Fallow-land Conversion Strategy*.

Fallow conversion will require land-use modeling. Farming systems that could be re-established on fallow agricultural land include improved and diversified cropping systems with new crop species, and the use of crop varieties that are resistant to drought, to pests, and to diseases.

Entrepreneurial Agroforestry Systems (EAS) should also be disseminated, based upon the modeling that has been demonstrated in the Agroforestry Systems and Practices Study (EU-TACS, 2021).

Technical and financial support will be required to pilot new landuse systems in all districts and up-scaling the most appropriate models during short-term, medium-term, and long-term planning periods, up to 2040.

LOCAL LAND MANAGEMENT PLANNING FOR FALLOW CONVERSION

As part of the implementation process, fallow land management surveys should be carried out by the NSSC and MoAF, supported by the National Land Commission and the Ministry of Labour. This requires the identification of Gewogs with a high percentage of formerly productive farmland that has fallen into fallow.

Collaborative Community Land Management Plans should be implemented, which fully involve farming households and local organizations. Based upon stakeholder-mapping exercises, community workshops at the Chiwog level will analyze and explain why there is a high percentage of fallow land in their Chiwog, why local households have let their land become disused as fallow land, and how they propose addressing any negative socio-economic factors.

Essential Procedures for Fallow Land Conversion

1. **Identify Gewogs** with a high percentage of fallow land.
2. **The detailed inventory of fallow land parcels** in the target Chiwogs.
3. **Classify the fallow land in five classes**, ranging from very-easy to convert, to very difficult.
4. Define **conversion cropping pattern options** in each Chiwog, and discuss these with villagers and policy-makers.
5. **Prioritize the land to be converted** and prepare thematic maps with conversion categories, and cost-benefit reports.
6. **Develop related policies** to make sure that fallow land conversion is supported and becomes permanent.

With the close involvement of participant households, plans will be developed to bring targeted fallow lands back into productive use.

Key stakeholders will be invited to take part, primarily in those Gewogs and Chiwogs where a high percentage of fallow land is suitable for conversion. These areas should be selected as a critical priority. Full participation of farming households must be ratified through participatory planning processes.

FALLOW LAND TAXATION, TAX INCENTIVES, COMPULSORY PURCHASE, AND LAND RENTAL

Fiscal strategies for converting fallow land back to productive use need to be explored by the government.

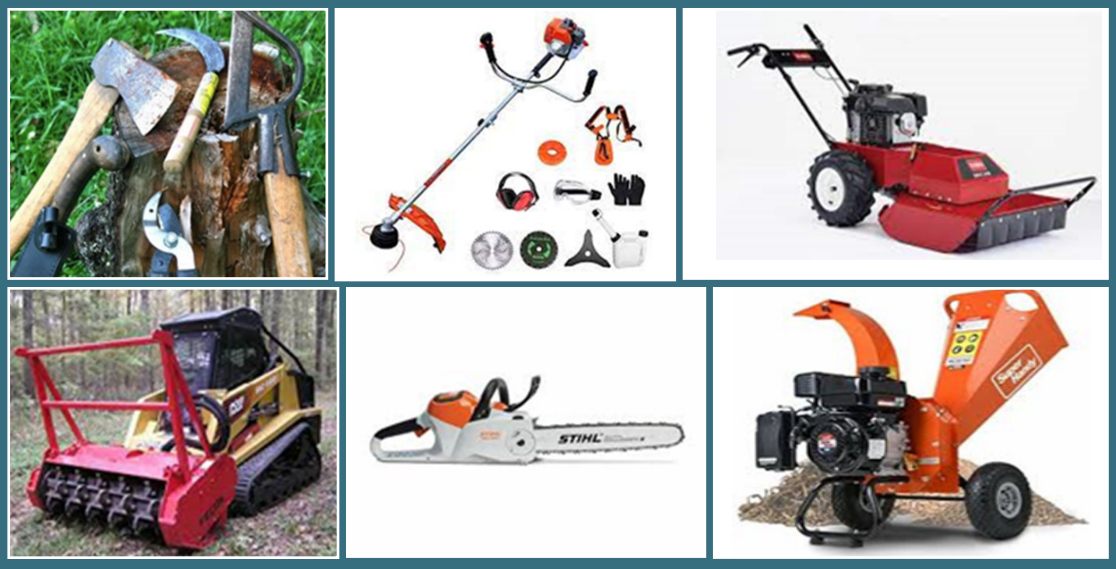
These may include strategies such as: taxing land that remains continuously under fallow; providing tax incentives to farmers who are willing to convert their fallow land into productive use; compulsory purchase in special cases where fallow lands have remained abandoned for over ten years; and allowing farmers to rent their land to start-up entrepreneurs, such as youth groups, or private agri-businesses. The option of Public-Private-Partnerships could be explored.

