

# agriculture

research findings for development policymakers and practitioners

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## Feeding poor people while the climate changes

**C**limate change is likely to affect agricultural production all over the world. This will affect strategies for poverty reduction. Although the impacts of climate change cannot be predicted exactly, poverty reduction strategies must consider all possible future scenarios.

Research from the Overseas Development Institute, in the UK, considers the possible impacts of climate change on agricultural production. About 40 percent of the world's land area is currently used for agriculture and this is highly dependent on the climate. Agriculture is also central for modelling the impacts of climate change on poverty, because many poor people depend on agriculture for their livelihood.

Climate change is likely to have different impacts around the world. For example, some models predict that 11 percent of the land in southern African will be unsuitable for growing crops by 2080. However, by the same date, the land suitable for growing cereals in North America could have increased by 40 percent. This means that policies concerning the global trade in food will be increasingly important for poverty reduction.

The research shows:

- The land available for agriculture is likely to decrease in tropical regions and increase in temperate regions. Most tropical developing countries will become more reliant on cereal imports from developed countries.
- Changes in crop yields are expected, but the biological and chemical relationships behind these are extremely complex. This makes it very difficult to predict future yields accurately.
- Most models predict that countries with diverse economies and strong agricultural sectors will fare best under different climate change scenarios.

There is a high degree of uncertainty in most predictions about the impact of climate change on agriculture. One problem is scale – how to link global agricultural models to local crop models. Other possible factors include

improvements in agricultural technology, changes to farming systems, and assumptions about population growth and the demand for food.

The many different models used to predict how climate change will affect agriculture each use different assumptions. However, most models predict that climate change will increase the number of people in the world at risk from hunger. Policy responses can either seek to reduce the rate of climate change or manage its consequences. However, both these responses will be based on uncertain models. The researchers suggest:

- Policymakers may need to develop more flexible policies that can cope with increasing uncertainty about possible future scenarios.
- Development assistance over the next few decades should focus on economic diversification and strengthening the agricultural sector in developing countries.

This means measures such as more investment in agricultural research and development.

- The coordination between climate change modellers, agricultural economists and agricultural policymakers must improve. Climate change issues should also be integrated into existing agricultural policies and programmes.

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*Climate Change, Agricultural Policy and Poverty Reduction: How Much Do we Know?*, Natural Resource Perspectives 109, Overseas Development Institute: London, by Rachel Slater et al, 2007 (PDF)  
[www.odi.org.uk/nrp/NRP109.pdf](http://www.odi.org.uk/nrp/NRP109.pdf)

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## Can biofuels tackle poverty and climate change?

**B**iofuels have been hailed as a solution to climate change and a way to reduce poverty. Some argue that by successfully entering the biofuel market, developing countries can create jobs, boost incomes and increase food security. But are biofuels sustainable in environmental, social or economic terms?

Research from the Overseas Development Institute, in the UK, explores the arguments and evidence around claims that biofuels can play a role in poverty reduction.

Biofuels can be produced from specially grown crops, from multi-use plantations, or as a by-product of other agricultural activities. The two main types are bioethanol, made from sugar or starch crops, and biodiesel, made from vegetable oils. Bioethanol has been in production for longer and accounts for most global production, with Brazil and the USA the main producers. The European Union is the main producer of biodiesel. The production of both is increasing steadily, with many more countries becoming involved.

The impacts on poverty of increased biofuel production are hard to predict, because they depend on a range of factors, which vary greatly between countries. Potential impacts include:

- Poverty reduction through employment: some biofuel production systems require significant labour.
- Biofuel production tends to be large scale, so it may not be easy for small, poor farmers to organise themselves to access biofuel supply chains.
- Increasing demand and pressure for biofuels may reduce poor people's access to land.
- Using land to produce biofuels instead of food could affect food security, through decreased food availability, increased prices and less food aid from USA grain surpluses (as they will be used for biofuels).

Increased biofuel production is likely to have differing effects, both internationally and within countries. For example, if oil prices continue to rise, the demand and prices for biofuels are likely to increase as well. This will be good for producers, but less so for consumers: countries such as Brazil will benefit, while importing countries in sub-



A child playing with a doll outside a machine house that is powered by biofuel in Mali's Sikasso region. The machine, which saves the villagers hours of strenuous work, was installed as part of a renewable energy programme sponsored by Christian Aid during an appeal to help poor communities deal with climate change.

