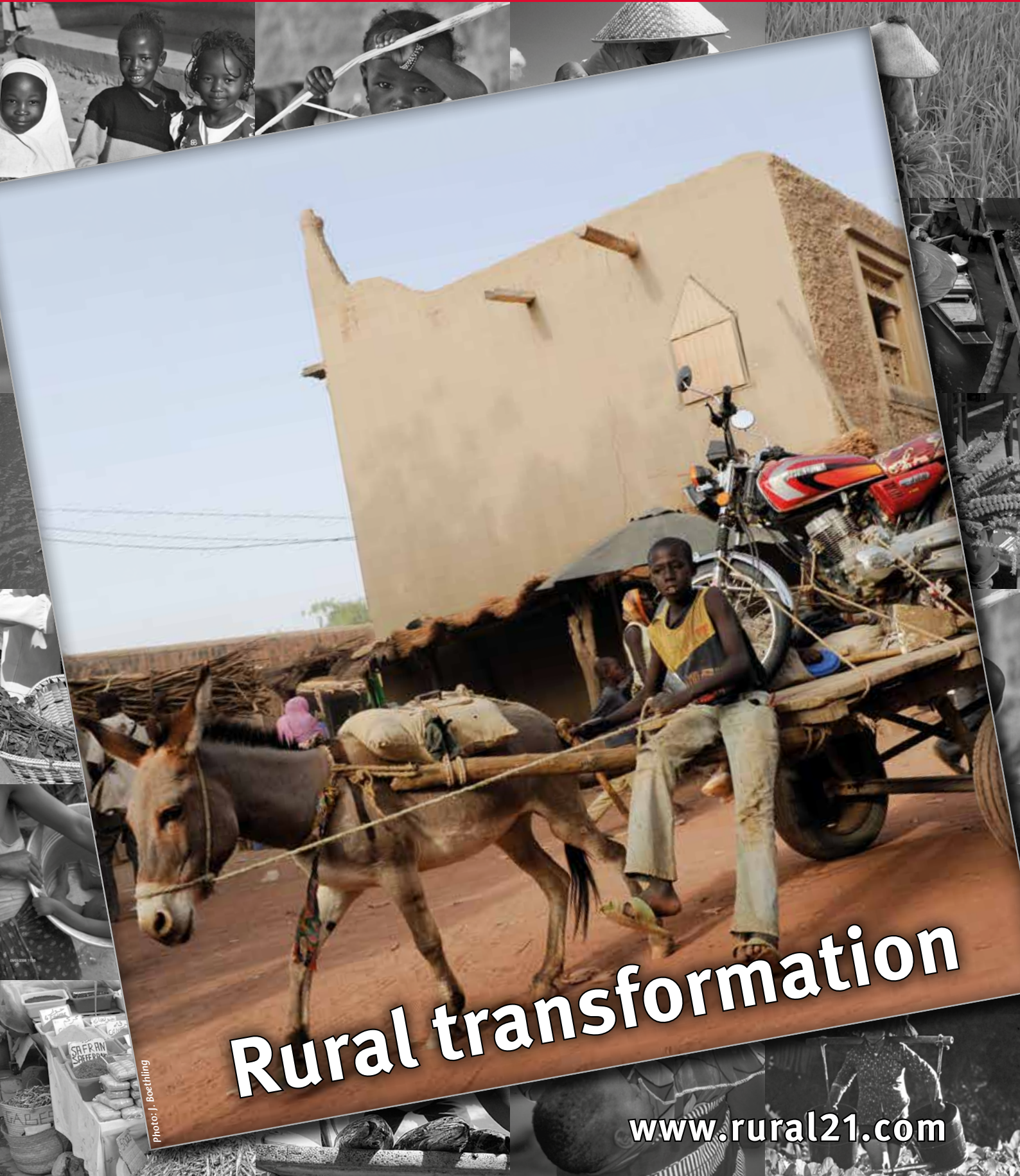


# Rural 21

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Rural transformation

Photo: J. Boethling

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### Dear Reader,

A comprehensive societal change is in progress in many rural regions throughout the world. More and more people are moving to the cities, the role of agriculture is diminishing, while the manufacturing and service sectors are increasingly determining economic development. These developments, which shaped the fortunes of the now highly industrialised countries in the nineteenth century and those of the middle-income countries in the late twentieth century, are now confronting many countries of the developing world with major challenges. How can they make this transformation process not only effective and efficient, but also socially equitable and sustainable?

In his introductory article, Steve Wiggins of the Overseas Development Institute looks at the mutual influence of economic development and structural change and shows the factors that determine change (p. 6). He describes how agriculture is going to develop in the Global South and the consequences this will have for politics, one of the chief tasks of which has to be that of assisting low-income households during transformation. This can be accomplished e.g. by providing support for farmers to enable them to make improvements, through social protection measures and through eliminating the disadvantages that women farmers are confronted with. Such measures also play a crucial role in German development co-operation, as Stefan Schmitz of the Federal Ministry for Economic Cooperation and Development describes. Schmitz above all emphasises the importance of making rural regions fit for the future. Key factors here include the development of an independent and efficient agri-food system and comprehensive spatial planning (p. 10).

If development co-operation measures supporting structural transformation are to meet with success, they have to be carefully tailored to the various groups of people they address. While corresponding classification models are available, they all bear numerous weaknesses. Michael Brüntrup of the German Development Institute suggests taking the "Five Rural Worlds" model of the Organisation for Economic Co-operation and Development (OECD) and extending it by some cross-connecting factors (p. 16).

In order to understand rural transformation, it is worthwhile having a look at how average farm size and farmland distribution have changed over time in the different regions of the world. Sarah Lowder and her colleagues of the UN Food and Agriculture Organization (FAO) show that this is above all also interesting with regard to what might be expected when countries move to higher levels of economic development (p. 13).

The path that was taken by most European countries has largely been adopted by newly industrialised East Asian countries. Can the same development also be expected for sub-Saharan Africa? By and large, the smallholder-dominated agricultural structure has remained unchanged in the region. This is due mostly to restricted employment dynamics in the African manufacturing and service sectors, as Theo Rauch and his co-authors from the Centre for Rural Development at Humboldt University of Berlin, Germany, demonstrate. However, since the food crises in 2008, new dynamics have also emerged in the rural regions in Africa south of the Sahara (p. 20).

Rural transformation always involves migration processes. Often, these are viewed negatively, and a picture of exploding cities and vanishing villages is presented. Supporting rural development is meant to counter this population drain. In reality, however, the phenomenon of demographic mobility is far more complicated than commonly portrayed. Benjamin Schraven of the German Development Institute shows that in sub-Saharan Africa in particular, the contribution that migration makes to urbanisation is usually overestimated (p. 27). Often, rural-rural migration flows are even greater. Moreover, in many cases, migration is a temporary phenomenon, with more and more people living in multi-locational households. Here, Einhard Schmidt-Kallert of Germany's TU Dortmund University distinguishes three types of dominant features: economic reciprocity, caring (for the children, the sick, the elderly) and transfer of knowledge, beliefs and values (p. 24). However, people's real-life experience shows that all three strategies matter for most multi-locational households. Nevertheless, local government officials still give too little consideration to the specific challenges resulting from these livelihood strategies. The same applies to the related prospects for rural local development, as a pilot project run by HELVETAS Swiss Intercooperation demonstrates (p. 30). This organisation is supporting the dialogue between authorities and migrants' associations in northern Benin in order to promote the inclusion of migrants in local development. Furthermore, it is attempting to prepare young migrants better for the migration process and thus lower the risks the process entails.

We wish you inspired reading.

*Silvia Richter*



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Photo: FAO/J. Holmes



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Photo: HELVETAS Benin

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Photo: A. Parvaiz

### Shrinking spaces for human rights defenders

There are reports from many countries that civil society organisations are seeing their activities increasingly curbed by governments. More and more often, activists campaigning for human rights, social justice or environmental protection are faced

with open or indirect threats. This development, which is often referred to as shrinking space or closing space, has long ceased to be a phenomenon observed solely in authoritarian regimes, as was demonstrated at an event organised by the Heinrich Böll Foundation in Berlin/Germany.

“There is nothing new about civil society being faced with repression,” said Böll Foundation Chair Barbara Unmüßig, opening the event in late April 2016. Unmüßig maintained that there were almost daily incidents of civil society actors being put under pressure and intimidated by governments. This was happening via a wide range of channels: via malicious campaigns in media forced into line, but often also via laws. Unmüßig stated that more than 60 laws were in force world-wide governing the activities of NGOs. However, anti-terror laws were also increasingly being used to take action against undesirable actors. Or strict media laws were being adopted to prevent any form of networking. State repression was also practised via secret services, the police or private security firms. These measures above all target human rights activists, but also women’s rights campaigners and environmental activists. Individuals are delegitimised, persecuted, arrested, and in the worst case, murdered, like Honduran environmental activist Berta Cáceres recently. Cáceres had engaged in campaigns against dam projects in indigenous settlement areas.



Protest against the caste system in Bombay  
Photo: M. Nascimento/laif

Actors from the Böll Foundation’s partner countries reported on how this global trend is reflected in day-to-day civil society practice. Henri Tiphagne is a lawyer and is Executive Director of the human rights organisation People’s Watch in the Indian Federal State of Tamil Nadu. Following a journey on which he had accompanied Margaret Sekaggya, former UN Special Rapporteur on the situation of human rights defenders and Executive Director of the Human Rights Centre Uganda, his organisation’s office was inspected, and in July 2012, the organisation lost its registered NGO status. The banking accounts were repeatedly sequestered, 100 staff had to be dismissed, and the equipment had to be sold. The then Indian government justified its action by referring to the law on foreign funding of NGOs.

In addition to restricting the freedom of association and freedom of assembly, closing down the Internet and the social media is a further frequently resorted to means of preventing communication in civil society, as Margaret Sekaggya demonstrated with the example of Uganda. During the Presidential elections in February, the Government simply imposed a social media ban rendering Facebook, Twitter and Whatsapp inaccessible for three days. It maintained that the measure was aimed at eliminating “security risks” and checking the “forwarding of misinformation”. In Kenya, too, the use of social media has made much progress, which the current government is tak-

ing advantage of, according to Gladwell Otieno, Director of the Africa Centre for Open Governance. Initially, teams of young people were used to support the election campaign via the social media. And precisely these young people were now being officially integrated in the government to take

action against civil society using these media, Otieno explained.

Amnesty International’s Secretary General Selmin Çalışkan explained what happens when civil society loses more and more rights and is depoliticised. NGOs are then unable to exercise their important watchdog role. In addition, a key advisory body is no longer available to politics, for the NGO representatives provide valuable expertise. And civil society is an important forum for various frequently marginalised groups that are without a political lobby and without money and therefore unable to make themselves heard. “Ultimately, the oppression of peaceful participation is going to result in political instability and violent conflict,” Çalışkan maintains.

Henri Tiphagne demonstrated that the United Nations still had to do its homework as well. The International Dalit Solidarity Network (IDSN), which advocates for Dalit human rights, has now been applying in vain for eight years for a consultative status at the United Nations Economic and Social Council (ECOSOC). Early in June, the UN Committee on NGOs deferred the application for the 18<sup>th</sup> time because India came up with two more questions to IDSN. Since 2008, India had asked 77 questions, many of them repetitive and previously responded to, Tiphagne explained. Without ECOSOC status, NGOs cannot present statements or organise side events at UN forums.

Silvia Richter

## Record number of internally displaced people in 2015

Conflict, violence and disasters internally displaced 27.8 million people in 2015, subjecting a record number of people to be forcibly displaced within their own country. Some 8.6 million new displacements associated with conflict and violence were recorded in 2015, and as of the end of the year the total, including those who fled in previous years, stood at 40.8 million. This is the highest figure ever recorded, and twice the number of refugees worldwide, according to the 2016 Global Report on Internal Displacement (GRID 2016). The report was published by The Internal Displacement Monitoring Centre (IDMC) in May 2016.

According to the authors, the Middle East and North Africa bore the

brunt of new conflict-related displacement in 2015, with 4.8 million people internally displaced, and Syria, Yemen and Iraq accounting for over half of all new conflict-induced internal displacement worldwide. Of the ten countries with the highest number of people internally displaced by conflict, five – Colombia, Democratic Republic of the Congo, Iraq, South Sudan and Sudan – have been on the list every year since 2003.

People internally displaced by disasters in 2015 numbered 19.2 million in 113 countries. Over the past eight years, a total of 203.4 million disaster-related displacements have been recorded. As in previous years, south and east Asia were worst-affected, with India, China and Nepal accounting for

3.7 million, 3.6 million and 2.6 million displaced people respectively. The vast majority of displacement associated with disasters is triggered by weather-related hazards such as storms and floods, but the earthquakes in Nepal were a stark reminder of the potential of geophysical hazards.

Additionally, preliminary estimates of internal displacement by other causes suggest at least a million people were forcibly displaced by criminal violence in Mexico and Central America, and tens of millions more by development projects such as dams, urban renewal projects and mega sporting events. *(ile)*

For more information, see:

➤ [www.internal-displacement.org](http://www.internal-displacement.org)

## World Bank warns of water threat

The combined impact of growing populations, rising incomes and expanding cities will lead to an exponential increase in water demand, claims the report "High and Dry: Climate Change, Water and the Economy", released by the World Bank early in May. Supply, on the other hand, is set to become more erratic and uncertain given the effects of climate change. Conservative estimates put the number of people suffering from water scarcity at 1.6 billion, although different definitions of scarcity imply up to four billion. The World Bank is reckoning with an increase in global water demand by 100 per cent over the next 20 years.

The report warns that without swift action, water is even going to become scarce where it is currently abundant, such as in Central Africa and East Asia. In regions like the Middle East or the Sahel in Africa, where water is already in short supply, scarcity will greatly worsen. In these areas, growth rates could decline by up to six per cent of GDP by 2050 under water-related pressure on agriculture, health and incomes. Water availability in cities could

drop by up to two thirds by 2050 compared to 2015 levels owing to reduced freshwater availability as well as to competition from the energy and agricultural sectors. In coastal regions, higher salinity levels are causing concern, with rising seawater contaminating aquifers.



According to the report, the food sector's water demand alone will increase by 40–50 per cent, with municipal and industrial demand rising by 50–70 per cent in the same period. And the energy sector is expected to consume 85 per cent more water. All this is going to have an additional severe impact on the environment. Furthermore, the report notes that changes in water availability and variability

can cause migration as well as social conflict. "Food price spikes caused by droughts and floods have generated waves of migration and statistical spikes in violence within countries," explains the report's author, World Bank Lead Economist Richard Damania. "In a globalised and connected world, such problems are impossible to quarantine. And where large inequalities prevail, people move from zones of poverty to regions of prosperity, which can lead to increased social tensions."

However, the report also maintains that the negative impacts of climate change could be neutralised with better policy decisions, and that some regions could even improve their growth rates by up to six per cent with better water resource management. Damania refers to water as "the common currency which links nearly every Sustainable Development Goal". He maintains that it will be "a critical determinant of success" in the SDG process and warns that neither positive growth in jobs and industries nor food security and health can be sustained without proper water management. *Mike Gardner*



Photo: Bilderbox.com



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Photo: FAO/G. Napolitano



Photo: C. Wallace/The World Bank

# Structural transformation and the future of agriculture

Interest in structural transformation, as integral to economic growth, has (once again) come under the spotlight, owing to resumed growth across much of sub-Saharan Africa from the mid-1990s onwards. Growth has been welcome; but the concern is that economies have grown without transformation as agriculture and mining have flourished with too little development of either manufacturing or high-value services.

Economic development, ever since the industrial revolution that began in the late eighteenth century, has almost always been accompanied by structural change. Agriculture, although growing absolutely, declines in relative importance within the economy in its share of both gross domestic product and employment. Manufacturing and services see their shares of GDP and employment increase. At any given moment, comparing countries by their GDP per capita shows the close correspondence of this measure to both the share of output from agriculture and the share of employment in agriculture (see Figure).

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There's a simple reason for this: as economies grow, incomes rise, but people spend proportionately more of their extra wages on manufactured goods and services, and proportionately less on food (Engel's Law). Hence with economic growth, demand for the former grows faster than demand for farm output.

Changing importance of sectors is matched by changed location of economic activity. A growing economy will tend to urbanise, with increasing shares of economic output and jobs taking place in towns and cities: correspondingly rural activity, although growing, declines relatively. There's a simple reason for this as well: most activities that are not tied to land or some other natural resource, as is agriculture, are best carried out in urban areas. That is because agglomeration brings economies. Not only does lo-

cating in cities tend to reduce transport costs for individual firms, but also, firms benefit collectively from economies in provision of power, water and other services, from being close to a large and diverse pool of labour, from technical advances that develop in one industry but have applications in others, from face-to-face communications with other firms in the supply chain, and from less variation in demand and supplies when located in large urban centres. Drawbacks of urbanisation in congestion, pollution and high rents for prime urban locations are, for most manufacturing and services, outweighed by the benefits of urban location.

These economic and geographical changes are accompanied by demographic changes. Most obviously, urban population grows, in part fuelled by migration out of rural areas. Less

obvious is that countries undergoing economic and geographical transformations are usually experiencing a demographic transition from high to low rates of birth and death, during which population grows rapidly. A slowing of population growth as the demographic transition proceeds accompanies structural transformation. Dependency ratios fall so that the share of the population in working age rises: a demographic dividend that applies until the population begins to age.

All of today's high-income and middle-income countries have seen these changes, whether they be the early industrialisers of the eighteenth century, or the more recent emerging economies where industrialisation has taken place in the last fifty or so years.

### ■ What drives these changes?

Structural change is both a result of economic growth and a cause of it. Labour productivity in manufacturing industry is commonly three or more times larger than that in agriculture in developing countries so that when labour moves from farm to factory, output rises rapidly. This is why it has long been thought that developing countries could, by industrialising, grow much faster than already industrialised countries. East Asia in the second half of twentieth century has shown, with a vengeance, just how powerful this motor of development can be. Late industrialising countries

have grown far faster than the early industrialisers did. But what if the attractions of manufacturing lead to a mass exit of labour from agriculture and loss of production on farms? This has usually not happened: labour productivity on farms has risen sufficiently to ensure that agricultural growth has at least matched population growth in industrialising countries. What's more, in many cases, with China as the prime example, a burst of agricultural development took place before the take-off of manufacturing, thereby making it possible to shift labour from farm to factory, while agricultural output increased rapidly enough to hold down food prices – to the great benefit of urban workers.