LAND CLEARANCE

Land clearance may be problematic, especially in areas affected by labor shortages, the feminization and aging of households, and youth out-migration.

Clearing shrubs, small trees, and invasive weeds are labor-intensive, and removing root systems and invasive weeds may be difficult where only hand tools are available.

Machinery for brush and bramble clearing and cutting suitable for different densities of fallow land biomass



As an alternative to slash-and-burn brush removal, **mechanized or semi-mechanized land clearance fire-free methods** are the only solution for rapid up-scaling of conversion of fallow lands, that is also environmentally sound. An assessment of the types of machinery that can be used on mountainous terrain will be needed.

There is an **array of machinery types** suitable for clearing biomass from fallow land. This includes mechanized brush-cutters, some of which can be battery-operated, as well as weed and grass strimmers. Chainsaws may be needed for removing larger invasive woody material. On fallow land with access to farm roads, wood-chipping machines and stump grinders can be used to prepare horticultural bark mulch. The woodchips that are produced can be used for laying pathways, erosion control, and animal bedding.

Other machines types that can be considered include mini-tractor propelled choppers, tree shredders, mini-biomass transporters, and garden trenchers, which are suitable for narrow terraces.

Hand tools such as bow-saws, axes, tree pruners, and machetes may remain suitable for smaller patches of fallow land.

Rechargeable, battery-operated, and hand-held equipment is available, providing a clean energy alternative for farmers. Services can be delivered to farmers through **start-up land clearing machinery hiring companies** established by unemployed youth groups, which the Agricultural Machinery Centre supports at Paro.

The costs of clearing fallow land may range from €500-2000 per hectare and will depend on the amount and density of biomass to be removed. Where investment capital is available, the option of using private contractors to carry out the clearance work should be considered, especially when large areas need to be cleared. Land clearance may be complete, if reversion to a traditional cropping system is required, or where *Rhododendron* must be removed to establish improved pastureland.

The costs of clearing fallow land may range from €500-2000 per hectare and will depend on the amount and density of biomass to be removed.

In other cases, partial conversion can establish an agroforestry system where enrichment of the fallow vegetation is the main aim, for example, by using leguminous trees, hazelnuts, or fruit trees.

ECONOMIC USAGE OF BIOMASS GENERATED BY LAND CLEARANCE

Land clearance will result in large volumes of waste biomass, generated in multiple locations, across the varied Bhutanese terrain. Traditionally, remnant vegetation from fallow land conversion would be burnt on the site, while smaller trees would be used as firewood.

Instead of these practices, *Biomass Stock Assessments* should be carried out at a Gewog level, to assess the type of biomass that would become available at a given geographical scale, derived from the land cleared for agricultural production, and the potential processing and uses of the biomass that is produced, as an output.

Recycling biomass waste can provide economic opportunities, for example, for bio-energy, fuel-briquette making, bio-brick making, charcoal making, bio-fertilizer, organic manure, chipping for mulching, wood biomass for mushroom production, and straw and grass residues for stall-fed livestock.

Fuel-briquette machinery

The types of land that should be given priority are those that are close to the community, and where roads are nearby.

These studies should assess the theoretical potential of biomass conversion, the cost of biomass machinery and transport, the types of inputs needed, the demand for biomass stocks, and the overall implementation potential of biomass recycling on the scale of a single, or of several Gewogs.

LAND USE CONVERSION STRATEGIES

When converting fallow land to productive uses, the labor and inputs required for clearance must be considered. The types of land that should be given priority are those that are close to the community, and where roads are nearby. Other key factors include the availability of water for irrigation; the types of labor available and its costs; and a minimal likelihood of problems caused to crops by wildlife. In these areas, reversion to intensive cropping, or agroforestry systems, with higher production potential, can be more easily achieved. In areas where it is difficult to convert the fallow land to an arable cropping system, Entrepreneurial Agroforestry Systems may be more suitable such as Alnus-Cardamom, with electric fencing against wildlife, where needed. For areas of fallow-land that are very difficult to access, it might be more appropriate to adopt low-intensity agroforestry systems, with partial land clearance, and enrichment planting techniques.