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## case study

### Has shifting to agriculture led to a better diet for hunter-gatherers in Indonesia?

The Punan people in Borneo, traditionally nomadic hunter-gatherers, began to cultivate rice over 60 years ago while continuing to collect some food from the forest. The Indonesian government is now giving them incentives to abandon their foraging lifestyle and leave the forest.

What impact has shifting to agriculture had on their diet and health? Research led by the Center for International Forestry Research and the French Research Institute for Development compares the diet and nutrition standards of three Punan communities living in East Kalimantan, Borneo.

The peri-urban Punan Tubu people live in settlements near cities and have become farmers. The remote Punan Tubu people no longer live nomadically, but still move around the region's forests in some seasons. The Punan Benalui people also live in a remote area, but have easy access to other settlements and markets.

Over a four-year period, the researchers surveyed food consumption in each community. At the same time, they made measurements of people's bodies to assess physical fitness. This included measurements of weight, size and body mass index (BMI) – the ratio of height to weight.

The researchers found that the two remote communities have higher standards of nutrition and physical fitness. They eat meat and fish more often than the peri-urban community, partly due to food-sharing traditions, and have more diverse protein sources.

- Important research findings include:**
- The average BMI of the remote Punan Tubu is significantly higher than that of the peri-urban Punan Tubu, meaning they are less overweight.
  - Depending on the season and availability of different foods, up to 18.8 percent of peri-urban women

are overweight, but no more than 2.1 percent of women in remote villages are overweight.

- The proportion of forest resources in people's diet decreases the closer a community lives to urban settlements.
- The Punan Tubu living near the city eat nearly twice as many vegetables as the remote Punan Tubu.
- The remote Punan Tubu consume little oil or fat, only occasionally cooking with wild boar fat. In contrast, the peri-urban Punan Tubu use a lot of palm oil in their cooking.

Punan people's diet and physical fitness has deteriorated as they have moved nearer to cities. This is not due to a shift to agriculture, but because of the rapid changes to their way of life. The researchers conclude that:

- Easier access to cities and markets can be an advantage for Punan people living in forests. In times of shortage, they can still get regular supplies of fruit, vegetables and dairy products.
- Regular access to markets can lead to greater dependency on cash incomes. This can threaten traditional Punan cultural behaviour, which is based upon helping each other and sharing food.
- The rapid switch to farming, which has led to an imbalanced diet, puts the peri-urban Punan Tubu at risk from health problems such as cardiovascular disease and cancer.

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'From Sago to Rice, from Forest to Town: The Consequences of Sedentarization for the Nutritional Ecology of Punan Former Hunter-Gatherers of Borneo', *United Nations University Food and Nutrition Bulletin*, 28 (2) (supplement), pages 294-302, by Edmond Dounias et al, 2007 (PDF)  
[www.cefe.cnrs.fr/coev/pdf/dounias/Dounias%20FNB.pdf](http://www.cefe.cnrs.fr/coev/pdf/dounias/Dounias%20FNB.pdf)

Saharan Africa will see prices rise. Within countries, agricultural producers will see increased incomes, but those who rely on energy imports will be worse off.

With so many uncertainties over global markets and price fluctuations for fuel and staple foods, it is not possible to make general predictions about the sustainability of biofuels. With this in mind, the researchers make the following recommendations:

- Each country must consider its own suitability for biofuels, in terms of available infrastructure for production and transport, human resources, food security and energy regulations (for example the sale of energy to the national grid).
- Data should be collected globally on food stocks and the prices of fuel and staple foods. These could be used for food security early warning systems.
- Climate change mitigation funds should be used to identify and support the cleanest biofuel production techniques.

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In Kenya's Amboseli National Park, a cyclist passes a pool of water originating from the melting ice sheets on Mount Kilimanjaro. The melt water is generally used for the irrigation of farmland in the region. However, experts have predicted that the amount of ice on top of the mountain is in decline, which will result in less water for the whole area.

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## The future of small farms in reducing poverty

**In the past, the development of small farms has played a major role in reducing poverty, particularly during the 'green revolution'. But is this still possible in today's changing world? With more than two thirds of rural people in developing countries still living on small farms, the question is urgent.**

In the immediate future, the majority of the world's poor people will live in rural areas of developing countries, and most will be engaged in farming to some degree. Research from the International Food Policy Research Institute considers whether small farms have a future, and if so, what can be done to help them succeed.

