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## Summary

By 2025, the rural population of the developing world will have increased to almost 3.2 billion, placing increasing pressure on natural resources, especially arable land. Around 1.3 billion people in developing economies live in marginal areas and on ecologically fragile land, such as converted forest frontier areas, poor quality uplands, and converted wetlands. Around two-thirds are among the poorest rural households, who have very few productive assets, except land and unskilled labour, and live in remote areas. It is these “asset-less” poor who are most likely to suffer from extreme land degradation, resulting in a “poverty-environment trap”. In addition, developing economies with high concentrations of their populations on fragile lands and in remote areas not only display high rates of rural poverty but also are some of the poorest countries in the world today. Policies to eradicate poverty and reduce land degradation therefore need to be targeted at the poor where they live, especially the rural poor clustered in fragile environments, remote areas and marginal land.

**Keywords:** developing countries, fragile environment, land degradation, rural poverty **Abbreviations:** PES, Payment for ecosystem services. **Glossary:** Remote areas: locations with poor market access, requiring five or more hours to

**reach a market town of 5,000 or more.**

## **Introduction**

Land use in developing countries is critically bound up with their pattern of economic development. Most of these economies, and certainly the majority of the populations living within them, depend directly on natural resources. Primary product exports account for the vast majority of the export earnings of many developing economies, and one or two primary commodities make up the bulk of exports (1).

Agricultural value added accounts for an average of 40% of gross domestic product (GDP), and nearly 80% of the labour force are engaged in agricultural or resource based activities (2). Further adding to these disparities, by 2025, the rural population of the developing world will have increased to almost 3.2 billion, placing increasing pressure on natural resources, especially arable land (3).

As a result of these trends, expansion of less-favoured agricultural lands is occurring primarily to meet the subsistence and near subsistence needs of poor rural households. This is not a new phenomenon, yet this process has become a major structural feature of most poor economies.

Many of the world's rural poor continue to be concentrated in the less ecologically favoured and remote areas of developing regions, such as converted forest frontier areas, poor quality uplands, converted wetlands, and similar lands with limited agricultural potential (4-7). Population increases and other economic pressures are driving many of the rural poor to bring yet more marginal land into production (3,8,9). Such marginal land expansion continues to absorb the growing number of rural poor in developing economies (5,8,10).

The result is that the rural poor located on marginal and low productivity agricultural land typically employ traditional farming methods, earn negligible land rents or profits, face insecure tenure arrangements, endure severe land degradation, and have inadequate access to transport, infrastructure and markets (1,5,10-14).

This paper argues that, because of the increasing concentration of the rural poor in areas of fragile environments prone to land degradation and remote from markets, there is a need to re-think global development strategies to cope with this problem.

The next section provides evidence of the scale of the poverty and land problem. It is subsequently shown that the economic vulnerability of the "assetless" poor in remote and fragile environments creates problems of "poverty traps". Overcoming such traps and reducing land degradation requires a different policy strategy aimed at targeting the rural poor where they are concentrated in remote and less favoured areas, and alleviating the constraints that they face to improving their livelihoods.

## **Marginal Land**

Since 1950, the estimated population in developing economies on “fragile lands” prone to land degradation has doubled (6). These fragile environments consist of upland areas, forest systems and drylands that suffer from low agricultural productivity, and areas that present significant constraints for intensive agriculture. Today, nearly 1.3 billion people – almost a fifth of the world’s population – live in such areas in developing regions (6).

Other estimates suggest that poor people in developing countries are predominantly found in areas with the greatest potential for land and water degradation; i.e., land with highly weathered soils, steep slopes, inadequate or excess rainfall, and high temperatures (4). About 630 million of the rural poor live on these unfavourable lands in the developing world, whereas just under 320 million of the poor have access to favoured lands (4).

Figure 1 further illustrates that rural poverty is correlated with the fraction of the population in developing countries found in degradable and poor quality lands. As the figure indicates, for a sample of 92 low and middle income economies, the incidence of rural poverty rises with the share of the total population concentrated on fragile lands. Although the average poverty rate across all economies is 45.3%, the rate falls to 36.4% for those countries with less than 20% of their population in fragile environments. For those with more than 50% of their populations in marginal areas, however, the incidence of rural poverty rises to 50% or more.

The rural poor of developing economies also tend to be concentrated in remote areas, locations with poor market access and that require five or more hours to reach a market town of 5,000 or more (see Figure 2).

Around 430 million people in developing countries live in such distant rural areas, and nearly half (49%) of these populations are located in less favoured areas, which are semi-desert and semi-arid regions characterized by frequent moisture stress that limits agricultural production and land degradation (7).

