

# RURAL

# 21

The International Journal for Rural Development

4 | 2018  
VOLUME 52

## RURAL-URBAN LINKAGES

Synergies, threats and limitations



### HEALTH, ENERGY AND FOOD SYSTEMS

Looking at the flows

### VIETNAM

How consumers can contribute  
to sustainable production

### INSECT ALLIES

Spreading genetically modified  
viruses to crops

**DEAR READERS,**

By 2050, two thirds of the world's population are expected to live in cities. The United Nations New Urban Agenda implies changing diets and thus the need to include sustainable food systems for the cities. So the rural areas have to transform in parallel. Secondary cities are growing enormously in the rural areas and play a crucial role in coping with waste management or wastewater treatment and other problems that are arising. Spatial regional planning approaches have to be adjusted to take rural and urban development into account in parallel.

Do rural surroundings really feed urban areas? And what about other flows such as cash in form of remittances, or the dynamics of geographical closeness which can lead to health risks? Land and resource conflicts may arise when cities are growing, and the demand for goods and services is changing production in the rural areas. Do such linkages pose an advantage or a threat?

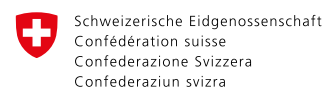
We concentrated on the topic in the 2005 edition, "urban-rural relations", and again in the 2008 edition, "urban-rural bias". While the previous editions provided best practices of instruments used in the European Union amongst case studies from the Global South, this time, we have opted for solutions from the South. This edition provides advices and examples of best practices as well as failures to bridge the gap between rural and urban regions.

Following Silvia Richter's announcing in issue 2/2018 that she would be passing on chief editorship, I would now like to introduce myself as her successor. Having studied Agricultural Science and Economics, I gathered experience in international development co-operation. Project acquisition and management provided me with insights into agriculture, rural development, forestry, climate change and natural resources management in an international context. After working as a project manager with frequent business travels and short-term missions to Namibia, Malawi, Tanzania, Kenya, Swaziland, Sierra Leone, Ethiopia, India and Morocco, I joined the Rural 21 editorial team at the DLG-Verlag in 2018, and became Editor-in-Chief in July.

We wish you inspiring reading.

Sincerely yours,

Daniela Böhm

**Partner institutions of Rural 21**

Direction du développement  
et de la coopération DDC



Photo: Tobias Feldt

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Photo: Tobias Feldt



Photo: Stéphanie Domptail



Photo: Jennifer Provost

## ACCELERATING THE END OF HUNGER AND MALNUTRITION



Official opening session of the conference.

Photo: Daniela Böhm

The number of people suffering from hunger in the world rose to 821 million in 2017 from around 804 million in 2016, the United Nations Food and Agriculture Organization (FAO) states. While two billion people are under micronutrient deficiencies, obesity affects 500 million adults. To achieve Sustainable Development Goal 2 – ending hunger and malnutrition in all its forms by 2030 – and discuss appropriate solutions, the FAO and the International Food Policy Research Institute (IFPRI) jointly organised the conference “Accelerating the End of Hunger and Malnutrition” which took place in Bangkok, Thailand at the end of November. More than 450 participants representing around 60 countries attended the global event.

During the three-day conference, the overall challenges and needs addressed by SDG 2 were defined, and different Asian and African countries shared their experiences, while appropriate accelerators in food systems were presented.

Rwanda’s Minister of Agriculture and Animal Resources, Gerardine Mukeshimana, explained that food security in Rwanda had improved from 65 to 82 per cent during the previous twelve years. Aspects related to this were a people-centred political leadership commitment as a key driver, clear planning, a high level of accountability, a focus on young people and co-operation with the private sector to scale up.

The Deputy Minister of Agriculture and Forestry of Lao PDR, Phouang Parisak, added:

“You cannot treat hunger and malnutrition isolated from poverty. Short and long-term solutions are necessary.” Laos, one of the least developed Asian countries, with more than 140 ethnic sub-groups and different diets and nutrition patterns, can benefit from forming food systems that are adapted to climate change. “It takes time and patience to adopt the system and achieve results,” said Parisak.

### 21<sup>st</sup> CENTURY COSTS FOR FOOD ARE RELATED TO ILLNESS

“We need to work closely together more than ever, sharing with each other those successful experiences. If we can accelerate this knowledge exchange, then we can accelerate its implementation and take actions that are more concrete,” said José Graziano da Silva, Director General, FAO. “Hunger and obesity are not simply an individual’s problem. They are public issues. We must accelerate our actions to end hunger and malnutrition. But we also need stronger political will and greater financial commitment to get the job done. Political will is fundamental.”

Participants discussed strategies and approaches from several perspectives such as inclusive acceleration to leave no-one behind, sustainable and healthy diets in the context of climate change, the role of public-private partnerships, promising new technologies, start-ups and policies; leveraging food systems to tackle obesity and overweight; nourishing cities to speed the progress; strengthening resilience in conflict regions and emergencies; tracking progress with new tools and data, good governance from local to global level; as well as how to enhance the return of investment.

“We have the tools, and we have the knowledge to eliminate hunger in the next twelve years,” said Shenggen Fan, Director General, IFPRI. “By empowering key actors in policy-making, research, and programme implementation with those tools and knowledge, we can reach this goal and help millions of people achieve their full potential.”

### HEADING TO TRANSFORMATIVE CHANGE

Finding solutions implies defining the tools linked to them. Hence, an accelerator is a specific technological innovation, policy change

or institutional reform, or often a combination thereof, that leads to transformative change at scale in the sustainable reduction of hunger and malnutrition. Transformative change in food systems requires a transition from a focus on quantity to an emphasis on quality, diversity and safety. Inter-sectoral synergies are essential for sustainable reductions in malnutrition in all its forms.

Turning this into practice and quoting Prabhupingali, Professor and Director of the Tata-Cornell Institute for Agriculture and Nutrition at the University of Cornell, USA, examples of accelerators are to:

- diversify from commodity focused policy to a nutrition-sensitive food system
- seek disruptive technological breakthroughs for enhancing resource efficiency, shelf life, food quality, safety and waste
- adapt new science tools, e.g. big data, ICT and precision farming to small-holder systems
- improve targeting and management of safety net programmes using ICT tools

The conference stressed that over the past decades, the terminology in terms of food security and fighting hunger and malnutrition had been continuously changing, coming from separate views on agriculture, nutrition, health and economic strength to a holistic approach determining that only properly nourished healthy individuals had the viable strength to increase economic productivity of a system.

David Nabarro, Curator for the Food System Dialogues noted that the time and need had come to involve nutrition scientists in the entire food system. Was the term healthy diets more appropriate than food security, tackling food systems more concrete than strengthening only value chains? The terms still had a different meaning, but extending the view to the entire complexity implied increasing the nutrient value per hectare while taking into account that certain amounts of micronutrients would be diminished during food preparation.

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Daniela Böhm

## HOW TO COPE WITH AGRICULTURAL MECHANISATION AND SOCIAL INCLUSIVENESS IN SUB-SAHARAN AFRICA?

According to the United Nations Food and Agriculture Organization (FAO), only five per cent of cultivated land in sub-Saharan Africa is used to be prepared by tractors. Land preparation is mostly done with hand tools, a practice that entails poor productivity, repels youth, and is highly labour-intensive and incompatible with the continent's Zero Hunger goal. But today, smaller and more affordable machinery, such as two-wheel tractor-based technologies, is available, and hiring services using digital technologies can improve agricultural production while tackling social inclusiveness and environmental sustainability, leading to higher profitability. To address this topic, the International Maize and Wheat Improvement Centre (CIMMYT) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) jointly organised a meeting entitled “Regional synthesis and research dialogue on appropriate mechanisation in Eastern and Southern Africa” which took place at the end of October in Addis Ababa in Ethiopia.

Agricultural mechanisation beyond engineering was on the agenda for the first time for CIMMYT, which usually concentrates on intensification and conservation agricultural machinery improvement. A further feature of this learning event was the participation of Green Innovation Centres from Ethiopia, Nigeria and Benin. The workshop aimed to bring together different international organisations to exchange knowledge and define the broader scope for research around appropriate mechanisation as a sound approach. More than 50 participants from eight countries (Ethiopia, Zimbabwe, Kenya, Tanzania, Rwanda, Malawi, Nigeria and Benin) representing national and international research institutes, governments, non-government organisations and donors attended the two-day event.

### TURNING TO SUSTAINABLE AND PROFITABLE MECHANISATION

Social inclusiveness, conservation agriculture and commercialisation were at the focus of exchanging experiences and lessons learnt.

Appropriate mechanisation should be socially inclusive to equally engage youth, women and the poor for wealth creation by generating more job opportunities in the production value chain including processing (post-harvest),



Participants from eight African countries at the learning event in Ethiopia.

Photo: CIMMYT

equal access to land and production means (machines, seed, fertiliser, chemicals and finance) as well as access to markets and the right to decide on their own how to generate and use income. Mechanisation should eradicate the drudgery associated with the poor, youth and female farmers working in the agriculture sector and should reduce the labour burden that usually affects these vulnerable farmer groups.

Conservation agriculture implies appropriate mechanisation in the context of sustainable intensification and climate-smart agriculture while at the same time reducing intervention in the soil structure. The participants discussed the lessons learnt regarding commercialisation and the supply chain network, training and the availability of rural mechanics, workshops and spare parts for identified technologies such as two-wheel tractor-based appropriate direct seeders for row planting with minimum soil disturbance (i.e. strip, minimum and no-tillage) in their countries.

Models and financial schemes that support commercialisation of agricultural machinery from dealership infrastructure development, after-sale service establishment, through import to local manufacturing were discussed, and subsidies, taxes and tariffs from region to country level were explored. Models such as leasing, loans with minimum collateral for individuals, and youth groups and farmers' co-operatives ownership scheme were discussed and reflected so that all country participants could gain experience and build upon their own models to influence their agricultural mechanisation implementation in their respective country.

### ENTERING THE MODERN AGE

Over the next ten years, new opportunities will lie in precision farming and digitalisation. These might be drones, for instance. With an exponentially growing African population, increasing climate change risks and frequent droughts, farmers have to be more resilient, and this especially challenges the poorest ones. In Africa, drones can soon be used beyond being a decision-supporting tool in view of crop production, but as a precise mechanisation tool for specific field operations such as planting and fertiliser or chemicals application through service provision schemes for smallholders in remote areas.

There is a need to advocate agricultural mechanisation in the continent through FAO's Sustainable Agricultural Mechanisation – framework for Africa (SAMA) launched in 2018. Moreover, CIMMYT and FAO will promote their training document “Hire service as business enterprise – a training manual for small scale mechanisation service providers” published in 2018. In addition, identified opportunities need to be promoted to donors and governments. This has to be streamlined and co-ordinated by national and international research institutes. Finally, CIMMYT will develop a policy brief on the promotion of agricultural mechanisation for the African Union member countries.

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Daily market in the town of Kpalimé in Togo.

Photo: Naftali Hilger/Laif

# BETTER FOOD SYSTEMS FOR BETTER RURAL-URBAN LINKAGES

Rapid global population growth is blurring the boundary between urban and rural. In reality, the traditional distribution of roles in agricultural and food production has given way to new structures. Regional planning ought to consider changed livelihoods in order to provide an adequate framework for development and to integrate food systems. A call for transformative change.

By Makiko Taguchi and Guido Santini

In 2007, the world population officially tipped over to be more urban, with the current estimate being 55 per cent living in urban areas. This development is certainly one of the reasons for much of investments in recent decades having had more focus on “urban development”, often leaving the rural population behind. The Food and Agriculture Organization of the United Nations (FAO) has focused its work on “rural development” since its foundation in 1945, concentrating on agricultural development which is considered mostly a rural activity, balancing this global trend towards the urban. But the fact of the matter is that agriculture was precisely the reason urbanisation began thousands of years ago, allowing people to settle in one location rather than having to move around to find food. However, when industrial revolution set in, it changed the rural-urban dynamics. Agricultural production became farther away from where people lived, and thus the image of agriculture being rural evolved.

Currently, urban development typically does not take issues of food or agriculture into consideration. The reason behind this is unknown. Perhaps it is that food is simply taken for granted, as a lot of us do. At any rate, schools teaching urban planning do not have elements of food and agriculture in their curriculum. This lack of food systems in urban planning – or the disconnect between rural and urban – has resulted in various forms of shortfalls: food deserts in inner cities resulting in malnutrition for the urban poor, vulnerability to flash flooding and extreme weather events, ever longer food chains, transportation and logistics challenges, more and more food losses and waste, loss of arable land – the list goes on and on.

## REALITY OF PEOPLE'S LIVELIHOODS NOT TAKEN INTO ACCOUNT

Most development theory and practice is implicitly based on the dichotomy between 'rural' and 'urban' areas, populations and activities.

This has been reflected in urban and rural development, with urban planning usually concentrating on urban nodes and infrastructure such as housing and transportation with little or no attention given to food and agriculture, while rural development has had a tendency to ignore urban centres and define rural areas as consisting only of villages and their agricultural land. The classification that divides people into either 'rural' or 'urban' is often used when policies are being developed but is in fact misleading and unhelpful. Links exist between rural and urban locations in the same way that links exist between people and their activities. This, however, does not reflect the reality of households' livelihoods, which often include both rural and urban elements.

