

CLIMATE CHANGE AND COMMUNITY FORESTRY IN SRI LANKA: POLICY ADOPTION, POPULAR PARTICIPATION, CLIMATE ADAPTATION AND RURAL DEVELOPMENT

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ABSTRACT

Sri Lanka has a paradigm shift in forest resource management refocusing decisions to more decentralized level of governance and moves toward a community based approach. The forestry sector of the country has developed climate change adaptation strategies to improve the forest resources in view of its ecological and socio-economic importance. Climate change combined with unsustainable land use has aggravated serious ecological losses due to lack of legislative and institutional capacity, and rural development efforts for effective management of forest resources. Climate change adaptation raises the importance of supporting agriculture, forestry and rural development. One of the main objectives of the Community Forestry Project was the establishment of farmers' woodlots on degraded government land, using agro-forestry approach for both promoting wood supply and improving their livelihoods. Farmers' Woodlot Development Programs have become critical for the integration of climate change adaptation through participatory rural development strategies depend on the household economy and production systems, while strengthening ecological systems. The paper reviews the related literature and analyzes the Farmers' Woodlot Development Programs in Sri Lanka in terms of policy adoption; popular participation of community; adaptation for climate change; and contribution for rural development. Climate change policy issues; forest policy and institutional setting; and Farmers' Woodlot Development Programs are discussed under the policy adoption. Farmers' organization and community participation; empowerment of women and disadvantaged communities; partnership development; supporting services and capacity building are discussed under popular participation of community through Farmers' Woodlot Development Programs. The main strategies for climate change adaptations by farmers' woodlots are revealed as: increased area and connectivity of vegetation; conserved and enhanced soil, water and environment; and maintained bio-diversity and forest health. Farmers' woodlots contribute for rural development through: supply of forest and agricultural products, and services; increase farmers' incomes; income distribution and poverty alleviation; promote rural services, diversify rural economies and improve rural livelihoods. The study makes the conclusion that the farmers' woodlots in Sri Lanka play an important role for rural development as well as adaptation of climate change by bringing the active participation of community under favorable policy environment.

Key words: Farmer Woodlots, Policy Adoption, Community Participation, Climate Change, Rural Development

Introduction

Background

Climate changes impacts undermine are linked to three domains: future development strategies; worsening rural economy; and deterioration of natural environment. Climate change is one major global outcome and serious issue of the degradation of land resources because economic activities continue to severely damage the natural resource base on which human well-being ultimately depends (IPCC Climate Change, 2007). Millennium Ecosystem Assessment found that 60% of ecosystem services are used unsustainably and continue to be degraded at an alarming rate despite the critical importance in addressing the poverty and hunger eradication (UNDP, 2007). According to the UNDP, world's 2.6 billion poorest people who have been hit the hardest on the front lines of climate change that will exacerbate existing economic, political and humanitarian stresses. In Asia and Pacific region where more than 1 billion people and 60% of the world poor are living, is vulnerable to climate change as they depend on the productivity of climate-sensitive ecosystems for their livelihoods. They are often lack the knowledge and resources to adequately adapt to growing climate-related risks (Lebel, et al., 2012). Climate change could affect almost every sector in society from the livelihoods based on agriculture and forestry. Both forest and agricultural systems are affected by climate change in the form of changing environmental conditions. Reduction in rainfall and increase in temperature as the climate change impacts lead to retardation of forest growth, degradation, and changes in ecological zones in the forestry sector.

Most of the human activities produce greenhouse gases (GHGs), primarily carbon dioxide (CO₂) contribute to climate change. Destruction and degradation of forestland are accounts for about 12 % of global GHG emissions. Removal of trees from forested land generates GHGs where mature forests, absorb CO₂ from the atmosphere while growing, and store carbon in wood, leaves,

and soil (Montagnini, 2012). About 20% of the global greenhouse gas emissions and particularly 62 % emissions of the developing countries are caused by deforestation (GCCA, 2012). Forest destruction and degradation lose their natural connectivity with fragmented landscapes. Maintain biodiversity among isolated patches of forest is very difficult and often impossible. Climate change produced serious ecological losses combined with unsustainable land use, which have been aggravated by lack of institutional, legislative and fiscal capacity for the effective management of natural resources (<http://ccdare.org/>). Lack of rural development efforts, legislative and institutional capacity and unsustainable management of forest resources combined with climate change has adversely affected the forest ecosystems. The role of institutions in forest management is being increasingly recognized in the context of climate change. Climate change adaptation considerations raise the importance of supporting many sectors including agriculture, forestry and rural development. Adjusting institutional structures and arrangements including defining adequate national policy and legislative frameworks, and assigning and coordinating responsibilities within the governance structures are required for the Adaptation to climate change (FAO, 2008), Climate change adaptation, poverty reduction and rural development are all strongly linked, as agriculture and forestry are highly climate-sensitive. IPCC (2007) estimates that afforestation/reforestation (A/R) activities, and reducing deforestation and forest degradation (REDD) activities, have the potential to a reduction of up to 2.7 gigatons (Gt) of CO₂-eq emissions per year by 2030. Adaptation to climate change in developing countries will need US\$75-100 billion extra cost per year over the period 2010-2050. The cost in the agriculture, forestry and fisheries sectors would range from US\$7.3 billion to US\$7.6 billion per year (World Bank, 2009). The project or program level is critical for the integration of adaptation considerations, and the project cycle can be used as a framework for the analysis and prioritization of adaptation options (OECD, 2009). The impacts of participatory rural development projects depend on the household economy, stakeholder objectives, livelihood choices, constraints, production systems, temporal and gender variation, as well as estimates of labor inputs and other costs (Richards, et al., 2003). The current speed and intensity outpacing the capacity of the small farmers to adapt climate change. Improving land management and farming along with forestry, can play a key role in tackling climate change (Jones, ...) Strengthening of social-ecological systems is an important part of climate change adaptation and has the potential to align closely with rural development objectives (Lebel, et al., 2012). UNCED in Rio de Janeiro in 1992 agreed to revise concept of Sustainable Forest Management ensuring the continued availability of wood, non-wood forest products (NWFPs), and provisions of environmental, social and cultural services, which forests and ecosystems provide. Although it was a traditional practice the development of a 'social' approach to forestry, the "social forestry" encouraging communities to utilize patches of degraded forest land to produce a range of subsistence products, has been documented in the late 1970s. Community mobilization, participatory tools and technical prescriptions were focused in implementing those social forestry programs. The programs eventually recognized the ability of local people to contribute more conceptually to forest management and acknowledged their right to participate in many forest-related decisions (Arnold, 2001). Based on a specific meaning and associated with particular programs, many alternative approaches have been recognized in terms of: social forestry, community forestry, rural development forestry, joint forest management (JFM), shared forest management, co-management, participatory forest management etc., (Ingles et al. 1999). Many participatory forestry approaches instead of government initiatives have become popular due its approach to the widespread poverty of the rural people and the scarcity of their livelihood opportunities