As indicated in Figure 2, developing countries that have a larger share of their rural populations located in remote rural areas also display higher rural poverty rates. Across 91 developing countries, the average (median) share of rural population in remote areas is 26.9% (19.0%), whereas the average (median) share of rural population in poverty is 45.2% (46.5%).

Developing economies with high concentrations of their populations on fragile lands and in remote areas not only display high rates of rural poverty but also are some of the poorest countries in the world today. As indicated in Figure 3, for a sample of 104 low and middle income economies, real GDP per capita declines sharply with the share of the population in fragile environments.

For all economies, the average GDP per capita is \$1,952, but for those economies with less than 20% of their populations on fragile lands, real GDP per capita more than doubles to \$3,961. In contrast, for those economies with 50% or more of the population in fragile lands, GDP per capita falls to \$822 or less.



The low-income, or poorest, economies of the world are those in which 2009 Gross National Income per capita was \$995 or less (2). Similarly, as Figure 4 indicates, developing economies with a large share of their rural populations located in remote areas tend to be relatively poor. Across 104 countries, the average (median) share of rural population in remote areas is 26.9% (18.7%), and the average (median) share of real GDP per capita is \$2,075 (\$1,100).

The rural poor will continue to be clustered on marginal lands, fragile environments and remote areas, given current global rural population and poverty trends. First, despite rapid global urbanization, the rural population of developing regions continues to grow, albeit at a slower rate in recent years.

From 1950 to 1975, annual rural population growth in these regions was 1.8%, and from 1975 to 2007 it was just over 1.0% (3). Second, the vast majority of the world's poor still live in rural areas, even allowing for the higher cost of living facing the poor in urban areas. In general, about twice as many poor people live in rural than in urban areas in the developing world (9).

Around 30% of the rural population in developing economies survive on less than US \$1 a day and 70% live on less than US\$2 a day, yet the respective poverty rates in urban areas are less than half of these rural rates (9).

## **Review of evidence**

Because the rural poor of developing economies are often concentrated in ecologically fragile and remote locations, these areas can become significant poverty traps. To understand why, it is important to identify the typical conditions facing the "asset-less" poor in such regions that influence their use of available natural capital.

The poorest rural households in developing economies have very few productive assets (11). First, land is one of the few productive assets owned by the rural poor, and almost all households engage in some form of agriculture, but the size of landholdings tends to be very small.

Second, poor rural households tend to rely on selling their only other asset, unskilled labour. Agriculture is generally not the mainstay of most these households; instead, they generally obtain most of their income from off-farm work as agricultural labourers or in unskilled paid work or occupations outside of agriculture. However, when households do engage in outside employment, they tend to migrate only temporarily and for short distances.

Permanent migration over long distances for work is rare for most poor rural households (11). Thus, given the lack of ownership of assets by the rural poor, and their tendency to stay where they are located, it is not surprising that the livelihoods of the "assetless" poor are often the most dependent on their surrounding natural environments, including the poor quality "marginal" land available for cultivation.

The range of choices and trade-offs available to the poor is also affected by their access to key markets, such as for land, labour, credit as well as goods and services, as well as the quality and state of the land and surrounding environment on which their livelihoods depend (1,5,7,10-15).

Because of missing or inaccessible markets, therefore, the “asset-less” poor often depend on exploiting the surrounding environment and available marginal land for survival (12). This is especially the case in remote rural areas, where local markets are isolated from larger regional and national markets and essential public services are lacking (13).

Lack of assets and access to key markets may also constrain the ability of poor households to adopt technologies to improve their farming systems and livelihoods. A meta-analysis based on 120 cases of agricultural and forestry technology by smallholders across the developing world found that credit, savings, prices, market constraints, and access to extension and training, as well as tenure and plot characteristics, such as soil quality and landholding size, are important determinants of adoption behaviour (16).

Not surprisingly, the result is low adoption rates for sustainable agricultural and forestry technologies among poor smallholders, especially those with lower quality soils. In Mozambique, market access through an adequate road network and transport services is crucial in determining the successful adoption of improved agricultural technologies, and may even compensate for the disadvantages of marginal environments, such as poor rainfall (17).

In Nepal and Ethiopia, the lack of vital infrastructure, such as roads, irrigation and infrastructure, severely constrains the ability of poor farmers in remote and environmentally fragile areas to adopt new technologies and increase agricultural incomes (18, 19).

Given that poor rural households engage in some agriculture, and are highly dependent on outside employment for income, their livelihood strategies across these activities must be interdependent. In particular, as the “natural” assets and land available to them degrade or disappear, the rural poor are likely to search for more paid work to increase their earnings from outside jobs.

Such environmental degradation effectively lowers the “reservation wage” of the poor for accepting paid work, as households are forced to look for additional work to make up the lost income (12,15, 20-22).