### ■ What does this imply for agriculture?

Agriculture plays a remarkably important role in these transformations: remarkable because agriculture is the sector in relative decline. The paradox is that the faster agricultural productivity rises, the faster the transformation can take place. This is because with rising productivity, above all of labour, agriculture can still grow – thereby producing food and raw materials for the domestic market, and often earning vital export revenue – while releasing labour and capital for the urban economy of manufacturing and services. This may seem a tall order, yet across much of the world labour productivity in agriculture has risen faster than that in manufactur-

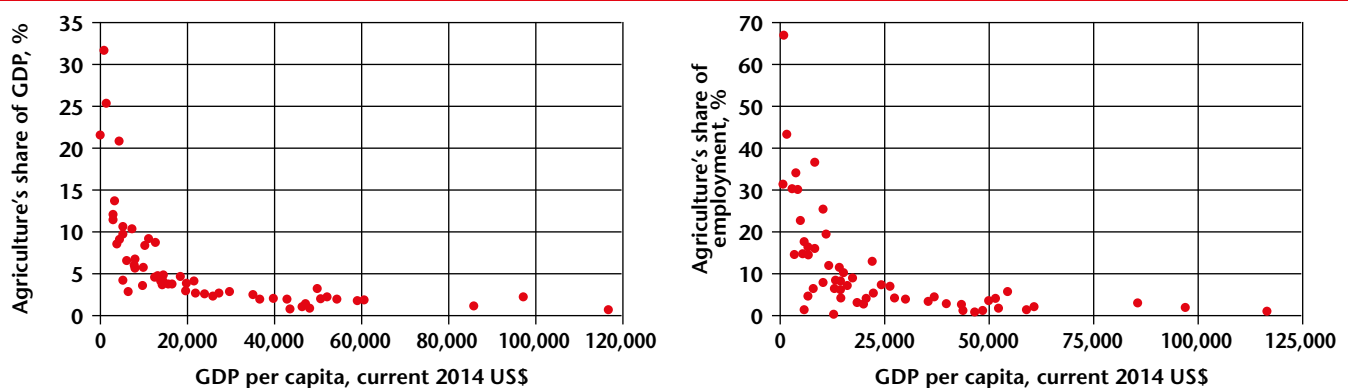
ing in recent decades (see Figure on page 8).

In part, productivity has risen because agriculture in many developing countries had such low levels of productivity, so large increases were potentially possible; but that potential has been realised by the application of improved technology, most notably the improved seed of the Green Revolution, accompanied by public investments in rural roads, power, rural education, health, clean water and the research that has helped produce technical improvements.

Hence the single most important issue for farming remains that of raising productivity, above all labour productivity, as ever it has been. With rapid economic growth of manufacturing and services and urbanisation, however, the circumstances differ to those that typically apply in low income countries in the early stages of development. The difference lies above all in rural labour. Labour is often abundant in rural areas of low-income countries in the early stages of development, but that becomes ever less so, owing to changes in both demand and supply of labour. Demand increases from more intensified forms of farming, from a growing rural non-farm economy – partly stimulated by agricultural growth, and from the jobs on offer in the urban economy.

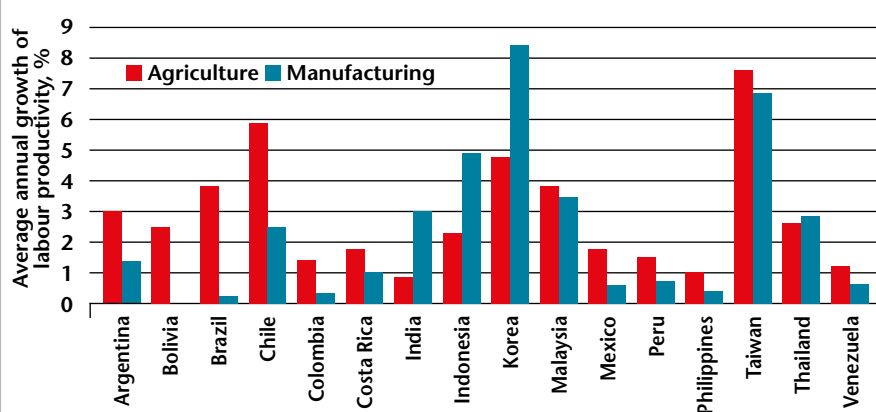
On the supply side, while the demographic transition is usually delayed in rural areas compared to urban areas, falling fertility, seen almost universal-

**Income levels and agriculture's economic importance, 55 countries, 2014**



Source: Compiled from World Development Indicators, World Bank. Data accessed May 2016

## Growth of labour productivity in agriculture and manufacturing, selected developing countries, 1973 to 2005



Source: Compiled from Szirmai (2012)

ly in the last fifty years in rural areas, means that sooner or later the natural growth of rural populations slows and eventually reverses. In thirteen out of sixteen developing countries, census data show that infant cohorts of 0 to 5 years of age were smaller in the late 2000s and early 2010s than before. Increases in population thus arise from large youthful cohorts, the product of past high fertility, making their way through the population structure. Hence, the combination of slowing natural growth and net out-migration from rural areas will soon lead to falling rural populations; as already in evidence in parts of Latin America, East and Southeast Asia.

The future of agriculture in the developing world is that of farming with less labour. Given that this has been the reality of agriculture in high-income countries for a century or more, technical options to do this are well known. Increasingly farm operations that can readily be mechanised, at modest cost, will be. This does not mean large tractors and combines: more likely it means two-wheel cultivators at first. Neither does this mean sudden conversion to the almost-fully-mechanised operations seen, for example, in the US Midwest. Plenty of operations will continue to require manual work: harvesting of most fruit and vegetables, picking coffee, for example.

Two economic issues thus arise for policy-makers. One concerns **scale of**

**farming and consolidation.** Mechanisation undercuts some of the advantages of farming at very small scale in supervising labour. Operated farm sizes are thus likely to increase. Since this point is open to misinterpretation, a couple of clarifications are in order. One is that the increase in scale will usually be from very small to small scale: not large scale and probably not even medium. Operated holdings should rise from, in many parts of Asia, less than two hectares to five to ten hectares. Why not larger? Family farms will still have advantages in carrying out most operations with household labour, or with close supervision of hired hands and contracted machinery. This is the pattern seen across most of the high-income countries: industrialised farming of pigs, poultry, horticulture aside, almost all farming is carried out by family-managed holdings. With part-mechanisation, for many family-managed farms, ten hectares will be the limit of what can be comfortably operated. In time, sizes may well increase, but such change is likely to take place over the medium rather than the short term.

The other clarification is that consolidation will probably be in operations, not ownership. The operation of land can be transferred to households that specialise in farming through renting and sharecropping from households that have their earnings from non-farm jobs, without the latter losing their land. In some cases,

informal arrangements set within customary tenure will allow this: village surveys often show lively local markets in rights to operate land. In other cases, tenure policy needs to provide legal recognition of both the rights of potentially vulnerable land users and of the exchanges agreed.

The second policy matter concerns the **rural non-farm economy**. This will increasingly provide rural jobs. Policy needs to stimulate such activity. Fortunately, most of the policy needed – an enabling rural investment climate, provision of rural public goods – overlaps with that of agricultural development. In particular, rural people need to have the skills and capacity to take up non-farm jobs. That means provision of schooling, health care and clean water so that young adults can take up jobs off the land, perhaps with additional training for which schooling is a precondition.

### ■ What are the social implications?

Economic inequality is high in most rural areas of the developing world, as are often social differences. Not all rural households will find it easy to adapt to transformations. Those households with few assets, on low incomes, already vulnerable to shocks, could find themselves threatened by loss of jobs they can do, or are used to doing, or to loss of land. This is not to suggest that the future is gloomy for those on low incomes: labour shortage will drive up unskilled wages in rural areas, as it already has across much of East and Southeast Asia, to the benefit of such households.

Three sets of policies can assist low-income households during transformation. One, most clearly **social protection** can ensure that whatever changes are taking place, individuals and households do not become worse off. Considerable experience has been gained over the last twenty or so years in cash transfers, employment schemes and pensions that protect living standards and ensure that children from such backgrounds get a



decent start in life. Two, many farm households that may get the bulk of their incomes from off the farm, and increasingly so, will **continue to farm** at least some of their land; often on a (very) small scale, part-time. For those on low incomes with little access to capital, technology that raises productivity in such circumstances is valuable. Often such technology exists, even if it may not appeal to those agronomists who want to see state-of-the-art innovations – but which demand too much capital, labour or know-how for marginalised farmers. Ensuring that such farmers have support to make improvements, however limited, is an important challenge for ministries of agriculture. Three, **women as farmers** are often disadvantaged in access to land, water, inputs, technical knowledge and markets. Remedying these deficits is especially important during transformations.

To these three issues may be added an overall social challenge: migration. Almost all rural areas will see **out-**

**migration to urban areas.** It runs against history to imagine that this will not be so; it runs against evidence to imagine that urbanisation will not, on balance, enhance welfare. Many developing world governments have schizophrenic policy for migration. On the one hand, they try to deter movement. On the other, they invest more in services in cities, making them more attractive places to live in than rural areas. The former policies have done little to stem migration, but rather have raised costs and dangers to migrants.

Better policy would seek to facilitate rural household choices. Providing information on opportunities and costs at destinations could help; as could reducing the cost of sending remittances; protecting the rights of migrants as workers, and their rights to public services such as education and health care. Developing rural financial services could avert migration undertaken largely to accumulate capital to invest back in the village.

### ■ Summing up ...

Economic transformation that sees agriculture become less important relative to manufacturing and services, with urbanisation, is a longstanding and universal feature of development. The policy challenge is to facilitate such transformation, to make it not only effective and efficient, but also socially equitable. The coming rural economy will see less labour used in agriculture: agricultural output will only grow if labour productivity rises. It will see incremental mechanisation, some consolidation of operated holdings and rising rural wages.

Socially there are dangers for those on low-incomes and vulnerable to shocks, with social protection as a key response. Rural areas will also continue to see net out-migration: a process that needs facilitation rather than obstruction.

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*Even though the cities are becoming more and more important, much of humankind's future will continue to be determined in the rural areas.*

*Photo: FAO/O. Argenti*

## Making rural transformation sustainable

A transition is under way in many of the world's rural regions. The form that it takes and the speed with which it progresses will depend in part on the attention that it receives from policy-makers. Our author explains why we need this rural transformation – and how development cooperation should support it.

We live in an urbanising world. This is a major challenge – one in which we should be investing all our energies. Nevertheless, the growing significance of cities and the fading rural-urban divide should not be a reason or a pretext to neglect our rural areas. They require just as much ongoing attention from policy-makers as our urban centres, for a multitude of reasons.

**Firstly**, the high rate of urbanisation worldwide and the dramatic expansion of some megacities – the subject of much debate – should not obscure the fact that many countries in Asia and sub-Saharan Africa remain mostly rural. According to the World Bank, sub-Saharan Africa currently

has an urban population of just 37 per cent, while the figure for South Asia is even lower, at 33 per cent. The turning point towards a mainly urban population is not projected to occur until mid-century. Indeed, the total rural population in Africa is expected to increase by 300 million to 2050 compared with 2010, bringing it close to one billion.

**Secondly**, poverty and hunger mainly have a rural face. Around three-quarters of all the world's poor and hungry people live in rural areas. To eradicate poverty and hunger, what is needed, first and foremost, are rural development strategies.

**Thirdly**, the future of humankind will be decided, at least in part, in rural areas. This applies even if at some point in the future, they are home to fewer people than the cities and rural poverty has been eradicated. The majority of our natural resources – not only those needed in agriculture – are located in rural areas, where they

will have to be managed sustainably. These regions will have to produce food for a growing world population, but they will also face other major challenges such as conserving fresh-water resources and achieving energy supply security. Wind, hydro and solar power generation will also have to take place in rural areas once the fossil fuel era ends. The entire bioeconomy – the great hope for the future, whose key dimensions are the conservation of carbon sinks and sustainable use of forests and biodiversity – will also be based in rural regions. Sustainable Development Goal 15 states: "Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss." So what we need, now and in future, are rural regions with sustainable economic and resource cycles.

In short, we must make our rural regions fit for the future. We must ensure that our rural regions offer

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people stable livelihoods and serve as the focal point for sustainable development. In order to achieve these goals with the appropriate measures, we need to look at exactly which challenges are faced by rural regions nowadays and which potential they offer. In many parts of the world, rural areas today are not static and unchanging, but highly dynamic. This dynamism is often summed up as “rural transformation”.

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### ■ Understanding rural transformation

Rural transformation is an extremely vague concept. Broadly speaking, it describes a profound and complex process of change with not only economic but also social and cultural dimensions. The New Partnership for Africa’s Development (NEPAD) characterises this process as follows: “Rural transformation may be defined as a process of comprehensive societal change whereby rural societies diversify their economies and reduce their reliance on agriculture; become dependent on distant places to trade and to acquire goods, services and ideas; move from dispersed villages to towns and small and medium cities; and become culturally more similar to large urban agglomerations.”

Often, however, “rural transformation” is not just a value-free description of an ongoing process. For many people, it is either a threat to be averted, or a major and perhaps not entirely achievable aspiration. There are many indications that due to the powerful economic and societal forces at play, rural transformation is ultimately unavoidable. So we should utilise it as an opportunity and do our utmost to move it in the right direction, both socially and ecologically – and that means guiding it towards sustainability.

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### ■ Taking account of regional specifics

Rural development is indivisibly linked to the future of farming. One of the forces driving rural transforma-

tion is the increase in the productivity of human labour, especially in agriculture, resulting from the deployment of knowledge and capital (mainly agricultural inputs and technology). If total productivity outstrips market demand, workers are laid off, which in turn often leads to changes in the number and size of farms. These are signs of rural transformation and are often associated with a greater degree of agricultural specialisation, i.e. a focus on specific crops, and shifting levels of self-sufficiency.

There is close linkage between rural transformation and urban economic development. If there is dynamic development in cities, with their commerce, industry and service sectors, this creates positive incentives (pull factors) for rural-urban labour migration. The situation becomes more problematical if a rural labour surplus (a push factor for migration) is not matched by demand for labour in the formal economy. In these circumstances, the workers concerned often have no choice but to move into poverty-type casual work or employment in the informal economy. Creating jobs in the rural non-farm economy, especially for women and young people, should therefore be a priority.

In this respect, there are noticeable differences between Asia and Africa and, to a lesser extent, between various African countries in the manner in which the transformation is unfolding. In Asia, growth in agriculture has been accompanied by strong industrial development, whereas in Africa, it is linked to vigorous expansion of the informal sector. In the global competition with Asia, Africa is unlikely, now or in future, to generate new employment in industry on a large scale to absorb the farm workers who have lost their jobs.

So it is even more important that African policy-makers identify alternatives to industrial jobs within the global economy by creating an enabling environment for rural employment which utilises the regions’ endogenous potential and is embedded in the local economy. Here, a key

priority is to support the development of an independent and efficient agri-food system, focusing on the entire agricultural production chain, both upstream and downstream, and encouraging the formation of complex value chains and wealth generation networks. Growing demand from the expanding cities for a variety of high-quality farm products should be seen as a major opportunity here.

This efficient and independent agri-food system should be centred around farm enterprises of various sizes and types, above all small farm households which have secure land tenure and belong to farmer associations, giving them good market access. They need easy access to seeds, fertilisers, credit and insurance and should be able to utilise modern inputs and techniques to produce a diverse and nutritive harvest of crops and livestock, significantly in excess of their subsistence needs.

Once an efficient agri-food system has been established, the incomes that it generates will drive up demand for housing materials, craft, trade and repair services, commercial opportunities, transport, clothing and, finally, education and health, thus creating jobs in these sectors and initiating endogenous, sustainable development in rural regions.

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### ■ Upstream inputs from the public sector

Ultimately, the transformation will be driven by the investment decisions taken by millions of private-sector stakeholders: small farmers, input providers, food processing firms, distributors, financial service companies, craft and trade enterprises, and many others. However, the pace and composition of this private investment will depend on the enabling environment created by governments. Thomas Jayne and Lulama Traub state: “Research evidence from developing countries has coalesced around public actions that typically include the following: investments in infrastructure such as electrification, increased grid

capacity, and roads; rehabilitation of decaying rail and port facilities; agricultural R&D appropriate for small farms; effective farmer education and bidirectional extension programs; irrigation; and policies that promote new entry and competition in agricultural value chains.”

In addition to these public services, which are of direct importance for agricultural development, other social services and physical infrastructure – primarily schools, health centres, and water and sanitation – are essential in order to enhance the appeal of rural regions. In essence, these are the upstream inputs that must be provided by the public sector, although with effective government regulation, it may in some cases be appropriate for the private sector to supply these services. The state also has a role to play in conserving natural resources and ensuring that they are managed sustainably. Comprehensive land-use planning aims to safeguard the effective management of water resources and grazing land, maintain soil fertility and prevent soil erosion, and preserve biodiversity.

Public policy to support rural development and the sustainable management of the transformation should therefore move beyond purely sectoral strategies and seek to apply a territorial approach. An important aspect is regional structural policy which creates coherence between all

the various dimensions of economic development in rural areas. Consistent support for the diffusion of innovations in the agri-food system is one example. This can take place through integrated measures to build the requisite knowledge system capacities (agricultural research, technical vocational education and training, extension services) and improve access to capital, inputs and markets, flanked by the development of physical infrastructure (rural roads, power). Consistent efforts to improve access to modern information and communication technologies (ICT) should also form part of this regional structural policy.

Comprehensive spatial planning for rural areas is the second key aspect. Here, the aim is to achieve a balance between diverse user interests in rural areas and utilise existing potential to the maximum extent. Priority areas should be designated, e.g. for settlements, farming and the conservation of biodiversity, thus establishing an essential framework for sustainable development.

### ■ Support from development cooperation

Investment in the provision of rural public goods and services has a key role to play in stimulating rural development and promoting the socially equitable and sustainable transformation of rural areas.

Development cooperation can support this process in a multitude of ways. It can provide extension services and funding, e.g. for infrastructural development. Through its One World – No Hunger initiative, German development cooperation funds a wide range of measures to promote sustainable rural transformation in various countries, mainly in Africa. The Green Innovation Centres now being established stand out in this context: their role is to promote the diffusion of innovations that boost productivity and resource efficiency in the agri-food system. Other priority areas of action are soil conservation/rehabilitation and land tenure. Furthermore, the international community has considerable experience with supporting the value chain approach, promoting processing and marketing in rural regions, and building decentralised administrations with opportunities for local public participation. This also offers great potential for rural development.

These are just some of the ways in which rural transformation can be managed and supported. However, in order to promote rural regions more generally, these interventions, which are often sectoral in focus, must form part of an integrated rural development strategy. This is vital in order to ensure complementarity. The measures adopted must be informed by local communities’ thinking about land use and should support structural capacity building, e.g. by contributing to regional structural policy or to the implementation of spatial plans. Wherever a cross-sectoral policy framework exists, it is worth supporting at the local level. Where this type of framework is absent, it should be developed in conjunction with partners.

The Sustainable Development Goals define the key elements of the cross-sectoral territorial approaches that are needed in order to do justice to rural areas, recognising their importance for development and serving the interests of the people who live there.

For a list of references, see:  
 ➤ [www.rural21.com](http://www.rural21.com)



*The exodus of young people to the cities is crucially influenced by whether they have job opportunities in rural regions, be it in agriculture or in the non-farm economy.*

Photo: FAO/A. Proto



35 per cent of all farms are in China.  
Photo: FAO/F. Botts

# The evolution of global farmland distribution

Land plays a crucial role in rural transformation. However, information allowing a comparison of number, size and distribution of farms and farmland throughout the world and, above all, showing how these factors are changing over time is difficult to come by. FAO researchers evaluated agricultural census reports from 167 countries and have arrived at some interesting results.