The proposed Fallow-land Conversion Strategy includes the following key components:

(1) **Community mobilization** and Gewog/Chiwog Fallow Land Management Plans;
(2) Land clearance and **refinement of technologies, techniques and machine types** to be used in land preparation;
(3) **Mechanized biomass removal** of shrubs, small trees, and invasive weeds; and the deployment of economically-robust recycling models of biomass waste;
(4) **Business Plans** for the proposed diversified crop diversification system, or agroforestry models;
(5) **Financing mechanisms** through Central and/or Dzongkhag grants (both economic and environmental), combined with bank loans and private capital;
(6) **Remote monitoring of land conversion**, where possible using drones to map the targeted areas of each participant Chiwog ; and
(7) Establish mechanisms that **support private start-up businesses**, provide services for land clearance during fallow land conversion, and give support for establishing and managing the improved farming systems.

POLICY IMPLICATIONS AND SECTOR REFORMS

STRUCTURAL CHANGE

To implement the proposed Fallow-land Conversion Strategy, implementation options to be considered by MoAF and other stakeholders could be as follows:

- Implementation through a separate Fallow Land Conversion Programme (to be defined in the 13th FYP – 2023-2028)
- Implementation through a strengthened SFED at MoAF
- Implementation through a strengthened NSSC at MoAF
- Implementation through a strengthened Land Management Section at MoAF
- Implementation through the strengthening of Dzongkhag Administrations, using an enhanced economic and environment grant system, under the decentralization programme
- Implementation through a State-Owned Enterprise, e.g., FCBL or GBCL
- Implementation through a private sector driven Public-Private Partnership (PPP).

Since there are likely to be several stakeholders involved, the most effective implementing structure would be establishing a *"2040 Fallow Land Conversion Task Force"* at MoAF to spearhead the program.

VISIONS, MANDATES, AND ROLES	Visions, mandates, and roles will need to be developed for the structure adopted for the Fallow-land Conversion Strategy through to 2040.

PROCESSES, PROCEDURES, AND GUIDELINES

Processes, procedures, and guidelines must be developed for Annual Action Plans used to implement the Fallow-land Conversion Strategy. Manuals and extension leaflets will need to be prepared that act as extension materials and for training purposes.

HUMAN RESOURCES AND TRAINING

To implement the fallow land conversion actions, there will need to be an increase in the number of key staff, with a wide range of disciplines at both central and local levels. A human resources gap analysis will be required, together with a training needs assessment and a training plan. The national task force for fallow land conversions will also need capacity strengthening.

POLICIES, STRATEGIES, AND PROGRAMMING

A Policy White Paper that profiles the Fallow-land Conversion Strategy should be prepared. This document will clarify the pressures that are causing expansion of fallow land areas; the state of the land and soil resources, where fallow land exists; the problems for the socio-economic development of Gewogs, that result from the increasing proportion of fallow land; and the responses required by the government, and other stakeholders, to reduce the incidence of fallow land. The benefits that will flow to society from a reactivated agricultural sector, by converting fallow land back into more productive uses, would be set out in a diverse array of communications materials and activities.

To develop the *Fallow-land Conversion Strategy*, stakeholder consultations and financial implications must be undertaken. Additional funding required due to the proposed policy changes, will need to be referred to the Ministry of Finance, before tabling the Policy Paper to the Cabinet Office. Legislative implications and a Regulatory Impact Analysis should be accounted for before submission.

A strategy will need to be developed to provide direction for achieving the fallow land conversion activities. The strategic targets and options could be:

- *To **convert 50% of fallow land to more intensive agricultural cropping patterns** that contribute directly to food security targets for rice and maize (13,500 hectares by 2040).*
- *To **convert 25% of fallow land to high-intensity entrepreneurial agroforestry systems** that enhance local livelihood and diversify cropping patterns (6,750 hectares by 2040).*
- *To **convert 25% of fallow land to low-intensity (low labor and low cost) agroforestry systems** through enrichment planting and other natural forests/ shrub management techniques (6,750 hectares by 2040)*
- *To **convert diseased and unproductive over-mature fruit and nut orchards** that are progressively unused to alternative farming systems such as livestock or horticulture (1,000 hectares by 2040).*

Piloting, demonstration, and up-scaling strategies will need to be developed and scheduled over the period up to 2040 for programming to cover all Dzongkhags.