For example, in the Yucatán, Mexico, in response to increased population density and declining soil fertility, only the better off households are able to devote more labour to off-farm employment; in contrast, the poorer households allocate even more labour to shifting cultivation, thus perpetuating problems of shortened fallows and declining yields (21,22).

On the other hand, in the rain-fed upland areas of Honduras, favourable rainfall during the secondary season lowers the probability that a household's income-earning strategy focuses on off-farm work, probably because it makes own farm vegetable production more profitable (20).

Evidence from the Philippines confirms that higher wages for off-farm employment can draw away small-holder labour that would otherwise be used for clearing more forests for on-farm agricultural production (10, Shively and Fisher 2004). However, poorer households in remote locations are the least likely to participate in off-farm employment, as they face higher transaction and transportation costs (23).

Similar results have been found in Nepal; higher wages reduce small-holder deforestation, but only if there are paid employment opportunities available in remote areas (24). Non-farm employment and improved wages in Honduras has also been associated with investments to improve cropland quality in Honduras and improved resource conditions in Uganda (25).

In El Salvador, as the employment opportunities and income per capita of agricultural wage owners declined, they relied increasingly on cultivating land for subsistence production. But rising income growth also enables poor and near poor households to acquire more land for cultivation, as a precaution against possible future income losses (26).

In Honduras, there is concern that the 30-50% decline in real wages over the past decade has shifted upland households to income strategies emphasizing hillside cropland expansion and resource degradation that has worsened rural poverty (20). Similarly, in the Yucatán, because they have limited access to off-farm employment, the least poor households tend to over-supply labour to shifting cultivation and thus clear too much forest land (22).

Although higher non-farm income may discourage cropland expansion and deforestation, it does not necessarily follow that households will invest more in conserving and improving existing land. For example, in the Ethiopian highlands, better access to low-wage non-farm employment improved substantially the income of households, but because it also reduced farming activities and food production, increased non-farm income also undermined the incentives for soil conservation (27).

Similarly, as real wages rise, the poorest households in the Yucatán actually decrease their supply of labour to outside employment and increase clearing forests for shifting cultivation. In contrast, richer households respond to higher real wages but supplying more labour to outside work, thus reducing shifting cultivation and deforestation (22).

## **Towards a new poverty eradication strategy**

To summarize, a distinct geographic pattern of natural resource use and rural poverty has emerged in developing economies. Many low and middle-income economies display a high concentration of a large segment of the population in fragile environments and in remote areas with poor market access, and rural poverty.

Moreover, there appears to be a correlation of this pattern of resource use with poor economic performance: those developing countries that are highly resource dependent and whose populations that are concentrated in marginal and remote areas tend not only to have a high incidence of rural poverty but also are some of the poorest economies in the world.

To eradicate such persistent problems of geographically concentrated rural poverty in developing economies will require a new poverty eradication strategy. Such a targeted strategy for the rural poor in remote and less favoured areas will require the following components:

- Provide financing directly, through involving the poor in payment for ecosystem services schemes and similar incentive mechanisms that enhance the environments on which the poor depend.
- Target investments directly to improving the livelihoods of the rural poor, especially their existing agricultural and resource production activities, thus reducing their dependence on exploiting environmental resources.
- Improve access of the rural poor in less favoured and remote areas to well-functioning and affordable markets for credit, insurance and land.
- Reduce the high transportation and transaction costs that prohibit the poorest households in remote areas to engage in off-farm employment and to integrate with larger markets.
- Addressing the specific problem of over-grazing and land degradation in semi-arid and arid regions.
- Improving education of women in remote and environmentally fragile rural areas.

If policies are to be targeted to improve both rural livelihoods and to protect the fragile environments on which many poor people depend, such a strategy must take into account many important factors influencing households' behaviour, including lack of income opportunities or access to key markets for land, labour and credit, and the availability and quality of natural resources, including land, to exploit (12). Nevertheless, there are several ways in which a strategy could be developed to target improving the livelihoods of the poor.

The first is to provide financing directly, through involving the poor in payment for ecosystem services schemes and other measures that enhance the environments on which the poor depend (28-31). Payments for the conservation of standing forests or wildlife habitat are the most frequent type of compensation programmes used currently in developing countries, and they have been mainly aimed at paying landowners for the opportunity costs of preserving natural landscapes



that provide one or more diverse services: carbon sequestration, watershed protection, biodiversity benefits, wildlife protection and landscape beauty (28, 29,31).

Wherever possible, the payment schemes should be designed to increase the participation of the poor, to reduce any negative impacts on non-participants while creating additional job opportunities for rural workers, and to provide technical assistance, access to inputs, credit and other support to encourage poor smallholders to adopt the desired land use practices. More effort must also be devoted to designing projects and programs that include the direct participation of the landless and near landless.