In order to better understand rural transformation, it is important to know how average farm size and farmland distribution have changed over time in each region of the world. This is above all also interesting with regard to what might be expected when countries move to higher levels of economic development. First of all, however, we have to define more precisely what we mean by “farm”. In our work, we used the agricultural holding as defined in the World Census

of Agriculture (WCA) guidelines, according to which an agricultural holding comprises the “units of crop and livestock production which are under single management (regardless of ownership) by either an individual or group of individuals, a household or several households, clan or tribe, corporation, cooperative or government entity” (FAO, 2005). We defined the farmer as the agricultural holder, that is, the person who makes strategic decisions regarding use of the farm resources and who bears all risks associated with the farm, but who may not necessarily assume day-to-day work management responsibilities.

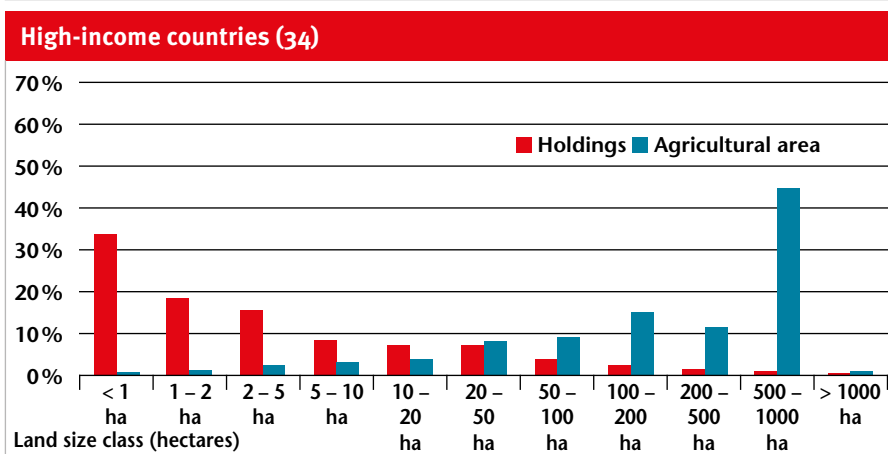
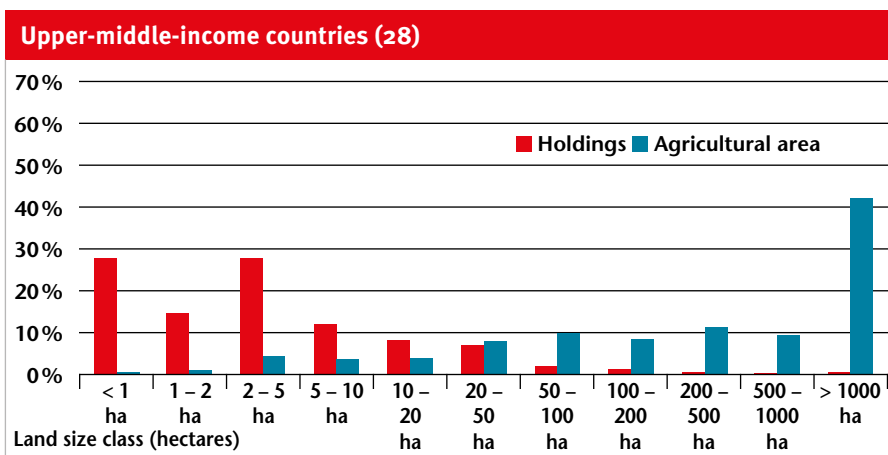
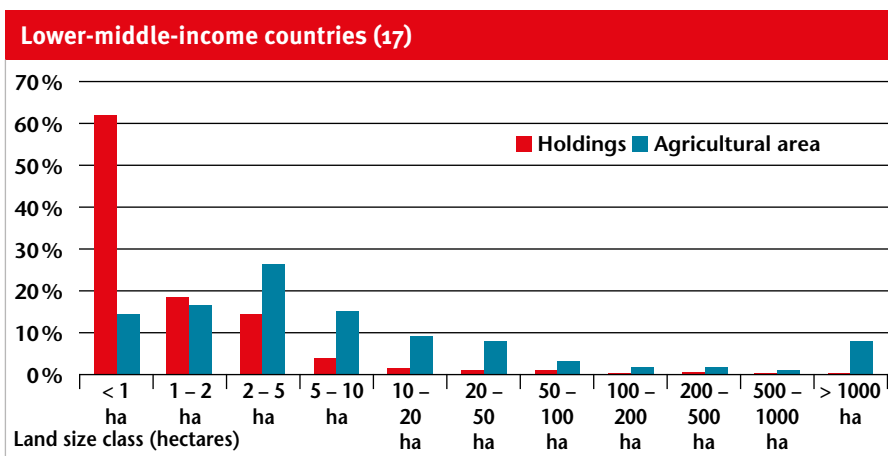
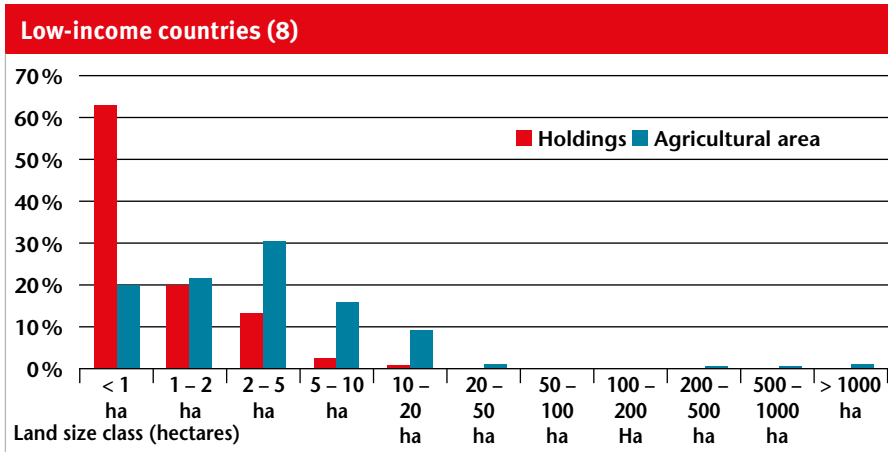
The surveys in 167 countries have revealed that there are more than 570 million farms in the world. Only 4 per cent of them are located in high-income countries, while the vast majority (74 per cent) are in Asia (see Figure on page 15). China alone represents 35 per cent and India 24 per cent of

the world’s farms. Nine per cent are found in sub-Saharan Africa and 7 per cent in Europe and Central Asia. Farms in Latin America and the Caribbean represent 4 per cent of farm holdings world-wide. Only 3 per cent are located in the Middle East and North Africa.

Many countries have only conducted a single agricultural census or their agricultural census reports lack information on farmland distribution, so we cannot consider the change in farmland distribution over time at global level. We were however able to analyse data from a sample of 106 countries (which represents a large share of the world’s agricultural Gross Domestic Product [GDP] and population) and for which data on farm size and farmland distribution are available to provide estimates for the world and by region and income levels. This allows inferences to be made regarding what might be expected as incomes

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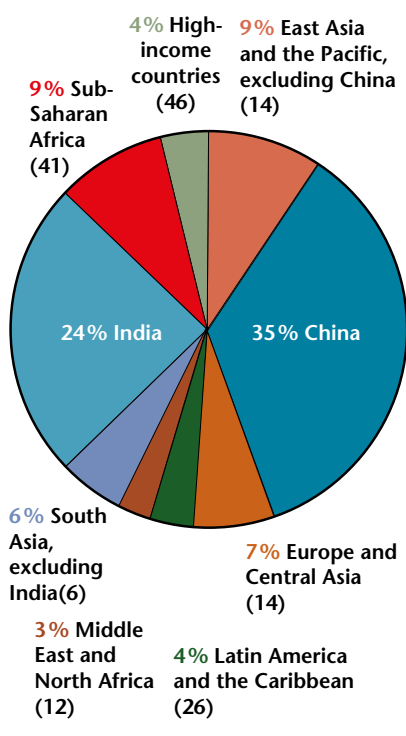
Notes: Country groupings are the same as those used by the World Bank (2012). Number of countries shown in parentheses.

grow and countries move to higher levels of economic development.

Globally, about 84 per cent of farms are smaller than two hectares, and these farms operate around twelve per cent of farmland (see Figure on page 15, top). In other words, only 16 per cent of the world's farms are larger than two hectares, but they represent 88 per cent of the world's farmland. Considering farmland distribution by income group, we see that smaller farms operate a far greater share of farmland in **lower-income countries** and regions than in higher-income countries and regions (note that this includes 87 countries for which we have tabulations of the number of farms as well as farmland distribution by farm size; as a result, China is among those countries excluded from the Figure on the left). In the **low- and lower-middle income countries** (which are located primarily in East Asia and the Pacific, South Asia and sub-Saharan Africa), about 80 per cent of farms are smaller than two hectares, similar to the global average, but they operate a much larger share of land, about 40 per cent. In **upper-middle-income countries** which are primarily located in Latin America and the Caribbean and the Middle East and North Africa, and in **high-income countries**, only about 40 to 50 per cent of farms are smaller than two hectares in size, and they operate less than five per cent of farmland. This pattern suggests that the share of farmland managed by small farms decreases as average income levels rise. That is, it suggests that farms consolidate as economies develop.

As noted above, many countries only have one agricultural census, or their agricultural census reports lack information on farmland distribution, but considering average farm sizes for countries for which estimates of average farm size are available for at least two of the census periods from 1960 to 2000, we see clear patterns according to income group (see Table). In most low- and lower-middle-income countries, average farm sizes have decreased. A slightly larger share of upper-middle-income countries have

### Share of farms worldwide, by region or country group\*



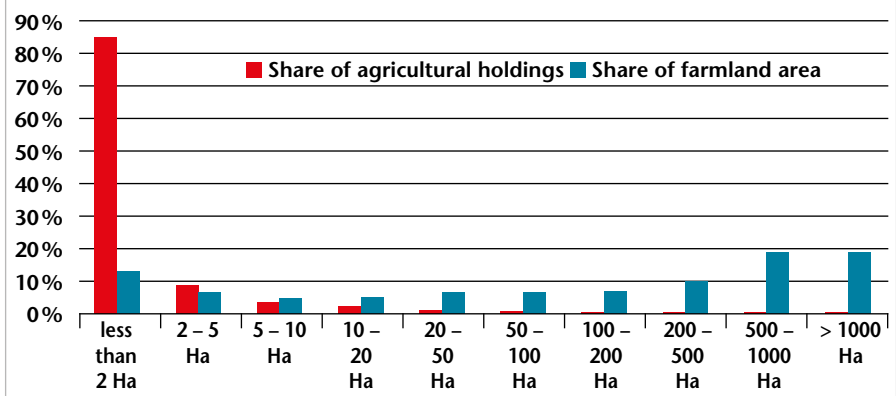
\* 570 million farms in 161 countries; number of countries shown in parenthesis.  
Sources: Authors' compilation using FAO (2013) and FAO (2001); see also Lowder, Scoet and Raney (2016), Web Appendix Table 1

exhibited increasing average farm size, and the majority of high-income countries have seen a clear increase. Patterns according to regional groupings of low- and middle-income countries show that an increase in average farm size has occurred in some (mostly upper-middle-income) countries in Latin America and the Caribbean, but in few countries in other regions.

In summary, the following key findings can be deduced from this data:

- There are more than 570 million farms in the world.
- 84 per cent of the world's farms are smaller than two hectares and they operate only 12 per cent of world farmland.
- In countries at lower levels of income, smaller farms operate a far greater share of farmland than in the higher-income countries.
- Average farm size has decreased in most low and lower-middle income countries and increased in some upper-middle income and in most high-income countries.

### Distribution of farms and farmland area by land size classes, 106 country sample



Sources: Authors' compilation using FAO (2013) and FAO (2001); see also Lowder, Scoet and Raney (2016), Web Appendix Table 3

### Number of countries exhibiting a decrease or increase in the average size of agricultural holdings, 1960 – 2000

	Decrease	Increase	Neither clear increase nor decrease
High-income countries	7	26	4
Low- and middle-income countries, by income group			
Low-income countries	12	2	1
Lower-middle-income countries	24	2	0
Upper-middle-income countries	19	5	1
Low- and middle-income countries, by regional grouping			
East Asia and the Pacific	8	2	0
Latin America and the Caribbean	18	7	2
Middle East and North Africa	10	0	0
South Asia	5	0	0
Sub-Saharan Africa	15	3	1

Sources: Authors' compilation using FAO (2013); see also Lowder, Scoet and Raney (2016), Web Appendix Table 2

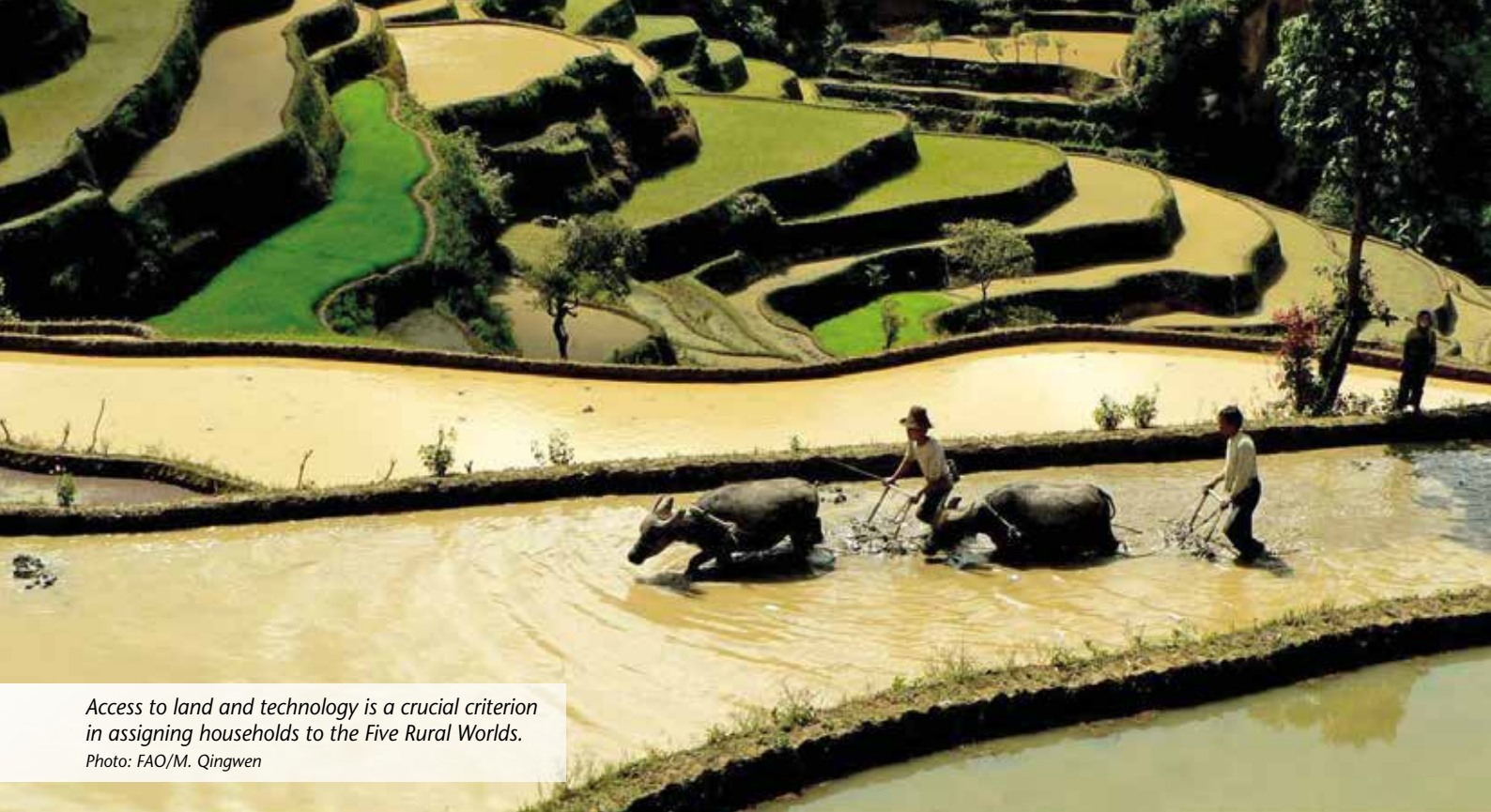
- The trends in average farm size as well as the distribution of farmland by farm size for countries at varying levels of development are both suggestive of farm consolidation as economies grow and of fragmentation in low-income slow-growth countries.

Furthermore, the surveys indicate that there is room to improve data. Continued efforts to enhance the collection of up-to date, comprehensive and more standardised agricultural census data are essential to having a more representative picture of the agricultural sector world-wide. It would seem appropriate to redouble efforts to make farm-level agricultural census data more easily accessible to re-

searchers as well as to encourage all countries to conduct comprehensive agricultural censuses which either sample or enumerate all types of farms throughout a country. For countries that limit agricultural censuses to a survey of household farms only, the international community might consider conducting supplementary surveys to consider corporate and government owned enterprises as well as household farms.

*The views expressed in this publication are those of the authors and do not necessarily reflect the views or policies of FAO.*

For the survey background and references, see: [www.rural21.com](http://www.rural21.com)



*Access to land and technology is a crucial criterion in assigning households to the Five Rural Worlds.  
Photo: FAO/M. Qingwen*

# Revamping the “Rural Worlds” model

The causes, processes and policy design of structural transformation in rural areas are multifarious and complex. Discussing them with a view to informing development co-operation on appropriate action requires conceptual models that are neither too complicated nor too simplistic. Here, the “Rural Worlds” approach of the Organisation for Economic Co-operation and Development (OECD) could be a starting point.

Development co-operation measures supporting structural transformation have to give special attention to growth processes, poor and marginalised groups of the population, maintaining environmental standards and effective planning and negotiating processes. Therefore, differentiated support programmes are needed for the various branches and groups of people addressed. However, these have to remain connected to the rural dynamics as a whole and the links between the elements. This calls for a conceptual model of rural areas that enables discussions among the many involved and affected individuals, institutions and sectors. The model should not be too simplifying. For

example, the term “smallholders” is often used for all family farmers in developing countries, completely ignoring the different potentials, needs, roles in structural transformation and support options of this huge group. On the other hand, public and political debate does not benefit from excessive complexity and abstractness. Wherever possible, the model should be globally applicable, even though it may have to be adapted to the respective individual regions. This article looks at how suitable the “Five Rural Worlds” model presented by the OECD in 2007 is in this context.