Most developing countries, including Sri Lanka, remain vulnerable to ecological, economic and social impacts of climate change. Climate change impacts in Sri Lanka could include: decreases in agricultural crop yields, and increased soil erosion and forest degradation that have a significant threat to the agriculture and forestry sectors of the rural economy. Forests are the source of wide range of timber and non-timber products and many people in Sri Lanka still depend on forests for subsistence and commercial use of products (Ministry of Environment and Natural Resources, 2007). The forestry sector has developed climate change mitigation and adaptation strategies to protect the existing natural forest resources as well as afforestation, reforestation, Farmer woodlots (FWLs) and homestead development in view of its biological, hydrological, ecological and socio-economic importance. There has been a paradigm shift in natural resource management in the late 1980s all over the world and Sri Lanka in particular by refocusing of management decisions to a more decentralized level of governance and moves toward a participatory and community based approach since the introduction of scientific forest management. Many of the forestry initiatives of Sri Lanka after the National Forest Policy in 1980 called for a participatory approach (Skutsch, 1990). There is an inequitable socio-economic development poses and wide regional disparity in incomes and poverty levels in Sri Lanka despite the decrease in overall poverty levels with the growth in per capita incomes over the last decades (Ministry of Environment and Natural Resources, 2007). Forestry activities are important options not only in any climate change adaptation strategy but also in any rural development strategy. Existing strategies, policies and programs on rural development and forest resources management relate closely to, or directly overlap with climate change adaptation measures. The traditional trees and tree-based systems were means of meeting people's survival strategy, and conservation of resources including biodiversity, land management and development, and timber production (Wickramasinghe, 1997). One of the main objectives of the Community Forestry Project (CFP) introduced in 1982 and Participatory Forest Project (PFP) launched in 1992 was the establishment of FWLs on degraded government land, using agroforestry approach for both promoting a wood supply and improving their livelihoods (ADB 2003c). Farmers' woodlot management representing a low-cost, low-technology, is relatively an easy way to adapt climate change, carbon sequestration and storage as well as the promotion of rural development strategies. Adaptation refers to changes in processes, practices, and structures in ecological, social, or economic systems to moderate potential damages or to benefit from opportunities associated with climate change. Hence, the paper analyze the farmers' woodlot programs in Sri Lanka in terms of on policy perspective; the adaptation of climate change impacts, acceleration of rural development strategies and improvement of the local institutional development for sustainable development. The evaluation of how farmers' woodlot programs have been developed in terms of: the policy perspective; adaptation of climate change; rural development and; institutional development provide a basis for learning, revising and scaling up real-life demonstrations.

Adoption Of Related Policy Climate Change Policy Issues

Climate change issues not a new trend but implies new conditions for forestry and rural livelihoods in Sri Lanka. It is therefore worth to identify the opportunities that could be brought by integrating climate change policies in the objectives of forestry and rural development. National development strategies encompass not only sustainable development strategies but also sectoral strategies directly refer to climate change (King, 2010). By adopting the main instruments agreed at the UNCED and WSSD, and by ratifying the Millennium Declaration, Sri Lanka made commitments to environmental protection and sustainable development. Sri Lanka is a party to several multilateral environmental agreements: International Plant Protection Convention (IPPC); Convention on Wetlands of International Importance (Ramsar Convention); Convention on International Trade in Endangered Species (CITES); Vienna Convention for the protection of the ozone layer; and the Montreal Protocol. Sri Lanka ratified the UN Conventions on Biological Diversity in 1993, Climate Change in 1994, and the Convention to Combat Desertification in 1998. Sri Lanka is also a party to the Kyoto Protocol under the Framework Convention on Climate Change, and the Biosafety Protocol under the Biodiversity Convention. The government has Institutional arrangements for coordination of actions were set up, and many activities and programs have been launched in this regard since UNCED in 1992 (Ministry of Environment and Natural Resources, 2007). Sri Lanka prepared a National Environmental Action Plan (NEAP) in 1992 as the first country in Asia and further updated in 1998 and 2003. Deforestation and degradation of biodiversity, and soil erosion were identified as priority environmental issues, from a poverty perspective TEARFUND (2006). The National Environmental Policy in 2002 was developed with the vision “to achieve a healthy and pleasant environment sustaining nature for the well being of people and the economy” balancing environmental conservation and economic development (Ministry of Environment and Natural Resources, 2007). The National Environmental Policy in 2003 provides the direction for the necessary measures to conserve and manage Sri Lanka’s environment within a framework of sustainable development (Ministry of Environment and Natural Resources, 2007).

United Nation's (UN's) World Meteorological Organization (WMO) organized the First World Climate Conference in 1979 which gave considerable political and legislative attention for the climate change. The UN (WMO and UNEP) established the Intergovernmental Panel on Climate Change (IPCC) in 1988 at a global level. The UN Framework Convention on Climate Change (UNFCCC) was agreed at the Earth Summit in Rio de Janeiro in 1992. The Kyoto Protocol of 1997 which in force from 2005 set GHG emission limits. Integrating Climate Change Adaptation at the Local Level under the OECD Declaration on Integrating Climate Adaptation into Development Co-operation in 2006 examines the specific challenges and opportunities arising from climate change also in rural contexts and discusses how to incorporate adaptation considerations within community-level processes (OECD, 2009). REDD Reducing Emissions from Deforestation and Degradation was evolved through UNFCCC agenda in 1995 to support the forest conservation, sustainable management of forests, and the enhancement of forest carbon stocks. REDD mechanism was developed and included REDD-plus as a climate change mitigation option after the UNFCCC COP 15 held in Copenhagen in 2009 (UNFCCC 2009). At the 2009 Climate Change Conference in Copenhagen (COP 15), positive effect on the conservation of associated biological diversity and ecosystem services, and the livelihoods of forest-dependent communities through a better management of forests were included in the definition of REDD, which was renamed to REDD+. Rural development and the conservation of biodiversity and vital ecosystem services are the other issues important to be considered under REDD+. Afforestation and reforestation adopted by the United Nations Framework Convention on Climate Change (UNFCCC) as a part of the Clean Development Mechanism (CDM) under the Kyoto Protocol (KP). Reducing Emissions from Deforestation and Forest Degradation “REDD+” conservation was subsequently adopted.