Spatial targeting of payments for ecosystem services may be one way of both reducing costs of implementation and also ensuring that more benefits reach the rural poor, as programmes and studies in Costa Rica, Ecuador, Guatemala and Madagascar have shown (32-34). Even in a poor African economy, such as Tanzania, a correctly designed payment for ecosystem services (PES) programme can provide an important source of funding for sustainable land use practices in agriculture while leading to greater watershed protection (35).

In the upstream catchment area of the Ruvu River, poor farmers face financial and technical obstacles to adopting sustainable land management that reduce soil erosion and enhance downstream water quality. By providing institutional, technical and financial support to farmers, a PES scheme for watershed protection delivers on these environmental goals while at the same time boosting crop productivity from improved soil conservation and fertility and thus raising farm incomes.

The PES scheme is now being used to enhance sustainability by investing in an appropriate legal and institutional framework for long-term financing and expansion of sustainable land management among farmers to improve watershed management.

A second objective is to target investments directly to improving the livelihoods of the rural poor in remote and fragile environments. For example, in Ecuador, Madagascar and Cambodia poverty maps have been developed to target public investments to geographically defined sub-groups of the population according to their relative poverty status, which could substantially improve the performance of the programmes in term of poverty alleviation (36).

A study that examined 122 targeted programmes in 48 developing countries confirms their effectiveness in reducing poverty, if they are designed properly (37). A review of poverty alleviation programmes in China, Indonesia, Mexico and Vietnam also found evidence of success in specifically targeting spatially disadvantaged areas and households, although the benefits are larger when



programmes, such as PROGRESA in Mexico, were successful in employing second-round targeting to identify households in poor locations and thus reducing leakages to non-poor households (38).

Research, extension and agricultural development has historically been oriented towards major commercial and export-oriented crops in developing economies, not targeted for improving low-productivity agricultural systems or farming in less favourable environments. Yet such improvements can substantially improve the livelihoods of the poor, increase employment opportunities and even reduce environmental degradation (1,8,10,18,39,40).

Empirical evidence of technical change, increased public investments and improved extension services in remote regions indicates that any resulting land improvements that do increase the value of homesteads can have a positive effect on both land rents and in reducing agricultural expansion (10,18,19,40-42).

In addition, policies need to address the lack of access of the rural poor in less favoured areas to well-functioning and affordable markets for credit, insurance and land, and the high transportation and transaction costs that prohibit the poorest households in remote areas to engage in off-farm employment, which are the major long-run obstacles that need to be addressed.

As discussed previously, such problems lie at the heart of the poverty trap faced by many poor people in remote and less favoured areas (12-13). For example, improving market integration may depend on targeted investments in a range of public services and infrastructure in remote and ecologically fragile regions, such as extension services, roads, communications, protection of property, marketing services and other strategies to improve smallholder accessibility to larger markets.

For poor households in remote areas of a wide range of developing countries, the combination of targeting agricultural research and extension services to poor farmers combined with investments in rural road infrastructure to improve market access appears to generate positive development and poverty alleviation benefits (16-19,41,43).

In Mexico, poverty mapping was found to enhance the targeting of maize crop breeding efforts to poor rural communities in less favourable and remote areas (41). In the Central Highlands of Vietnam, the introduction of fertilizer, improved access to rural roads and markets, and expansion of irrigation increased dramatically agricultural productivity and incomes (43).

Because they face higher transaction and transportation costs, poorer households in remote locations are the least likely to participate in off-farm employment. Yet, as discussed previously, when off-farm employment opportunities are available in remote areas, they can reduce conditions fostering the poverty-environment trap faced by poor households (10,21-24,26).

For example, in Columbia, high-input, intensified, highly mechanized cropping on the most suitable land, as well as expansion in cattle grazing has drawn labour from more traditional agriculture, so that areas of marginal land are slowly being abandoned and revegetating (44).

Investments in expanded market opportunities, improving market access and expanding public infrastructure and services, including, rural education and health services, seem to be important factors in both reducing the barriers to household participation in off-farm opportunities and expanding their supply.

Of particular concern is addressing the problem of overgrazing of rangelands in remote semi-arid and arid regions. Around 10 to 20% of global drylands experience some form of severe land degradation, affecting the livelihoods of around 250 million in the developing world (45).

Raising livestock is often the predominant use of these lands, which supports the livelihoods of the poorest rural households. For example, in Kenya rangelands have some of the highest poverty rates in Kenya, and they are also the areas with poorest access to roads, education and health services, and general infrastructure (46). A concerted effort is required to target policies and investments directly to improving the livelihoods of the rural poor dependent on rangelands in dryland regions and improving the sustainability of grazing methods. There is also a need to improve upon and develop community-based payment schemes for ecosystem services that target the rural poor on rangelands (47).