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## ■ Types of household and enterprise in the Five Rural Worlds model

The “Five Rural Worlds” model is target group-oriented and breaks down the rural population into five stylised types of enterprise and house-

hold. In a development co-operation debate, it has the advantage of specially considering poverty-relevant groups while also explicitly referring to the potential actors in economic growth. The model has not become particularly well established, perhaps also because the OECD does not hold any strong power of interpretation in rural development issues and because the model itself has been too little used and operationalised. However, it does also bear the disadvantage of not having offered enough instructions for broader debates on structural transformation. This is why it is extended here in a way that will also allow it to systematically clarify interaction between the larger groups of actors. Furthermore, to be used in the context of structural transformation, it is important to enter the contextual factors that the rural regions described above are embedded in and that crucially determine pressure to as well as options for change.

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The Rural Worlds in the OECD model comprise the following types of enterprise and household:

**Rural World 1: Large-scale commercial agricultural households and enterprises**

They are internationally fully competitive and do not produce for home consumption. In sub-Saharan Africa (SSA), only a relatively small amount of enterprises fall into this category, among them large firms run with relatively low-input (“smallholding”) technology as well as those operating with technology packages oriented on industrialised countries.

**Rural World 2: Traditional landholders and enterprises**

This category comprises many smaller rural households and agricultural firms. They usually only hold land informally. They pursue both subsistence agriculture and commercial agriculture for local markets and also grow certain crops (e.g. traditional colonial goods such as cotton, coffee or cocoa) for the international markets. However, most products (food crops) are not internationally marketable owing to inferior quality, the obligation to provide proof of origin and a lack of access to markets. These enterprises generally operate risk-aversely and input-extensively, and they have considerable difficulty obtaining formal credits. They are quite able to produce an income above the poverty line and are often also capable of growth. They can build reserves to make up for failed harvests.

**Rural World 3: Subsistence agricultural households and micro-enterprises**

These households probably represent the largest share of households in rural areas. Production is dedicated mainly to home consumption, although households still have to buy substantial amounts of food additionally. Some products yield a surplus to finance food and other purchases, although non-agricultural activities are a crucial component of income. These households are very highly vulnerable and correspondingly averted to risk and are hardly credit-worthy, so that

the technology they apply has to be capital-extensive. Even in some good years, but above all in the bad ones, they remain below the poverty line.

**Rural World 4: Landless rural households and micro-enterprises**

In SSA, landless households are still relatively rare. Sufficient land and collective land rights allow most households to pursue agricultural activities on at least a smaller scale. This is often different in densely populated Asia, where many rural households have nothing but informal micro-enterprises or provide agricultural labour to secure their livelihoods. Their living conditions are frequently even more precarious than those in Rural World 3, and in many years they are among the poor.

**Rural World 5: Chronically poor rural households**

This type of household comprises in particular those without land and with hardly any labour force, those in which people are chronically ill or disabled, orphan households as well as a considerable share of micro-farmers in unfavourable locations or locations where land is very limited.

The Five Rural Worlds approach has fewer disadvantages than other classification approaches such as those of **livelihoods** (too unspecific or, in practice, too detailed, does usually not allow for comparisons, of little relevance to policies), **smallholders** (too sectorial a focus on agricultural aspects, too unspecific), **producers/consumers** (too inaccurate regarding the position in agricultural and food markets), **classes** (hardly applicable, particularly in rural, pre-industrial areas), or **farming systems** (too focused on agricultural technology, either without any focus on poverty or addressing poverty by combining several variables ad hoc). It sufficiently differentiates according to the chief categories of groups of actors – level of income and sectorial source of income, potential, requirement for and type of support – while not being quite as crude, fatalistic or deterministic as the well-known classification by Andrew Dorward into “stepping-up”, “stepping-out” and “hanging-in” farm households.

■ **What support needs to address**

With the Five Rural Worlds approach, the need for development co-operation support can often already be sufficiently differentiated. Some examples are given to illustrate this:

**Food prices:** World 1 produces only for the market; it benefits from high prices. Worlds 4 and 5 are almost exclusively very poor consumers who have to rely on staple crops at low prices. World 3 mainly produces for its own needs, but also to create smaller surpluses and to supply special crops for the market. In total, it is a net consumer. World 2 produces for the market but also to meet its own needs; it is chiefly a net producer. Depending on the constellation of products and the times of the sales and purchases, high and low prices of various products affect these two worlds in very different and partly contradictory ways. The effect on poverty and food security has no clear direction.

**Agriculture and business technologies:** World 1 is largely in the formal sector, it can use modern modes of production and can also finance the business services it needs, whereas World 2 requires government support to gain access to and use modern technologies. Often, World 3 cannot even apply certain technologies, especially if they entail risks and offer no particularly high cost-use benefit. Only few agricultural activities are of immediate use to Worlds 4 and 5 (e.g. landless animal husbandry), but they are affected indirectly through the creation or loss of low-skilled jobs.

**Financial services:** World 1 has access to the formal banking system and hence to relatively favourable credits as well as all other financial services. World 2 hardly enjoys this (in poorer countries) and requires support e.g. in setting up co-operatives and gaining negotiability. Worlds 3 and 4 can hardly establish ties with financial co-operatives individually. They are typical candidates for group and micro-credits. Everyone can and should save, including the poor, but it is the

more wealthy actors who can sufficiently and regularly deposit money and drive the rural financial systems.

**Social security:** World 5 needs social security as a livelihood basis, while Worlds 3 and 4 only require temporary security for periods of crisis and Worlds 1 (and 2) can easily fall back on their reserves if necessary.

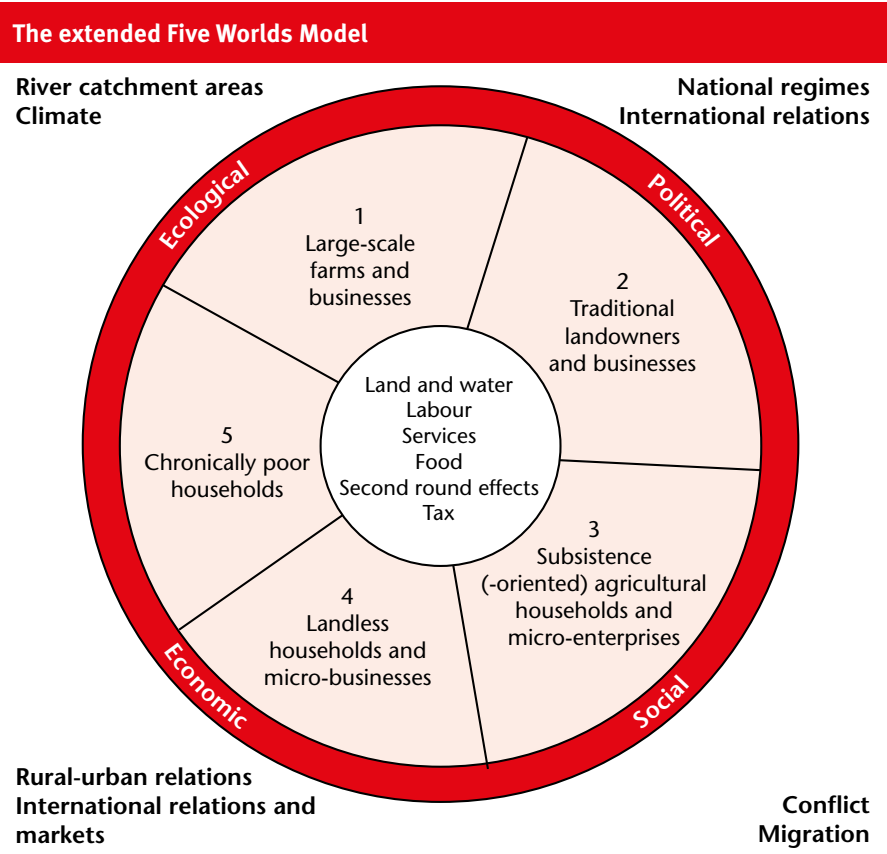
**Political participation:** World 1 forms a large share of the rural elite and can formulate and assert its interests. Given its sheer size and financial independence, which is also reflected by its educational standards, World 2 can keep pace here. But Worlds 3, 4 and above all 5 are quickly left behind and need training programmes, support and perhaps also permanent institutions to exercise and secure their political participation.

Many development co-operation tools can be run through in a similar manner for the individual Worlds, and very often, they result in important differentiations that often receive too little attention in debates on development co-operation. However, further details are required regarding individual sectors and technical implementation.

### ■ Considering further stratification and World interactions

Some improvements could perhaps be made regarding the classification of the Worlds in the case of very special sub-groups with strongly differing resources and needs, such as pastoralists. Separating agricultural and non-agricultural businesses in Worlds 1 and 2 could also make sense since these usually produce more strictly according to sectors than the other Worlds. This would result in six or seven categories of households enabling interventions and structural transformation debates with a sufficient degree of differentiation.

We would propose that cross-connections between the Worlds be systematically incorporated in the model. These are the dimensions in which



interaction systematically develops between the Worlds. This is very often the case in rural areas – sometimes, activities take place in the same markets, institutions are shared, and there is competition for resources. A systematic screening of these cross-links could perhaps reveal antagonisms and synergies and help initiate political and planning responses. Here are some examples:

**Land and water:** Even without external interventions, land ownership and use are subject to dynamic change processes through factors like population growth or technology-induced modifications of the production processes in any of the five Worlds. Foreign investment in land very often results in antagonistic relationships since land can hardly be multiplied (cultivated or arable land can be, so that a closer look is required here). Although similar antagonistic relations have been observed with water, there may be significantly more cases of improving the availability of existing, unused water to all enterprises through major investments in water retention and irrigation by World 1 (in SSA, less

than ten per cent of irrigable area is in fact irrigated).

**Jobs:** Rural Worlds 1 and 2 are the main employers for Worlds 3 to 5, with World 1 tending to offer formal and World 2 above all informal jobs. Mutual employment relations exist within World 3, together with a wide range of forms of collective work. In an increasingly populated and differentiated rural space, jobs, and not subsistence production, are key to long-term poverty alleviation and food security.

**Local food and agricultural markets:** Since many rural regions are only incompletely integrated in national agricultural markets, the interactions of individual Worlds through food markets can be of considerable importance. World 1 produces major agricultural surpluses, although it tends to rarely supply goods to the other rural Worlds, and concentrates mainly on national and international formal markets since they are more lucrative, while and because they demand higher quality and process standards. World 2 has structural agricultural sur-

pluses, often comprising food of inferior quality for the local (and lower segments of national) markets. However, if it is strongly integrated in the formal agricultural markets, e.g. as a contract grower for World 1, local food may well become more expensive, with a negative impact on Worlds 3 to 5. On the other hand, investments in Worlds 1 and 2 resulting in spill-over effects in World 3 (e.g. technology, input or credit spread through contract farming) can strongly stimulate food production there.

**Second round effects:** This term refers to effects impacting on actors indirectly and over longer terms, beyond the direct effects on income and employment in the target group, e.g. through stimulating local markets or the local economy in general. Although difficult to measure, such long-term effects are often the crucial factors in rural structural transformation. Extensive agriculture tends to have fewer direct feedbacks into other upstream and downstream sectors, whereas these are usually stronger in modern agriculture. Conversely, since poor households tend to seek local goods and services, their growth has greater local impacts than that of rich households that consume more imported goods, save or invest externally.

All these examples demonstrate the importance of analysing interaction between Rural Worlds, which may however yield complex constellations. For example, in their early stages, major investments in World 1 can lead to a scarcity of land and income losses, and later on in the investment phase to job opportunities, better water supply, technological spill-overs to the contract farmers in the case of linked contract farming, long-term second round effects as well as greater dependence and, in the case of bankruptcy, the economic collapse of entire districts.

Certain combinations of Worlds may be essential in some contexts. For example, market-based insurances with poor smallholders are hardly viable on their own, although things change once more affluent house-

holds in Worlds 1 and 2 (and the urban middle classes) are incorporated. In the case of privately financed irrigation perimeters, major enterprises with sufficient financial clout have to provide input and often also take over water management. Favourable money transfers require mobile transfer systems that cannot develop without the commercial activities of Worlds 1 to 3 but for which there may be cross-subsidy options via public investments in social transfer programmes.

Finally, the external drivers of rural structural transformation referred to above should be explicitly considered in a conceptual model. This keeps them visible, so that they cannot be neglected or ignored to the advantage of idealised or illusory abstractions. The model as a whole is represented in the Figure on the left.

#### ■ Integrating relations with the outside world

And what about migration? As already indicated, people migrate if there is too great a discrepancy between ambitions and local opportunities, if there are options elsewhere, if migration is allowed and if there are possibilities to abandon fixed capital. Structural transformation in rural regions need not lead to migration but will often do so if there are very big incentives outside the rural region and prospects in that region are poor. Experience in SSA has shown that mi-

gration takes place across all groups, within only a fraction of the really poor being able to migrate internationally. Education often reinforces migrating from rural regions, possibly also because currently, livelihood options there are often still particularly poor since agriculture has so far seen hardly any radical changes and the smaller urban centres are neglected. In order to gain a better understanding of these relations and be in a better position to steer them, the Five Worlds model has to be extended by the relationships with the outer world, and the ambitions held by youth have to be examined in particular. Ultimately, the most effective means to stem migration appears to be strong economic growth in rural regions, accompanied by social, cultural and technological impulses.

All in all, it should have become apparent that this seemingly simple conceptual model of Five Rural Worlds together with systematic links via channels of effects is already suitable, if not to quantitatively assess, then at least to identify and discuss many relationships in rural regions and the overall effects of interventions, particularly for poverty and food security. Also, necessary and important complementary measures can be identified. The model affords an overall view of the rural region and its transformation, and, while not being a substitute for more accurate sectorial analyses, it can facilitate structured policy dialogue.



*Worlds 3 and 4 are typical candidates for group and micro-credits.*  
Photo: S. Noorani/  
The World Bank



Photo: J. Boethling

# Rural transformation in sub-Saharan Africa

The present debate on rural transformation reflects a paradigm shift in addressing rural development. While, in past decades, rural development was mainly considered from a micro-level perspective, focussing on farming systems and value chains, the macroeconomic perspective of structural change now prevails in rural development studies. Setting out from trends in sub-Saharan Africa (SSA), the authors comment on how social inclusiveness and ecological sustainability can guide rural transformation dynamics.

The current debate on rural transformation in low- and middle-income countries is mostly based on an understanding of structural change following the pattern of industrial countries.

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Accordingly, rural transformation is seen as a shift of value added and employment from the rural-agricultural to the urban-industrial sectors, accompanied by increased agricultural productivity, growing farm size and intensified rural-urban linkages. This is the path that was taken by most European countries and has largely been adopted by newly industrialised East Asian countries like China or South Korea. High urbanisation rates in many African countries tend to suggest that

Africa might perhaps follow a similar route. Accordingly, some scholars envisaged a future development path for African smallholders (which still constitute the vast majority of farms south of the Sahara) in line with the motto “stepping-up, stepping-out or hanging-in”. In terms of a promotion strategy, this slogan was translated by its proponents into a target group-differentiated approach suggesting that resource-rich smallholders be promoted to become full-scale com-

mercial farm enterprises (“stepping-up”), while those with fewer agricultural resources but higher off-farm incomes be assisted in moving out of agriculture towards non-farm activities (“stepping-out”), thus leaving their land to the more advanced farmers, whereas the masses of subsistence farmers or marginal smallholders be helped to stabilise their subsistence basis and be provided with social transfers (“hanging-in”). To check whether or not such a strategy can fit in the context of sub-Saharan countries, it is necessary to analyse the past and on-going rural transformation dynamics there.

### ■ Sluggish transformation in sub-Saharan Africa

An analysis of development dynamics in post-colonial sub-Saharan Africa (SSA) based on aggregated macro-economic data shows that rural transformation is still sluggish. By and large, the smallholder-dominated agricultural structure has remained unchanged. Growth in agricultural production has been roughly in line with population growth. This means that a growing labour force has used the farm land still available to supply an increasing number of consumers and – to a lesser degree – external markets on the basis of widely unchanged production techniques. Farm sizes have stagnated at a level of one to two hectares. Agricultural productivity has not increased by any great measure. Most farm households have maintained their diversified and flexible rural-urban livelihood systems, composed of subsistence agriculture, cash crop production, seasonal off-farm employment and (often temporary) labour migration during the decades after independence. Still, neither agricultural nor off-farm income sources, neither subsistence nor the market and employment opportunities alone are sufficient and secure enough to ensure a living income.

What has happened more recently and what is often labelled as a “new rurality” is a shift within these rural-urban livelihood systems to-

wards non-farm and urban sources of income. While the number of rural households is still growing, many farm-based households are forced to manage their farming activities with a reduced labour force. Frequently, only women are left at home caring for the children and the elderly. The – often exaggerated – urbanisation rates (see article on page 27) reflect this shift. They should, however, not be mistaken for indications of a definite and permanent migration from rural

to urban areas. Most of the migrants are not successful in finding a safe and rewarding alternative income basis, even if they prefer to stay in the city. Thus, urban income sources mostly continue to form a supplementary income rather than an alternative to farming. Hence, rural-urban migration in Africa is mostly not a shift from farm to more productive non-farm sectors (as it should be according to the conventional rural transformation model), but one towards even less

### Urbanisation and new urban poverty in Zambia. The case of Kabwe

Zambia has been one of the forerunners of urbanisation in sub-Saharan Africa. At the same time, this country shows that urbanisation in SSA is no one-way trend. Much of the migration to urban centres characterise themselves as temporal or circular. During the 1990ies, the migration flows turned to the contrary in Zambia when prices rose and the level of income fell. Urban-rural migration was one way to escape from this urban trap during that period. Moreover, in Zambia as in other countries of SSA, there is a recently growing trend of land acquisition in rural areas undertaken by the urban middle-class.



*A woman breaking rocks in a rock quarry in Msisi, a slum outside Lusaka.*

*Photo: J. Barbee/NYT/Redux/laif*

Urbanisation as such is a livelihood strategy but no general way out of poverty. There is much evidence of a new urban poverty, which in Zambia is most visible in the fast growing peri-urban areas of Lusaka, the Copperbelt and emerging cities like Solwezi or Kabwe. The Mayor of Kabwe, Mr Richard Bango, looks full of concern on his city. The last census in 2010 counted 208,049 inhabitants in Kabwe. As immigration and natural population growth continues to be high, the Mayor has the bad feeling “that this number might double within five years”. The projections of the 2010 census are not that extreme, but they forecast that Kabwe will be inhabited by 269,759 people in 2030. And when it comes to income opportunities, the Mayor states that there is no evidence of significant improvement. On the contrary, formal employment is rather on the wane.

Mr Bango is concerned about the fact that the municipality is far from having enough financial and personal capacities to provide the basic infrastructure (water, sanitation, solid waste management, etc.) and the minimum social services of health and education for the rapidly extending peri-urban townships. According to the African Development Bank Group, urbanisation in Africa “has largely been translated into rising slum establishments, increasing poverty and inequality.” The problems of new urban poverty are above all challenging the urban local governments of SSA.

### Transformation in the pastoral areas of Ethiopia

Studies on rural transformation in Africa tend to focus on farming livelihoods, ignoring transformation processes within pastoral livelihoods, which are widespread in arid and semi-arid regions. At the same time, the economic and ecological relevance of mobile pastoralism is often underestimated by governments, so that strategic interventions are biased towards the support of sedentary forms of agro-pastoralism. The case of Ethiopia and the devastating impact of the current drought, especially in the lowlands of the Afar Region, point towards the deficits of previous external development efforts. The lack of context-specific strategies for pastoralists has led to their exclusion.