REDD+ mechanism provide financial incentives to reduce emissions from Deforestation and Forest Degradation as well as for sustainable management of forests to enhance forest carbon stocks. UN-REDD Program awarded observer status to Sri Lanka to the UN-REDD Program Policy Board in October 2009 (UN REDD Program, 2009). Nearly 44 countries including Sri Lanka have prepared a National Adaptation Program of Action (NAPA) with Global Environment Facility (GEF)-funding and submitted to the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat (King, 2010). Forest Department (FD), under the Ministry of Environment (MoE) is the UNFCCC national focal point, coordinating REDD activities in Sri Lanka. Forest Department has conducted three Workshops in 2011 on UN-REDD Program in Sri Lanka to discuss the draft document of Sri Lanka REDD+ Readiness Preparation Proposal with relevant stakeholders including civil Society, academic experts, researchers, senior officials from various government agencies, private sector etc., (Forest Department, 2011). Climate Change Secretariat (CCS) of the Forest Department serves as a node for the implementation of UNFCCC decisions and as the Designated National Authority (DNA) for the CDM under the Kyoto Protocol (UN REDD Program, 2009).

The integration of policies and measures to address climate change into ongoing sectoral planning and management refers “mainstreaming” ensure the long-term viability and sustainability of sectoral and development investments. The decision makers through “mainstreaming plus” attempt to address all of the drivers of vulnerability, and reducing poverty and other non-climatic stressors (Klein 2009). “Mainstreaming” incorporate climate change considerations into established or on-going development programs, policies, management strategies, rather than developing adaptation and mitigation initiatives separately. Mainstreaming the mitigation and adaptation responded to the climate change challenges several countries have enacted through existing laws or by formulating new laws (King, 2010). The environment tends to be unvalued, unpriced, unmonitored by major mainstream institutions such as treasuries, planning departments and corporations and their decisions. They treat environment as a free good and not generally recognized the environmental underpinnings of development (King, 2010). ‘Mainstreaming Climate Change for Sustainable Development: Towards a National Agenda for Action was published by Institute of Policy Studies, Sri Lanka in December 14, 2009. The proposed agenda has highlighted a national vision on climate change, a national policy on climate change, a strategic action plan (national strategy), a coordinating mechanism, a climate change information system and a mechanism for resource mobilization which aimed at mainstreaming climate change issues (IPS, 2009).

ADB initiated a technical assistance (TA) project titled "Strengthening Capacity for Climate Change Adaptation" in 2009 with the aim of increasing Sri Lanka's resilience to climate change impacts, while pursuing sustainable economic development and natural environment conservation (ADB, 2012). National Action Plan for Haritha Lanka Program of the National Council for Sustainable Development in 2009 aims at addressing the environmental issues in Sri Lanka including meeting the challenges in climate change, saving fauna, flora and ecosystems, sustainable use of coastal belt, land resources and waste management and environmental friendly choices for industries (Ministry of Finance and Planning Sri Lanka, 2012). National Climate Change Adaptation Strategy for Sri Lanka (2011-2016) in 2010 highlights the strategies for climate change mitigation, technology transfer, financing and investment mechanism, education, training and awareness, monitoring, assessment and management of impact risks due to climate change (Ministry of Finance and Planning Sri Lanka, 2012). National Climate Change Adaptation Strategy for 2011–2016 consisting with five main components: 1. Mainstreaming CCA into national planning and development; 2. Enabling climate-resilient and healthy human settlements; 3. Minimizing the impact of climate change on food security; 4. Improving the climate resilience of key economic drivers, including tourism, transport, and power; 5. Safeguarding natural resources and biodiversity from climate change impacts (Sterrett, 2011). The World Food Program in Sri Lanka in 2011 assisted "Food for Work" for the participating communities on forestry interventions, distributing 20,300 seedlings and food rations worth of about Rs. 4.0 million for 16,240 work days, with the objective of "mitigation and adaptation of the climate change by increasing tree cover through community participation (Forest Department, 2011). National Climate Change Policy of Sri Lanka in 2012 provides guidance and directions for all stakeholders to address the impacts of climate change issues (Ministry of Finance and Planning Sri Lanka, 2012)

Forest Policy and Institutional Setting

National Forest Policy of Sri Lanka in 1980 has promoted the modern concept of community forestry followed as a promising strategy about local control over and enjoyment of the monetary and non-monetary benefits offered by local forest resources, leading to sustainable rural development (De Zoysa, and Inoue, 2008). Community-based forest management was emerged to share benefits, authority and even forest ownership with local people in order to sustain forest resources. The Participatory Forestry Project commenced in 1982 under ADB funds was implemented in 18 of 25 districts in Sri Lanka. The project intended to 1. Increase tree planting and rehabilitate environmentally degraded areas; 2. Create employment opportunities and income and reduce poverty in rural areas; 3. Strengthen the institutional capability of the Forest Department for non-forest tree planting, adaptive research, extension delivery systems, and privately operated village nurseries (ADB 2003a). National Forest Policy statements in Sri Lanka expanded with "Social Forestry" to involve the local community in the development of private woodlots and forestry farms (Carter, et al., 1994). Social forestry has been further supported by over six Integrated Rural Development Projects (IRDPs) (Skutsch 1990). Forest policy of Sri Lanka in 1995 was aimed at the establishment of a protected area network, creation of permanent forest estates, encouraging agro-forestry systems and building of rural industries based on non-timber forest resources as commercial ventures with partnerships from community based organizations and the private sector (Tiwari, 2004).