Tackling gender inequalities within households in remote rural areas is often identified as important for improving and diversifying livelihoods (48, 49). Evidence suggests that female-headed households may also lack access to crucial productive resources, certain labour-intensive activities are more difficult for households without sufficient youthful and able-bodied workers, and women may be excluded from participating in schooling or off-farm labour markets (49).

Remote and less-favored areas not only have fewer health and education programmes, but women in these areas especially lack access to such programmes, further contributing to household poverty, poor nutrition and child morbidity and mortality (49). Policies and investments that address women's education and health in remote and fragile rural areas as well as the particular production and livelihood constraints faced by female-headed households are urgently needed.

## **Conclusion**

Overcoming the problem of wide-spread rural poverty and land degradation in developing economies will require new strategies for poverty eradication that take into account the increasing geographical concentration of the rural poor in remote and less favoured areas. Rural poverty rates in developing economies have declined

over the past decade but remain high in South Asia (40%) and Sub-Saharan Africa (51%), and where reduction in rural poverty has occurred, it is largely due to rural development and not rural-urban migration (7).

Policies to eradicate poverty therefore need to be targeted at the poor where they live, especially the rural poor clustered in fragile environments and remote areas.

The specific elements of such a strategy include involving the poor in payment for ecosystem services schemes and other measures that enhance the environments on which the poor depend, targeting investments directly to improving the livelihoods of the rural poor, thus reducing their dependence on exploiting environmental resources, and tackling the lack of access of the rural poor in less favoured areas to well-functioning and affordable markets for credit, insurance and land, and the high transportation and transaction

costs that prohibit the poorest households in remote areas to engage in off-farm employment. A special effort is also needed to target women and female-headed households in remote and poor rural areas, as well as rangeland systems in drylands.

Finally, a policy strategy targeted at improving the livelihoods of the rural poor located in remote and fragile environments must be assessed against an alternative strategy, which is to encourage greater out-migration from these areas. Rarely, however, are the two types of policy strategies, investment in poor rural areas and targeted out-migration, directly compared.

In addition, only recently have the linkages between rural out-migration, smallholder agriculture and land use change and degradation in remote areas been analyzed (50). Another important emerging area of research is to examine the economic choices made by poor rural households to migrate to remote and environmentally poor frontier regions as opposed to urban areas (1,8,12).

Researching such linkages will become increasingly important to understanding the conditions under which policies to encourage greater rural out-migration should be preferred to a targeted strategy to overcome the root cause of the poverty-environment and spatial-poverty traps in remote and fragile areas.