Major current trends in pastoral regions of Ethiopia relate to:

- a) an increasing sedentarisation and livelihood diversification towards subsistence-oriented agro-pastoralism, although livestock still represent the major source of income,
- b) shifts in land use regimes marked by enclosures on previously communally used land and the government appropriation of pastoral resources for the purpose of commercial irrigation agriculture, and
- c) the weakening of customary institutions for natural resource management.

The combined impact of these trends has been a significant reduction of livestock productivity, environmental degradation and loss of pastoral resilience. At the same time, there is increased in-migration of labour migrants from rural highlands searching for employment opportunities on the commercial farms. Small and medium towns grow as destitute pastoralists and educated youth move there.



*Sedentarisation is one of the major current trends in pastoral livelihood systems. Settlement of destitute pastoralists in the Afar Region of Ethiopia.*

*Photo: S. Rettberg*

Against the background of an increasing global and national demand of livestock products and increasing livestock prices, it is essential to make use of available potentials for an intensification of pastoralism which have been largely ignored up to now. This has to be supplemented through the creation of more diversified income opportunities, including non-pastoral sources of income. At the same time, possibilities for an extensive use of pastures have to be sustained as this is the only option for a sustainable and socially inclusive land use in certain areas.

productive informal service sectors, the expansion of which is to a considerable extent the result of growing numbers of job seekers rather than a growing demand for labour. An annual 15 million additional entrants to the labour market in sub-Saharan countries must be set against only two million additional employment opportunities in the formal sectors. Ac-

ording to all forecasts, the absolute number of rural people will continue to grow beyond 2050.

Thus, the major reason for the persistence of farm-based livelihoods is restricted employment dynamics in the African manufacturing sectors and productive "modern" service sectors. In contrast to 19<sup>th</sup> century Eu-

rope and late 20<sup>th</sup> century East Asia, African countries no longer have the possibility of protecting an emerging labour-intensive manufacturing sector against global competition.

### ■ New rural dynamics since 2008

While rural transformation dynamics have been constrained during the post-colonial decades, recent developments make it worth paying attention to this issue. Since the global agricultural boom and the food crises in 2008, new dynamics can be seen in rural regions of sub-Saharan Africa. Growing global demand for agricultural products, along with increasing population densities in rural areas, the deterioration of natural resources accompanied by the impacts of climate change and a new interest on the part of national and international investors in African farmland have triggered new dynamics in many rural regions south of the Sahara. Agricultural growth through the extension of the cultivated area is reaching its limits in many places. Providing more people with food and taking advantage of new market opportunities without destroying the natural resource base and ecosystems (soils, water, forests) requires an intensification of agricultural production, i.e. an increase in yields per hectare and per drop of water. Preserving extensive forms of cultivation or animal husbandry with low and insecure yield levels is neither feasible – taking the changing economic and natural environment into account – nor is it desirable from the small-scale farmers' point of view. A structural change in the rural economy in terms of a transformation from extensive towards more intensive land use systems seems to be inevitable.

### ■ The challenge of shaping the transformation in a socially inclusive manner

The big challenge for a rural development policy aimed at achieving "One World – No Hunger" is to shape that inevitable transformation process in a socially inclusive and environ-

mentally sustainable manner. Social inclusiveness is a must if food security is to be enhanced. However, a socially inclusive transformation process implies that no smallholder families will lose their land and subsistence basis without finding a safe and sufficient alternative economic basis for their existence. Those who lose their access to food as farmers must consequently acquire sufficient purchasing power to buy that food on the markets. In other words, any involuntary stepping-out of agriculture without a safe harbour will aggravate hunger rather than reducing it. Such safe harbours in off-farm economic sectors are to be seen hardly anywhere in Africa. Urban employment opportunities tend to grow during phases of raw material booms (as witnessed during the last decade) and tend to decline with shrinking world market prices for raw materials (as is happening at present).

As long as there is no dynamic expansion of safe and productive employment opportunities outside the agricultural sector, any socially inclusive rural transformation needs to be a change that takes place within the prevailing system of farm-based rural-urban livelihoods. Rural transformation, therefore, means in the first instance a broad-based and ecologically sustainable intensification of farming, accompanied by efforts towards improving off-farm employment opportunities, especially along farm-based commodity chains. Most African small-scale farmers have under-utilised potential for intensification at their disposal. Using location-specific and ecologically sustainable low-external input technologies, yields can still be doubled at most locations. Those who tend to underestimate the potential of resource-poor smallholders often overlook that many of their constraints are a result of decades of negligence on the part of governments and development cooperation.

Such broad-based intensification should focus on increasing land (rather than labour) productivity, taking the abundant and growing rural labour force into account. This, however, may have to be accompanied by focused

### Trends in SSA from 1961 to 2013

Factor	1961	1990	2013
Share of agricultural sector in GDP / GNI (%)	43	35	27
Share of working population in the agricultural sector (%)	83	70	62
Share of manufacturing industry in GDP (%)	n.a.	13	11
Share of working population in manufacturing industry (%)	n.a.	5	4.6
Share of working population in the service sector (%)	n.a.	25	33
Annual cereal production (million tons)	30	57	123
Annual cereal production / per capita (tons)	0.150	0.130	0.145
Cereal production/ per capita of rural population (tons)	0.17	0.17	0.23
Cereal area harvested (million hectares)	40	57	86
Yields of cereals (tons/hectare)	0.75	1.0	1.42
Average farm size (hectare)	1.6	1.5	1.6

Sources: FAOSTAT 2014, World Bank WDI, ILO 2013, Rauch 2012. Macro figures for SSA without South Africa

### Income sources, employment opportunities and rural poverty 2010

	2010
Farm income share of household income (%)	60-70
Subsistence share of food production (%)	60
Annual increase in working population (million)	15
Annual increase in formal employment (million)	2
Share of rural population in extreme poverty (< \$1/p/d)	40

Sources: Losch, Freguin-Gresh, White (World Bank) 2012

mechanisation steps which may be necessary to overcome specific labour bottlenecks within intensified cultivation systems. Intensification will have to be promoted in a manner specifically tailored to the location and target group: While densely populated, central and highly market-integrated locations may require value chain development and a focus on off-season crops, remote and marginal locations affected by soil degradation and variability in rainfall patterns may require a focus on sustainable land management techniques with improved soil and water conservation practices

aimed at increasing food security. In all of these cases, improved and inclusive agriculture-related service systems will be required. To make these systems affordable, the majority of small-scale farmers will have to organise to gain access to them. To make them feasible and cost-effective, context-specific service system concepts will have to be designed, taking the capacities and interests of public and private stakeholders into account. Relying on market forces and private initiative alone will not result in socially inclusive rural transformation towards a world with no hunger.

The article is based on the study "Rural Transformation in Sub-Saharan Africa" carried out by the Centre for Rural Development (SLE) as part of the One World – No Hunger special initiative launched by the German Federal Ministry for Economic Cooperation and Development (BMZ). It is part of the BMZ-financed research project "Towards a Socially Inclusive and Ecologically Sustainable Rural Transformation in Africa". The study (SLE Research Paper No. 1, 2016) is available in English and German at: [sle@agr.ar.hu-berlin.de](mailto:sle@agr.ar.hu-berlin.de). The digital version can be downloaded at: [www.sle-berlin.de](http://www.sle-berlin.de)



Chinese migrant workers in Beijing.  
Photo: E. Schmidt-Kallert

# Multi-locality – migrants shape the future of their places of origin

An increasing number of migrants in the Global South live in so-called “multi-local household arrangements”. They combine the opportunities offered by two places, often a rural and an urban one. Their livelihood practices can have positive effects on the villages of origin.

There was a time when regional planners and development practitioners believed that rural development projects would eventually reduce or even reverse the exodus of people from the rural areas. This has not happened. Ex-post evaluations have shown that although the most successful rural development projects have led to increased income levels and improved livelihoods, out-migration to urban areas continues. Paradoxically, sometimes, interventions which were part of the rural development package, have had the effect of encouraging the more active people to leave their home area.

In recent years, many international organisations have adopted a more positive attitude towards migration. A case in point is the World Migration Report 2015 published by the International Organisation for Migration (IOM), which states in its introductory chapter: “Moving to cities can greatly enhance people’s well-being. It offers an escape from the impact of the hazards of a fragile rural livelihood, and an access to diverse employment opportunities and better health and education, all of which have the potential to reduce the poverty of the people moving as well as those who stay behind.” Especially in Africa, rural-urban migration continues at an unprecedented pace, but there is also evidence of rural out-migration in many Asian countries. There is an increasing diversity in migration trends in the Global South, a fact that has also been acknowledged by the World Migration Report. A large proportion,

possibly the majority of all migrants (which is difficult to prove, because reliable statistics are scanty), are non-permanent, sometimes “semi-permanent”, migrants. Especially those who are engaged in precarious informal income-earning activities in their destination areas, tend to return at regular intervals to their home areas (“seasonal migration”). Others are circular migrants, who return to their home villages at less regular intervals. And there is a wide variety of different directions: from rural to urban, from a small town to the capital city, and some also using their move to the city as a departure point for international migration.

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## ■ What is “multi-locality”?

For the last 15 years, many researchers of different disciplines have pointed to the growing importance



of non-permanent migration, and in this context the concepts of multi-locality and the “multi-locational household” have emerged. Most migrants in the Global South do not cut their links with their place of origin. On the contrary, they remain part of their rural household, and they consciously take advantage of livelihood opportunities in two or more locations. This has been characterised as a risk-minimising strategy. In Africa, and in some parts of Monsoon Asia, it is still common for migrants who have established a first foothold in the city to return to their home village during peak periods in the agricultural cycle to help with the farm work (e.g. transplanting of rice or harvesting). Sending remittances back to the village, either regularly or during lean periods, is equally common.

Numerous studies in many different parts of the Global South, e.g. in South Africa, Namibia, Ghana, Senegal, India, Bangladesh, China, but also in countries of the former Soviet Union, have established the intricate network of reciprocal economic links within such multi-locational households.

Obviously, not all newly migrated residents of the big cities live in multi-locational household constellations. Although this appears to be a minority, some migrants prefer to fend entirely for themselves and to shed all family obligations. Therefore it is important to have a clear-cut definition

of the multi-locational household. A definition which my colleague Peter Franke and I coined in the course of a research project on migrants in China reads: “A household is made up of members from the same family or kin pooling their economic resources and planning together the expenses for the purpose of reproduction of all household members, but the members may well live in two or more spatially split locations.” According to this definition, economic necessity is the main reason for engaging in multi-locational household practices. This may refer to earning money for daily necessities for the upkeep of all household members in both places, but it may also refer to more long-term planning, like the education of the children.

Definitely, globalisation and modern communication and transportation technologies have given a boost to multi-locality, it has become so much easier to keep in touch with the family members back home, and better roads make the trips to the home village less cumbersome. Multi-locality has become a common way of life in our globalised world. But the phenomenon itself is not entirely new. When I lived in Ghana in the 1980s, there were no asphalt roads linking the northern regions to the south, and there were no telephone lines. Even the banks did not have telex lines at their disposal. Yet, there was frequent movement of people, money, messages and goods between the southern cities and the villages in the north. The migrants residing in the southern cities of Accra and Kumasi used to pass messages and remittances through lorry drivers going up north, and de-

spite the risks involved in this informal channel of transmission, reports of embezzlement were few.

Many aspects of multi-locality are still controversial and require more research. Undoubtedly, it is a feature typical of our globalising world. But is it a transitional phenomenon, a practice born in a period of crisis? Or is it a more permanent practice? Apparently, the practice is more long-lived than anticipated by many earlier observers. In China, we find migrant workers who have lived between the countryside and the city for three generations. And there is similar evidence from some parts of Africa. Multi-locational practices have survived many ups and downs and changes in family life cycles, but migrants often have enough good reasons to maintain the practice for generations. We do not yet have sufficient longitudinal evidence, however, to conclusively contend that such practices will be maintained beyond the third generation or (maybe) forever. This may be the case, but we do not know yet.

### ■ Types of household strategies and their effects

We live in an urbanising world. But focusing on the transformation happening in the cities is not everything. The multi-locality lens helps us to understand the transformations in the rural areas that are happening at the same time. Many household-based studies of multi-locational households have found evidence of economic reciprocity between urban and rural household parts. But, to be sure, there is certainly more money flowing from city to countryside than in the other direction. Migrants acquire new skills in the city, and they also enjoy better facilities. And yet they have good reasons to maintain their multi-locational practices.

In earlier publications on the topic, I introduced the distinction between three types of multi-locational livelihood strategies: Firstly, strategies in which economic reciprocity is the dominant feature, secondly, strate-



*Ethiopian migrants keeping in touch with their home village.*

*Photo: E. Schmidt-Kallert*

gies for caring (for the children, the sick, and the elderly) and thirdly, strategies for the transfer of knowledge, beliefs and values. I would still argue that these categories are useful analytical tools. But when recording people's real-life experiences, it quickly becomes clear that these are not mutually exclusive strategies, but rather different layers of a complex and comprehensive household strategy. For most households, all three layers matter.

In many migrant households in China, the money flow, as well as the ups and downs of the level of remittances, can only be understood in the context of a strategy for the upbringing of left-behind children and the family life cycle. According to the most recent statistics, there are currently 250 million migrant workers in China. Since they do not enjoy full citizen rights at their place of destination and do not have access to the complete range of services, many of them have to leave their children in their villages in the care of the grandparents. There are currently 53 million "left-behind children".

In a village in Armenia, I found very clear evidence of a steady flow of remittances from Armenian migrants in Russia, which were used to buy farm inputs such as spare parts for the irrigation equipment. One could say the urban-based household members invested in the means of production in the rural area. But was there also economic reciprocity within the three-generation household? A few crates of Armenian wine and a few bottles of Armenian cognac would be shipped to Siberia, but the value did not match the amount of investments in farm equipment. And here the third layer of reciprocity came into play. During the summer vacation, the grandparents in the village gave private tuition to their visiting grandchildren from Siberia – for the parents found it important for their kids to be conversant in the Armenian language and to master the Armenian alphabet. There was reciprocity in the strategy, but it could not easily be measured in monetary terms.

Maintaining traditions, having an emotional anchor in one's home village, and imparting family and clan values to one's children are good reasons for people to maintain links to their home villages in many parts of the world. In West Africa, one can find posh mansions in remote villages that have been built by successful business people originating from that place. Nobody lives in these houses; a caretaker switches on the dusty generator once a month. The sole purpose of such mansions is to give shelter to a funeral party once in a decade. Researcher Jerome Kessy has recently studied multi-locational households on the slopes of Mount Kilimanjaro in Tanzania. People who have made some money in the city build their first house in their home village, not in the city, where they live, a practice which Kessy calls "a cultural-prestige strategy". And in China, migrant workers have built millions of cement houses in their home villages. Investment in the wrong place, World Bank economists would say. But apparently this type of investment, which fosters family cohesion, is part of a perfectly rational risk minimising strategy.

Migrants' emotional attachment to their place of origin is an asset that could and should be taken advantage of in development-oriented activities. When looking at studies on multi-locational living arrangements, it is obvious that the better part of remittances is used for consumptive purposes. I have mentioned examples of migrants who channelled their remit-

tances into investments for productive purposes, e.g. irrigation equipment or the construction of a small maize mill. But normally all remittances are exchanged within the same household. But the benefits of multi-locational living could also accrue to an entire rural community. My colleague Karin Gaesing has reported about an interesting case from Mali, where migrant associations in France became instrumental in funding local infrastructure projects in the rural municipality of Sibou. A local library, additional classrooms for the primary school and the solar panels for the health post were all financed by the villagers now resident in France through their association, while the local population in Sibou provided communal labour for project implementation.

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### ■ More attention to multi-locational households is needed

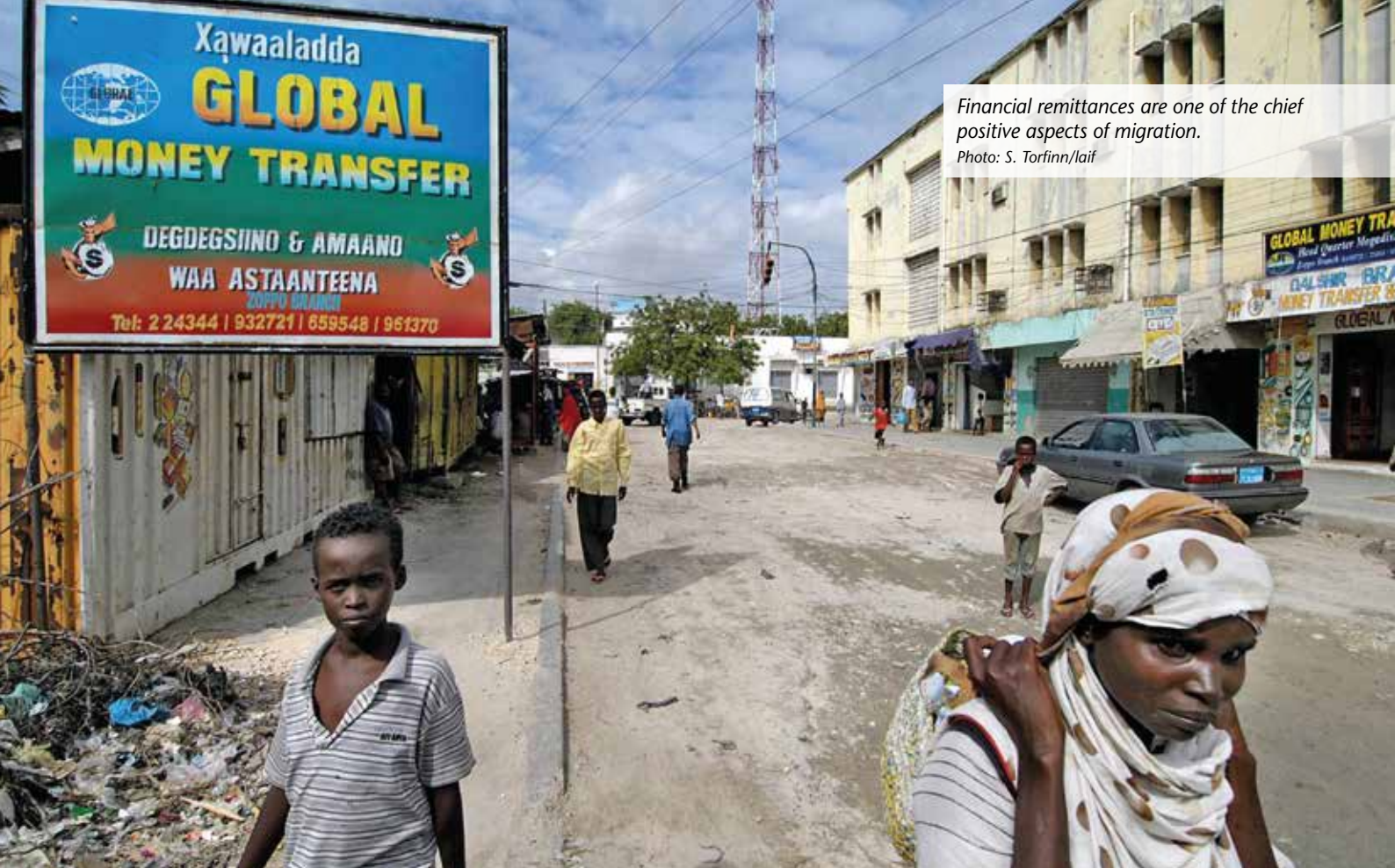
In my opinion, acknowledging that we live in an urbanising world does not mean that the villages are vanishing. To be sure, just as the urban areas are being transformed, villages will also undergo enormous transformations in most parts of the world. But they will not vanish from the map altogether. An increasing number of the world's population will live between city and countryside for a long time to come. Many of them will develop hybrid lifestyles, aspirations, and practices that are distinctly different from both existing rural and urban lifestyles.