FWLs Management Programs

Participatory Forest Management (PFM) activities have attracted international interest, a large amount of donor funding, and dissemination of lessons learned from PFM initiatives around the world over the last three decades. FWLs a model developed by Community Forestry Project (CFP) introduced in 1982 and Participatory Forest Project (PFP) launched in 1992 expected to provide food, timber and income, while providing environmental services (Nanayakkara, 2001). Environmental rehabilitation by creating woodlots in marginal state lands with the participation of local people, and socio-economic upliftment of the rural poor were the major concern of the farmers' woodlot component of the PFP (Dissanayake, 1998). The farmers' woodlot program selected farmers and allocated them with about 0.2-0.4 hectares of degraded government forest lands on a 25-year lease agreement. The program had distributed 420 ha among 1861 farm households by the end of 1992 (Wickramasinghe, 1997). The project had paid special consideration for the site suitability as an important site character in selecting the lands for farmers' woodlot program. Further, selection of the most suitable tree species for the project's location, planting design and spacing based on participant's preference for intercropping, location specific weeding and maintenance regime, adequate measures for protection were used as the different plantation establishment techniques of the program. The incentives including issue of free tree seedlings, food aid coupons, lease agreements, and the provision of technical assistance at the initial stage of the program were given, considering as important site specific needs (Dissanayake, 1998). FWLs component under both the Participatory Forestry Project (PFP) and Forest Resources Management Project (FRMP) during 1993-1999 was established where small blocks of state land is given on a 25-year period lease to the local farmers to plant both forest trees and cash crops (Jørgensen and Vivekanandan, 2003). The project selected lower income groups of farmers and given them lands under a lease agreement for a period of 25 years to establish the FWLs. They were also given incentives such as food coupons, seedlings, fertilizer, right of intercropping in the given land and technical assistance, and also the right to harvest timber after the rotation age of 25 years. They had to manage Woodlots by using their labor, time and knowledge. According to the reforestation plans, the forest department determines proper species for planting, thinning cycles, and the right timing for a final harvest cut. The Forest Department provided the farmers with free seedlings, fertilizers and technical guidance on establishment and management of the wood lots as incentives. The farmers were expected to plant timber trees together with their agricultural crops at the establishments of FWLs. FWLs in 15,500 ha have been established in 19 districts of Sri Lanka under the Participatory Forestry Project implemented during 1993-1999. Teak (*Tectona grandis*) Neem (*Azadirachta indica*), Eucalypts (*Eucalyptus species*) and Khaya (*Khaya senegalensis*) were used as main tree species planted as monocultures and mixed-cultures. Forest Policy in Sri Lanka was amended in 1995 to provide the necessary policy and legal framework for the private sector to participate in forest plantation development (Jørgensen and Vivekanandan, 2003)

Popular Participation Of Community

Farmers' Organization and Community Participation

The roles of local institutions contribute significantly to causing and confronting climate changes cannot be ignored. It is necessary to understand of the role of local institutions in climate change and build capacity of local communities to adapt to these changes. Rural development programs aim at climate change adaptation are succeed if communities are empowered with the knowledge, skills, resources, and authority. Institutional factors mainly well-established participatory culture and general policy, and legal environment support participation are among the key determinants of the success of participatory forest management. Positive institutional, policy, and legal environments are preconditions to ensure that processes are understood and accepted for effective participation of stakeholders in forest management. Combined with the allocation of forest tenure, participatory forest management can reduce the potential for illegal logging (ADB, 2003). Participatory forest management would have positive impacts on sustainable resource use, sustainable resource conservation, and benefit-sharing equity, specifically regarding their impact on poverty reduction and resource sustainability. The process of participatory forest management requires greater stakeholder involvement in all project stages, from identification through planning, design, implementation, and operation and maintenance, with clear allocation of responsibilities. Participatory approaches can add value to forest management project design, implementation, and operation. Participatory forest management generally promotes good governance and transparency and accountability. Community participation cannot be taken for granted without clear mechanisms for participatory social mobilization and organization development and the establishment of workable mechanisms for realizing, distributing, and reinvesting the benefits of the investments according to the participatory project purpose (ADB, 2003). Community based organizations through its community-based operations empower local communities to make transparent, collective decisions and improve accountability at the local level. In most of the countries the governments grant and defined rights to the registered community based local groups such as Community Based Organizations (CBOs), trusts and associations with devolved forest management responsibilities. Community based organizations recognize the importance of sustainable forest management and respect forest management rules when they are empowered with responsibilities and rights for the forest management and receive benefits. Participation of community in participatory forestry projects depends on the level of contribution of the project to reduce the risk of non permanence land tenure and adequate carbon benefit sharing (Yamanoshita, and Amano, 2012). Traditional institutions can be a boon or a curse their networks linking them are the hub for local grassroots development and socio-cultural traits enjoy more political legitimacy at the local level (Kayambazinthu et al., 2003).

The Small Farmer Group Development Unit (SFGDU) of the Ministry of Agriculture, Lands and Forestry (MALF), Sri Lanka was established in 1994 for working out a strategy for strengthening the Farmers Organizations involving in forestry development programs (Reyes, 1997). The government of Sri Lanka still settles for participation rather than devolution, decongestion of power to districts forest office control the FWLs rather than devolution to local community organizations. A package of incentives, including free seedlings and food aid under the World Food Program was given to the farmers to establish woodlots. Farmers considered the food incentives as payments for their labor and participated for the sake of the incentives without any commitment to the program (Wickramasinghe, 1997). Participatory forest management should involve primary stakeholders in most, if not all stages of decision making. Although the forest official took the initial decisions such as selection of project's location, land distribution, planting design of the FWLs, local farmers were involved with taking decisions related to the selection of participants and species. The officials further impose main operational decisions such as, weeding and maintenance regime, application of fertilizers while the farmers take decisions related to intercropping. (Dissanayake, 1998). Building capacity of the farmers and other stakeholders to adapt to climate change of their FWLs through capacity building programs should be designed by learning from management systems of the stakeholders and their dynamics. Although the farmers have realized the production and service benefits of their woodlots, required level of technical assistance is not available for improvement of their woodlots to a sustainable level. Forest professionals have paid little attention to the farmers' woodlot management. Their research has not been particularly relevant for these small farmers' woodlot situations. Farmers and community leaders and community-based organization officials have to review participatory forestry processes with the aim of workable mechanisms for realizing, distributing, and reinvesting the benefits of the investments generated through FWLs.