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## Figures

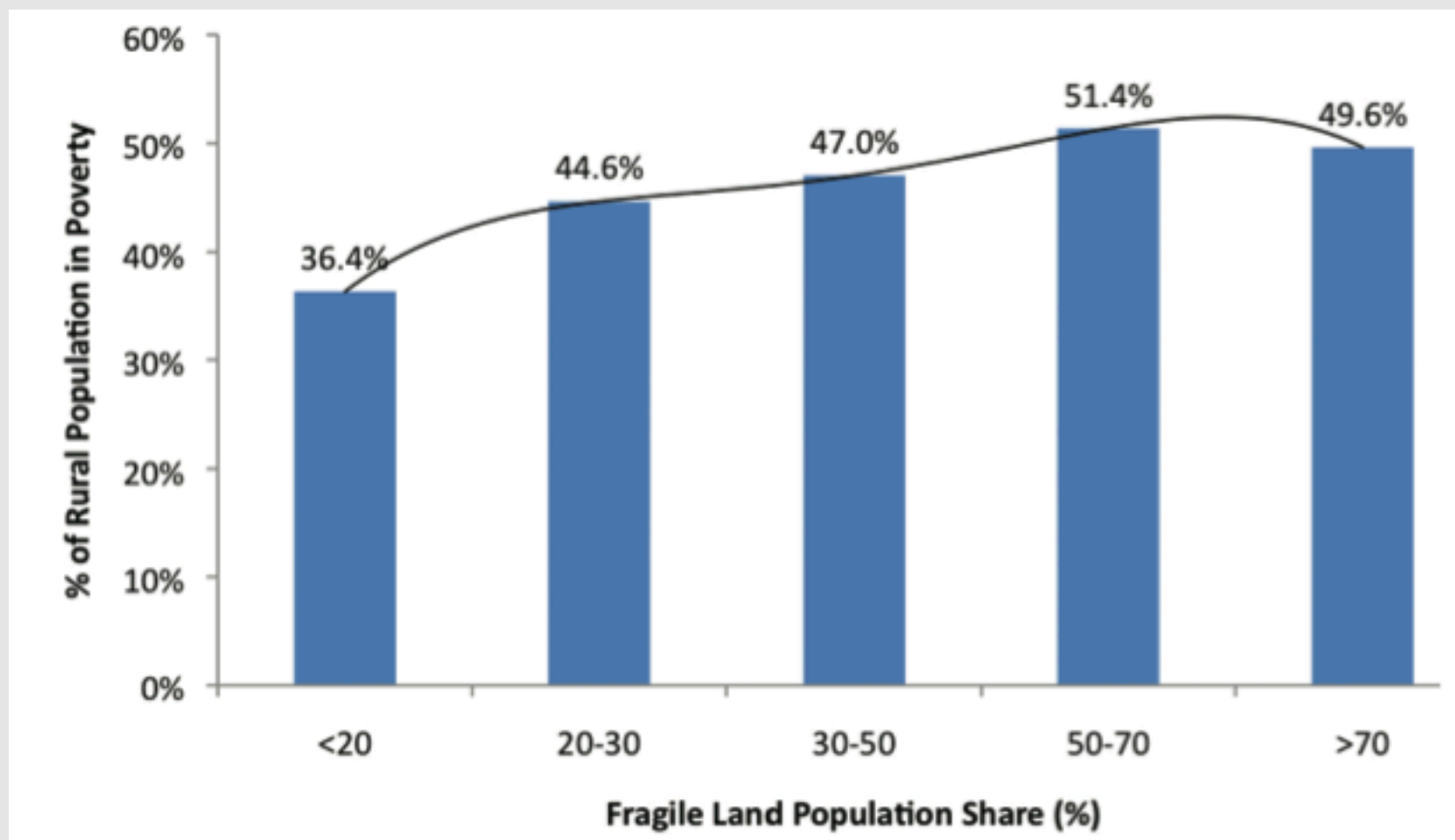


Figure 1.