In the past, agricultural development in the form of the 'green revolution' has done much to reduce poverty. The benefits of small-scale farming are clear: farming has a high potential to create jobs and provide returns from the assets poor people have – their labour and their land. Agricultural growth can also reduce food prices. Besides, there are few alternatives to farming in many rural areas.

Agricultural development is becoming increasingly difficult, however. The prices of

most products have fallen on world markets and the impact of new technologies is declining. Also, environmental degradation and HIV/AIDS epidemics create serious problems for small farmers. For these reasons, there are arguments that promoting the rural non-farm economy might be a better option.

Arguments for and against small farms include:

- Efficiency: small farms typically use land intensively by using a lot of labour, and save costs on worker supervision and marketing. However, large farms can increase efficiency because they can obtain agricultural inputs and access markets and credit more easily.
  - Equity and poverty reduction: small farms use local labour and workers spend incomes on locally-produced goods and services. This stimulates the rural non-farm economy and creates jobs.
  - New technologies: small farms are at a disadvantage if these require considerable funds, mechanisation or high levels of education.
  - Marketing chains: increasingly dominant supermarkets have stricter standards for produce and supply timetables, which small farms may struggle to meet.
- Where there is no indication that supporting small farmers will have significant benefits,

governments should instead help small farmers move into other occupations and provide support – 'safety nets' – whilst this move takes place.

Where small farms can provide benefits, policies should:

- get the basics right: ensure a stable economy, provide public goods (such as rural roads, education and health care), ensure good governance, and intervene in food and credit markets where necessary
- encourage farmers to follow market demand and improve their marketing by upgrading transport systems, providing credit and forming farmer associations
- provide inputs and services to small-scale farmers, which are coordinated among the state, the private sector, non-governmental organisations and farmer associations.

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[www.ifpri.org/2020/dp/vp42.pdf](http://www.ifpri.org/2020/dp/vp42.pdf)

## Making agriculture work for poor people

**A**griculture still plays a vital role in reducing poverty in most developing countries. But which factors are important for ensuring that agricultural growth helps people to escape from poverty? And what role does land tenure play in this relationship?

Based on background work for the second Chronic Poverty Report, a paper from the Overseas Development Institute, in the UK, summarises findings from Vietnam, Uganda, India, Nicaragua and Ethiopia.

The paper examines how people escape from poverty (referred to as poverty exits), how this relates to agricultural growth trends and the factors that promote poverty exits. It then describes recent work on the relationship between land tenure and agricultural productivity.

The research shows that agricultural growth does not ensure exits from poverty. Of the countries studied, Nicaragua had the highest agricultural growth rate (5.1 percent), but also the highest levels of

chronic poverty and the lowest exit-to-entry ratio (a figure which describes how many people moved into and out of poverty).

Vietnam and Uganda had the greatest success in reducing chronic poverty and the highest exit-to-entry ratios. Whilst both countries enjoyed good agricultural growth rates (3.8 percent), this was not much higher than the agricultural growth rates in Ethiopia and India, which had less success in lowering poverty levels. So which factors help to translate agricultural growth into less poverty? The researchers identify three factors ('pillars') that make poverty exits possible:

- economic infrastructure, such as successful investments in irrigation and road infrastructure
- education, which can contribute to increased on-farm productivity, diversification into non-farm activities and successful migration to urban or other rural areas
- information on job opportunities, markets and farming techniques – these can be from state extension services, private organisations and non-governmental organisations.

Access to land is also crucial for escaping poverty. However, opinions are divided on what form this should take. Some researchers believe freehold titles (when an individual not only has the rights to use the land, but also owns it) boost security and

productivity. They argue that freehold titles promote the adoption of new technology and the use of loans. Others think that the link between tenure status and agricultural productivity is not clear. They claim that a lack of credit, knowledge and labour affects productivity more than tenure status. Furthermore, some argue that:

- Customary tenure, where communities exercise rights over land rather than individuals, is an important source of protection (especially from eviction) and is often flexible enough to adapt to market conditions.
- Land rental markets can offer poor people fast, affordable access to land and bring under-used land into production.

The researchers conclude that reforming land tenure to increase productivity does not necessarily require freehold land titling. While providing productive land to poor people may be necessary to reduce poverty in some cases, it should be supplemented by state and non-state investments in the three 'pillars'.

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Land rental markets can offer poor people fast, affordable access to land and bring under-used land into production

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