## RURAL-URBAN LINKAGES ARE MANIFOLD

Rural and urban areas exist across a broad “rural-urban continuum”, ranging from megacities and large regional centres to small townships and the rural hinterland. Besides the fact that rural areas were always dependent on cities, that interdependence has become more profound nowadays, also facilitated by greater access to traditional and virtual communications. The nature of these interactions has become more intense, both across space and across sectors – agriculture, industry and services – with important implications for food systems. The urbanisation of rural regions is a central feature of rural transformation. It allows rural households to diversify their sources of employment and income while living and working across a rural-urban continuum. These links are not only key components of livelihoods and of local economies, they are also 'engines' that drive economic, social and cultural transformations.

Rural-urban linkages have been defined broadly as the reciprocal flows of people, goods, services in general, money and environmental services, with many of these linkages

related directly or indirectly to food systems. They can be represented by linkages between sectors (e.g. between agriculture and manufacturing). In addition, rural-urban interactions can include “rural” activities taking place in urban centres (such as urban agriculture) and activities often classified as urban (such as manufacturing and services) taking place in rural settlements. Significant changes happen within food systems that impact rural-urban linkages such as the decline of traditional markets, globalisation of diets and the increasing availability of highly processed food. Smallholder producers and processors, who often rely on nearby urban areas for markets, are increasingly competing with food produced from distant sources, often selling for lower prices. Food systems link rural and urban communities in a region within a country, across regions, and sometimes between continents. Cities and urban food systems play an important role in shaping their surrounding – and more distant – rural areas as far as land use, food production, environmental management, transport and distribution, marketing, consumption and waste generation is concerned.

## BRIDGING THE GAP IN FOOD SYSTEMS

In recent years, this problematic gap is slowly being recognised by urban planners, national and local policy-makers, the development community and consumers. One important turning point was the inclusion of Target 11.A under Goal 11 of the Sustainable Development Goals (SDGs, see Box).

**SDG 11:** make cities and human settlements inclusive, safe, resilient and sustainable

**Target 11.a:** support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning

Following this, the third United Nations Conference on Housing and Sustainable Urban Development (i.e. Habitat III, 2016) adopted the New Urban Agenda (NUA), which further clarifies the importance of rural-urban linkages and the role of food security, nutrition, and food systems for sustainable urban development. One of the objectives of Habitat III was to dive deeper into the “how” to implement the SDGs, in this case with focus on SDG 11, taking into account the inter-connectedness of Goal 11 with other goals. This outcome is leading UN agencies such as FAO, the World Food Programme, the International Fund for Agricultural Development and the United Nations Human Settlements Programme (UN Habitat) to work closer together in an effort to bridge this gap. One example of that is the work being led by UN Habitat on the guiding principles on rural-urban linkages currently in progress.



Loading coconut shells to be transported to urban areas in Tamil Nadu, India.

Photo: Jörg Böhling

## SECONDARY CITIES PLAY A CRUCIAL ROLE

When people hear the word “urban”, it may evoke an image of a large city or a metropolitan area. However, many urban areas in the world are secondary cities, in particular smaller towns and cities. There is no universally agreed definition for the term “secondary city”, although most of the literature agrees that they form part of the order or systems of cities in a country or a global system of cities. Secondary cities play a very important functional role, depending on whether they are considered as part of a country- or global-level system of cities. Secondary cities are thus not primary cities, nor are they likely to be small cities with populations of less than 100,000, but they are everything in between.

Some towns are experiencing decline in population, while others are going through a rapid growth. These towns and cities that are growing are where opportunities lie to include food systems into their urban development. Megacities and large metropolitan areas certainly have their own challenges in terms of food security and food systems, but they tend to attract investments and political attention (most are capital cities) compared to secondary cities. So what we, working in development, need to focus on is the small or secondary

cities where there may still be more “room” for improvement and where there is a need for investments and technical support. Many of these secondary urban areas are agricultural hubs, where primary production or raw materials may be consolidated and processed. Improving connectivity of these hubs with larger cities or markets can create job opportunities, and improving the food system within them can create a more sustainable and resilient environment for their residents.

In this respect, smaller, intermediate settlements and rural areas can constitute systems of “functional territories” when better integrated, and thus they support both sustainable urbanisation and sustainable food systems. The interaction of agricultural producers, input, processing and other farm services is more proximate in these combined rural and urban spaces. More remote rural areas and larger cities both depend on the functioning of the intermediate cities and rural areas.

## CHALLENGES AND OPPORTUNITIES

Globally, sub-national and local governments are increasingly interested in creating stronger linkages with their surrounding areas, developing territorial food systems or incorporating

food systems into urban planning. One of the examples of this growing interest can be seen in the Milan Urban Food Policy Pact, which was initiated by the mayor of Milan, in Italy, on the occasion of the Milan Expo in 2015. This group of cities, which now counts 179 municipalities in the world, are committed to improve their food system at city and regional level. Some of these cities are taking innovative approaches, and the Pact facilitates the exchange of experiences across its members. The FAO has been supporting this effort through providing technical support, establishing a common indicator framework so that the cities can keep track of its progress. What has become very clear in this process is that situations in each of these cities are vastly different, and capacities varied. While this does not indicate

that experiences from one city to another or a region to another cannot happen, it means that careful contextualisation is required when approaches, methods, or technologies are being introduced to a new city or region.

It has also highlighted the fact that while many municipalities are ultimately responsible for the food security of their citizens through decentralisation or devolution of power, capacity building in how a city deals with that has not been done, leaving them with little or no capacity to plan or implement appropriate policy at local level. For some cities, this is becoming a pressing issue as they face an increasing number of extreme weather events and are having to deal with food insecurity situations. Considering the fact that 40 per cent of the world population live within a distance of 100 km from the coast, extreme weather events such as hurricanes, typhoons, tsunamis, and other natural disasters caused by climate change in general are of major concern for coastal cities.

The Pact’s framework for action as well as the New Urban Agenda state the importance of balancing urban and rural interests for sustainable development. The challenge for rural areas is that their voices are inevitably weaker than those of the cities with larger populations. To better balance this dynamics, more advo-



cacy and awareness is necessary on the ecosystem services that rural – agricultural and forest land – can provide to urban dwellers. Cleaner water and air can be provided by strategically placed and managed agricultural land in rural hinterlands. As food is taken for granted, other natural resources such as water and air are also taken for granted by urban dwellers. Policies protecting watersheds and green corridors must be supported by both urban and rural residents, fully acknowledging the important role rural hinterlands have for a healthy city to thrive. This goes back to the importance of food systems integration into urban planning, as unplanned or poorly planned urban sprawl can result in accelerated water scarcity and other negative impacts such as increased potential for flooding and landslides.

## THE WAY FORWARD

Empowering local governments and stakeholders to improve their food system and ensure that food is considered in urban planning is a must. Promoting a territorial, city region perspective recognises the territory as a geographical space that reconnects urban and rural areas including the environmental, social, political, cultural and economic assets, and processes interacting within it, and a space of governance for human activities and where future projects are conceived and implemented. The territory is governed and influenced by a community of actors dealing with common challenges by defining appropriated actions and policies. The scale of territorial or city region is the most suitable one to understand and improve food systems in an efficient way and make them more sustainable. This should include maximisation of local production potential and creating shorter food chains for the efficiency and securing delivery of nutritious foods by better linking peri-urban and surrounding rural producers with the urban markets, but it obviously cannot be completely detached from the global economy. What is required then is to have streamlined and coherent policies across local, national and global levels to create an enabling environment for the development of sustainable food systems. Investments are necessary to build capacity at all levels of government, and to implement the

## WHAT IS RURAL, WHAT IS URBAN? AND WHAT ARE THE TRENDS?

There is no universal definition of what is urban, and the global data is based on each country defining what it considers urban, and the population within it. The definition can vary from a cluster of five households or more to an administrative boundary defined by population density and built-up area. In addition, the definition of urban within a country can change over time. Asia and Africa are the two regions currently experiencing the fastest growth of urban areas. Combined, they will account for 86 per cent of the global urban growth in the coming four decades. In Africa, the pull towards the capital city for opportunities is still strong, but some countries are realising the importance of secondary cities and starting to invest in them. In Asia, a phenomenon described as *Desakota* can be observed, where growing cities absorb other smaller towns and rural areas surrounding it and the boundaries between rural and urban literally become blurred.

Latin America is the most urbanised region, with 80 per cent of its population living in urban areas. Development of secondary cities is also occurring in this region at a very high pace, with some cities progressively integrating food systems into their planning.

changes they need in their food systems. Investments for urban development may in general be directed towards infrastructure such as transportation, waste management, or energy, but even so, taking food into consideration for all of these sectors can ultimately benefit the city. Multi-disciplinary, cross-sectoral dialogue is the first step towards a successful system approach.

So what exactly does this mean for urban development? It is actually about better connecting the rural elements, whether it is food, ecosystem services, natural resources, or labour, with elements that may be considered urban – such as financial services, information, and energy – to work together towards a more sustainable development. With the technologies we already have in transportation or ICT,

physical or virtual distance between rural and urban really does not exist, we just have to change our mind sets for the environment we already live in, and accept the fact that we cannot live without one or the other.

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A parallel world between modernisation and tradition in Zinder, Niger.

Photo: Jörg Böhling

# FROM SMALL FARMS TO BIG CITIES – LEVERAGING FOOD SYSTEMS FOR ENDING HUNGER AND MALNUTRITION

Two 2017 IFPRI and FAO reports suggest that strengthening food supply chains can immensely contribute to ending malnutrition and reducing poverty. Our author explains the complex interdependencies between rural and urban regions.

By Rob Vos

Rapid urbanisation, particularly in developing countries, is reshaping food security and nutrition in both rural and urban areas. Over half the world's population now lives in cities, and by 2050, 66 per cent of the world's population is projected to live in urban areas, with the increase concentrated in East and South Asia and Africa.

Urbanisation and population growth are expected to put mounting pressure on the global food system as agricultural production comes under stress from environmental degradation, climate change and extreme weather conditions. And as urbanisation has accelerated in some developing countries, so has the triple burden of malnutrition: the coexistence of hunger, under-nutrition, and over-nutrition in the form of overweight and obesity. Poverty, food insecurity, and malnutrition are increasingly becoming urban problems in all regions of the world. Child stunting now affects one in three urban children, for example. Among adults, the global rise in overweight and obesi-

ty had been concentrated in urban areas. Poor urban residents, especially slum-dwellers, face unique food security and nutritional challenges related to accessing nutritious food, employment, social protection, and adequate water and sanitation. Food security in urban areas requires access to cash, which jeopardises the poor, who depend heavily on unstable, informal sector employment. In many developing countries, extremely poor urban households spend more than 50 per cent of their budgets on food. Limited safety nets often fail to protect the poor, while food security and nutrition problems are aggravated by an unhealthy living environment, especially in slums.

## GROWING POPULATION, CHANGING DIETS

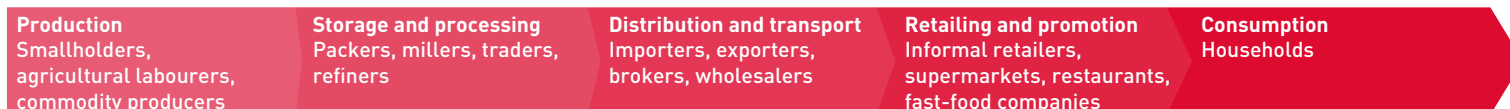
Urbanisation is also accelerating the “dietary transition” involving increased shares of animal-sourced foods, sugars, fats and oils, salt and processed foods in consumption baskets. This

change in diets is associated with increased risks of overweight, obesity and diet-related illnesses such as diabetes and heart disease. The most easily available and affordable diets, particularly for the urban poor, are often unhealthy. Food policies must be designed to transform urban – often “obesogenic” – food environments to increase accessibility of nutritious diets and create healthier, supportive environments for the urban poor. This will require not only working with actors at the retail end of the food value chain, such as supermarkets, but also building linkages with rural producers.