**Figure 1: The rural poor and population on fragile lands in developing economies.**

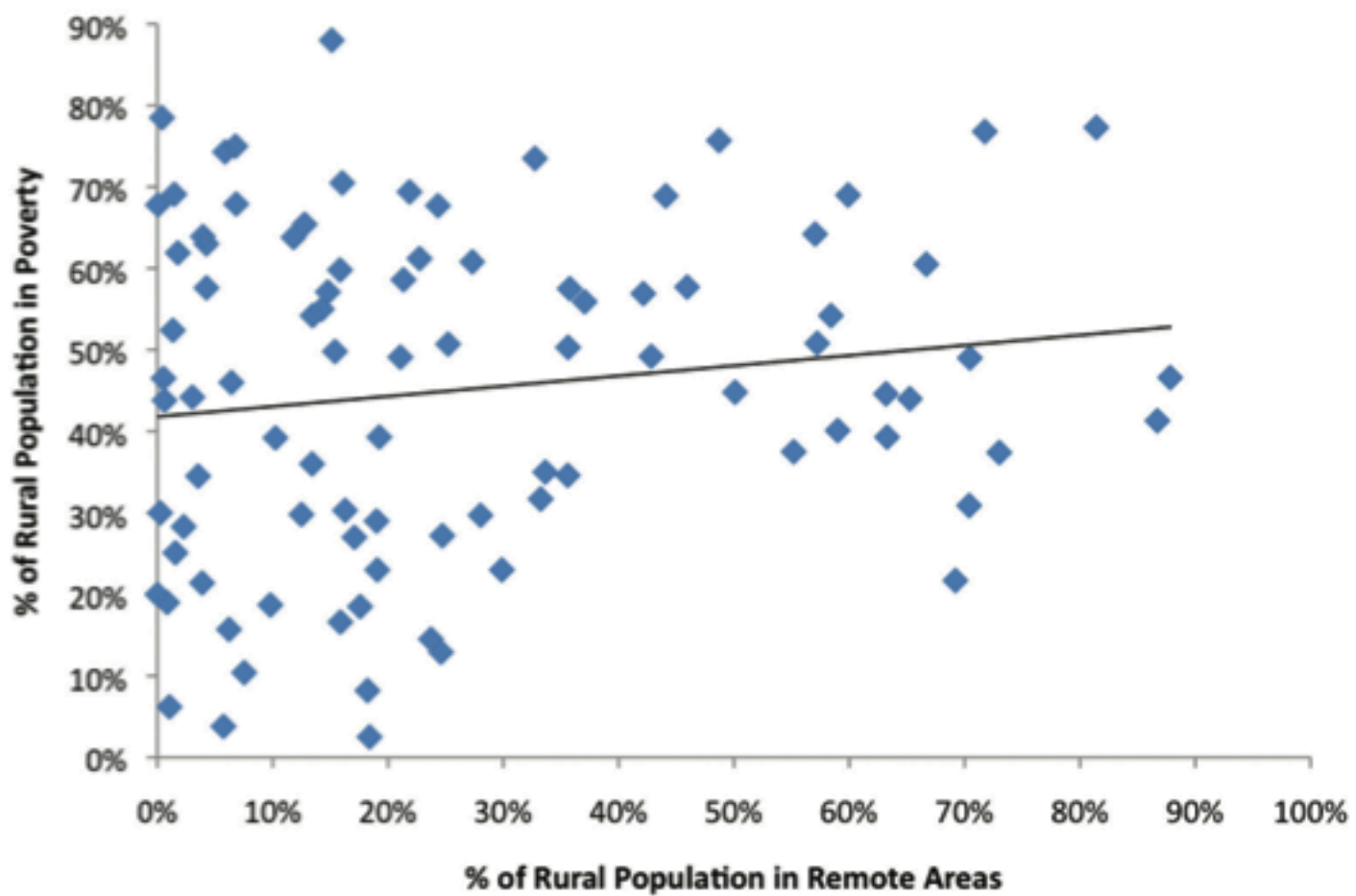


Figure 2.

Figure 2: The rural poor and population in remote areas of developing economies.

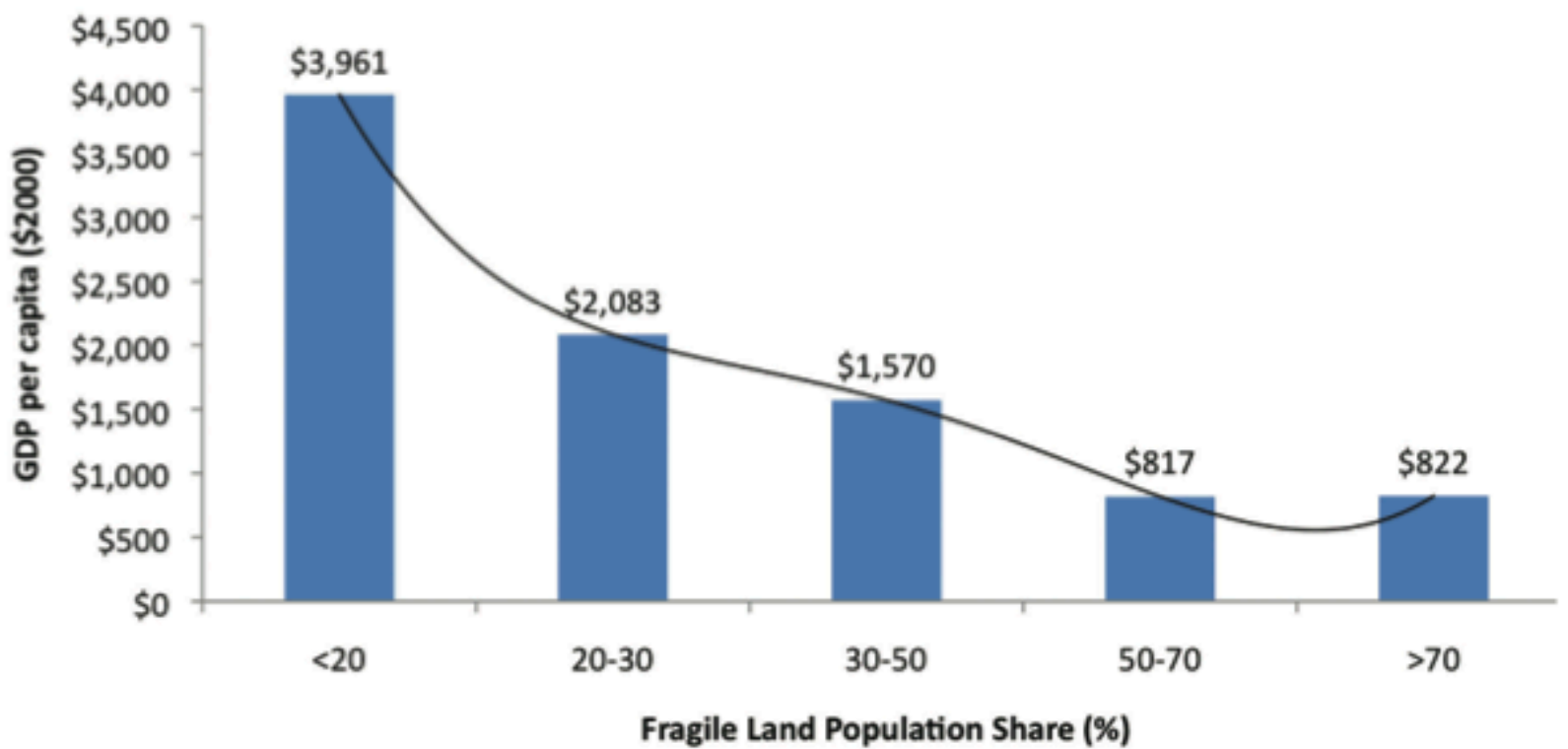


Figure 3.

