

## Policy brief

The hilly areas of the Northern Pakistan mostly rely on subsistence farming, which provides food, fodder and livelihood to the poor rural farmers. However, these hilly areas have generally poor-quality marginal land that give low yield. Since this is an arid region and crops rely on rainfall, changing rainfall patterns and frequent droughts result in crop failure, exposing poor farmers to multiple risks including loss of livelihood and food insecurity. Farmers need to adapt their farming practices to climate change; however, it is impossible for them to take-up adaptation measures without financial support as they lack the access to financial instruments such as low interest concessional loans. The present research, therefore, proposes a self-sustaining financial initiative in which adaptation finance donors would provide financial resources to facilitate climate adaptation by setting in motion a well-designed commercial forestry scheme (CFS).

This CFS would enable farmers to diversify their crops to make farming resilient to climatic changes. As such, farmers would be compensated by adaptation finance donors to shift their less productive marginal cropland to commercial forestry. Farmer compensation includes initial plantation cost, monthly payment to manage the plantation in the non-yielding period of CFS, and a share in CFS wood (as an incentive) at the end of the scheme. On the other hand, adaptation finance donors could benefit from the sale of sustainably certified wood (at a premium) and CERs (certified emission reductions) against carbon offset achieved through tree plantation. CFS also has ancillary (social) benefits such as increased biodiversity, reduced soil erosion and creation of carbon sink which make CFS a socially optimal proposal.

The present research deployed discrete choice experiment (DCE) approach to investigate farmer willingness to adopt CFS, farmer compensations (e.g. annual payment and wood share) required for the uptake of CFS, and the incentive structure under which farmers switch to CFS and donors lend the concessional loans. A primary survey which includes a piloted questionnaire and an experimental design was administered with 450 farm households in five rural village of district Haripure. Experimental design was generated in Ngene software to create the choice situations from the CFS attributes, which include biodiversity area that farmers had to designate on their farm as a condition of CFS, CFS location on the farm, farmer wood share and the annual payment.

Results show that the use of DCE approach in this study has contributed to a deeper understanding of the farmer preferences for the design of CFS. For example, the methodology has uncovered the CFS attributes that farmers prefer and enabled the quantification of the trade-offs farmers make regarding these

attributes. DCE modelling results reveal that farmers derive disutility from existing farming practices, which is possibly due to their crops' susceptibility to unfavourable weather changes. This means that farmers might prefer to adopt the CFS to align their farming to climatic changes.

Similarly, farmers derive disutility from designating a biodiversity area on their farms as a condition of CFS, and demand significantly high compensations for this attribute. This means farmers are interested in CFS for their private benefits such as crop diversification rather than the improvement in biodiversity. This is possibly due to farmers' lack of awareness about the importance of biodiversity, which indicates the need for farmer education and the design of incentives which could improve the social aspect of CFS.

Findings reveal that farmers prefer their own choice of CFS location on their farm and are unwilling to allow donor to choose CFS location. Furthermore, while farmers demand compensation for allowing donor to choose the CFS location, they are willing to sacrifice some amount of annual payment for choosing CFS location themselves. This indicates farmers' disinclination to forgo their control on their farmland, which most plausibly is due to farmers' lack of trust on CFS administration which is expected owing to the businesses' thin compliance to the regulations and poor law enforcement. Policy makers should take appropriate measures to mend this lack of trust amongst farming communities as this can significantly impede the adoption of technologies.

Interestingly, farmers place a positive and significant value on wood share attribute of CFS as they are willing to forgo annual payment for having a share in the wood at the end of project. However, the amount of annual payment that farmers are willing to forgo for each level of wood share is significantly lower than the monetary value of the respective wood share. This shows that despite limited literacy, farmers have made rational choices while making a trade-off between annual payment and wood share. A more intriguing aspect of this result is that farmers have preferred wood share over annual payment, despite knowing that annual payment has minimal risk and wood share is uncertain. While this indicates that farmers are willing to take some risk for expected returns, it is also possible that farmers are unsure of the timely disbursement of annual payment.

Results of attribute interactions with farmer socioeconomic characteristics show that aged farmers and farmers with large household size prefer existing agricultural practices, and hence demand additional compensations to sign-up for CFS. This is conceivably due to older farmers' limited literacy and education and a poor understating of CFS terms in addition to large households' possible off-farm sources of income. This suggests that relatively young farmers with small household size are more likely to adopt CFS.

Similarly, farmers with relatively large farm size are disinclined to designate a greater biodiversity area and demand additional compensations, which is possibly due to their higher farm income and greater resilience. Farm households with a greater participation in off-farm work disliked donor choice of CFS location on their farm and they are willing to forgo some amount of annual payment to be able to choose the CFS location themselves. This shows that farm households with higher income and wealth are more likely to decline some of the CFS terms, which clearly indicates that these households are economically more empowered and choose to negotiate more favourable CFS terms.

Likewise, educated farmers prefer their own choice of CFS location on their farm, which most plausibly is due to their higher socioeconomic status that influence their choices. However, farm households which are further from market are willing to commit a greater biodiversity area against relatively lower compensations. This implies that households further from market feel more vulnerable and are extra keen to adopt CFS, which is probably due to their limited engagement in off-farm work and access to nearest urban centres that is facilitated by the nearest market. In a way, this finding also complements the notion of improved socioeconomic status and its impact on household choices. These results clearly suggest that households with less income, education and wealth feel more vulnerable and might be keen to adopt CFS.

## Abstract

Using discrete choice experiment (DCE) and a primary survey of 450 farmers, this study investigated the rural farmers' willingness to adopt donor-funded commercial forestry schemes (CFS) to align their farming to climate change in the hilly areas of the Northern Pakistan. Results reveal that farmers derive disutility from existing farming practices, which is possibly due to their susceptibility to unfavourable weather changes such as droughts, implying that farmers might prefer to adopt the CFS as an adaptive response.

Farmers are unwilling to pledge a biodiversity area, and demand significantly high compensations for designating a biodiversity area on their farms. This shows that farmers are interested in CFS for their private benefits such as crop diversification rather than the improvement in biodiversity. Findings reveal that farmers prefer their own choice of CFS location on their farm and demand compensation for allowing donor to choose the CFS location. However, farmers are willing to sacrifice some amount of annual payment for choosing CFS location themselves, which indicates farmers' disinclination to forgo their control on their farmland.

Interestingly, farmers place a positive and significant value on wood share attribute of CFS and are willing to forgo certain amount of annual payment for having a share in the wood. However, the amount of annual payment that farmers are willing to forgo for each level of wood share is significantly lower than the monetary value of respective wood share. This shows that despite limited literacy, farmers have made rational choices while making a trade-off between annual payment and wood share. A more intriguing aspect of this result is that farmers have preferred wood share over annual payment, despite knowing that annual payment has minimal risk and wood share is uncertain. While this indicates that farmers are willing to take some risk for expected returns; it is possible that farmers are unsure of the timely disbursement of annual payment, and hence prefer wood share.

Results of attribute interactions show that aged farmers and farmers with large household size prefer existing agricultural practices and demand additional compensation to sign-up for CFS. Similarly, farmers with relatively large farm size are disinclined to designate greater biodiversity area without additional compensation. Farm households with a greater participation in off-farm work disliked donor choice of CFS location on their farm and they are willing to forgo some amount of annual payment to be able to choose the CFS location themselves. Likewise, educated farmers prefer their own choice of CFS location on their farm. However, farm household further from the nearest market are likely to commit a greater

biodiversity area against relatively lower compensations, which implies that households further from market feel more vulnerable and are extra keen to adopt CFS.