In the academic world, the concept of multi-locality has been mainstreamed over the past decade. Sadly, local government officials as well as urban and regional planners across the world are still somewhat at a loss when asked how they respond to the specific challenges of an increasing number of residents in their constituency who engage in multi-locational practices. Certainly, more efforts will be needed to convince all those in the practical world that, in the future, they need to look beyond territorial boundaries in order to properly care for the well-being of their citizens.



*Left-behind children. A grandmother with her grandchild in Sichun village, China.*

*Photo: E. Schmidt-Kallert*



Financial remittances are one of the chief positive aspects of migration.

Photo: S. Torfinn/laif

# Migration dynamics in sub-Saharan Africa – myths, facts and challenges

Migration dynamics in rural areas in sub-Saharan Africa are mainly associated with rural exodus and rapid urbanisation, which often goes along with high crime rates and social conflicts. Rural areas are expected to be depopulated in the long run. But is this perception of migration in the context of African rural areas actually justified?

At first glance, statistics on global demographic trends seem to support the general notion of rapidly growing urban areas and deserted rural areas. According to the United Nations Department of Economic and Social Affairs (UNDESA), 2008 was the first year in the history of humankind when more people were living in urban areas than in rural areas. The share of people living in cities and

towns increased globally by about 125 per cent from 1960 to 2014. Today, more than 360 million people in sub-Saharan Africa live in urban areas. This number is expected to reach one billion by 2050. Globally, the share of urban population had already totalled about 3.5 billion by 2015.

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## ■ Urbanisation myths – a reality check

In particular in the African context, rapid urbanisation has ever met the scepticism of policy-makers as increased crime rates, urban sprawl,

fast growth of slum areas or even riots were – and still are – expected as potential consequences. Many countries have consequently put policies in place aiming to prevent rural-urban migration. At the same time, international development organisations have increasingly withdrawn support for urban development initiatives in favour of rural development projects, often justified by the argument that improving living standards in rural areas will help to mitigate the growth of urban poverty. The notion that more rural development may curb rural-urban migration is still quite efficacious. But this so-called sedentary bias

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is contradicted by empirical findings: In fact, at least initially, development and development projects that lead to higher incomes and increased living standards rather tend to stimulate migration than to mitigate migration processes. Areas characterised by high rates of extreme poverty in turn hardly produce migrants as very poor people simply lack the financial and other resources that are required to migrate at all. Or they just cannot bear the risks associated with migration, such as uncertainties concerning finding accommodation or employment at the place of destination. Only a certain level of social and economic development enables more people to increase their aspirations and to migrate.

### ■ Rural-urban migration: overestimated

But the fact that rural development projects are not a very effective measure to stop migration out of rural areas is not the only fallacy in this context. The other one is that rural outmigration is predominantly linked to urban in-migration and urbanisation, respectively. The contribution that migration actually makes to urbanisation in sub-Saharan Africa but also in other parts of the world is overestimated. Meanwhile, natural population growth in towns and cities is a stronger driver of urban growth than in-migration. Thanks to better health services and improved levels of food security, birth rates in African urban areas by far exceed death rates. Furthermore, the urbanisation rate in sub-Saharan Africa is still much lower as compared to East Asia, for instance. In other words, the share of the population living in rural areas in sub-Saharan Africa is not dramatically changing in favour of the urban share of the population.

Population estimates by UNDESA assume that the African urbanisation rate will stagnate at about one per cent in the next three decades. Moreover, by 2050, slightly more than 50 per cent of the overall population in sub-Saharan Africa are projected to live in urban areas. By comparison, it

is assumed that the urban population share in Europe will have reached the 80 per cent threshold by then. Thus, it would be an illusion to presume that the rural population in sub-Saharan Africa will simply “fade out” via a huge rural exodus within the next few decades. In absolute numbers, as compared to all other world areas, the rural population in Africa is in fact even set to increase over the next decades (see Figure).

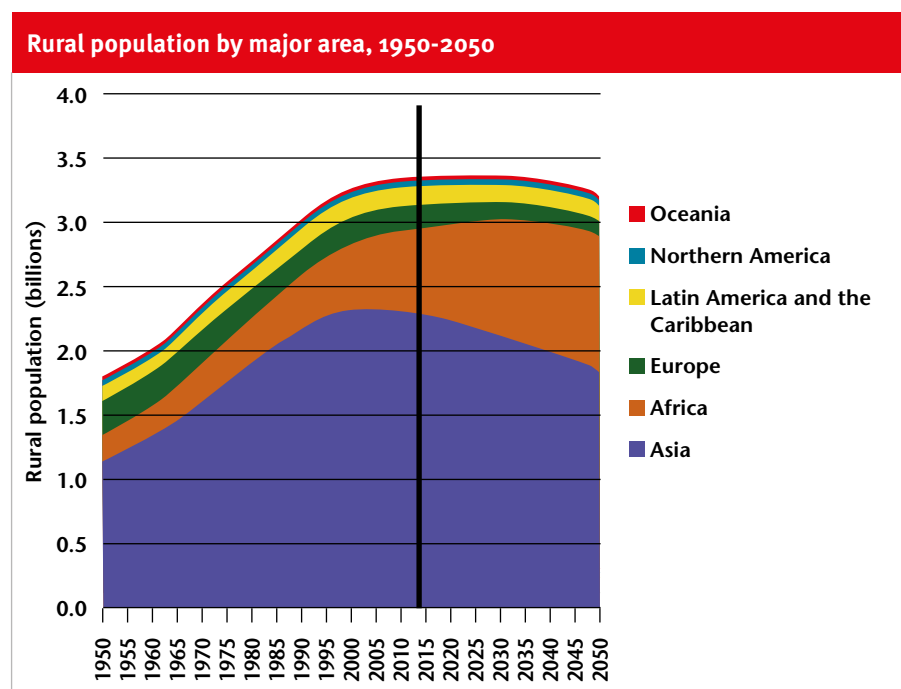
### ■ Internal migration: important, but largely ignored

Nonetheless, many African countries are characterised by a high degree of demographic mobility and migration rates. A lot of these migration movements within African countries are still rural-rural and are often temporarily limited or circular. The few studies dealing with internal migration in sub-Saharan Africa show that rural-rural migration flows are often even greater than rural-urban migration. A growing disinterest of young people in agriculture is often mentioned as a major reason for this high degree of mobility. Young people in rural areas of sub-Saharan Africa – about 70 per cent of overall African youth currently live in rural areas – are indeed affected

by an increasing access to education, media consumption and communication technologies. That certainly changes their perceptions of rural life. But it would be another fallacy to perceive the young rural population in sub-Saharan Africa as actors without agency that are just being “pushed” or “pulled” away from rural areas. These young population strata are not a homogenous group but very diverse in terms of their educational, vocational and life perspectives.

Smallholder agriculture and subsistence farming is increasingly being rejected by young people in Africa due to tedious work conditions, lacking or insufficient market access, limited land or capital access or increasingly unfavourable ecological conditions through climate change and local environmental degradation. But that is not necessarily valid for agriculture in general, as what matters to many young people is opportunities for income generation – rather than the economic sector they are working in per se.

Without a doubt, agriculture plays a fundamental role in the rural economies of sub-Saharan Africa. The provision of employment opportunities in the agricultural sector is a key to



Source: UNDESA (2015)



*Should they stay or should they go? To young people, opportunities for income generation matter more per se than the economic sector they are working in.*  
Photo: J. Boethling

economic growth and achieving food security. This is reflected not only in the Comprehensive Africa Agriculture Development Programme (CAADP) process, for instance, but also in the reinvigorated donor activities in agriculture and rural development – in particular after the world food price crisis of 2007/2008. Debate on rural development and transformation within the last years has focused very much on issues like market integration of smallholder farms into value chains, better access to social safety nets and financial services or the creation of non-farm employment for farmers whose potential for market integration is very low. Internal migration as a potential in this regard has attracted astonishingly little attention, which is related not only to the already mentioned sedentary bias but also to the fact that there is hardly any data on rural-rural or rural-urban migration in sub-Saharan Africa. In particular, the links between large-scale land investments and migration are as yet dramatically under-investigated. The migration dynamics being discussed in the context of large-scale land investments are still almost exclusively related to farmers being expelled from their farms on account of these investments. The number of jobs that are created by a farm scheme run by agricultural investors depends mainly on which crops are actually grown and the (related) degree of mecha-

nisation. Likewise, the income levels that can be earned by farm labourers in these schemes are often low, and the working conditions might be poor. Nonetheless, it can be assumed that land investments coming along with employment opportunities for contract farmers or farm labourers are an important driver of (rural-rural) migration dynamics in several African countries that have attracted a lot of agricultural investments (e.g. Malawi, Ethiopia or Tanzania).

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#### ■ What should be done?

Academic research and development policy have been dealing with the positive linkages between migration and development for quite some time now. Unfortunately, both research and policies addressing the interactions between migration and development focus mainly on international migration. As migrants usually do not migrate for individual reasons only but also try to support their families in their home areas, the mechanisms that constitute the positive potential of migration for development do likewise exist in internal migration dynamics. Interestingly, these mechanisms – financial remittances, which can be used for investments or educational or health related expenditures, knowledge transfers and technology transfers – also happen to be the

positive aspects associated with large-scale land investments.

Especially in the African context, knowledge and data on internal migration dynamics – and in particular rural-rural migration processes – are largely missing. There is an urgent need to close these knowledge gaps and to generate more data and a deeper understanding of rural-urban and rural-rural migration processes in sub-Saharan Africa. Likewise, policy-makers would do well to reconsider their largely negative perceptions of internal migration processes as these do not automatically lead to rapid urbanisation processes with their negative circumstances on the one hand and “dying” rural areas on the other. It would make a lot of sense to come to a generally more hard-headed analysis and policies addressing internal migration in order to try to maximise the potential benefits and to minimise negative aspects. Fostering the positive potential could for instance mean to improve the infrastructure for remittances in rural areas or to create portals to provide migrants with better information about job opportunities. Minimising negative aspects could mean addressing the often miserable living and working conditions of migrant labourers.

For a list of references, see:  
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# How can mobility better benefit rural local development?

The prospects that mobility offers for rural local development are often underestimated. Authorities demonstrate limited capacities for addressing the topic and supporting migrants in their socio-economic integration. Our authors look at regional mobility in the context of West Africa and give an account of a pilot project in Northern Benin examining approaches to fostering better linkages between migration and rural development.

While most public and political attention today focus on South-North migration and on the flows of migrants seeking to join Europe, this should not eclipse the fact that close to 90 per cent of all movements in West Africa remain within the region, with a strong tendency for short movements to neighbouring countries, as publications issued by the International Organization for Migration (IOM) confirm. This 'other side' of West African migration is both a well-established and constitutive feature of the region, reminding us that international borders only improperly reflect the constantly evolving dynamics structuring this geographic space.

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## ■ Regional dynamics and the ECOWAS

Migration constitutes a livelihood strategy and an option to diversify and mitigate risks for numerous households in West Africa. Motivations for

migration often reflect a combination of economic, political, social and, increasingly, environmental arguments. It is also often perceived as a learning process and is thus socially valued. Trajectories of mobility in West Africa are numerous and are frequently influenced by socio-ethnic ties and networks. The ECOWAS, which gathers 15 countries of the region in a process of regional integration, not only recognises regional mobility as a reality but has established the free movement of people within its community as a key principle. Inspired by other processes of regional integration, the free movement of people is in this case seen as a basis to promote regional dynamism and economic growth.

Today, however, there is a significant gap between this regional normative framework and the actual migration dynamics which remain informal in their great majority. The ECOWAS framework and the rights and obligations it formulates for member states and their citizens remain mostly unknown. With most (cross-border) movements unregistered, it remains difficult to quantify the phenomenon and analyse its implications for informed public policies. Nevertheless,

migration is a continuous and diverse process which contributes to reshaping the social, economic and political equilibria in many parts of West Africa. The implications of mobility are evident not only for the migrants and their families but also for the regions of origin and destination. Today, it touches many households in West Africa and offers opportunities for individual and collective development, if proper framework conditions are made available. Its context-specific implications need to be analysed and properly taken into account in development policies and initiatives at local and national level. This is precisely where Helvetas comes in. The pilot activities in Benin are meant to deepen the organisational understanding of the migration and development (M&D) nexus, its potential and modalities to promote it.

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## ■ The department of Borgou – A crossroad of diverse trajectories

Situated in the northern part of Benin (see map), the department of Borgou is amongst the country's poorest areas and constitutes one of the pri-

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ority areas of Helvetas' intervention zone in Benin. The organisation's programme works primarily at local level. Its chief partners are municipalities and their associations, local civil society and private sector organisations.

Borgou fully participates in the regional migration dynamics that characterise West Africa. At the same time, it constitutes a region of destination for many migrants of the sub-region, of departure as well as an area of transit for migrants on longer routes to North Africa and, sometimes, to Europe. Initial studies allowed the identification of three main migration dynamics affecting the department. Borgou primarily attracts many migrants from the ECOWAS region and in particular from the neighbouring countries. Individual migrants follow a route and destination that in many cases was previously used by a member of their communities. Migrants follow relatives or acquaintances from the home country to exercise an economic activity which is usually also the result of socio-ethnic solidarities and networks. For instance, while the Igbos from Nigeria are known to work in the trade of spare parts, Togolese women generally integrate the restaurants sectors, while young men from Niger work as travelling salesmen, usually offering second-hand clothes and tea.

Second, the department of Borgou is also hosting many internal migrants. Communities from dryer North-Western Benin, for instance from the departments of Donga and Atacora, come in search of cultivable lands. While it is once again difficult to quantitatively estimate the phenomenon, this internal migration represents a very important corridor of human mobility for Benin. Many recent settlements are for instance composed of a majority of Beninese people originating from another department. The possibility to acquire cultivable lands is a central motivation of this corridor. In general, the (young) head of the household comes first and brings his family after a couple of years, following the acquisition of some rights over an agricultural plot.

### ■ A lack of integration mechanisms ...

Field surveys show that despite the permanent significance of both international and internal migration, the issue is not systematically taken into account in local public policies. While local authorities acknowledge the presence of many *étrangers* (foreigners) on their territory, no active mechanisms or policies are generally in place to communicate with the newcomers and facilitate their gradual socio-economic integration in the locality. Most migrant communities are organised through semi-formal associations, which are often only weakly institutionalised and primarily designed for social rather than political purposes. Nevertheless, there is at current no mechanism for regular dialogue between the authorities and these migrants' associations. Furthermore, only very limited initiatives exist to include non-natives in consultations on local development. In this sense, they find themselves excluded from the planning of key public services or the necessary socio-economic infrastructures, despite the fact that all migrants' communities are economically active. Neither is the question of land rights discussed in the case of internal migrants. However, land governance is of critical relevance in a context of high demographic growth and migration. Newcomers often lack the necessary knowledge, and the usage



Migration dynamics in Benin.

rights they may perhaps acquire can be precarious. Under such pressures, the potential for conflict over land rights is evident in the medium term.

### ■ ... and preparation and support

In addition to receiving migrants, the Borgou is also characterised by an important movement of departure of its youth for seasonal migration. According to first surveys, more than one out of ten young people migrate, mainly to neighbouring Nigeria. Young men go to work in agricultural plantations, while young women are less numerous and very often employed in restaurants and for domestic works. This migration happens in a relatively spontaneous manner, often without much dialogue at household level and preparation. Young migrants leave with limited knowledge about their destination points, payments, working and living conditions, which in reality often turn out to be very harsh. They travel without any identification document. Informal intermediaries (called "waga" = the guide) play a critical role in structuring this corridor, both in recruiting and ensuring border crossing. As things are at the moment, this stream of seasonal migration creates few long-term benefits. Their limited knowledge and preparation makes these young migrants vulnerable to employers and intermediaries when and after crossing the border. Furthermore, there is no reflection on how migration may be integrated in a longer-term personal and household development process. While programmes are in place to fight against child trafficking, there is no intervention supporting young migrants in reflecting on and preparing for migration.

### ■ Support local capacities and promote inclusion

Helvetas' objective is neither to encourage nor to discourage migration. We understand migration as a livelihood strategy available to individuals and households. We further see its role in reducing the potential costs

and supporting the benefits resulting from these (self-chosen) development strategies. Migration patterns also need to be properly taken into account when designing development initiatives.

A first intervention axis of the pilots concentrates on governance and inclusion of migrants into local development. The objective is to support local capacities for an improved understanding of mobility's implications and for dialogue between local authorities and migrants' associations. On the one hand, the project supports municipalities in gaining an improved understanding of their migration context and their related duties in the light of national legislation and the ECOWAS principles. It also supports the establishment of communication channels with non-native communities.

In parallel, the project has tested approaches to support migrants' associations for effective use of and participation in the consultation mechanisms. In this case, two associations have been given institutional and thematic support based on their expressed priorities in order to improve their functioning and ability to participate in local development. The set-up and practice of communication channels have allowed increased mutual understanding of each other's role and expectations. This has also led to the identification of priority issues for collaboration, such as land rights and governance. As stated before, constant demographic growth and continued migration will increase pressure on land. It is therefore critical to inform on applicable legislation and available options for securing land rights to prevent a rise in conflicts over land. In collaboration with the national farmers' union, *Synergie Paysanne*, Helvetas is for instance active in the vulgarisation of the procedures of the new land code and involves all relevant stakeholders: the farmers without land, the landowners and the local public and traditional authorities. It further supports communities in formalising their renting agreements so that if nec-



essary, they can serve as a basis to resolve conflicts.

### ■ Promote safe migration

A second axis of intervention concerns community dialogue and preparation for safe and beneficial migration of the youth to Nigeria. Given the scale of seasonal migration to the country but also the challenges young migrants face through the different stages of the migration cycle in particular when 'in-service' and when returning, we have developed a two-step approach for first informing communities and potential migrants on the implications of migration, their rights and obligations and secondly helping candidates experience migration as a safer and more beneficial venture. The first step thus consists in a dialogue with rural communities on mobility. The exchanges include reflections on risks and possible alternatives. The test phase showed that it is possible to create a climate of confidence that allows a discussion on this sensitive topic at household level. The methodology further enabled identifying and entering into dialogue with young candidates for migration. This bilateral dialogue constitutes the second step of the approach and leads to discussing the 'personal project' of the migrant and its objectives. Nearly half of the participants confirm their

choosing for "departure" and attend preparation training with modules on agricultural training, salary negotiations, but also more general issues such as hygiene or health. Young adults interested in alternatives to migration such as skills training are registered in training centres after passing the entry test.