Figure 3. Fragile land population and GDP per capita in developing economies.



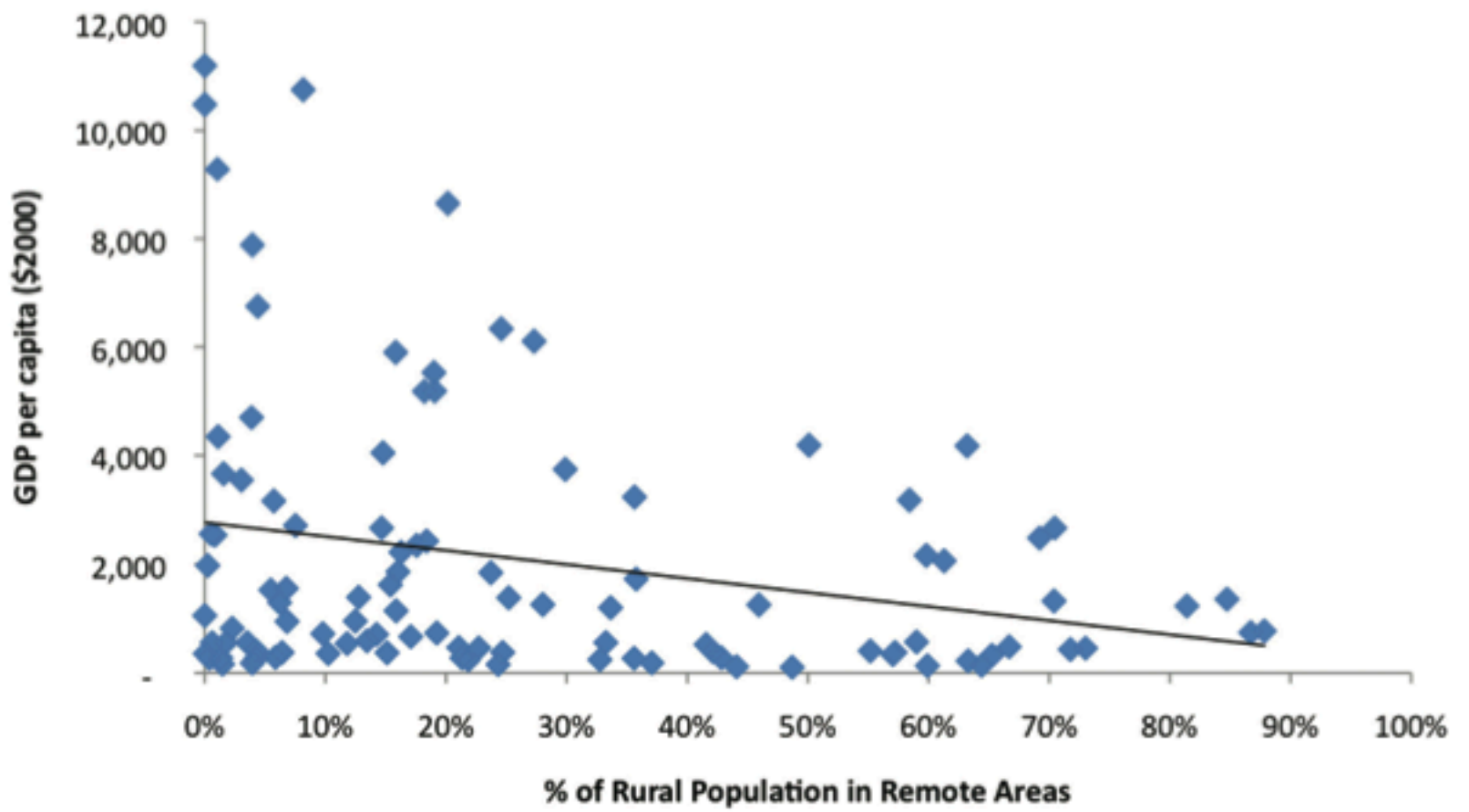


Figure 4.

Figure 4. Remote rural population and GDP (\$) per capita in developing economies: (2,7).

# 1319

Professor Edward B. Barbier

16th June 2013

## Comments