Programming should be divided into three timeframes: short-term, medium-term, and long-term:

(1) In the short-term, for the remainder of the 12th FYP, Fallow-land Conversion Strategy will focus on preparatory work, such as establishing a Fallow Land Bank task force and piloting approaches in 1-2 Dzongkhags.

(2) Over the medium-term (13th FYP), the Fallow-land Conversion Strategy will focus on establishing a program through piloting and demonstration in those Dzongkhags with a high percentage of fallow land, and where farmers are willing to address the issue of idle land.

National Fallow Land Investment Plan

A five-year fallow land investment plan will require a conversion area of around 28,000 hectares. Using an investment model based upon a lower land clearance cost fixed at €500/ha, then €14 million would be needed. For a higher investment model with clearance and establishment costs reaching €2,000/ha, up to €56 million may be required.

Attention will be paid to *Collaborative Community Land Management Plans* that engage community leaders, farming households, and other Gewog-level stakeholders to take part in learning lessons from these pilots, contributing to the subsequent out-scaling to reach different communities and to involve more Gewogs.

Indicators of Land-Use Change

- **Target fallow land area to be converted** (estimate 28,000 ha).
- The **number of farmers who will benefit directly** (estimate 50,000).
- The number of **youth groups** involved in fallow land conversion projects.
- **The number of farmers leasing land** to Dzongkhags for conversion by youth groups and the unemployed.
- **Estimated costs for land conversion** (clearance costs, system establishment costs, training costs, etc.)
- Number and diversity of traditional cropping system; diversified cropping patterns; and agroforestry **models to be established on the converted fallow land.**
- **Household benefits** after conversion (cost-benefit analysis, income enhancement, self-sufficiency).
- **National benefits after conversion** (GNH and GDP contributions, socio-environmental benefits).

(3) Longer-term, out-scaling and the up-scaling of policy learning will take place in the 14th and 15th FYP, to eliminate most idle and fallow land and convert these areas to productive use throughout Bhutan.

MONITORING AND EVALUATION

Monitoring and evaluation of fallow land should be linked to indicators in the five-year plans under MoAF.

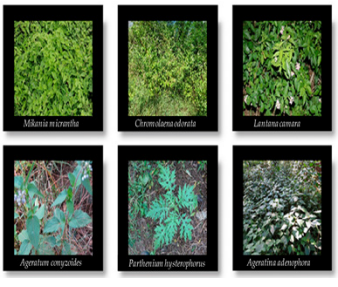
The emphasis on previous five-year plans had been on defining: links to National Key Result Areas; links to Agency Key Result Areas; Programme Outcomes, Programme Outputs; Programme Key Performance Indicators; and Programme Activities. These will need to be developed for all fallow land conversion actions defined in the following three five-year plans (13th, 14th, and 15th).

Five-year M&E Frameworks will be developed by the Policy and Planning Division of MoAF, supported by implementing agencies. The implementing agencies will prepare M&E Annual Plans with the support of PPD staff. Monitoring of fallow land conversion implementation could use drones to map fallow land and enable more rapid conversion area surveys.

COORDINATION, COLLABORATION, AND LINKAGES

Coordination, collaboration, and linkages will need to be developed by the Policy and Planning Division of MoAF following a multi-level stakeholder mapping exercise for fallow land conversion, and the establishment of institutional responsibilities for all key stakeholders.

Any reduction in the extent of fallow land on farmland will require improved capacities of farming households and local community groups. This will be heavily influenced by the interests and capabilities of a wide range of stakeholders.



Policy Briefs

Policy Briefs provide highlights on development issues in the renewable natural resources sector in Bhutan. The Policy Briefs provide information on topics such as governance, livelihoods, natural resources, and sustainability in an accessible way for decision makers and donors.

Many of the Policy Briefs are based on evidence-based statistics available at the Ministry of Agriculture and Forests, together with the Research Studies carried out by the Policy and Planning Division at MoAF. These study reports are prepared by international experts on behalf of donor agencies assisting the MoAF in Bhutan.

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