### ■ An initial stocktaking

Migration is almost a 'defining' trend for West Africa, and will remain a prominent dynamic, considering for instance its demographic growth or its exposure to climate change. Human mobility impacts on local economic but also on social and political equilibria and processes and thus cannot be avoided in policy design. The pilot activities conducted so far have confirmed the multiple dimensions of mobility in the department of Borgou but also a range of missed opportunities for development, risks and potential influence on local conflicts. While they contribute to economic life, migrants' communities are often invisible in local governance and development plans. Land rights emerge as a key issue for local governance in migration-prone areas such as the department of Borgou. There is an important potential in community dialogue and offering support to the preparation of young migrants intending to go to Nigeria. The extent to which the proposed approaches effectively contribute to a more beneficial migration experience and increased returns for personal and community development still needs to be analysed.

Finally, these pilots have once again underlined that a 'migration lens' should be mainstreamed in the region and mobility systematically be taken into account in the design of policies and interventions. In this respect, the pilots have already shown concrete linkages to be made in the fields of good local governance, education and vocational skills trainings and rural economic development.

For further information, see:

➤ [www.rural21.com](http://www.rural21.com)



# Infrastructure for Zambia's rural areas

China's engagement in Africa is viewed negatively by many. However, it does have numerous benefits for the rural population, our author maintains.

Chinese companies have made valuable contributions towards the development of rural areas in Zambia most of which are in need of infrastructure. They are involved in constructing health posts, schools, roads, hydro-power stations and other infrastructure following decentralisation and the creation of several districts, mostly in rural areas, by the ruling Patriotic Front government since 2011. Among new districts benefiting from infrastructure development is Nsama, in the Northern Province.

Nsama used to be a village without any infrastructure until it was turned into a district in 2011. Its first boarding secondary school is now being built by the Chinese company Jiangxi Zhongmei Engineering Group at a cost of 43 million Zambian Kwacha (about 4.2 million US dollars). The school will have 59 blocks including classrooms, hostels for pupils, an ablution block, a kitchen and a dining hall. The design of the school includes 27 modern staff houses for teachers. While the company employed about 100 locals, construction initially stalled due to a shortage of skilled bricklayers among Zambians. Professionals were therefore brought in from China and from urban areas in Zambia. The school, which has been financed by the Zambian government, is expected to be completed by the end of this year.

According to the United Nations Children's Emergency Fund (UNICEF), around four million of Zambia's 16-million-plus population are of primary school age. However, over 250,000 of them do not go to school, while more than 45 per cent of those enrolled in primary school do not complete basic education. The situation is worse for girls, especially in rural areas where there are long distances between settlements and schools. To address the problem, the government has made seven-year primary education free-of-charge. It is also having new schools built by Chinese firms, particularly in rural areas and newly-created districts, to take state resources to the grassroots.

Zambia is grappling with child marriages and teen pregnancies, especially in rural areas, which are forcing girl students to leave school even if their families have financial resources. According to Ministry of Education statistics, over 16,000 Zambian schoolgirls be-



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came pregnant in 2015, a rise from nearly 15,000 in 2014. However, the number could be higher because the ministry's figures are only for students in school.

The new schools, especially the boarding schools in rural areas, offer several benefits, as observed by one resident. "Most of the people here are poor and are forced to send their children to other districts such as Kaputa and Mporokoso for secondary education," explains Lawrence Chilonge, who works as a committee clerk for Nsama District Council. "This means that when the school is completed, transport costs will be reduced for the families of prospective pupils."

Nsama is surrounded by Lakes Tanganyika, Mweru wa Ntipa, Mweru and Chishi, which will give an incentive to farmers to supply the new school with rice grown there owing to abundant water. Fishermen will thus make a living by providing the school with proteins.

The energy sector is another example of involvement of the Chinese in rural development. The Chinese state-owned Sino Hydro Corporation Limited is building the 750-megawatt Kafue Gorge Lower Hydro-power project in rural Zambia in Chikankata in the Lower Zambezi. The company has announced that it will establish a training school at the project site to give three months' training to employees. The project, which is valued at 2 billion US dollars (USD) and has a capacity of 5 x 150 megawatts, is expected to be completed in 2018, having been commissioned by government recently. It is an example of China-Africa co-operation in which rural people in Zambia will benefit and 5,000 workers are employed. The Zambian government will provide 15 per cent of the project cost, while the remaining 85 per cent would be provided through debt financing by China Exim Bank and the Commercial Bank of China.

Construction by the Chinese has a long history in Zambia, going back to the 1970s when the Asian dragon built the 1,860 km Tanzania-Zambia Railway Authority (TAZARA), which connects several rural districts between Tanzania's Dar es-salaam Port and Kapiri Mposhi town in Zambia. It was China's first and largest single foreign-aid project in Africa. The Asian dragon was well received by Zambia's first President Kenneth Kaunda, and Chinese assistance for Africa, co-ordinated through the Forum for China-Africa Co-operation (FOCAC), has since increased, with several areas set to benefit. Assistance through FOCAC was pegged at 20 billion USD in 2012 and tripled to 60 billion USD in 2015. With abundant funds, the Zambian Government seeks to have new projects implemented especially in infrastructure development, broadband communication and rehabilitation of the existing railway network.



*Drying of the sisal fibre in the sun.*  
Photos: J. Boethling

# An East African comeback

Until the late sixties, Tanzania was the world's leader in sisal production. But the advent of synthetic fibres brought about a collapse of the industry that it took very long to recover from. Now cultivation and processing of this natural fibre, which is both environmentally friendly and used in a wide variety of areas, is experiencing a new upswing in northern Tanzania.

Damien Ruhinda is a true phenomenon. After leaving the state Tanzania Sisal Authority 25 years ago, he bought an abandoned sisal plantation at the foot of the Usambara Mountains in northern Tanzania at a low price. Weeds were thriving on the 1,750 hectares of land that he had acquired, many of the agaves were old, going to seed and no longer of any use for natural fibre production. Now more than 300 staff are cultivating and processing the thorny, green leaves of *Agave sisalana*, the fibres of which surround the vascular tissue in the pulp and were once referred to as "Africa's blond gold".

"Yes, sisal really is tough," says 80-year-old Ruhinda in his little office at D.D. Ruhinda & Company Limited in Tanga. His mobile is buzzing on his desk; his son has sent him an SMS from South India, informing him about new contacts to Indian carpet manufacturers. "First of all, I must emphasise that sales are not a problem; production is the real challenge," Ruhinda explains. But his mission goes beyond his own business ambitions. He seeks to contribute to sisal fibre regaining its past significance. It once used to be Tanzania's most important export commodity.

## ■ Demand is on the increase

However, in order to achieve this, the entire Tanzanian sisal branch, from plantation growing to the downstream processing levels, still has a long way to go. But the present circumstances

are not that bad. International demand for the natural fibre is on the increase again. In addition to the local market, Ruhinda refers to buyers in the Arab countries, in China and also in Europe, where he is in touch with the Hamburg merchant house Wilhelm G. Clasen. The largest share goes to the Arab countries, where large amounts of the fibre are used as structural material in the plasterboard industry. Further contingents end up in carpet manufacturing world-wide, although demand is also on the increase again in agriculture and shipping after many years of stagnation. For example, shipping organisations in Australia and New Zealand want to have the use of synthetic hawsers banned because they do not rot, which puts a strain on the oceans. With such a ban Down Under, it is hoped that shipping lines will return to hawsers made of sisal, which can be disposed of without harming the environment.

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Tanga is a rather sleepy Indian Ocean port. From here, northern Tanzanian sisal produce is shipped overseas. In colonial days, railway trucks brought the golden fibre to Tanga, but this has long been a thing of the past. Today, it is lorries that carry both the raw fibres and yarn from the plantations and the spinning mills to the port. In addition to Tanzanian actors such as REA Vipingo Plantations Ltd., Chinese and Indian players like Mohammed Enterprises Tanzania Ltd. (MeTL) operate these mills. "Mkonge ni Tanga, na Tanga ni Mkonge," it says in big letters on the signboard still dating back to colonial days on the front of the Tanzania Sisal Board building. Translated from local Kiswahili, this means "Sisal is Tanga and Tanga is Sisal", and it underscores the immense significance this renewable raw material had for the city and the surrounding region in the past.

In the sixties, the sisal trade was still employing 100,000 people, and currently, it is providing 30,000 with an income again. And whereas sisal was still growing on 500,000 hectares of land in 1964, according to Yunus A. Mssika, 173,000 hectares has been planted with sisal, only 43,000 hectares of which is however regularly harvested. "Our efforts are focused on significantly raising this figure over the next few years," adds the young man from the Tanzania Sisal Board, which has a membership of 43 sisal companies. "By 2021, we want to attain a production volume of 210,000 tons again."

Damien Ruhinda puts a damper on being over-optimistic. "The wish is of-



*Farm worker Nuru Waziri harvesting the Agave leaves.*



*The spinning unit at Tancord (1998) Limited. The fibres are subsequently turned into carpets, doormats, cables, ropes, hawsers, nets sacks and yarn.*

ten father to the thought," he says in an old industrial shed that he has rented and in which he intends to set up a new spinning mill in order to raise the company's own value added. "Everywhere in Tanzania, we have a lack of capital," the grand seigneur explains, pointing to the old, used spinning jenny named "Fibre Mackhigh Good Machine, built 1967". He bought it in South Africa only recently. A handful of workers in blue overalls are having a job getting the old spinning jenny

going again. When it is at last switched on for a trial run, it creates a hellish noise in the hall. "It is difficult to get hold of these machines because the decline of the sisal fibre also had an impact on the machine manufacturers", Ruhinda explains. "This means that de facto, there is not a single mechanical engineering innovation in the field of sisal processing, which is why we are forced to resort to tried-and-tested but old technology."

Meanwhile, the machines in the factory sheds of Tancord (1998) Limited on the outskirts of Tanga are spinning incessantly. "We are producing carpets, mats and ropes with a workforce of 250," says general manager Maige Hamisi Maige. "We above all supply the local markets with our products as well as Kenya, Mozambique and South Africa." The company is also keen to export goods overseas. "But this requires innovations to refine the fibres," Maige maintains. "Although it is technically feasible, the conviction that investing in research in this area would be worthwhile still seems to be lacking. The result is that we are stuck at an unchanged level of processing as a leftover from European colonial days." Maige also explains that adding value in sisal cultivation should not be limited to obtaining the fibres. "The fibre accounts for just four per cent of the entire plant. In future, we will have to make better use of the remaining 96 per cent, for example to generate biogas. Extracting agave agents for pharmaceutical industry would also be conceivable. And you can brew liquor with agave juice as well."

processing as a leftover from European colonial days." Maige also explains that adding value in sisal cultivation should not be limited to obtaining the fibres. "The fibre accounts for just four per cent of the entire plant. In future, we will have to make better use of the remaining 96 per cent, for example to generate biogas. Extracting agave agents for pharmaceutical industry would also be conceivable. And you can brew liquor with agave juice as well."

Heading inland for a couple of hours, we get to the Mkumbura Sisal Estate of Damien Ruhinda. Here, many hands lift the freshly harvested sisal leaves from the skip wagons and put them on a conveyor belt that takes them straight to the so-called decortication plant, which is driven electrically via large transmission belts and takes the fibres out. It beats the fleshy, lancet-shaped leaves with iron mallets. As the plants juice runs off through a channel, the golden fibre comes out of the machine on the other side, stacked in rows. Men wearing slippers stand in the frothy plant juice, pick up bundles of fibre and load them onto a wagon. After the fibre bundles have been decorticated, women hang them onto lines at hip-level. The scorching sun then dries and bleaches them in a matter of hours. The fibres are subsequently brushed with a machine that removes dusty plant residues and short fibres, making the fibre as a whole more ductile. Women workers protected from dust by scarves and caps once again comb the short fibres manually so that they can also be made use of. At the end of the process chain, a press turns the fibre material into bales weighing 250 kilograms or 100 kilograms.

## ■ A strictly organised system

“We harvest around five tons a day,” reveals manager Khalidi Mgundo in a plantation area that is set out in squares and symmetrically dissected by transport routes. Manual harvesting is a strictly organised system. The just below two metre tall agaves have a trunk around which 20 leaves are grouped forming a rosette. The rows are planted at intervals of roughly two metres, and plants grow at one metre intervals in the rows. Only the well-practised harvesting workers know which leaves are ripe for cutting. Among them is Nuru Waziri. She holds the knife, which looks like a machete, with a supple hand, skilfully cutting the thorny leaves that are about a metre long. The 35-year-old lays the leaves she has cut on the ground between the rows. In a second step, she picks up 30 leaves and

ties them into a bundle which she then carries out of the rows of plants to the transport route. There, she stacks the bundles into square heaps. One heap of exactly 110 bundles and a volume of one cubic metre will earn her around 5,300 Tanzanian shillings at current wage levels, which corresponds to roughly 2.15 euro. She manages an average of 2.5 heaps a day (in 7.5 hours).

Twenty years after resumption of operation, the sisal stocks of the once state-owned Mkumbura Plantation have recuperated. Even so, many agaves have already passed their yield zenith, which is at around 12 to 15 years. They have to be replaced by new seedlings (so-called bulbils) whose leaves can be cut after a four-year root-taking period for the first time. In order to grow sisal in the long term, manager Khalidi Mgundo has planted around 200 hectares with seedlings. Until the

first harvest, beans and maize are put in the ground between the rows in the Mkumbura Plantation. They yield additional income, and what is more, the harvest leftovers form valuable humus of which there is a lack in many parts of the plantation. “So far, we have been harvesting 1 to 1.5 tons a hectare each year on average,” says Mgundo. “Fortunately, there is no trouble with insect damage, fungus or Korogwe leaf spot disease, and as long as the soil gets a sufficient amount of nutrients and we additionally have enough water, which is not always the case owing to dry phases that have become longer and longer over the last few years, we can even achieve an increase of up to three tons per hectare,” Mgundo maintains, holding high hopes for the future in his Spartan office. He wants to drill wells to permanently secure water supply. Things are on the move again in sisal production to the south of the Usambara Mountains.

## Sisal – some statistics

In the early sixties, global sisal production peaked at almost 2.5 million tons. At the beginning of the seventies, an annual estimated 800,000 tons was still being produced. Then the advent of synthetic fibres such as polypropylene caused the market to collapse. The chief sisal-growing countries, among them Tanzania, cut their production by up to 80 per cent. But after the turn of the millennium, global production slowly rose again, eventually reaching a level of about 230,000 tons, with a slight tendency towards further growth. Setting out from the current price levels and the amounts supplied by the respective producing countries, the world-wide trade value of sisal fibres ought to be at around 300 million euro a year, according to the German hardboard expert Oliver Reimer-Wollenweber.

Currently, Brazil is the leading producing country, turning out roughly 85,000 tons of sisal fibre a year. Further important producing countries include Tanzania, Kenya, China, Madagascar and Mozambique.

## Sisal in Tanzania

In 1893, agricultural engineer Richard Hindorf was commissioned by the then German East Africa Company to bring the first sisal agaves from Mexico's Yucatan via Florida in the USA and Hamburg in Germany to Tanzania. In 1898, the German colonialists harvested the first 600 kilograms, and by the outbreak of the First World War, the amount harvested had grown to more than 11,000 tons. After the war, the British colonialists continued to expand sisal production up to the late fifties. Peak production was attained at 230,000 tons following independence in 1964. Afterwards, it was the triumphant march of synthetic fibres that put severe pressure on the Tanzanian sisal branch, while the expropriation of foreign sisal plantation companies did not bring about the economic developments reckoned with as a result of ujamaa, an African version of socialism declared by the country's then President Julius Nyerere. On the contrary, the productivity of the state-run sisal plantations declined dramatically, and many were shut down. Reprivatisation of the plantations after Tanzania had once and for all abandoned socialism in the early nineties resulted in a tedious and thorny U-turn, with rock bottom reached in 2000. Since then, annual production started to grow again, and by 2015, it had once more attained the level of roughly 40,000 tons.



Women at the water distribution point of the irrigation canal in the village of Samuti.

Photos: J. Boethling

# Protection is possible

The climate phenomenon El Niño has caused Africa's eastern and southern regions to suffer from extreme drought this year. Smallholders are particularly hard hit by failed harvests. But simple irrigation systems can prevent this, as an example from Malawi demonstrates.

This year, Africa has been hit by what could be the worst drought of the century. Dryness prevails from the Horn of Africa all the way down to South Africa. There, as well as in Mozambique, Zambia, Zimbabwe, Namibia and Malawi, this is already the second year with too little rain. In addition, parts of East Africa are having to cope with severe floods that destroy harvests and fields. Here, the El Niño climate phenomenon, which leads to extreme shifts in weather patterns every two to seven years, has struck double. This is why staple food prices have even risen strongly in South Africa, a major agricultural producer, which is inhibiting the country's capacity to export vital food supplies to

its neighbours. Alone in Southern Africa, the provision of food for 28 million people is threatened. Some of the countries in the region have therefore declared a state of emergency. Small subsistence farmers and their families are especially severely affected by the extreme weather. If one of their harvests fails, hunger will soon be knocking at the door.

## ■ Resisting climate change

However, simple irrigation systems can be a help in this situation, as a visit to smallholder John Chimwayi in the village of Samuti in southern Malawi demonstrates. It is an important day for the 56-year-old. The farmers take turns irrigating their fields, and it is his turn twice a week. With a plug made of straw and clay, he blocks the basin in the canal, along which the water flows, making a gurgling noise. The precious resource soon builds up,

and John Chimwayi diverts it to his field with a pipe. "This is the nicest part of the work," he comments. The smallholder smiles as he watches the water making its way down the slope through the small gullies and furrows that he has dug into the field with his hoe. The dusty soil around the plants gradually darkens.

This is how John Chimwayis' beans and tomatoes get enough water even though the rain everyone has been hoping for is taking time to come. Things used to be much more difficult. The irrigation system in John Chimwayis' village was only introduced two years ago. "Life used to be very tough for us before the system was built," he recalls. "Several weeks a year, we would only have one or two meals a day. And they consisted entirely of our Nisma maize porridge." John Chimwayi could only plant and harvest maize once a year – and the harvest was never certain.

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Eighty per cent of Malawi's population live on agriculture. Most of them are smallholders. Especially in the densely populated South of the country, the fields are particularly small, and are usually no bigger than a small allotment garden. But the survival of families with many members depends on them. Whether the farmers can bring in a harvest that the people can make it through the year with is a question of rainfall. More and more frequently, the rain is only light, or it comes too late. Or extreme downpours wash away the entire topsoil of the slopes with its seed and seedlings. Then people are threatened by malnutrition – or even have to go hungry.

