

# The Impact of Agroforestry-Based Soil Fertility Replenishment Practices on the Poor in Western Kenya

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Western Kenya is one of the most densely populated areas in Africa. Farming there is characterized by low inputs and low crop productivity. Poverty is rampant in the region. Yet the potential for agriculture is considered good. In the study described here, researchers looked specifically at soil fertility replenishment (SFR) systems as part of a larger IFPRI effort to examine the impact of agricultural research on reducing poverty. Focused on two specific systems—the tree-based “improved fallow” system and the biomass transfer system—the study compared rates of adoption in poor and nonpoor communities and evaluated the extent to which their adoption reduced poverty.

Improved fallow refers to the intentional planting of a fallow species. Improved fallows are more efficient than natural fallows, typically achieving the same effect on crop productivity in a much shorter time. Biomass transfer systems are those where organic nutrient sources are grown in one place and then transferred to crops in another place. This system allows farmers to grow crops continuously, an advantage over the improved fallow system. The space available for producing organic nutrient sources on-farm is limited, however.

## COMBINING QUALITATIVE AND QUANTITATIVE ANALYSIS TO ASSESS POVERTY

The range of issues covered in the study required the use of a variety of research methods and interdisciplinary perspectives. For example, distinguishing the poor from the nonpoor for the purposes of the study was not straightforward. The researchers used a variety of methods to assess poverty levels, including quantitative measures from surveys, enumerator ratings, and farmer self-assessments. Local perceptions of poverty and the role of gender, power, and other social constructs in understanding why and how farmers adopted the new systems, and the impact of the systems, could only be explored using qualitative research

methods and sociological perspectives. These were combined with quantitative measures of adoption and impact, along with economic analysis. The researchers also drew on long-term knowledge of the region based on work by members of the study team and others.

## STUDY FINDINGS

- Over the course of the study, welfare or livelihood outcomes worsened for many households. There was a general deterioration in welfare indicators, including assets, expenditures, and food consumption. Particularly striking was that households with relatively high welfare indicators in the initial period suffered the greatest losses. This was due partly to the large number of adverse shocks affecting households and the cultural obligations felt by all community members.
- Households did see the importance of SFR, and there were many human capital impacts. Both the qualitative and quantitative research found significant knowledge acquisition taking place, not only for agroforestry methods but also for general soil management and farming practices. People valued this information and often put it into practice.
- The poor adopted SFR strategies at the same rate as the nonpoor. Adoption rates were not outstanding but were encouraging, with about 20 percent of all farmers using the technologies on a regular basis.
- Adoption at the early stage was at low levels of intensity. While an encouraging number of households used or tested SFR practices, the size of plots on which they were applied was small. It is not yet known whether this is a ceiling or a consequence of the early stage of dissemination.
- The dissemination analysis found that farmers appreciated some aspects of different disseminating organizations and the many different methods tried. Although characteristics of SFR affected whether people adopted a sys-

tem or not, aspects of the dissemination process also affected adoption. The dissemination analysis found that the main feature of most dissemination approaches—group-based methods—can strengthen human and social capital, and that farmers of different social status benefited from such methods. However, this analysis also found that group-based approaches may disadvantage farmers of lower social status and women, who are less likely to participate in or dominate groups. These findings reinforce the idea that it is best to use a variety of methods to disseminate new technologies or knowledge.

- Sustainability of dissemination structures and processes proved possible, but challenging, due to problems encountered by farmer groups, limited capacity of local administration, social dynamics within villages, and limited cost-sharing ability. Monitoring would help to pick up these problems so that resolutions can be sought where possible.
- SFR did significantly raise crop yields. Respondents in the case studies and formal surveys consistently reported significant increases in yields from the use of SFR practices. This is consistent with farmer-managed trial data.
- Despite being used by a number of poor households and having an impact on yields, SFR's impact at the household level is modest. This is due to the small land sizes under SFR and because the weak rural economy is not conducive to investment and development. As a result, technological innovations alone are likely to have limited short-term impact. Poverty alleviation should encompass other sectors as well.

## STRATEGIES FOR ADDRESSING POVERTY AND SOIL FERTILITY

SFR technology interventions imply assumptions about the role of agriculture in people's livelihoods that may not be true. The assumption that poverty can be reduced through farming is not necessarily reflected in the investments in livelihood activities made by people in the region. In fact, their decisions are embedded in their economic circumstances, cultural and normative frameworks, and social identities.

Identifying agricultural strategies to reduce poverty is difficult due to low prices, variable climate, and the high cost of profitable investment. Small land sizes, in turn, limit the amount of diversification that households are willing to undertake. This study shows that even when progress is made, households can easily slip back into poverty. Therefore, in addition to the generation of production and income, the need exists for insurance through investment in risk-buffering assets.

The soil fertility systems being disseminated are useful options for farmers, and many farmers that have never before invested in soil are giving them a try. There are clear limitations to the use of improved fallows and biomass transfer, however. Small farm sizes, for example, limit the extent to which niches can be found to produce the green manures. The technologies are therefore best perceived as components of a larger farm-level integrated soil fertility management strategy. Consequently, dissemination strategies should encompass a range of management practices for addressing the problem of poor soil fertility.

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