The International Food Policy Research Institute (IFPRI)'s 2017 Global Food Policy Report (GFPR) and the United Nations Food and Agriculture Organization's 2017 report on The State of Food and Agriculture (SOFA) provide compelling evidence showing that strengthening rural-urban economic linkages and developing and modernising the midstream of food supply chains (i.e. transportation, storage, processing, distribution and services) can make

Photo: G.M.B. Akash/Panos



**Figure 1: Food from small farms to big cities****SUPPLY CHAIN ACTIVITIES AND ACTORS****RURAL-URBAN CONTINUUM**

Very rural — Rural — Small towns — Intermediate cities — Peri-urban — Very urban

**FOOD-SECTOR FLOWS**

Source: Joachim von Braun, 'Rural-Urban Linkages for growth, Employment and Poverty Reduction', Presentation at Fifth International Conference on the Ethiopian Economy, Ethiopian Economics Association, Addis Ababa, June 7-9, 2007, as adapted by José Graziano da Silva and Shenggen Fan. 2017. Strengthening Rural-Urban Linkages to End Hunger and Malnutrition. In: IFPRI, Global Food Policy Report 2017, page 16.

a major contribution towards accelerated poverty reduction and sustainably end malnutrition in developing countries. Strong linkages between agricultural producers, particularly smallholders, and urban consumers can propel economic development and improve food security and nutrition for both rural and urban areas. Expanding urban markets provide enhanced income and employment opportunities for actors along food supply chains, including through greater demand for more nutritious foods like fish, meats, dairy products, fruits and vegetables, as these food items tend to have higher economic value and greater requirements for cooled storage and transportation, packaging, and processing than most staple crops like grains and pulses. The two reports detail the linkages that should be strengthened across the broader rural-urban continuum and across the food system (see Figure 1).

**THE QUIET REVOLUTION IN FOOD VALUE CHAINS**

In many developing countries, these vital linkages are already strengthening. A “quiet revolution” is affecting staple food value chains. Growing use of modern inputs, information and communications technologies and expanding midstream sections of the value chain all figure in this transformation. For example, farmers are more likely to adopt new technologies, such as improved seeds, when transport costs to major urban markets are low since it eases their access to markets and increases payoff from adopting new technologies. Cities are serving as engines of growth that support rural development and meet urban needs.

Such benefits will not come automatically but will require adequate infrastructure and the right market incentives. Trade-offs, especially greater environmental pressures resulting from higher energy use and resource intensity associated with the production of livestock, fruits, vegetables, and processed foods, as well as obesity and health risks associated with excess consumption of animal fats, salty foods and sugary beverages will need to be addressed in tandem.

Supply chains bring food produced by rural smallholders to urban consumers and inputs produced in cities or towns to smallholders. However, weak links along the value chain may disrupt this flow (see also Box on page 13). A deficit of inputs, such as seeds and fertilisers, or physical and financial impediments to accessing inputs faced by smallholders, can weaken the value chain upstream. A lack of processing, milling, cold storage, and transportation can sever the midstream of food systems. Poor transportation infrastructure can make it too costly for smallholders to sell their

produce downstream to urban consumers and can contribute to greater food losses and waste. Strong value chains are important for improving livelihoods, food security and nutrition.

**LINKAGES FOR ACHIEVING MULTIPLE SDGs**

Rural infrastructure, including quality rural and feeder roads, electricity and storage facilities, is essential for pro-poor growth, agricultural development and improved livelihoods. Inadequate rural infrastructure leads to isolation of communities and is significantly associated with poverty and poor nutrition. Weak transport infrastructure tends to be a major constraint in low-income countries, despite the potential for rural roads to pave the way for other investments that can improve areas as a means of nutrition – such as schools, health services, and security services. Lack of paved roads and electricity also contributes to substantial post-harvest food losses along the value chain, since cooling the goods after harvesting is not secured and the transport routes become longer (see Figure 2).

**WEAK GOVERNANCE OF NATURAL RESOURCES**

Inadequate shared governance of natural resources tends to weaken links between rural and urban areas. With existing predominant production methods, rising food demand will increase pressures on natural resources and the environment (see also article on pages 17–19). These pressures will be exacerbated by shifts in land use for livestock production (including in peri-urban areas) that are associated with changing dietary patterns. Proper land

Figure 2: Rural-urban linkages can help achieve improved food systems and multiple SDGs

Activities for enhancing rural-urban linkages	Benefits to food systems and residents in		SDGs supported*													
	Rural areas	Urban areas	1	2	3	8	9	10	11	12	13	15	16	17		
Investing in rural feeder roads and cooled transportation	Connects smallholders to input and output markets, generates employment, improves incomes and value-added, and diversifies food production and diets	Improves availability and accessibility of staples, high-value foods and other agricultural products and generates non-farm employment and incomes	●	●	●	●										
Establishing processing centres and storage facilities	Increases value-added of agricultural products and incomes, spurs employment, and reduces food losses	Improves availability of diverse foods and increases incomes	●	●		●	●		●		●					
Using information and communications technologies (such as mobile phones) to link farmers to processors, retailers, and consumers	Improves market participation, incomes, and livelihoods of smallholders	Improves availability of diverse foods	●	●			●		●							
Facilitating in-country movement of people while providing assistance to people who move to cities	Allows rural workers to mitigate income risk through migrant work and remittances, improving income and livelihoods	Improves food security and nutrition through social safety nets and rural-to-urban food and cash transfers	●	●		●		●							●	
Improving co-ordination and planning between rural and urban areas, especially as related to food and agriculture	Opens labour opportunities and markets for smallholders	Helps manage land use and reduces food insecurity and malnutrition	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Leveraging small and medium-sized cities as key nodes to link smallholders to big cities	Allows for growth in scale of markets (such as processing, cold storage) and improves access to input, output, and credit markets and can dynamise employment generation	Increases food access, consistency, and quality and dynamises employment generation	●	●	●	●	●									

\*SDGs supported by enhancing rural-urban linkages



use planning and regulation of land tenure are often missing in urban and rural governance structures in developing countries, hampering the development of urban and peri-urban agriculture. Urban sprawl will affect food security and natural resource availability in places where it causes significant loss of productive peri-urban agricultural land and contributes to degradation of environmental resources. The expected increases in the urban population in the developing world will be accompanied by a tripling in the built-up area of cities from 200,000 to 600,000 square kilometres between 2000 and 2030. The way in which cities are built up will have major implications for establishing connectivity and securing adequate rural-urban linkages.

The lack of co-ordination between governance mechanisms for food security and nutrition and those for the management of natural resources may arise from misperceptions about the economic and social roles of rural and urban areas. Urban food insecurity and malnutrition are often overlooked in low- and middle-income countries, as hunger and malnutrition are perceived to be mainly rural problems. On the other hand, a disproportionate focus on urban areas can bring about an “urban bias” against agriculture and the rural economy in the allocation of development resources and prioritisation of policies to address poverty.

Both the GFPR and the SOFA report emphasise that investments along the continuum between rural and urban – in small towns and medium-sized cities that constitute the hidden (and sometimes non-existent) geographic middle – are critical. Rural townships and medium-sized cities can serve as important inter-

### HOW BROKEN LINKAGES WEAKEN DOMESTIC DEVELOPMENT: THE RICE VALUE CHAIN IN NIGERIA

Rice has become one of Nigeria’s most-consumed staples, and the country has made boosting rice production a priority. Yet 60 per cent of rice purchased in urban areas is imported because of consumer concerns about locally produced rice. These concerns include inconsistencies in quality, labelling, and taste – problems that arise from poor vertical integration in the domestic rice value chain. For rice, post-harvest processing (milling, parboiling and cleaning) and marketing (weighing, bagging and branding) play key roles. Yet with a highly fragmented domestic value chain, the many small and medium-sized rice millers that process 80 per cent of Nigerian rice have varied skills and degrees of access to services and information, and little scope for upgrading varieties or technologies.

The result is wide variation in the quality of the final product in Nigeria, including unfavourable properties such as discoloration and the presence of stones. Lack of traceability along the value chain leads to inconsistencies between variety names and the final product, preventing a link between production and consumer preferences. That consumers prefer the quality, taste and texture of imported rice over domestic rice is in large part due to the broken rice value chain is not surprising.

Source: Taken from José Graziano da Silva and Shenggen Fan. 2017. Strengthening Rural-Urban Linkages to End Hunger and Malnutrition. In: IFPRI, Global Food Policy Report 2017, page 18.

mediary points to connect hinterlands to urban centres while providing social and economic benefits. They can act as service delivery nodes for rural areas and link the rural economy to markets, thereby reducing transaction and transportation costs. Towns and intermediate cities can also foster non-farm rural growth, affording smallholders access to employment in agri-food processing or other commercial or industrial activities.

### STILL A LONG WAY TO GO

While leveraging food systems by overcoming bottlenecks in the midstream and geographic middle thus can bring significant economic benefits, the consequences for human health and planetary sustainability associated with di-

etary change and the related greater environmental pressures should not be overlooked. Forged in the right way, stronger rural-urban linkages can help address such trade-offs as they can help reduce the price of healthy foods, such as fresh fruit and vegetables, in urban markets through improved transportation or storage. Along with other nutrition policies, this can contribute to healthier diets for urban populations, particularly for the poor, who are often limited to cheaper, unhealthy, and less nutritious diet options. While urbanisation and modern food systems have lengthened supply chains and increased environmental pressures, better connected markets and actors along the food chain also allow for policies and regulatory frameworks that more consistently promote environmentally sustainable practices from farm to fork. Unfortunately, reality is still at quite some distance from consistently addressing these challenges, but the GFPR and SOFA reports provide directives that would lay the seeds for the urgently needed transformative change.

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Rurally produced fruits sold at the market in Nairobi, Kenya.

Photo: Sven Torfinn/Panos

For references and further reading, see online version of this article at: [www.rural21.com](http://www.rural21.com)



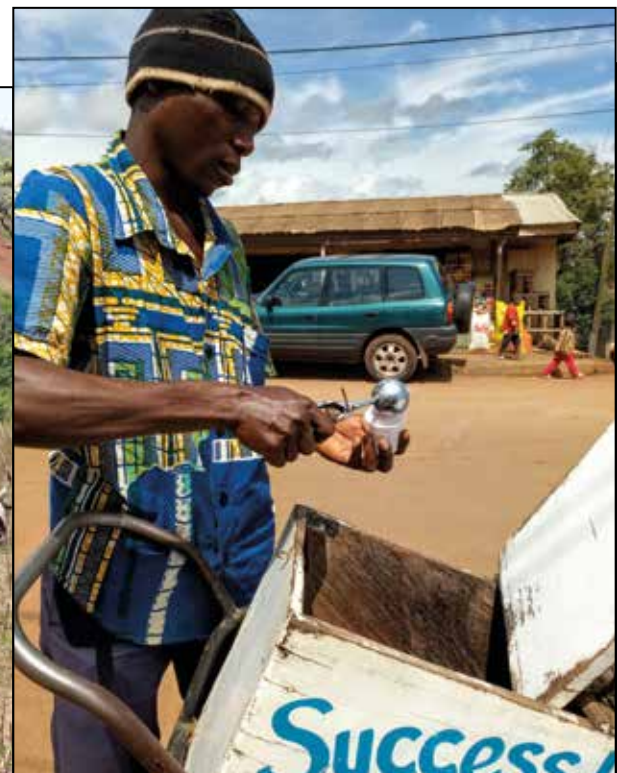
A cow farm built as per Heifer International Project guidelines.

Photo: Jennifer Provost



A herd of Mbororo cattle on a dry season transhumance pasture near Santa, Cameroon.

Photo: Tobias Feldt



Street vendor selling ice cream made from powdered milk.

Photo: Jennifer Provost

## A MISSED OPPORTUNITY FOR THE DAIRY AND MEAT MARKET – A CASE STUDY FROM CAMEROON

Growing human populations and rapid urbanisation are associated with a higher demand for fresh vegetables and animal-based products, which should theoretically be satisfied by local farmers from the surrounding regions. However, global and transregional trade as well as development initiatives often lead efforts in the wrong direction, rather hindering than strengthening rural-urban linkages. And so, in Cameroon, the dairy and meat market has been biased and requires systematic improvement.

By Tobias Feldt and Jennifer Provost

With almost 400,000 inhabitants as of 2018, Bamenda is the fast-growing capital of Cameroon's Northwest Region – an area that today has gradually become the focus of international attention due to on-going violence in the context of independence attempts by the country's two Anglophone regions. Irrespective of the current conflict, the area around Bamenda is one of the most densely populated parts of Cameroon and has become one of the country's most important regions both for crop and livestock production thanks to its fertile volcanic soils, cooler temperatures and its long, extensive rainy season which ensures rich vegetation almost year-round. However, the expansion of agricultural production promoted by national and international initiatives has not necessarily led to enhanced food security for local populations, in particular for producers.

Rural and peri-urban crop farmers are gradually using larger areas for growing cash crops such as maize, potatoes and other vegetables. While

most of the harvest is meant to supply urban markets inside and outside the region or even the country, very little is used for local consumption, if at all. Instead, many farmers still rely on their traditional, often nutrient-poor diets rather than foregoing revenues from the sale of their crops. Simultaneously, a substantial amount of the production destined for urban and supra-regional markets is lost on the way because of a particularly poor road infrastructure and a lack of storage facilities. Food insecurity thus remains prevalent. Likewise, the region's dairy and beef markets also present contradictory developments towards food security.

### THE TRADITIONAL AND THE MODERN MILK PRODUCTION SYSTEM

Milk production in and around Bamenda can today be broken down into two very distinct production systems as a result of both history and development initiatives that have been

trying for some time to establish a local milk market in order to supply the growing urban population with fresh and healthy dairy products and to create income opportunities in this field. The first system involves pastoral rural Mbororo populations who live with – and off – their large herds of predominant local cattle and a minimum production of milk (on average 2 L/cow\*day) mostly destined for household consumption. The second production system consists of urban inhabitants of non-Mbororo origin (henceforth referred to as the “natives”). These agropastoralists traditionally owned pigs, poultry and goats for meat production and historically had no affinity for the rearing of large livestock and the consumption of dairy products, but now own a few imported cows of improved breed supplying higher milk production (on average 12 L/cow\*day).