Empowerment of Women and Disadvantaged Communities

It is a common argument that, the forest policies and designing of participatory forestry project interventions are rarely based on understanding of decision-making criteria of rural poor who are highly depend on forests for their livelihoods (Richards, et al., 2003). Participatory approach in forest management can make a significant contribution to poverty reduction. Participation includes the poor and other disadvantaged groups in decision-making and promotes their inclusion in project activities to improve their situation and reduce their sense of hopelessness (ADB, 2003). Traditional social forestry in Sri Lanka shows that both men and women are equipped with knowledge and experience in procuring planting materials, raising nurseries, and planting and managing trees and tree-based agricultural systems. The men who make up the majority of village forestry organizations women's gender specific priorities have been ignored in the farmers' woodlot development programs (Wickramasinghe, 1997). Collection of firewood can be contextualized as a woman's practical gender need as it is usually performed by women. The farmer's woodlot program in Sri Lanka which was aimed at solving rural wood energy problems had simply assumed that it would directly benefit women. The FWLs planted with Eucalyptus had no opportunity for the women to make decisions who usually aim for multiple outputs and service functions of trees from traditional social forests. Although the men dug holes for planting the seedlings the labor intensive tasks of the FWLs such as planting, weeding and construction of stone bunds for soil conservation, have been performed by women. Legal ownership of the FWLs was not the concern of women, as the family-focused program it would provide equal opportunities for women (Wickramasinghe, 1997). Women and

disadvantaged communities need to be empowered to involve in work related to woodland management and the marketing of wood products.

Partnership Development

Participation of local stakeholders, including local governments, communities, civil society and businesses are main enabling conditions for the successful integration of climate change adaptation into rural development processes (OECD, 2009). Strengthen multi-stakeholders participation and partnerships mobilizing national and international institutions, civil society, policy and research community and local communities encourage the farmers to adopt practices that would restore, maintain and enhance ecosystem services. The governments in collaboration with development partners, local communities and civil society should implement programs to enable rural communities to engage in income generating activities, while minimizing vulnerability and risk posed by climate change (United Nations - Commission on Sustainable Development, 2010).

Current arrangement of forest use rights and responsibility to shift into ownership responsibility and authority reframe the forest management of Sri Lanka into a government-community partnership, in which the government supports the effort of the people rather than the people supporting the effort of the government (Brown, 1999). Strong partnership linking extensive network of stakeholders and diverse interests of FWLs has become a critical need for a nationwide effort to build rural community capacity for delivering agricultural, forest and other ecological goods and services including water quality and quantity; biodiversity; pollination services; carbon sequestration; and, landscape aesthetics. Partnership development brings the range of required expertise, community power and funding to promote the Farmers' woodlot program as a strategy for rural development as well for the adaptation of climate change. Partnerships with farmers in raising FWLs on a long-term lease basis were established by the forest department in 1980s. The farmers were consulted by the FWL program officials during the planning process concerning the site selection, species selection and planting design deviating from the traditional reforestation model. Seedlings of forest and crop species and technical advice to the farmers were provided by the forest department under the FWLs program. Usufruct rights of the FWLs were transferred to the farmers to harvest the trees upon maturity (FAO, 1998). The farmers do not maximizing the potential benefits from their woodlots as they do not aware of the value of the products, services and potential income that may derive from their woodlot, and they may not be familiar with the management of small scale forestry operations as a commercial enterprise. Partnerships between farmers and private companies secure access to forest product as industrial raw materials from FWLs. The partnerships may improve the image of the companies and they can provide farmers with new income-earning opportunities and access to skills, technologies, raw materials and markets they would otherwise find hard to secure. With the maturity of trees for final harvest of FWLs, close cooperation and partnership with forest industries is very encouraging raise the raw material needed for meeting their requirements. Increased income from FWLs initiate the setting-up of community savings and credit societies that provide financial credits to community members using their woodlots as collaterals to finance income-generating activities (<http://ccdare.org/>). Effective partnerships with government and other stakeholders are required to meet the increasing demand for timber, recreation and other products, including non-commercial services such as clean water and attractive landscapes through farmers' woodlot program. Weak technical support network to transfer education and knowledge on woodlot management for farmers remains a major challenge to sustainable development of woodlots. The program would reduce costs and optimizes the social, economic and environmental benefits by leveraging the strength of various partners. Active participation of all the interest groups such as researchers, policy and decision makers as well as farmers, industrialists in their multiple roles are need to be actively involved to deal with these woodlot management problems of not only ecological and technological but also roots in social and political problems. Sharing of views, resource management and benefits between the all the stakeholders of farmers' woodlot program is inevitable for successful partnerships and participatory management. Neither communities nor forest authorities and corporate entities are in a position to successfully manage multiple-use forest resources which are invariably numerous, diverse and potentially conflicting. Cooperative nature of the partnership provides benefits by the large pool of diverse resources and expertise which is the key to the success of Farmers' woodlot program. Collaborative forest management (CFM) is a working partnership between the key stakeholders of forest management including local forest users and state forest departments, as well as parties such as local governments, civic groups and nongovernmental organizations, and the private sector. Collaborative forest management (CFM) combining the strengths of different players is a rational response to the challenges of modern sustainable forest management particularly for people-centered forestry as a tool for poverty alleviation, better governance and social change (Carter and Gronow, 2005).

Supporting Services and Capacity Building

Forest Ordinance in Sri Lanka in 1995 amended with the legal provisions for leasehold forestry as an effective form of partnerships. The tenure arrangements of FWLs have reinstated the usufruct rights enjoyed by farmers for their traditional shifting cultivation lands in Sri Lanka. The farmers preferred individual blocks of land allocated to each family to enable them to reap undivided benefits through FWLs programs. In some cases, the government-led individual leased land tenure policy for FWLs diluted the customary rights enjoyed by farmers for their traditional shifting cultivation lands. Success of implementing FWLs has affected to some extent by the insecure land tenure without any legal assurance and the history of mistrust between farmers and the Forest Department (Carter et al. 1994). REDD presents a danger of customary rights violations and carbon finance may increase social conflicts without clear land and carbon rights (Eliasch, 2008).

Over-harvesting of woodlots and conversion to agricultural use and crop production are major concerns of the government to act decisively to improve the overall level of farmers' woodlot management and also about sustainability of natural resources and rural landscapes. Proportion of well-managed woodlots could be increased through sustainable forest management certification and establishment of respect individual farmer' rights. Forest certification improve the quality of forest management and provide

marketing advantages for production from sustainably managed resources to local communities, thereby enhancing the role of forests in rural livelihoods.

Research and development effort is essential and an urgent task to tackle areas of knowledge where research can add value for greater innovation on an issue and problem driven approach. Even though the farmers produce high value timber species, the degradation of woodlots are still continuing in many farmers' woodlot programs. They urgently need for innovations in FWLs, especially to conserve forests as ecosystems. Effective policies are also a major challenge lies with incentives that would make environmental and other non-timber investments in FWLs economically feasible. Climate change adaptation measures and disaster risk reduction strategies in farmers' woodlot programs requires transfer and diffusion of new technologies to decrease vulnerability to climate change. Lack of information about harvesting and silviculture levels, delays in updating resource inventories, for FWLs make difficulties in estimating and managing for sustainable yields. This has become a major obstacle to develop landscape management strategies and to move toward sustainable ecosystem management through FWLs.