"This used to be different," says John Chimwayi, who grew up in Samuti. His father also fed the family with his small farm. "The rain would always come in September or October." John folds his arms. "Now it keeps us waiting until November or even December." But this has not led to losses or failed harvests since he and 80 other farmers in the village were linked to the new irrigation system. On the contrary, they have all stepped up production and thus very much improved their living conditions. For example, irrigation can enable up to three maize harvests a year.

## ■ Improved food situation

Instead of only growing maize, as in the past, John Chimwayi now has additional crops of tomatoes, beans, peas, Chinese cabbage and many local varieties of vegetables. "Now I can eat as much as I want," he says. His family often used to be ill. John Chimwayi and his wife Elinet were too weak to work in the fields. Their children suffered from diarrhoea and were constantly absent from school. "Now the youngest one is getting on very well," the farmer remarks, and adds that the other two children have since completed school education.

John Chimwayi can buy what he does not grow himself at the market, where he above all earns money selling his tomatoes. Once or twice a



*Farmer John Chimwayi sells his products in the market in Bvumbwe.*

week, the menu consists entirely of meat or fish, eggs and fruit. "We are really thriving!" exclaims Elinet Chimwayi. Together with her husband, she starts going along the rows of tomato plants to remove little shoots from the stalks. "That strengthens the plants, and then they carry more fruit," says the 47-year-old. She planted the tomatoes in August, in the middle of the dry season. "They particularly need a lot of water at the beginning," she explains. Now she and her husband will soon be able to start harvesting. "If everything works out well, each plant will be bearing fifty or sixty tomatoes," the farmer maintains. In all, this could earn the family up to the equivalent of nearly ninety euros. This is spent not only on food but also on school fees for their daughter, which amount to 30 euros a year. Elinet and John Chimwayi have bought a couple of goats and a pig as a sort of four-legged savings bank as well. "If we need money, we can sell an animal," says John, squinting as he looks across the hills. The sun has reached its zenith, and the baked landscape is only interrupted by green spots along the irrigation canals – the little fields of the smallholders.

Upstream from the fields, a small river has been dammed with a weir for the irrigation system. From there, the water flows along the canals with a

sufficient level of pressure. At the weir, women are doing the washing and cleaning pots, and children are splashing about in the water. John dampens his face and watches the scene. "We used to dam the river with sandbags, and we scooped the water out with watering cans that we then used to water the fields," John explains. This was painstaking and time-consuming work that he now no longer needs to do. Instead, John Chimwayi wants to cultivate even more land. And he is saving up to buy building material. He wants to build himself and his wife a bigger house at the farm. He already has a corrugated iron roof and a pile of fired bricks. He then wants to save up for a small motorbike. "I could use it to take my vegetables to the market or earn a little extra carrying goods for other people," he explains.

## ■ Ownership in practice

With the support of Germany's "Brot für die Welt", the non-governmental organisation Churches Action in Relief and Development (CARD) set up four irrigation systems in the region. Around 630 households are linked to the systems. "This number has to be multiplied by a big factor," says CARD's Director, Melton Luhanga. First the families are big, and several generations live on a sin-

gle farm. And secondly, the village inhabitants who are not linked up with the system also benefit from it. They can buy fresh vegetables or maize from their neighbours. Moreover, the increased income of the smallholders is often spent in the village, at the shop around the corner or at local artisans'.

John Chimwayi and the other farmers readily joined in with building the weir and the canals. They brought sacks of sand and cement, bricks and other building material and helped dig the foundations and the ditches. "This has made me very familiar with the system, and I know how to repair it or get rid of blockages," John Chimwayi says. The group of farmers participating in the irrigation system meet regularly to discuss what has to be seen to and who is allowed to irrigate on which days. "This works very well," maintains Pedro Rison, who looks after the field next to John's. "There is enough water for everyone." The farmers even plan to start a co-operative, for example to join up to sell their produce. There has never been any problem with Pedro being a Muslim and John a Christian. The village's different religious communities even bury the dead together in one cemetery. "We humans are all equal," says Pedro Rison, and John Chimwayi nods in approval.

"By taking part in installing the irrigation system, the users identify with the scheme," says Melton Luhanga. "And they are very familiar with this simple technology, so that they can carry out most of the repairs themselves. For instance, when heavy rain destroyed part of the weir at the beginning of the year, they immediately started to set it up again."

Even in the dry season, there is really enough water, in the rivers, the lakes or the waterholes that the smallholders have dug close to the rivers. But it is very difficult for them to make use of these sources without an irrigation system. In order for



*Esnart Miles in her maize and tomato field. Irrigation gives her the chance to have a healthy diet and to sell her surplus products on the market.*

them not to run short of the precious natural resource, the smallholders plant trees along the river and at its source, mainly mangos and bananas whose fruit they use. They also plant various varieties of forage grass as well as *Gliricidia Sepium*. This tree, with its feathery leaves, is a jack-of-all-trades. It offers shade, provides the soil with nutrients and loosens it with its roots. And if dung is added, the leaves can be used as a fertiliser into the bargain.

## ■ HIV/Aids is part of daily life

The new irrigation system in Samuti also offers protection to the weakest members of the community. "This work really wears me out," says 55-year-old Esnart Miles, putting the hoe down that she has carved furrows into the red soil with. For three years, Esnart Miles has been aware that she is HIV-positive. She gets medicine free of charge and feels alright given the circumstances. "After the diagnosis, I was almost relieved. I used to feel re-

ally awful and didn't even know why," she says. When her husband left her five years ago, he probably already knew that he was carrying the virus. He didn't tell his wife anything about it. He wanted to go to the capital, Lilongwe, to get a job. That was the last she heard of him, and she declares: "If he came back now, I would chase him off."

Thanks to the irrigation system, there have been many changes for the better in Esnart Miles' life. She can now look after her family and take care that she eats healthy food, such as the leaves of the marrow or indigenous medicinal herbs that also grow in her field. "I'm a fighter," she says and gets up to start irrigating. Some women drop by to say hello. Esnart Miles is not ostracised. HIV/Aids is often discussed, also at the meetings of the committee of farmers linked to the irrigation system. "Here, people don't see the disease as a punishment you deserve for a sinful life. Neither do they believe in any other rubbish," Esnart Miles says.

Back home, the farmer prepares dinner together with her daughter. They sort beans they want to cook with tomatoes and the leaves of some local vegetables. Of course Nsima will be served together with them. Soon her two grandchildren come up the dusty path, which looks as if the mid-day sun has baked it. School is out, and the children are very hungry. Esnart Miles stirs the pot over the wood fire with a wooden spoon. In a calm and friendly manner, she explains that the children will still have to be a little patient. Then she sits down on the veranda in front of her little house to have a rest.

A cactus growing next to her house towers several metres over the roof. Many people living in the villages believe that this plant shields them from evil. So does Esnart Miles. But it is in fact she herself who protects her family. And here, the irrigation of her field is a great help.

## Organic farming is the name of the game

Many years back the government of Sikkim – a small north-eastern Indian state in the Himalayan mountain region – had conceived the idea of going completely organic. Early this year, the project was put into practice. It remains to be seen whether the scheme is going to pay its way for the farmers.



*There are roughly 6,000 certified organic farmers in the small north-eastern Indian state of Sikkim, with its just over 76,000 hectares of farmland.*

*Photos: A. Parvaiz*

In 2003, the government of the Indian state of Sikkim passed a resolution in the state assembly and enacted the policy of transforming Sikkim into a complete organic state. There were well-founded reasons for this. The hilly state in eastern Himalaya has a difficult terrain, and with its just over 76,000 hectares of farmland far less cultivable land compared to other agricultural states of India. Also, its agricultural practices hardly resemble those in the country's other areas, where chemical fertilisers and pesticides form the backbone of farming. Pursuing organic farming as a state policy sparked off a movement and swiftly put the state's organic agricultural movement on a fast track. Cultivation area under organic farming started adding up until it reached to its full capacity by the end of 2015, following a blanket ban on chemical fertilisers and pesticides.

### ■ Change of mindset needed

"It was a matter of patience, but thankfully we ultimately achieved the status of 100 per cent organic farming with the completion of organic certification of all agricultural land in Sikkim," says Dr. S. Anbalagan, the

Executive Director of the Government's Sikkim Organic Mission. Some clear-cut approaches were needed to be adopted in Sikkim considering the various advantages and disadvantages as well as the prevailing scenario of fertiliser and pesticide consumption all across India. "We had to discourage the use of artificial fertilisers and pesticides and had to substitute chemical inputs by organic manures and fertilisers and biological plant protection measures," he adds. "And we also had to initiate the establishment of basic infrastructure and statutory requirements to effect the actual organic farming process in the absence of a national policy, standards, accreditation, certification and marketing systems."

In recent years, a number of studies have suggested that massive use of chemicals has not only degraded Indian farms, water bodies and ground water, but has also caused harm to human health. A study carried out by doctors in the northern state of Jammu & Kashmir has revealed that the use of pesticides showed direct links with growing incidence of brain tumours in parts of the state where pesticides are extensively used in orchards. "Analysis [of the results of the study] revealed that 90.04 per cent (389 out of 432) patients were orchard-farm workers, orchard residents and children playing in the orchards who had been exposed to the high levels of multiple types of neurotoxic and carcinogenic

chemicals, sometimes for more than 10–20 years," the study revealed. Scientists have often been critical about the use of chemical fertilisers and pesticides in India. "Before the Green Revolution, we were importing the bulk of grains, and now we are importing fertilisers and chemicals in enormous quantities," says Om Rupela, a former scientist with the International Crops Research Institute for the Semi-Arid Tropics, Hyderabad.

### ■ Creating new value chains

On January 18<sup>th</sup> of this year, India's Prime Minister, Narendra Modi, himself officially announced Sikkim becoming 100 per cent organic while inaugurating the Sikkim Organic Festival in the state capital, Gangtok. "If the experiment succeeds, farmers in other places will follow it on their own. Farmers may not be influenced by any amount of lectures by scientists ... For them, seeing is believing," Modi said. Later, in a radio-talk, the Prime Minister highlighted the idea and contribution of two young alumni of the Indian Institute of Management Ahmedabad (IIMA), Anurag Agarwal and Siddhi Karnani, whose business venture 'Parvata Foods' has started making a big difference to the lives of Sikkim's organic farmers. "Ours is the first company which is building integrated value chains for the organic produce of Sikkim farmers. We are also packaging and branding their produce, thereby

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eliminating non-value added middlemen at multiple stages, which is helping to elevate their living standards," says Siddhi Karnani. Parvata's primary products are ginger, turmeric, buckwheat, chilli, pineapple and mandarin. The two young entrepreneurs teach the farmers modern agricultural practices to increase productivity and profitability. "We tell them very simple things such as not to grow ginger on the same track each year but use the beds alternately. We also recommend using raised beds instead of flat beds for cultivating ginger," Siddhi Karnani states. The prices the farmers get for organic produce are at least 20 per cent higher than those of non-organic products.

## ■ Hope for rural youth

According to S. Anbalagan, everything is in place for taking organic farming in Sikkim to new heights. "Now all the necessary groundwork has been done. People, especially the youth of the country, only need to exploit this situation to create employment opportunities for themselves and capital for the state," Anbalagan says. Renzino Lepcha, Chief Operating Officer of Mevedir, an agriculture company which provides services to Sikkim farmers through the Sikkim Organic Mission, fully agrees: "Thanks to the recent budgetary announcement in the union budget and the declaration of Sikkim as a complete organic state, more opportunities will come up in the employment sector as infrastructure will now be taken care of with the advent of more resources." According to Lepcha, younger people had mostly shifted to urban areas. However, with organic farming opportunities, some are returning to farming with big hopes. But more lucrative ways have to be found to attract the youth. "On-site value addition to crops and products and more work towards developing high value low volume products like large cardamom will give better opportunities in Sikkim," he said and added that tourism was a big money spinner in Sikkim, but that value addition with organic farming would make it an even better alternative.

The Sikkim government has already identified a few crops like ginger, large cardamom, buckwheat and turmeric as unique products of Sikkim which have a huge demand. "We don't have that much land area. So, we have to produce unique things which are of high value. That is why we are targeting these crops," S. Anbalagan says. He sees a good possibility of the entire north-east Indian region becoming a hub of organic farming. "All the states in the north-east have a similar topography and all of them have mostly been doing traditional farming, which means that for them, the transition to organic would be quite easy," he says and adds that they are getting visitors from the neighbouring north-eastern states to learn about organic farming practices.

## ■ Transport and marketing are crucial factors

The state of Sikkim supports its farmers in several areas, ranging from financing inputs such as seeds and organic fertilisers to the setting up of input production facilities such as vermicompost pits and rural compost pits. The government has also been bearing the cost of organic certification of all the farmers in the state. One of the major challenges for the roughly 6,000 certified organic farmers as of now is transporting the produce to the markets. "It is very difficult to deal in fresh produce especially as we are landlocked and have no rail or airport connectivity. The risk factor is quite high as there are no proper facilities, no cold chain, no refrigerated vans, no processing unit – no food park, no packaging material – everything comes from outside the state," says Renzino Lepcha. Further challenges



*India's Prime minister Narendra Modi taking a look at products in Sikkim's Organic Market after declaring Sikkim fully organic in February this year.*

include pests and diseases of certain cash crops like ginger and cardamom, but also issues regarding timely supply of organic pesticides and bio-fertilisers and irrigation problems in some areas.

Presently, the majority of the organic vegetables and fruits find their market within Sikkim. "Although there are markets for organic products outside the state, such as in Delhi or Mumbai, we are not able to cater to them because our products do not become competitive as a lot of cost is involved in transportation to these faraway markets," Government representative S. Anbalagan explains. "There is a huge export market potential. However, there is no marketable surplus produced in the state." To remedy this, the Department has come up with the above-mentioned strategy to produce a limited number of crops with a sufficient volume and of high value.

In spite of the numerous obstacles, S. Anbalagan remains optimistic and explains that efforts are being made to address most of the issues – building processing plants for value addition, creating cold-storage facilities everywhere in the state and getting the region connected to the rest of India for speedy transportation of produce to markets. However, this will take some years as a lot of research needs to be carried out, he concedes: "As I said, we need to fix many issues on the technical side. But in other respects, we are making a good progress."

## Ebola vaccine: phase 1 study promising

The outbreak of Ebola virus disease in 2014 was declared a public health emergency of international concern by the World Health Organisation (WHO). In August 2014 the Canadian government donated 800 vials of the replication-competent recombinant vesicular stomatitis virus (rVSV)-vectored Zaire ebolavirus (rVSV-ZEBOV) candidate vaccine to the WHO.

In late 2014 the VSV Ebola Consortium (VEBCON) was created under the auspices of the WHO to initiate phase 1 studies of the rVSV-ZEBOV vaccine to facilitate rapid progression to phase 2 and 3 trials in affected countries. When presenting the study in May, Dr Marilyn Addo, professor of infectious medicine at the University Medical Centre Hamburg-Eppendorf, explained that the antibodies formed against the virus were still demonstrable even after six months. "This means that a one-time vaccination should provide lasting protection against Ebola," Addo believes. A total of 158 healthy adult volunteers were tested at Hamburg (Germany), Geneva (Switzerland), Lambaréné (Gabon) and Kilifi (Kenya).

The vaccine used is an attenuated genetically modified vesicular stomatitis virus carrying a surface protein of the Ebola virus. The immune system of the vaccine recipient is to form antibodies which help prevent the disease



Team members of the WHO Ebola vaccine trial, at work in Katongourou, Guinea.  
Photo: WHO/S. Hawkins

in the event of contact with the Ebola virus. The scientists tested the vaccine's safety, tolerance and immune response in humans for the first time. The study shows that in all the subjects the immune system was stimulated to form antibodies specifically against the Ebola surface protein. The results of the work are now being used in further

studies employing the identified optimal dose, and are particularly looking at children. The vaccine has already been tested in Guinea in a major study, where people who had been in contact with Ebola patients were vaccinated. The Food and Drug Administration's (FDA) approval is sought by the start of 2017. (wi)

## New mega initiative to transform agriculture in Africa

More than 200 leading research and development partners and experts have met at the International Institute of Tropical Agriculture (IITA) in Ibadan, Nigeria, in April, to discuss a new initiative known as "Africa Feeding Africa", or the Technologies for African Agricultural Transformation (TAAT) programme. The TAAT programme aims to eliminate extreme poverty, end hunger and malnutrition, achieve food sufficiency, and

turn Africa into a net food exporter as well as set Africa in step with global commodity and agricultural value chains.

Modernised, commercial agriculture is seen as the key to transforming Africa and the livelihoods of its people, particularly the rural poor. To carry out these objectives, the African Development Bank (AFDB), working with IITA and other partners, has iden-

tified eight priority agricultural value chains relating to rice sufficiency, cassava intensification, Sahelian food security, savannas as breadbaskets, restoring tree plantations, expanding horticulture, increasing wheat production, and expanding fish farming. The Forum for Agricultural Research in Africa (FARA) and the CGIAR Consortium and twelve of its 15 international agricultural centers active in Africa support this initiative. (wi)

## Cassava genome unravelled

A team of international scientists that has been studying DNA sequence information from cassava varieties grown all over the world has provided clear evidence on the ancestry of cassava. They have also published a high-quality genome assembly of the hardy crop.

Cassava is a very important food staple in sub-Saharan Africa, yet its yield and quality are compromised by two damaging virus diseases: cassava mosaic disease (CMD), causing disfigurement, curling, and yellowing of leaves, and cassava brown streak disease (CBSD), causing severe browning in the storage roots. According to a press release of the International Institute of Tropical Agriculture (IITA) in Ibadan, Nigeria, the new DNA sequence resources will help scientists develop varieties that are resistant to these virus diseases.

its wild relatives, and given insights into its population structure. It is expected that this will accelerate progress in basic biological research and genetic improvement," says Morag Ferguson, Molecular Geneticist at IITA.

The study also provided clear evidence to support the hypothesis that cassava was domesticated from a wild species, known as *Manihot esculenta* subspecies *flabellifolia*, in the western part of the southern Amazon region in Brazil, and went through a "genetic bottleneck", restricting the amount of genetic diversity in cassava. This reduction in genetic diversity, especially in Africa, was a result of the use of a limited number of parents in the development of new varieties. This is important knowledge to guide breeding decisions to restore lost variation. "We are excited about the results of this study. As a clonally propagated



*The DNA sequence information will support efforts to provide farmers with high-yielding varieties resistant to diseases.*

*Photo: IFPRI/M. Mitchell*

The international research team sequenced 58 wild and cultivated cassava varieties, including related species such as Caera or Indian rubber (*Manihot glaziovii*), and genotyped 268 African cassava varieties. "The development of genomic resources, such as this chromosome scale reference sequence, has increased understanding of the genetic diversity of cassava and

crop, genetic improvement of cassava through conventional breeding is a complicated and lengthy affair. Therefore, understanding the genetic diversity of cassava and its wild relatives will support genome-enabled breeding efforts," says Peter Kulakow, Head of IITA's cassava breeding programme, based in Ibadan, Nigeria. (wi)

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