The use of exotic European breeds, such as Holstein-Friesian or Jersey cattle, remains a



Yogurt made with fresh milk, packaged in recycled soda bottles, and sold at the Santa market.

Photo: Jennifer Provost

relatively new phenomenon in Bamenda. Until recently, the NGO Heifer Project International had been active in the region since the 1990s. It imported hundreds of pure breed Holstein heifers and gave them to “native” farmers (one cow per household) after they had gone through an extensive and detailed training on pen-farming, cut-and-carry feeding and milk handling. This led to the multiplication of dairy co-operatives and dairy owning households, and then a substantial increase in milk supply in the region. Nowadays, pure Holstein cattle can be found in urban and peri-urban households. However, probably due to their often remote rural location, Mbororo communities were not included in this initiative.

### FRESH MILK VERSUS MILK POWDER

The Mbororo raise cattle mostly for meat and cultural value. During the rainy season (April to November), milk is typically collected once a day in the morning and then handed to the women. Usually, the milk is not pasteurised and is used for the household’s consumption as sweet tea, butter, or “pendi” (curdled milk similar to yogurt). However, some women decide to sell surplus milk by walking around their communities and visiting the closest markets sporadically. They are allowed to keep the milk money without reporting to their husbands. According to a study completed in 2017, a third of milk sellers in the region are Mbororo.

### THE MBORORO PEOPLE

For many decades, cattle breeding has been the traditional domain of formerly semi-nomadic Mbororo people, a subgroup of the Muslim Fulani ethnicity that entered the so-called “grasslands” in Cameroon’s Northwest Region in the late 19<sup>th</sup> and early 20<sup>th</sup> century. They found an ideal environment for their cattle herds of typically Red and White Fulani breeds, with sufficient pasture and water for most of the year, and no tsetse flies (responsible for the spread of trypanosomiasis, also known as sleeping disease). Today, they mostly inhabit the rural areas around Bamenda. The region is still suffering from ethnic segregation, basically between the Mbororo and the “natives” (a general term for a wide range of Bantu groups mainly of Christian faith). Both of the ethnic groups are organised in interest groups and associations that mostly keep to themselves and usually do not co-operate with their counterparts in the respective other ethnic group. As a result, a prejudice-laden “us-against-them” attitude often prevails between pastoralists and crop farmers or traditional and “new” cattle breeders.

Even today, some Mbororo still keep large cattle with an average of around 90 head (not rarely in several herds per owner); the share of dairy cows within these herds varies considerably. Wealthy “natives” also increasingly acquire large herds of cattle and then have them “managed” by Mbororo – here however the focus is clearly on meat races.

Surprisingly, despite the two milk supply chains (i.e. of the Mbororo and the native farmers), no fresh milk can be found when one walks through the supermarkets and outdoor markets of the city (unless you are able to catch an Mbororo woman passing by!). All the yogurt and ice cream sold on the streets and in the grocery stores are made with milk powder. Bakeries, coffee houses and restaurants all use imported milk powder. No dairy facility, processing unit or collection centre has existed in or around Bamenda since mid-2016, when the last of the two processing plants in the region was closed down because it was unprofitable. Since then, there have no longer been any “professional” structures in the city and its direct (peri-urban) surroundings to which the cattle owners could sell their raw milk. In the meantime the thus remaining “informal” market has been restricted to private individuals and smaller societies and associations who, however, lack the financial resources, equipment and business know-how and links needed to process and distribute greater volumes of produce. The informal market is the only outlet of fresh milk or dairy products and is quite challenging for busy and overwhelmed milk producers to integrate. For consumers this informal market also represents sanitary risks and often requires longstanding relationships of trust with the producers.

This situation can be partly explained by cultural perceptions of milk as a food. It is often assumed that increasing urbanisation and income go along with increasing demand for

products like dairy and meat. While Heifer Project International had good intentions by introducing commercialised milk production in Bamenda, it assumed that there was a milk demand to begin with. In reality, fresh milk is not truly known and appreciated by the natives, and as a consequence the informal market is too small to accommodate the hundreds of milk farmers in the city. Natives reported that milk was regarded as a food for “bush people”, in reference to rural Mbororo, who are hardly integrated into the communities of native agro-pastoralists and urban dwellers. Fresh milk is considered “smelly”, “dirty” and a “poor people’s food”. Despite its cheap price, surplus milk regularly spoils, gets thrown away or is fed to pigs and dogs. Some milk producers have resorted to transforming their surplus into yogurt sold in washed, re-used plastic bottles, but the demand remains low, unstable and seasonal. However, in contrast to fresh milk, powdered milk is considered fancy, clean, and for “civilised” people. Unfortunately, this powder of varying quality is mainly imported from Europe, Asia and the Middle East.

The informal market is defined as activities that are unrecognised, unrecorded, unprotected and unregulated by public authorities.

International Labor Office, 1972

The demand for fresh milk is limited to bigger urban centres like Douala and Yaoundé, where the country’s wealthy middle and upper class has developed a taste for particular dairy products such as cheese and flavoured yogurts. Given its environmental advantages, the region of Bamenda could easily evolve into a “milk basket” for the country. However, the connecting routes to the large cities are neglected and

impractical: driving less than 400 kilometres takes roughly eight hours. Furthermore, no costly cold chain equipment could sustain the poor state of the roads and the security risks. Since dairy products are also highly sensitive and perishable, Bamenda is limited to supplying its immediate surrounding areas, where demand remains low, almost non-existent.

### INTERFACE OF CATTLE MARKETS, BEEF PRODUCTION AND TRADITION

In contrast to dairy, beef production remains predominately in the hands of the Mbororo, who still manage their cattle herds in a largely traditional and non-intensive way – although changes such as the mixing of stocks with improved, non-Zebu breeds is now noticeable to some extent. Through intermediaries, they serve a chain of cattle markets, from small rural and peri-urban villages to the weekly big cattle market in Bamenda. Part of the animals sold directly end up in the city's two official abattoirs, where about 30 to 35 cattle are slaughtered per day. Meanwhile, others are transported alive, either by truck or even on hoof, towards Douala, Cameroon's largest city and economic hotspot. From this angle, one might think that beef production and marketing in and around Bamenda provides a good example of a successful rural-urban relationship: while the growing population demands more and more meat which – despite health and ecological reservations – is nowadays seen as the essential ingredient of almost every African meal, this demand is largely served by regional producers who can make a good living from it.

The reality, however, looks slightly different. Although the results of a study we carried out between 2017 and 2018 show that about 40 per cent of Mbororo pastoralists consider the sale of live animals as the major purpose of cattle keeping, only a small share of their herds actually ends up in the markets. Instead, many cattle owners still follow the old custom of accumulating the largest possible herds for cultural reasons and prestige (identified as the major purpose by 36 per cent of the interviewees) and only selling animals when needed. Therefore, they risk investing in quantity rather than quality while creating a surplus of animals that is not actually meant or available to satisfy the meat demands of the consumers. By doing so, they inevitably enter into competition over land with rural crop farmers, which is becoming increasingly severe in that region due to growing human and livestock populations as well as progressive land-use change

### RECOMMENDATIONS FOR IMPROVEMENT

1. Business and entrepreneurship initiatives for livestock producers must be supported and financed in the region.
2. Cattle farmers should emphasise the high quality and special value of their local dairy and beef products to compete with global and transregional offers.
3. National and international efforts aimed at intensifying agriculture and livestock production should be based on a comprehensive understanding of the rural, peri-urban and urban actors as well as their preferences.
4. Traditional Mbororo and local livestock-keeping practices should be included rather than replaced with imported production approaches.
5. Prestige and social norms that still hinder commercialisation of cattle should be overcome.
6. Encouraging a multicultural dialogue would reduce the prejudices against dairy products and the "my people first" mentality (see Box on page 15).
7. Sensitisation and awareness raising of nutritional benefits of milk could increase the demand on the informal market.
8. Bamenda urgently needs a formal dairy processing unit to reduce fresh milk spoilage and to keep farmers in the dairy business.
9. National border controls should include regulation of the influx of foreign livestock in terms of their health and headcount to protect Cameroonian cattle markets.



Rural cattle market near Acha, Cameroon.

Photo: Tobias Feldt

from natural and traditional grazing areas to agricultural land. Simultaneously, Bamenda's market for live animals and beef is coming under pressure from a rising influx of cattle from neighbouring Nigeria. Often entering the region without traceable origin and veterinary certificates because of insufficient border controls, these import trades have contributed to a decline in market prices for Cameroonian cattle in recent years and, at the same time, have increased the risk of spreading bovine diseases. Thus, despite ideal conditions for rural-urban linkages for beef production, the process remains inadequate and weak due to the high cultural significance of cattle and uncontrolled transregional trade inflow flooding the domestic market.

The example of the Bamenda dairy and beef market shows the need for better strategies and regional approaches of livestock and commodity policies, adapted to the actual needs of both producers and consumers in a rural-urban context.

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For references and further reading, see online version of this article at: [www.rural21.com](http://www.rural21.com)



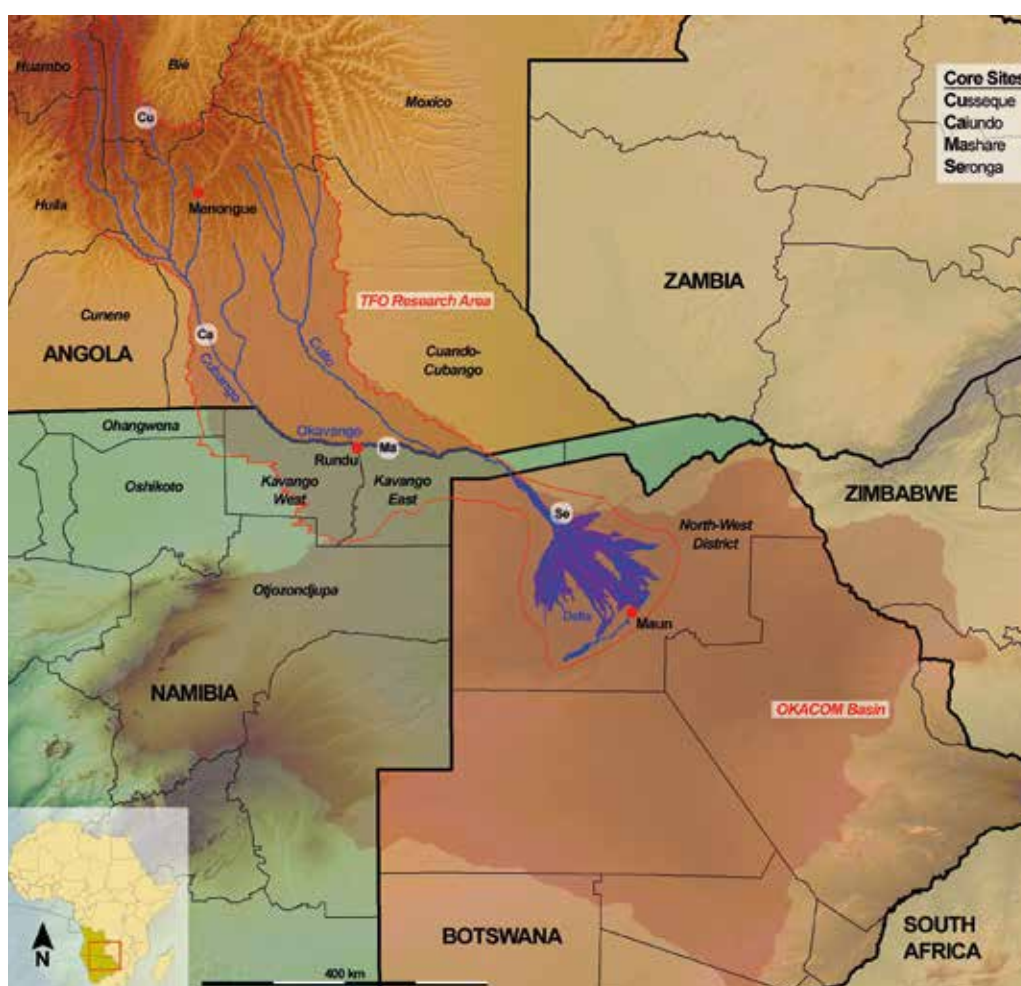
# PUSH AND PULL RELATIONS BETWEEN VILLAGES AND CITIES FROM A RURAL PERSPECTIVE

Trade in natural resources between rural areas and the urban islands developing in them bears a huge conflict potential. In parallel to the traditional regulations on the use of natural resources, governments are intervening with privatisation and industrialisation in moves towards modern large-scale farming. Other conflicts arise through the shift from traditional techniques to quick wins as well as from social to individual benefiting. Our author depicts the push and pull relations of cities (and the world) to villages located in the Cubango-Okavango River Basin – a transboundary catchment area in Southern Africa.