The role of institutions at local, national, regional and global level in natural resource management is being increasingly recognized in the context of climate change. Institutions and decision-making must remain flexible for dealing with uncertainties of potential climate change impacts (FAO, 2008). Resilience to the adverse impacts of climate change should be addressed through continuation of work on farmers' woodlot management programs and adaptation programs. Training and capacity building to enhance capability of foresters and local community is required for up-scaling the farmers' woodlot practices covering modern resource management systems, management of income generating activities and enterprise development. In many cases, the participants of farmers' woodlot programs are involved in forest management according to defined work plans while forest officers play a facilitating role and provide technical backstopping in planning, surveying and moderate conflicts between participants. Forest department and other institutions are seriously lacking in basic human capacities and skills needed to develop and put in place appropriate tools, methods and approaches for the development of FWLs. Involvement of local communities in the development of technologies has been a general failure in the absence of clear knowledge on tree/forest performance and associated interactions between biophysical, socioeconomic and environmental factors.

Financing is usually a prerequisite for countries to implement climate change adaptation activities effectively (FAO, 2008). Although Sri Lanka has developed national climate change strategies and action plan "the National Climate Change Adaptation for Sri Lanka 2011-2016", only a limited amount of resource have been committed to make a significant adaptation efforts (Sterrett, 2011). Weak economic incentives and poor understanding of these incentives has hampered the participation by local forest users and other stakeholders in rural development forestry projects and policy design of participatory forestry (Richards, et al., 2003). Integrating climate change into annual budgets has become vital importance to ensure that adequate resources are allocated to high priority mitigation and adaptation measures. Department of National Budget, Ministry of Finance & Planning in Sri Lanka invested funds for establishment of 280 ha of farmer's woodlots by 556 farmers providing seedlings and technical assistance, and also maintaining 462 old woodlots (Department of National Budget, 2011; and Forest Department, 2011). Department of National Budget, Ministry of Finance & Planning in Sri Lanka invested Rs. 2,540.9 million for environment sector institutes in 2011 for implementing policies aiming at conserving and preserving the environment mainly to reforest in 872.73 ha of harvested plantations, carry out silvicultural operations in 2,407.74 ha in selected forest plantations, establish 761 ha of woodlots, and 205 ha of farmer's woodlots, develop 4,684 nos. of Home Gardens by providing seedlings and technical assistance, and produce 973,102 seedlings in nurseries of the Forest Department (Department of National Budget, 2011). Incorporating climate change adaptation measures related to FWLs programs on macro-economic basis, budget policy outline, preparation of revenue and expenditure targets, and submission of related sector plans within those ceilings should be the main stages in budget formulation.

Adaptation For Climate Change

Increase Area and Connectivity of Vegetation

Agroforestry linkages with climate change have been identified as contribution to climate change emissions; impacted by climate change; and, contribute to climate change mitigation through both CO₂ substitution and sequestration (Best, 2003). The carbon sequestration in trees and soils by agro-forests bring social and economic advantages to the farmer through increasing productivity of biodiversity friendly forest system as well as the systems contribute to climate change mitigation and adaptation (Montagnini, 2012). Forest land degradation and excessive land exploitation caused by high rural population density and lack of off-farm livelihood opportunities have become a serious environmental problem in Sri Lanka. The FWLs programs have a major component need for agriculture and forestry for the rural populations to adapt to climate change impacts. FWLs contribute for significant improvements in the conservation of trees, vegetation area and density of forest cover. The farmers' woodlot programs have provided financial and material incentives at the establishment of woodlots in degraded forest lands due to long-term shifting cultivation. The program pursues small-scale farmers to maintain their woodlots successfully and not to involve directly or indirectly on the deforestation in the protected forest resources. The silvicultural techniques provided by forest officials are used by the farmers to rehabilitate degraded woodlots and it will preserve the forest cover and also increase the land value to smallholder farmers.

Participatory Forestry Project in Sri Lanka was rated successful on the basis that it greatly exceeded its planting targets (ADB 2003a). Predominant wood tree species in different agro-climatic zones were selected for FWLs. Teak (*Tectona grandis*) only or teak / margosa (*Azadirachta indica*) mixed stand have been cultivated in dry zone. Teak only stands have been introduced in intermediate zone and eucalyptus or teak models are used in wet zone areas (ADB, 2003b). The farmers had developed 420 ha of lands as FWLs under CFP in 1992 and 15,500 ha of FWLs under PFP even exceeding the expected target (ADB 2003b).

Conserve and enhance soil, water and environment

Forests play a vital role in conserving soil and regulating water flow. Farms' woodlots act as reservoirs of trees, carbon sinks and a source of clean water. As windbreaks and shelterbelts Farms' woodlots help to increase crop yields, and promote soil and water conservation. FWLs protect soil from wind and water erosion, contribute to cleansing, filtering and stabilizing wetlands and water bodies and provide habitat for a wide range of plant species, and contribute to clean air and provide a place to commune with nature. Forestry sector priorities in Sri Lanka have shifted from timber production to environmental conservation during the last decade (Bandaratillake, 2011). FWLs help enhance soil and water conservation in the degraded forest lands. FWLs are more important over time in controlling farm runoff preventing flooding farm lands and soil erosion. In some areas FWLs become more important in controlling farm runoff as well as serve to filter agricultural chemicals from the soil preventing contamination of the water resources. FWLs which are often the only forest in inhabited rural areas are important for their environmental and recreational values, and as a source of many specialty products. In some areas the farmers have high value timber species but the process of land degradation is apparent due to little management, even after many years of farmers' woodlot program.

Climate change alters forest and agricultural site conditions and the competitive balance between species that has existed in the past. Trees in FWLs can contribute to adaptation to climate warming. The trees planted in farmer woodlot adapted to warmer temperatures, less rainfall, and other extreme weather events. Compared to temperatures measured in the open, temperatures in many agroforestry systems are 2-5 0C lower under the tree canopy (Montagnini, 2012). Climate change not only alter the local site conditions experiencing warmer temperatures, less rainfall, and more extreme weather events, but also the competitive balance between species, changing behaviors of native insects and diseases, and spread of invasive plants of the forests resources. FWLs cope with the changing ranges and behaviors of native insects and diseases damaging agricultural systems.