By Stéphanie Domptail and Ernst-August Nuppenau

The Cubango-Okavango River Basin (CORB) is shared by Angola, Namibia and Botswana. The Cubango-Okavango River has its source in the plateau of Huambo in Angola and flows across the borders between Angola, Namibia and Botswana to end in the world-famous inner delta of the Okavango. Listed as a World Heritage Site since 2014, the delta is one of the largest protected wetlands on Earth. About 600,000 people live in the CORB and derive their livelihoods primarily from natural resources, livestock and agriculture. According to the 2011 statistics, the population remains largely rural. Yet major cities in the river basin, such as Menongue (approx. 200,000 habitants) in Angola, Shakawe (approx. 6,700 habitants) in Botswana and especially Rundu, counting around 63,000 habitants and the second largest city after Windhoek in Namibia, have been growing rapidly since 2010. Since the end of the civil war in 2002, Angola has been working on clearing mines and rebuilding its transportation in the Kuando Kubango Province, CORB. The recent completion of the main road connecting the Angolan to the Namibian and Botswana parts of the basin will surely sharpen the already rapid trend in urbanisation. In other words, the region is currently being embedded in the global metabolism.

In a study within the research project 'The Future Okavango', we used a social ecology approach and a political ecology perspective to investigate human-nature relationships in three villages of the Cubango-Okavango River Basin: the Kimbo of Caulololo in Angola (village of Cusseque), Mashare in Namibia and Seronga in Botswana. While Caulololo and Mashare are both located on the main road from the upper catchment to the Okavango Delta, Seronga, while larger, lies on the other side of the river and can only be reached by ferry and 4\*4 vehicles. Our aim was to quantify how the villages use the resources of their environment to function and to which extent they exchange with the outside world.



Source: Jan Wehberg

A constructive approach complements this initial picture, in which we report and reflect on conflicts reported in 2013 by 80 stakeholders of the different countries on the use of natural resources. How are some resource use conflicts related to push and pull relations of the villages to cities and the rest of the world?

## VILLAGE EXCHANGES WITH THE OUTSIDE WORLD

At present, the smallholder agricultural sector in the CORB produces only a very limited sur-

plus of mainly millets, maize and cassava, and the only agricultural food flows from the rural areas to urban and global world worth mentioning are in Angola, and even there, they are limited. However, wild resources, such as fish, game, medicinal plants, timber, honey, thatch grass and reeds (serving as construction material for people's huts) are transported in increasing amounts from rural areas to cities but also to the countries directly outside the CORB, or even sometimes as export flows, also illegal ones, to further away countries (reportedly South Africa for timber and China for some poached animals). For instance, in Caulololo in

Angola, agricultural products are sold at a share of 20 per cent in dry mass, while as much as 60 per cent of the hunted or collected wild fruits, vegetables and game are sold and hardly consumed at all. Honey as well as wild fruits and vegetables provide an important export to city markets and a source of cash. Honey from the larger Cauololo region (Chitembo municipality) is well-known throughout Angola, and the demand for it is rising. It also contributes greatly to the local diet in the more isolated village of Seronga. At the time of reporting, in 2014, charcoal made from local timber in Cauololo was also produced and sold by the roadside, albeit to a very limited extent. Its quantitative importance ought to have risen since then. In return, the flow of imports coming into the villages consists of communication and care products, but significantly also of energy (gasoline) and food. In 2014 and 2011, as much as 27 per cent and 40 per cent of the food (counted in energy units – calories) was imported in Cauololo and Seronga respectively. However, the bulk of the food items had low nutritional value, as it largely consisted of white flour-based products and manufactured alcohol.

## THE CONFLICT OF MODERNITY

In the course of the study, stakeholders expressed a fruitful diversity of visions and strategies of land use for the long-term sustainable development of the basin. Among these, there were two key conflicting notions of agricultural production, with proponents of rural development facing proponents of a green revolution. The first group argued for the support of smallholders to improve their agricultural production with less environmental damage. The modernisation of agriculture would be led by smallholders as actors of innovations. The second group aimed to achieve an increase in yields and the production of world commodities via a high-input/high-output logic. The latter notion is triggered by the need articulated by the nations sharing the CORB to feed their urban population, reduce their food imports, and export some commodities while creating local employment. Some see the end of the smallholder agriculture approaching. This would mean in theory that most smallholders would either migrate to cities or become landless farm workers. One could argue that the first group prioritise the immediate well-being of the local rural people, while the second the well-being of the nation, including its urban population and economic aspirations.

Modernisation efforts in the direction of a green revolution are taking place today in the

## GOVERNING LAND ALLOCATION AND LAND USE

From a governance perspective, a characteristic feature of the basin is that the customary system still operates aside from the formal statutory legal system. Traditional authorities exist all over the CORB; in Namibia, they are still organised in Kingdoms. Their power and responsibilities vary strongly from one country to the other. But throughout the basin, land in the rural areas is allocated by the village headman or headwoman, while he or she also regulates access to and collection of natural resources from the wild. Even today, land disputes in Namibia are settled by the traditional court. In parallel, the statutory system has also independently developed policies and laws for the protection of natural resources. In principle, the states of the basin strive to consult stakeholders, for instance through the establishment of provincial boards. Besides, new institutions such as Community Based Natural Resources Management (CBNRM) schemes, conservancies and Community Forests (CF) are presented as the devolution of management rights over resources from the wild from the state to communities. However, whether this really is the case is heavily disputed.

## THE HUMAN FACET IN NATURAL RESOURCE MANAGEMENT

The recent peace has increased the pressure on natural resources in the CORB from different perspectives. First, countries now have safe access to the natural resources, including the Cubango-Okavango River, one of the few permanent rivers of Namibia and Botswana, in order to fulfil their national development aims. Thus, new actors stemming from outside the rural areas and sometimes even from outside the CORB have started competing with the local population and smallholders for land and resources.

Second, the infrastructure in building is creating a new connection between the rural areas of the basin and the cities. The infrastructure and the dynamism of the region to develop have increased the demand and created new markets for natural resources. Thus, the CORB rural natural resources now feed into global cash and material flows.

implementation of state production units in Namibia (Green schemes) and of private fazendas, large commercial farms, as well as major agricultural schemes such as the Angolan-Chinese rice production scheme in Longa, Angola. In parallel, the three countries are running reforms in land tenure towards the privatisation of land and the intensification of land use. Land registration and land-use planning are being put in place which foresee an agricultural production on fixed and permanently used pieces of land. These initiatives clash with the traditional slash-and-burn practices of smallholders in the basin and may have deterring effects. For instance, smallholders were deforesting more land than needed at the time of reporting in order to secure the option of rotating land in the future despite the change in the land attribution system. To adapt to the new context, they would need to re-organise their farming system. Yet, they lack knowledge and cash resources as well as support. Local stakeholders blame the government for constraining their livelihoods while bringing in little support to help them adapt and improve their practices.

## OVERHARVESTING, ILLEGAL HARVESTING AND POACHING

*“There are some changes that I have observed in people. Some of them are by all means*

*trying to live, to get some income. Now, most of them are concentrating on cutting grass, which was not done in the past. This is not good. Because by cutting the grass, they have to burn the forest again for the grass to regrow faster, which is putting a very heavy burden on the forest. And some of the species are getting extinct.”*

Regional stakeholder, Namibia

In all three countries, stakeholders are expressing their concern with regard to the rising extraction of natural resources, for instance of charcoal-making in the Cauololo region or the thatch-grass business in Mashare and fish and reeds extraction in Seronga. The amount and methods of harvesting and the development of legal and illegal markets are criticised more than the harvest itself. Under these conditions, and subject to the growing demand from cities, businesses and the outside world, these natural resources are increasingly perceived not only as subsistence items, but also as commodities. Our analysis shows that a small number of individuals are even specialised in the collection and retail of natural resources from the village to the city, both in Seronga and in Mashare. While most stakeholders at higher governance levels blame the communities and smallholders for the excessive extraction, the latter report conflicts over the harvesting of sand, wood or grasses involving outsiders coming to grab re-

sources in a community's territory. Currently, neither the traditional authorities nor the modern statutory approach of prohibition (e.g. hunting bans, seasonal fishing bans, establishment of permits) nor the combination of both in the form of Community Based Natural Resource Management (CBNRM) in Botswana and Community Forests (CF) in Namibia seem to succeed in effectively controlling these trends. Initially, CBNRM and CF schemes are institutional innovations aiming to devolve management rights from the government to the communities. Yet, stakeholders at various governance levels have denounced the little decision freedom that communities de facto enjoy, leaving their individual members with a feeling of restricted access to resources for their own direct use. The return compensation is an often ill-organised flow of cash which fails to reach the bulk of the community members. Yet, poaching in Botswana and illegal timber logging in Namibia do occur, maybe also as a form of resistance. In Botswana, some stakeholders fear that state control may sharpen and even involve the military.

We argue that the new tools used by the statutory governance system are based on modern values. These are, for instance, the need to protect nature from humans rather than their interacting with it, as transported through the hunting ban in Botswana. Besides, the value of cash versus the subsistence economy is strengthened by the fact that permits have to be purchased in cash. Thus, some of the measures of the statutory system may contribute to alienating the smallholders from their subsistence culture and challenge their land use. In addition, the measures are administered from distant city offices, away from the rural reality.

### TRADE-OFFS IN LAND USE WITHIN VILLAGES

Increasing links with city and further markets and their pull effect contribute to driving land use in rural areas. Some smallholders or individuals respond via a change in practices, while others seek to maintain their traditional livelihoods. Trade-offs between new and traditional land uses may arise within villages. In Angola, the urban demand for energy in the form of charcoal has stimulated the deforestation of major areas surrounding the largest cities of Menongue and Cuito. In the medium term, deforestation has a significant ecological impact on the Angolan woodlands and on the agricultural systems. Indeed, access to sufficient forest lands is the key prerequisite

for the sustainable shifting cultivation systems that were still in practice in the Cauololo region in 2013.



Charcoal smoke repels insects.

Photo: Stéphanie Domptail

But there is also an immediate trade-off. Not only is the current local charcoal production technique little efficient, but the smoke generated also repels insects, including bees. Yet, in the Cauololo region (Chitembo municipality), honey is more than a cash crop. It is traditionally a key energy and food source for the community that is also used for its medicinal virtues, as well as being processed into wine and playing an important role in social gatherings. The ensuing land-use conflict is that honey has to be collected far away from the charcoal pits, which are often located along the road.

A second aspect of the conflict is social. Honey is collected traditionally and requires specific skills and climbing; the harvest is seasonal, and so is the cash flow. The skills are held by experienced and older men who traditionally pass them on to the younger generation. Yet, younger people seem to be losing interest in this activity as the charcoal market expands. Indeed, the production of charcoal is described by honey-makers as an activity of younger men seeking immediate means of acquiring cash and no longer willing to take the physical and time risks related to honey collection. To a certain extent, the honey/charcoal trade-off represents a clash between values of younger and older members of the communities and villages, including individual versus social values. The youth are seeking ways to engage more quickly in the cash economy, and this often relates to activities which are conducted by individuals and where cash is appropriated by individuals.

The clash between the individual and social values is also apparent in a conflict mentioned

in a Namibian village opposing a smallholder who had fenced off a portion of the communal and common rangelands to increase his productivity of livestock and profit from the developing urban market in Rundu. He was in fact hogging resources from other community members and blocking passage. This, of course, poses a serious threat to the community property rights and the traditional tenure system, as an individual is reaping the fruit from shared resources.

In general, not all community members react to the market signals by harvesting and selling natural resources. The disparity and individuality of the responses of households and within households has the potential to create a stratification of households within villages and tension within families.

### THE THREE EFFECTS OF RURAL-URBAN DYNAMICS ON RESOURCE CONFLICTS

Rural-urban dynamics, along with other factors more specific to the CORB region, are increasingly shaping land and resource use and related resource conflicts in three ways. First, cities have a pull effect on the rural areas, driving an extraction of rural and local resources and foods to urban areas and to the distant outside world. Second, cities are vectors of the world cash economy regulating human exchanges in the global world. The flow of money within subsistence economies affects people's relationship with their natural resources, and probably also their relationships with one another. Third, cities may be conceived of as the location and symbol of the statutory law system which competes with the traditional one; often, their combination does not effectively lead to the sustainable management of resources. As a result, the stigmatisation of smallholders and rural citizens regarding overharvesting and degradation increases. Clearly, traditional rules are being put to the test by the changes in the institutional and economic context, but how exactly this takes place requires more research. The customary system seems bound to change – but must it disappear?

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## FOOD, NUTRITION AND ENERGY SECURITY IN AN URBANISING WORLD

Increasing urbanisation is accompanied by a rapid growth of the poor population's share in urban areas. Changes in food systems brought about by this, the opportunities it creates for farmers and what investments are needed to turn the changed conditions into a win-win situation for both the (peri-)urban and the rural population are being looked at by the Swiss Agency for Development and Cooperation in an on-going "learning journey".

By Ueli Mauderli and Fabienne Stämpfli

Between 1990 and 2018, the share of the urban poor increased from 18 to 25 per cent on average in most of the low and middle-income countries. The Swiss Agency for Development and Cooperation (SDC) is giving increasing attention to this trend. In order to identify relevant fields of action, it conducted four case studies on urbanisation processes from 2017 to early 2018. The studies were carried out in Bolivia, Ethiopia, Haiti and Laos. One of their most striking findings was that e.g. Laos, with generally low percentages of urbanisation and a stable population growth rate of approximately 1.6 per cent since the 2010s, showed record urban growth rates for peri-urban and urban zones. While three quarters of the population live in rural areas, the country experiences an annual urban growth rate of 17.3 per cent.

Based on the findings of the case studies, the core group of SDC's Agriculture and Food Security (A+FS) network organised a webinar and a contiguous three-week online dialogue on the topic of city region food systems with the Food for the cities experts of the United Nations Food and Agriculture Organization (FAO). Both the webinar and the online dialogue underscored win-win investment for rural and urban areas, demonstrating in particular the strategic importance of the cities for the rest of the country. Some of the main topics and key findings are presented below.

### MAINSTREAMING FOOD ISSUES, IDENTIFYING INVESTMENT POLICIES

According to the FAO webinar presenters, it is essential for the issue of food – as a basic need for all – to be mainstreamed into the four key instruments of urbanisation policy and urban planning: logistics, zoning, procurement and waste management. Relevant food systems should be integrated from field to plate through spatial synergies, social inclusion and ecological resilience. Participatory multi-sectoral platforms should be created to achieve this integration. Public and private stakeholders of food and value chain systems in city re-



Towards clean energy cooking. A new solar cooker.

Photo: Jörg Böhling

gions need to come together, become aware of their mutual interests of territorial nature and be active in the following three fields:

- Food systems planning, policy support and governance (analyses, assessments, platforms, strategic design, monitoring frameworks). Two issues cannot be overemphasised in this context: securing land tenure for the poor and the less well-off along the rural-urban link and integrating post-harvest measures for different food crops in value chain approaches.
- Specific actions related to institutional procurement of food, supply and value chains, circular economies (regenerative systems related to resource input and waste in which emissions and energy leakage are minimised by slowing, closing and narrowing energy and material loops) and to urban agriculture and gardening;

- Knowledge sharing, partnerships and co-operation (local, national, regional and global networks).

Participants of both the webinar and the online dialogue highlighted the following agricultural investment priorities along the rural-urban link:

- analysing and developing food and market systems with the market system development (MSD) approach (see <https://beamexchange.org/>) and testing the FAO City Region Food System toolkit (see Box on page 21),
- improving nutrition,
- disseminating knowledge,
- improving territorial governance,
- conducting research on the externalised costs of imported and exported agricultural products, and
- creating better institutions for safe food production and consumption.

### RESPONDING TO DIET TRENDS AND GRASPING MARKET OPPORTUNITIES

The prevalence of food insecurity and malnutrition is clearly higher in urban populations (50 per cent) than in rural ones (43 per cent), and obesity is increasing with accelerating speed in urban and peri-urban areas. In the new millennium, these trends are also observable in Asia, where changes in food preparation habits among time-saving urban dwellers set in later than in other parts of the world. Participants were divided into two groups. One group thought that it would be important to also focus on large cities, which undoubtedly presents lots of opportunities for interventions through development agencies, although it bears risks, too. Another group insisted on the significance of focusing on medium-sized towns ("market towns") that might be better suited to test new approaches in.

The discussions suggested a focus on nutritious foods for urban and peri-urban production and markets such as dairy products, fish (from aquaculture), meat and poultry, pulses, fruits

and vegetables – products that provide either essential proteins or micronutrients for their consumers. Apart from a few exceptions, these goods are much more perishable and are therefore ideal for being produced in proximity of (peri-) urban markets.

Here, changes in diet trends formed a further focal aspect of discussions. For example, in the context of the above mentioned trend that also people of urbanising areas in low and middle income countries dispose of less time for food preparation “healthy ready-to-eat foods” – pre-processed or cooked foods such as pre-cut vegetables and fruits, pre-cooked rice, cured and dairy products such as yoghurt, curd – might become a new and growing niche for a whole range of micro to big entrepreneurs in the context of nutrition awareness campaigns.

## THE ENERGY ISSUE MUSTN'T BE IGNORED

Cooking time for inexpensive proteins such as pulses and less costly unprocessed food remains high. Increasing prices for cooking energy and lacking alternatives to biomass are thus both an obstacle to safe and healthy nutrition for poor consumers and a market opportunity for rural and peri-urban farmers and other stakeholders. In several sub-Saharan countries, biomass products including fuel wood and charcoal are cash crops with a higher national annual turnover in million US dollars than any food crop in the country. To prepare a sustainable biomass production means convincing land tenants to use part of their land for a crop that can only be harvested after a couple of years. This increases the need for clear property rights and for intensification on the rest of the land in order to generate enough income. Closely interlinked is the promotion of affordable energy-efficient and smoke-reducing, healthier stoves. Simultaneously, it will become more and more crucial to raise awareness on all aspects around nutrition. It should become a priority to address the behaviour of millions of consumers and producers through information and training on appropriate production, processing, preparation and consumption. The creation of producers' and consumers' organisations was proposed as a possible strategy to achieve this. These awareness-raising efforts should lead to an intensification in producing the above-mentioned goods, additional cereals and tubers, while respecting environmental sustainability and food safety.

Finally, agricultural producers – rural or peri-urban ones – face more and more chal-

## THE CITY REGION FOOD SYSTEM (CRFS) TOOLKIT

The City Region Food System (CRFS) toolkit aims to help local authorities and other stakeholders to strengthen the understanding of the current functioning and performance of a food system in the context of a city region within which rural and urban areas and communities are directly linked. It forms the basis for further development of policies and programmes to promote the sustainability and resilience of CRFS. The toolkit is based on the experience of the CRFS assessment and planning process in seven cities around the world: Colombo (Sri Lanka), Lusaka and Kitwe (Zambia), Medellín (Colombia), Quito (Ecuador), Toronto (Canada) and Utrecht (the Netherlands).

A CRFS process must take into account existing and specific agronomic, economic and institutional-political conditions, the variety, interests and expertise of the different stakeholders involved, available resources, existing data and information, and specific goals set in the local context. The process, structured in a number of steps, is cyclical, not linear. In a nutshell, a CRFS assessment and planning process may include the following results:

- A mapping and characterisation of the local city region food system. This includes understanding and mapping of the city region foodshed, how food is processed, distributed and marketed, what people eat and what their food security and nutrition status is, how food waste is managed and who the government and institutional actors involved in the food system are.
- An analysis of current food system performance with regard to different sustainability dimensions, food system vulnerabilities, threats and weaknesses. Also, identifying the opportunities for strengthening the CRFS.
- Proposals for concrete policy and planning interventions and action plans through a multi-stakeholder dialogue process. This may also include the identification of policy lobbying needs and elaboration of specific advocacy materials. The process fosters inclusive multi-stakeholder dialogue to support local governments and multi-stakeholder bodies in taking informed decisions on food planning, recognising the great importance and added value in consultation-participative processes and knowledge sharing.

The assessment helps city stakeholders to spot the links between food and various other sectoral policies, such as transport (as a large part of city transport is food-related), health (malnutrition, obesity, school feeding), land-use planning for agricultural and multi-functional areas, community development and revitalisation, employment generation (in food production, processing and retail) and waste management (productive use of waste and waste water, management of food waste). In addition, a CRFS approach helps cities to understand the extent to which their urban food security is dependent on rural production areas and how the food system impacts both urban and rural populations in the city region. This understanding helps city governments to start seeing food as a driver for other sustainable urbanisation policies.

**Guido Santini**, FAO

The CRFS toolkit was developed by FAO, RUAF Foundation and Wilfrid Laurier University, with the financial support of the German Federal Ministry of Food and Agriculture and the Daniel and Nina Carasso Foundation.

For more information visit: <http://www.fao.org/in-action/food-for-cities-programme/toolkit/introduction/en>.

lenges related to finding enough and appropriate labour forces. Intensification, light mechanisation and online job markets – the latter allowing higher transparency and accountability in the agricultural labour market – appear to be approaches worth trying.

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The authors would like to thank Guido Santini and Thierry Giordano from FAO for their valuable input to the webinar.

For more information to this studies, see online version of this article at: [www.rural21.com](http://www.rural21.com)

## WHEN TOO MUCH CLOSENESS GETS DANGEROUS

The increasing interactions between rural and urban areas have induced health benefits in rural areas, slowly shrinking the rural-urban health gap. However, this higher level of interaction, is giving rise to various health risks threatening health advances achieved over the previous decades. Our author describes the particular hazard potentials arising at the rural-urban interface and explains why we can only counter them with an integrated approach.

By Timo Falkenberg

Although rural development has achieved great progress over the past decades, rural-urban health disparities still persist. Key health indicators, including life expectancy as well as infant, child, and maternal mortality, show worse outcomes among rural compared to urban populations. The 2017 World Health Statistics report of the World Health Organization (WHO) highlights that rural populations have lower access to essential infrastructures such as improved sanitation and drinking water, electricity and communication technologies, and lower access to healthcare services. Whilst the rural-urban gap has narrowed in terms of improved sanitation and drinking water over the Millennium Development Goals (MDGs) era, 14 per cent of the rural population are still relying on unimproved water sources, compared to three per cent among the urban population. Similarly, access to essential healthcare services, including antenatal care, reproductive health services, immunisation services as well as diagnosis and treatment of infectious diseases, remains lower among rural communities. Whilst a multitude of economic factors underlie the health disparities between rural and urban communities (income, consumption, wealth, etc.), low access to essential infrastructures and healthcare services are key determinants of these differences.

Although rural-urban health disparities persist, the dichotomy between rural and urban as distinct locations with distinct characteristics has been blurred over the last few decades. Accompanying the decrease in spatial distance and increasing interdependencies between rural and urban are various economic, social and ecological consequences that interact in a complex system to shape the health and well-being of the population. It is now recognised that such health repercussions cannot be addressed by individual disciplines or sectors but require an interdisciplinary holistic perspective. One concept, which is of particular interest at the rural-urban interface is the 'One Health' approach, which recognises the interdependence of human, animal and environmental health, thus calling for inter-sectoral collaboration to optimise the health of all (see Box on page 23).



When cows live closely together with humans, like in Ahmedabad, India.

Photo: Timo Falkenberg

### ZOOBOTIC DISEASES – THE PATHOGEN SPILLOVER

Zoonotic diseases, which are transmitted between humans and animals, are a key theme of One Health. According to the US Center for Disease Control (CDC), zoonotic diseases make up six out of ten known infectious diseases and three out of four emerging diseases (recently appearing infections). A great majority of the global epidemics of the past decades, Ebola, Zika, SARS, influenza (bird flu, swine flu, etc.) are of zoonotic origin, while the globalised movement of humans, animals and materials is compounding the risk of pandemic outbreaks. The 'pathogen spillover' (the transfer from animal to human) often occurs from wildlife via livestock to the human population, thus at the rural-urban interface. In rapidly changing environments, where land-use transformations and deforestation meet agricultural intensification, population growth and densification, the level of interaction between animals and humans is increased, posing higher risk of pathogen spillover and disease outbreak. Therefore, it is essential to monitor animal and human health in an integrated surveillance network to enable rapid detection of pathogens affecting livestock and quick deployment of control measures. At global level,

the tripartite of FAO, the World Organisation for Animal Health (OIE) and WHO are operating the Global Early Warning System for Health Threats and Emerging Risks at the Human-Animal-Ecosystem Interface (GLEWS). The three sister organisations pool their data on disease occurrence from their respective channels and jointly monitor, analyse and model trends to send early warning messages to the affected regions. The system monitors six non-zoonotic and 19 zoonotic diseases.

Another disease category strongly influenced by urban transformations and rural-urban interactions is vector-borne diseases. These are diseases that are transmitted by living organisms, including mosquitos, flies, ticks, aquatic snails, as well as rodents, between humans or from animals to humans. Thus, vector-borne diseases can also be zoonotic. One example of such a zoonotic vector-borne disease is West-Nile Fever, where wild birds form the pathogen reservoir and Culex mosquitos transmit the virus into the human and animal population. The complex transmission pathway is influenced by rural-urban dynamics, as agricultural practices, land-use changes and unplanned urbanisation, along with climatic factors, determine the spatial and temporal distribution and abundance of vectors and

reservoirs. Rural-urban migration fuels slum formation in peri-urban areas, which are built with inferior materials, lack access to clean water and sanitation, and are often overcrowded, thus creating breeding sites for mosquitos, rats and other vectors. At the same time, agricultural intensification and land-use changes in rural areas affect the intensity of contact between reservoirs, vectors and humans, increasing transmission, while also driving vectors to seek new (urban) habitats.