Using as a community investment process, FWLs have already made several investments aimed at proving concepts for generating carbon offsets within rural supply chain in order to adapt climate change. This is a significant step towards further environmental accountability and transparency in product value chain of the FWLs.

Maintain bio-diversity and forest health

Sri Lanka is richly endowed with biological resources manifested in a wide range of forest ecosystems. Sri Lanka one of the global biodiversity hotspots has lost its bio-diversity due to environmental degradation and destruction of natural resources as a result of population pressure and developmental activities (Ministry of Environment and Natural Resources, 2007). FWLs maintain forest health and diversity to enable forests to survive under the conditions of climate change. Healthy forests are more resistant to pests and climate-induced stresses such as drought. In many FWLs consisting predominant wood trees in monoculture or mixed stand with two tree species make extremely less contribution for biodiversity conservation. Dominant trees in the FWLs completely suppress even the undergrowth of agricultural crops and regeneration of other plant species. Keeping a mix of age classes and tree species; controlling undesirable and invasive plant species; maintaining the genetic diversity within the woodlot; increasing the size of the forested areas; and removing seriously diseased trees improving forest health and species diversity within the woodlot. Despite the extensive knowledge of the farmers on their trees and environment, with the rapidly changing conditions created by FWLs, they urgently need innovations especially to conserve the ecosystems in the traditional land use systems. Maintaining health resistant to pests and climate stresses and species diversity of the FWLs is the most important approach to enable forests to survive sustainably.

Contribution For Rural Development

Supply of Forest and Agricultural Products, and Services

FWLs (FWLs) was designed for farmers to grow trees on shifting cultivation lands, for promoting a wood supply and improving their livelihoods through sustainable forest management (Kallese and De Alvis, 2004). The owners of FWLs have to improve their management so as to boost timber production. Many farmers are poorly maintaining the woodlots after initial stage ignoring the long-term benefit which is timber due to lack of knowledge and inadequate monitoring and assistance of Forest Department. Most farmers don't fully manage their woodlot operations to reach the potential timber growth and spaced adequately to maintain good form and quality. Their timber growth generally reaches only 50 to 60 percent of potential. Although the FWLs has contributed to increase the tree cover, growth rates in most FWLs are poor. Per tree average volume is 38% with regards to provincial yield table values mainly due to mismatching of species and sites, water shortage etc., (Wijewarnasuriya, 2009). The wood produce on FWLs are not only good to sell to timber merchants, but the timber can also be useful on the farm to build fences, barns, or other buildings. Some farmers grow specialized woodlots that are used for a specific purpose. Many farmers who have grown low-valued trees such as Neem, Eucalyptus and Pine have converted all their woodlots to pasture or short-term field crops such as Green grams.

The farmers were participated for FWLs Programs and maintained Woodlots during the first 3-4 years successfully due to early incentives given by the government. They have adopted agroforestry intercropping system planted and harvested agricultural crops during the first 3-4 years of the FWLs program (Sathurusinghe 1998). Policy responses to climate change driven by debates among scientists have largely neglected the insights of poor farmers living on the frontline. They have less concerned about the impact of climate change on agriculture and food security. Some of the farmers have already drop or limited in crop production due to frequent flooding and droughts. It is recommended to plant of Nitrogen Fixing Trees in vacant places after thinning operations, and extending the rotation period for existing woodlots. Consideration of site-species compatibility, use of

fast growing species and use of a better monitoring plan are recommended for newly establishing woodlots (Wijewarnasuriya, 2009). It is imperative to take multi-sectoral approach at the community level with the smallholder farmers who are directly affected by climate change in addressing adaptation challenges. These farmers need knowledge and skills and incentives for addressing short- and long-term needs of diversifying crops and trees.

FWLs favor not only the production of wood and other goods and services such as fuel-wood, forage, water, esthetics, and recreation and also help with fire protection. The social responsibility of FWLs programs could be assessed standards of wood supply chain covers various environmental aspects linked to climate change, including energy conservation, soil and water conservation, and biodiversity. FWLs provide dead trees and small branches for fuel wood, and bring about a great deal of cash income. Clearing of village forest to establish FWLs have created short supply of wood and other forest products for immediate local needs. Lack of common forest land in villages after establishment of FWLs lead to cutting down reserve forests by the rural community in order to extract firewood and other forest products and for animal grazing. Forestry officials have to prepare more detailed plans, educate the farmers and oversee their proper execution for improvement of immediate and long-term commercial potential of woodlots. There is no any publication or book that woodlot farmers can consult.

Increase Farmers Incomes

Climate variability and change crops production failed tremendously threaten food security and the wellbeing of rural people. Farmers responded positively to farmers' woodlot programs due to unfavorable climatic conditions and poor soils in degraded forest lands from shifting cultivation that contributed to poor agricultural crop production. Despite the threatening of food security and the wellbeing of rural people in short-term the farmers have established woodlots as an alternative source of household income. From the thinning of trees in their FWLs in 8 and 15 years interval the farmers have already earned average Rs. 24,500 (US\$ 318) and Rs. 66,000 (US\$ 858) per hectare income respectively, contributing to a greater economic value to the rural community. The farmers have understood the importance of trees in FWLs as they contribute highly to the economy of individual households in long run. The farmers are expecting greater yield of timber from their final harvest of forest trees at the end of 25 years lease agreement (ADB 2003). Improving smallholder livelihoods through woodlots management would empower the local communities to mitigate the risks and adapt the climate change poses to development rural development. Expanding climate change adaptation measures through establishment of FWLs improve rural livelihoods and the economy as a whole. Species diversity may have little monetary value but an important to adapt the climate change. Diverse species may even pay off in cash and a relatively low-value species may become valued because of shifting market demand. Diversity in the population relates to the sizes and ages of trees enhance the value of the timber. Instead of removing all trees of a marketable size, the harvested volume on market demand will increase along with the value of individual trees. Push for the recognition of farmers' woodlot management as a carbon mitigation option on climate change represents a potential for farmers to receive benefits from carbon sequestration. The community investment process in FWLs would generate carbon offsets within the wood supply chain of the country. There would be a potential for obtaining additional income from carbon credits by enlarging the size of managed woodlots in order to become self-sufficient in wood. A number of challenges exist to engaging farmers' woodlot owners in carbon-oriented management such as the low price of carbon and high cost of market entry; meet requirements of management plans and certification; and managing for carbon in consistent with the other forest management goals.