## ANTIMICROBIAL FLOWS AND RESISTANCE

The challenge of growing antimicrobial resistance (AMR) has been hailed the greatest threat to sustainable development by the WHO and forms a central pillar of the One Health concept. Resistant pathogens cause infections that cannot be treated by common antibiotics but require the use of so-called 'reserve' or 'last-resort' antibiotics. The use of these last-resort antibiotics has been increasing, resulting in multi-drug-resistant strains that cannot be treated. The root cause of the development of AMR is its overuse in agriculture, veterinary and human medicine. Despite increasingly strict regulation (i.e. bans on antibiotic supplemented feed or on preventive antibiotic use), the livestock sector remains the chief user of antibiotics. The types of antibiotics used are similar across animals and humans and it has been well established that resistant pathogens can transfer their resistance gene to other microorganisms.

The food chain represents the traditional rural-urban linkage, where food items produced in rural areas are transported to urban markets and consumed by the urban population, whilst the inputs of production flow from urban to rural areas. Along this rural-urban linkage resistance genes can spread either directly or indirectly. The most direct transmission pathway is via animal products carrying resistant pathogens, which are transported from rural areas to urban consumers. The application of manure in agricultural production forms an indirect pathway, where faeces excreted by livestock, potentially containing antibiotic residues and resistance genes, are applied to fields. Consequently, the food or feed produced may be contaminated with AMR, which is then spread through the food chain to ultimately reach urban consumers.

Antibiotics consumed by animals and humans alike are partially excreted through urine and faeces. Consequently the wastewater system

## THE ONE HEALTH APPROACH

One Health is a interdisciplinary approach bringing together the collective knowledge of multiple disciplines, including public health, veterinary medicine, ecology, agricultural science, sociology and economics, to address the issues at the human-animal-environment interface. Although this called for a unified approach to veterinary and human medicine to address zoonotic diseases. Since the international recognition of One Health, the concept has evolved beyond its initial focus on zoonotic diseases, expanding into issues of antimicrobial resistance, urban health and ecosystem health.

### Forschungskolleg One Health and Urban Transformation

The Forschungskolleg "One Health and Urban Transformation" is coordinated by the Center For Development Research (ZEF) as well as various other institutes of Bonn University in co-operation with the United Nations University – Department for Environment and Human Security (UNU-EHS), and the University of Applied Science Bonn Rhein-Sieg (HBRS), all in Germany. The graduate school has 13 doctoral students from different disciplinary backgrounds, each conducting her or his research in one of the four research areas Ahmedabad/India, Accra/Ghana, São Paulo/Brazil and Ruhr Metropolis/Germany.

In the context of Ahmedabad, the Forschungskolleg investigates the spread of antimicrobial resistant bacteria, namely Methicillin-resistant *Staphylococcus aureus* (MRSA), between animals, humans and the environment. The MRSA is commonly associated with hospital-acquired infections. However, community-acquired MRSA is becoming more prevalent. As *S. aureus* can be zoonotic, the study investigates the transmission of MRSA from cows and buffalos into the human population, considering three pathways: direct contact, via shared surfaces, via milk products.

These transmission pathways are mediated by individual (and community) hygiene behaviour as well as food safety regulations.

plays an important role in the spread of AMR. Water is an important rural-urban linkage, as contaminations flow along waterways, giving rise to classical upstream-downstream relations. Even modern wastewater treatment plants cannot fully remove resistant genes, leading to their inevitable release into surface

water. Hence urban antibiotic consumption (as medication and via the food chain) results in higher concentrations of resistance genes in the water system, therefore spreading resistance from urban to rural areas. This is of particular concern, as surface water forms a chief irrigation water source, thus potentially contaminating food and feed crops, which further amplify the development of AMR through the spread via the food chain.

## WHAT DOES THIS MEAN FOR HEALTH POLICIES?

As described above, despite the great advances in rural development and the shrinking rural-urban health gap, rural areas remain underserved. In light of Sustainable Development Goal 3, "Good Health and Well-Being", it is important to create incentives for doctors, nurses and other skilled health staff to come to rural areas, as well for attracting investment from insurance companies, private providers and pharmaceutical companies to promote rural healthcare. Here, digital solutions can also help to bridge the rural-urban divide. In India, for example, an app-based clinical decision support tool was developed to support accredited social health care activists (ASHAs) in identifying and managing a wider range of diseases. As a result, fewer visits to healthcare facilities were required, saving time and resources for the individuals and easing pressure on the overcrowded facilities. At the same time, the specific health and development challenges arising from the growing convergence of urban and rural life need to be addressed. The pressure exerted on rural lands by urbanisation and population growth, which is intensifying rural-urban flows, is most evident in peri-urban areas. Research towards understanding the transmission of AMR, identifying critical control points and developing interventions to reduce antimicrobial use are being prioritised at international level. However, continued political commitment (provision of financial resources and engagement in inter-sectoral collaboration), public-private partnerships (for the sustainable implementation of 'One Health') and public engagement (in development and implementation of initiatives), as well as further research are required to develop effective policies and interventions.

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## ACHIEVING SUSTAINABILITY WITH A REGIONAL PLANNING APPROACH

Traditional definitions of urban and rural territories do not capture the complexity of different land use changes and realities. The connection between urban and rural areas is crucial to sustainable development, especially in fast growing economies, which has to be addressed in public policies. The Land Use Planning and Management (LUPM) project in India aims to improve the system of land use planning through a regional planning approach.

By Nina Gräfenhahn and Felix Knopf

Like any other natural resource, land is limited. With high growth rates of population, economy and industrial development, pressure on land increases, and the distribution, use and management of land becomes a challenging task. This is apparent in and around urban areas, where borders between rural and urban become blurred. New approaches need to be taken into account in spatial planning in order to meet the changing demands in administering city regions, controlling development and providing infrastructure.

In India, approximately 2.2 per cent of the overall global geographical area accommodates about 18 per cent of the world's population. Tremendous pressure has been put on land as a result of increasing population growth and rapid urbanisation. Growth occurs not only in megacities such as New Delhi or Mumbai. The population is also constantly increasing in the fringes of most of the Indian cities. The reasons for this are better access to information technology, better roads, higher levels of education and changing economic realities. Not only does growth pose challenges for food security, but it also threatens the flora and fauna surviving in an already limited number of hotspots as settlements sprawl unplanned in the countryside.

### URBANISATION DOESN'T JUST MEAN BURGEONING MEGACITIES

While the problem of bursting cities in India is well known and the cities' governments are already implementing urban planning strategies to manage growth, there is a gap between urban and rural administration in terms of mandate and capacities for spatial planning. Whereas the global debate on urbanisation often focuses on big cities, the process has in fact been happening mostly in the continuum of rural areas with villages, towns and cities of fewer than 500,000 inhabitants. Approximately 1.3 billion reside in provincial towns and small and medium cities, most of which are



Rural planning exercise in the village of Sampur, Ganjam District, Odisha.

Photo: Felix Knopf/GIZ

closely linked to their surrounding rural areas through their economies and labour markets, social networks, culture and the proximate environments they share.

Thus, growing peri-urban areas or rural areas and cities are interdependent and interconnected. Although peri-urban agglomerations have urban characteristics, they are not classified as such and thus lack institutional structures and capacities to address, amongst others, infrastructure planning and service provision. Rural local bodies are administered without the mandate for spatial planning, and therefore without any planning capacity.

The result is visible in the newly developing outskirts of the cities, where no spatial pattern is followed and development is steered by land ownership rather than by a spatial development strategy. This has consequences for the people living in these areas, such as a lack of adequate basic needs services like fresh water, sewerage, roads, electricity.

### FACING PROBLEMS AT THE REGIONAL SCALE

There is a need to rethink the frame within which planning is currently conducted in India as it is becoming increasingly clear that traditional definitions of urban and rural are no longer able to capture the complexity of the different land uses and connections between them. To better manage the challenges that are occurring in India, one must acknowledge the interaction between the urban and the rural constructs. This new territorial reality should be addressed in public policies, as national and local governments play a pivotal role in shaping these change processes and ensuring that future perspectives for (rural) populations are created.

The effect of the urbanisation trends must be handled as a supra-local interest as cities can have on the one hand a positive impact on the rural areas and their development but can aggravate land use conflicts, too. To address this,



regional plans are one tool and on an appropriate scale to manage the side effects of the current development.

The regional planning approach is not new. In India, it has been applied mostly in Metropolitan Regions such as Delhi and Mumbai. Also, a few states, such as Kerala and Goa, have implemented regional plans at district level, including both urban and rural areas. A regional plan summarises the governmental sectoral and inter-sectoral development and minimises possible land-use conflicts within a region, including the urban and rural parts. A comprehensive regional plan involves all sectors and stakeholders (settlements, infrastructure, agriculture, mining, industries, commerce, etc.) and enables these to make spatially informed decisions.

### THE VISION OF THE “NEW URBAN AGENDA”

In the southern state of Tamil Nadu, the government already realised the need for regional planning in 1971 when the Town and Planning Act was passed with a section on regional planning. Regions were defined, but neither a Regional Plan nor a Regional Planning Authority are in place yet. The government has decided to revisit the Regional Planning Approach Act since 2016 as part of the Land Use Planning and Management (LUPM) project supported by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). Also in the eastern state of Odisha, the government acknowledges the need for regional planning despite the fact that there is no such provision in the Act. Therefore, the Government of Odisha chose the district level to demonstrate spatial planning at regional scale in a normative and systematic way. Both of the states thus contribute to achieving the vision of the “New Urban Agenda” by integrating urban and rural functions into national and sub-national spatial frameworks. Developing land-use policies in a participatory manner is seen as crucial to strengthen democratic structures through more co-determination at lower levels in political decision-making.

### LAND USE PLANNING AND MANAGEMENT PROJECT

Under Indo-German co-operation, India's Ministry of Rural Development (MoRD) with its Department of Land Resources (DoLR) and GIZ are jointly implementing the LUPM project. The project is meant to improve the

#### Levels of spatial planning



Source: Georg Jahnsen/GIZ

system of land-use planning in order to enable and ensure that institutions apply policies and instruments of integrated spatial and land-use planning. The project has identified Odisha and Tamil Nadu as two pilot states. In these two states, different scales of governance, from state level to local level, are taken into consideration.

At state level, a land-use policy is being developed. The aim here is to include all spatially relevant government sectors with their respective policies and come up with mechanisms of conflict resolution and better co-operation between sectors. One example is roads departments on one hand and forest departments on the other. The policy on forests provides a goal of extending forest cover in the state, although no land is available for that purpose. Roads departments need to take care of noise emission when building new highways. The effective utilisation of the space for roads can be managed through co-operation between these departments.

At the same time, a manual for the preparation of regional and district plans is being developed in parallel to the preparation of demonstration plans. The manual provides a toolkit of instruments and guidelines for regional planning and complements already existing guidelines for urban planning. Demonstration areas are taken as living examples and showcase specific chal-

lenges in preparing the plan. In this context, a focus is put on planning tools beyond urban areas. A region consists mostly of rural areas with few urban centres. For a comprehensive planning system, spatial planning in rural areas is required to be strengthened in order to transfer benefits of land-use planning also to the rural population. Thus, capacity development modules extend the skillset of urban planners and local authorities in the two states to planning tools especially in peri-urban and rural areas.

### PLANNING ALWAYS HAPPENS IN CIRCLES

Several lessons have been learnt at various levels which contribute towards bridging the gap between the rural-urban continuum. Currently, planning at the regional level is understood as economic development planning. However, planning is seen as more than the mere allocation of funds. It includes gathering data and creating maps taking account of the economic, social and environmental trajectory of specific areas and working spatial analysis findings into the plan. It is important to link district plans to regional and state development plans to ensure that rural areas are adequately planned for and to create benefits from rural-urban interlinkages.

Spatial planning can also be a leverage for change. Rather than being a restrictive tool, a plan must be communicated as a dynamic, pro-development tool catering to a greater prosperity of all. A strong ownership of the plan through intense public participation can ensure the convergence of “bottom-up” and “top-down” planning. Participation amongst government institutions is as important as participation of people. Multi-stakeholder forums address needs and interests of all land-related government sectors and ensure a balance of these interests. Finally, a key lesson is that planning always happens in circles. It takes considerable time to set up stakeholder involvement, collect data, implement mechanisms of participation, and build the individual and institutional capacities for successful planning. The planning process can be seen as a consensus building spiral, taking different rounds and repetitions in order to achieve solutions which are beneficial for everyone.

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The growing city of Kathmandu, Nepal's capital.

Photo: Jane Carter

## SMALL AND MEDIUM-SIZED TOWNS – AN UNTAPPED POTENTIAL FOR INCLUSIVE DEVELOPMENT?

Small and medium-sized towns are important for connecting rural and larger urban areas and have the potential to play a more effective role in inclusive and equitable regional development. Yet the development potential that they offer often goes unnoticed and unplanned. Inadequate financial resources and infrastructure as well as lack of power and authority are some of the challenges these towns face, as the examples from Nepal and Bolivia show.

By Craig Hatcher, Jane Carter, Martín del Castillo and Yogesh Pant

The growth of the world's global urban population has led to economists, policy-makers and urban theorists declaring this as an era of the 'Urban Age'. In 2007, the world crossed the tipping point in which 50 per cent of its population became urban, in comparison to 1960, when only 34 per cent of the world's population lived in towns or cities. The growth in the size of urban areas, especially in Africa, Asia and Latin America, means that far more people are urban dwellers today than was the case 50 years ago, a figure that is predicted to increase.