Income Distribution and Poverty Alleviation

There was a considerable potential for tree cultivation by farmers, both on private land and on former government land on a lease or more permanent basis. It was suggested a form of people-oriented forestry tailored to the Sri Lankan situation focuses on individual farmers or small, cohesive groups of farmers, rather than on villages and 'community' organizations (Carter, et al., 1994). The rights for individual lands of FWLs are held by single individuals other than commonly, being the case in different 'community forests' but also describe as the term 'private forest'. The FWLs program selected only few lower income groups of farmers where majority of the farmers are grouped as "poor" in the rural areas. They were given lands under a lease agreement for a period of 25 years to establish the FWLs while their fellow farmers still continue their poverty ridden subsistence farming. In some cases, participatory Forestry was a top-down project and experienced poor community participation due to lack of secure tenure for FWLs (ADB 2003a),

A considerable level of forest encroachment and conversion in Sri Lanka is still continue at the current rate of 1.5% a year due to widespread rural poverty and landlessness (www.cmsdata.iucn.org/downloads/sri_lanka.pdf access February, 2009). Climate change poses to development efforts improves smallholder livelihoods through woodlots management. For the establishment and maintenance of farmers' woodlot at the initial stage farmers were provided with food ration in addition to other incentives mainly required inputs (FAO, 1997). The farmers have disappointed about the FWLs a kind of forestry as a means of rural poverty alleviation (Nanayakkara, 2001). During the early stage of FWLs program farmers generated short-term income through inter-cultivation of agricultural crops. According to a trend analysis by the ADB (2003a), after three years, the farmers had lost the regular income and have to wait for longer periods about 25-year to obtain the income from final harvest of trees in FWLs. The economic potential of harvesting trees from FWLs is determined by the land base, the species of trees, log size, volume, quality of logs, as well as the capital, labor and management applied to the enterprise. The farmers have the very high expectation that most woodlots will provide income for individuals to achieve their long-term desired livelihood.

Promote Rural Services, Diversify Rural Economies and Improve Rural Livelihoods

Farmer woodlot not only provides direct benefits to individual but the village community and the government at large receive benefits indirectly through community development activities. Farmer woodlot allowed not only for producers to increase their

incomes, it increase the revenue for forest department through collection of royalties from timber sales. Farmer woodlot can contribute to infrastructure, public facilities, and credit service through its cash income. This income is devoted to improving the village community, and in some cases used for public facilities such as improvement of roads, electricity supply, and construction of a meeting place for the village. Repair and construction of schools, temples, and public meeting places; construction of small irrigation systems; and reinvestment in tree planting could be identified as how cash benefits earned are used for community development related activities in villages. Environment, social and economic considerations of the FWLs are an important influence on carbon market participation by woodlot owners. The farmers who have carbon-oriented management of woodlots have an opportunity to obtain a new source of income, and have environmental co-benefits.

FWLs create new sources of income as well as income for the government collecting royalties from timber sales by the farmers. The governments increase the investment in expanding climate change adaptation measures and improve rural livelihoods (<http://ccdare.org/>). Timber harvest in FWLs is one-time income sources which provide significant amounts of timber to the forest economy and these harvests are not managed on a sustainable basis. The value of FWLs could be increased by improving farmers' ability to produce forest products and services, and stimulating rural economies by creating or diversifying business activity and employment. They are interested in developing their silvicultural techniques to improve their woodlot management and secure the future supply of timber for their rural industries. The timber can also be useful on the farm to build fences, other buildings as well as to promote wood based furniture and other cottage industries as rural development strategies. Some farmers are interested in converting their woodlots as a savings account. If they are given permission, when they need some extra money for other income generating activities, they can always cut down some trees and sell them to a timber company. Forests and forest product-based small scale enterprises need to be emerged as important players in the rural development sector providing employment in production and processing. The potential of NTFPs to contribute to rural economies is immense and not yet fully realized under the farmers' woodlot programs. Management of Non Timber Forest Products (NTFPs) which have vital importance for sustainable forest management and rural development is not included in any of the existing farmers' woodlot management regimes. Producing NTFPs in the FWLs implies modernization may sometimes change the relevance of natural production factors drastically, and usually entail temporary or permanent changes to the quality of natural sites. Ecotourism is also one among the potential forest-based industries promising sources of direct and indirect employment related to FWLs. FWLs programs implemented in Sri Lanka have made fewer attempts for the process of expanding the capabilities of the farmers as an important strategy of rural development. Designing rural development forestry project interventions and policies which improve the incentives for participatory forestry needs the assessment of costs and benefits of alternative livelihood and land use options (Richards, et al., 2003).

Conclusions And Policy Implications

In addition to a supplement to afforestation and reforestation strategies making contributions to the climate change mitigation, FWLs as an alternative source of household income is essentially a climate change adaptation strategy. Although the farmers' woodlot as small scale-scale forestry programs do not completely adapt to the impacts of climate change and promote the rural development it can adapt some impacts and take advantage of opportunities to achieve positive outcomes. Incorporate climate change adaptation into forestry and rural development policies rather than creating separate climate change policies would be the most efficient and effective way to achieve adaptive and resilient FWLs forestry systems and rural development. Strong partnership is needed to create innovative local institutions based on adaptive management and a more equitable and inclusive decision-making process for the promotion of FWLs to make significant contribution to the climate change adaptation and rural development. Specific measures such as diversified subsistence crops and increased diversity of woodlots, sustainable practices and new economic opportunities incorporated with FWLs are required for the adaptation of climate change and rural development.

Diversity of species is an important tool in light of climate change and the farmers should be encouraged to grow species diversity of forest trees and agricultural crops including species that have some monetary value. Current national forestry and rural development strategies and priority proposals should be reexamined and determine the need for changes to incorporate climate change impacts. Farmers' woodlot programs that do not integrate into broader rural development plans will run the risk of creating future new problems. The programs has to be carefully designed, otherwise, it would result in the leakage or negative welfare implications of the poor. There is an urgent need for mutual learning and advancement of rural development, environmental stewardship and sustainability objectives across sectors by bringing the stakeholders interested in farmers' woodlot development. The knowledge gained the evaluation of how farmers' woodlot programs supporting adaptation of climate change impacts and promotion of rural development strategies provide a basis for learning, revising and scaling up real-life demonstrations.

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