Nepal and Bolivia are no strangers to this trend. Nepal's population was predominately rural until recently but is now urbanising at a rapid rate. The capital city of Kathmandu, with its surrounding valley, accounts for 24 per cent of the total urban population and has been growing between three and four per cent each year as people migrate to the area in search of better jobs and services. The urban population

has also increased rapidly in Bolivia over the past 30 years – from 30 per cent of the total population in 1976 to nearly 75 per cent today. In both countries, a steady growth of population in larger urban centres is coupled with a more rapid population growth of small and medium-sized towns, expanding along road corridors.

### TAPPING THE DEVELOPMENT POTENTIAL

Helvetas focuses its urban engagement on small and medium-sized towns. In many developing contexts, a significant and growing proportion of the population live in such towns, which also provide vital services and markets for those living in the surrounding rural areas. With adequate investment and political authority, small and medium-sized towns have the potential to promote a more inclusive,

equitable and sustainable approach to regional development – an approach which also has the potential to target the poorest and most marginalised.

However, small and medium-sized towns have tended to receive little policy attention or funding from development agencies, and struggle attracting investment from the private sector. They tend to fall between what is perceived as the more deserving rural areas and larger towns that remain within the purview of national power-holders such as politicians and administrators who tend to live there. This bias towards 'rural development' and 'primary' or 'mega-cities' not only neglects the number of people living in smaller towns, but also overlooks the development potential of secondary towns – both at the national level and in terms of the intermediary role that such towns form by their connections with the surrounding rural areas and larger towns.

## A CLOSER LOOK AT NEPAL AND BOLIVIA

There is no agreed international consensus on the size of a small or medium-sized town; they come in all shapes and sizes. Classifications of towns vary according to national contexts and may be either purely in terms of population numbers, or include population density.

As part of Nepal's recent transition to a federal republic (which began in 2017), the country is now divided into 753 administrative divisions which include *gaunpalika*, or rural municipalities, and *nagarpalika*, referred to here as (urban) municipalities, although the official translation of the latter is simply a municipality. The rural and (urban) municipalities lie within seven new States (provinces). Heavily urban areas are defined as metropolitan or sub-metropolitan cities – the latter having a minimum population of 150,000. (Urban) municipalities are required to have a minimum population of 60,000 in the low-lying Terai plains, 31,000 in the hills and 17,000 in the mountains. However, the division between rural municipalities and (urban) municipalities is not always a straightforward one between country and town; many are a mix of rural and urban areas.

In Bolivia, a settlement must have a population of over 2,000 to be classified as a town. Just under 1.3 million, or approximately 20 per cent of the total population, live in small and medium-sized towns with a population between 10,000 and 100,000. These small towns fall into two categories: small cities that are located close to bigger cities such as La Paz and Cochabamba and are growing to create a larger

suburban, metropolitan area and those smaller cities that are more remote and tend to grow outwards through low-density extensions.

Small towns often come under pressure from urbanisation – uncontrolled development, little infrastructure and poor service provision – combined with a lack of strong institutions of local governance. Community cohesion is rarely strong, as the population is often mixed, coming from different backgrounds. Further, rapidly urbanising areas are often reclassified into 'towns' by legal or bureaucratic measures – as has been the case for many (urban) municipalities in Nepal – although their social, political and physical infrastructure and services remain at a basic level.

### NEPAL: FEDERALISM – A CATALYST FOR URBANISATION

At the heart of the federalisation process in Nepal is the devolution of political and administrative decision-making to State and local levels. Federalism is still in its early stages in Nepal, but already the political and economic dimensions of categorising urban centres are clear. This is particularly evident in the naming of the capital cities of the seven new States, which is the responsibility of the elected State governments. At the time of writing, only three of the States had officially declared their capital, over nine months after their governments were formed. Investors move in, and land prices immediately rise once a capital is known – making some people rapidly rich and leaving the prospect of land or house ownership far out of the reach of others. Similarly,



Shivu Sharma is a 39-year old labourer who works most of the year in India and is head of one of the families that were supported to build a toilet in Katarniya.

Photo: Jane Carter

the main towns of (urban) municipalities are seeing significant investment and growth; they can also claim a greater allocation of federal funds than rural municipalities.

This noted, federalism is – and is intended to be – a catalyst for urban development across a wider swathe of the country, spurring the growth of urban conurbations outside Kathmandu valley. Nepal's 2017 National Urban Development Strategy is explicit in this. Yet promoting equitable, inclusive development in urban areas appears to be a major challenge. A 2017 Country Poverty Analysis by the Asian Development Bank notes that whilst inequality amongst the rural poor in Nepal is declining, amongst the urban poor, it is increasing.

### RECOGNISING AND INCLUDING THE POOR AND VULNERABLE

In all its country programmes, Helvetas seeks to pro-actively include the poor and disadvantaged – defined according to country circumstances. One of the issues apparent in working at the rural-urban interface is that these definitions need to be contextualised. In targeting those residents most affected by pollution, Helvetas in Bolivia identified not only specific groups such as women and indigenous persons to be more disadvantaged, but also how disparities exist between different cities.

In Nepal, social mores are changing – with federalisation bringing new opportunities for the political representation of the previously marginalised, especially women and Dalits, members of the lowest caste. Small and medium-sized towns can be a place for those facing discrimination in their home villages, particularly Dalits, to forge a new identity for themselves. They are also places in which the vulnerable can be easily exploited, or at least find it difficult to gain a livelihood. Those vulnerable in this case are often recent arrivals who lack social support networks, such as young women and men arriving from their villages with limited education and skills. Who is truly disadvantaged may in some cases be less a function of caste and ethnicity, and more a matter of sheer economic poverty, combined with gender. It can also be a simple matter of location, with those concerned being forced to live in the most recently established, least desirable parts of town.

### LEARNING FROM A SMALL TOWN EXPERIENCE?

In the above context, there are lessons that can be learnt from carefully planned, local-level urban activities. One such example is the development of the emerging town of Katarniya in Nepal supported by the Swiss consortium of Helvetas, Terre des hommes and the Swiss Red Cross. In this case, the residents comprised a mixture of households belonging to

different castes and ethnicities. The poorest and most vulnerable were often those who had arrived most recently. As a population, they had many dividers – but they shared the wish for a safe drinking water system. The Swiss consortium facilitated the formation of a group of all user households, represented by a committee. Many meetings were held to discuss the improvement of the water situation, with a tripartite agreement eventually being signed between the local municipality, the user committee, and the consortium. This agreement linked universal sanitation to the construction of a borewell and drinking water tower. Thus, all households unable to afford their own toilet – as identified and agreed by all users – were supported to do so through a collectively established fund that will also be used to cover maintenance costs.

The lessons learnt from Katarniya have been shared with the municipal representatives of the town of Birendranagar, recently declared as the capital of the new State of Karnali. Birendranagar is well situated for expansion in a wide, flat-bottomed valley with connections to the larger border town of Nepalganj in the southern plains and rural municipalities and small and emerging towns in the north. In terms of its sustainable, inclusive development, ensuring safe drinking water, sanitation and effective waste disposal is crucial for the town. To maintain this, the technical assistance team works together with the elected municipal representatives and administrative staff. This entails building municipal capacity regarding the quality and sustainability of sanitation ser-

vices, applying a Faecal Sludge Management tool box (developed by the Asian Institute of Technology Gates Foundation) and assessing different technical options for a faecal sludge treatment plant, plans for which will be designed accordingly. Importantly through this process, the municipality's responsibility will be to ensure that sanitation is accessible to all, not just the wealthy, and that regular citizen consultation is integrated into decision-making processes.

### BOLIVIA: HARNESSING RURAL-URBAN LINKAGES

A similar story of urban development can be told in Bolivia. While urban and peri-urban populations have steadily grown over the past 30 years, this population growth has not been accompanied by an improvement in infrastructure and services for wastewater treatment or solid waste management.

Villamontes is a medium-sized city with about 50,000 inhabitants that is situated in the southern part of the country, while Cliza is at Bolivia's heart, in the Cochabamba department and counts 20,000 inhabitants in the urban centre. Villamontes and Cliza are two such towns that were lacking the necessary resources to be able to provide quality basic services to its citizens. The small towns have strong links with the surrounding rural areas; the urban residents often have cropland in the countryside surrounding the town, and goods, foods and services are often sold and shared between

the rural and urban settlements. Supported by the Swiss Agency for Development and Cooperation and implemented by Helvetas, the Gestión ambiental municipal (Municipal Environmental Management) project builds on the importance of these rural-urban linkages to ensure that basic urban sanitation is financially viable and soil and water pollution, which is caused by solid and liquid waste as well as untreated wastewater directly deposited into the rivers, is reduced.

The towns have established formal partnerships with other surrounding small municipalities in order to benefit from economies of scale and reduce operational and maintenance costs. Villamontes, for example, shares a sanitary landfill with a smaller neighbouring municipality, while Cliza is developing a shared solid waste management service with 16 other small municipalities. Both towns are now covering 80 per cent of their urban populations with quality sanitation services. Rural residents also use the organic waste from the town for fertilising their crops and use treated wastewater for irrigation during the dry season.

### Fostering rural-urban linkages through a holistic agenda

It is not just the population growth of towns that is emphasised by policy-makers and theorists, but also their economic importance. Policy-makers emphasise towns as being 'crucial' to development, and as hubs for job creation, innovation and growth. Urbanisation, under the right circumstances, is the future driver of growth and development in emerging economies. The era of the urban age has its winners and losers, however. If not strategically managed and planned inclusively, urban development can lead to inequality both within the same town and between different towns at the national, regional and global level. National urban policies need to be developed that focus on harnessing rural-urban linkages and investing in small and medium-sized towns that support these linkages to encourage a form of urbanisation that is sustainable and inclusive.



Collected waste in the municipality of Cliza.

Photo: Martín del Castillo

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What most people associate with Kyrgyzstan: mountains, grasslands and yurts.

Photo: Gladieu/Le Figaro Magazine/laif

## THE TWO SIDES OF RURAL-URBAN MIGRATION

Around a third of Kyrgyzstan's GDP comes from remittances, which puts the country second world-wide in this respect. Migration within the country is also at a high level. But cash flows from urban to rural areas are only one effect of this phenomenon. The population in the cities themselves are also provided with food by their rural relatives. Nevertheless, this by no means implies that the food situation in the country is on a sound footing.

By Niels Thevs, Begaiym Emileva and Kara Lorraine Canlas

Kyrgyzstan is one of the five Central Asian countries which gained independence in the course of the disintegration of the Soviet Union. It is located between Kazakhstan at its northern border and China, Tajikistan, and Uzbekistan at its southern border (see Map). Most people attribute high mountains, nomadic culture and yurts to Kyrgyzstan. In fact, the country hosted the second World Nomadic Games in September this year.

Less known to most people, but of crucial importance to Kyrgyzstan, is labour migration and the associated inflow of money through remittances. From a population of about six million people, around 800,000 (some estimates even refer to one million) work abroad. The total amount of money transferred from migrant labourers into Kyrgyzstan was 32.9 per cent of GDP in 2017, according to World Bank data. This figure ranks Kyrgyzstan second world-wide in terms of remittances compared to GDP, only surpassed by Tonga (see left Figure on page 30).

The major destination for migrant workers is Russia with an estimated 640,000 Kyrgyz people working there, followed by neighbouring Kazakhstan (see right Figure on page 30).

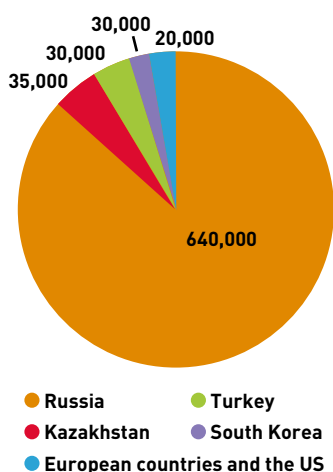
In Russia, the major destination is Moscow, followed by other big cities like Saint Petersburg, Yekaterinburg, or Novosibirsk, which is also easily visible on the flight schedules of Bishkek and Osh Airports. Many migrants work in informal contexts so that only estimates can be provided on the actual number of people. According to a 2017 study from the University of Central Asia, about three quarters of the migrants in Russia work in the sectors of trade and retailing, gastronomy, and construction. The reasons for labour migration are low salaries and unemployment in Kyrgyz-

stan. According to the International Labour Organization (ILO), current average monthly earnings of employees are 14,217 Som (USD 205) in Kyrgyzstan, compared to 38,609 Rubles (USD 588) in Russia and 163,725 Tenge (USD 450) in Kazakhstan.

Migration is also an issue within Kyrgyzstan, since more and more people are moving to the capital, Bishkek, and to a lesser extent to Osh, the second largest city. This migration adds to the lack of labour for rural households. While migration to Russia and other countries is as-



Number of people from Kyrgyzstan to other countries



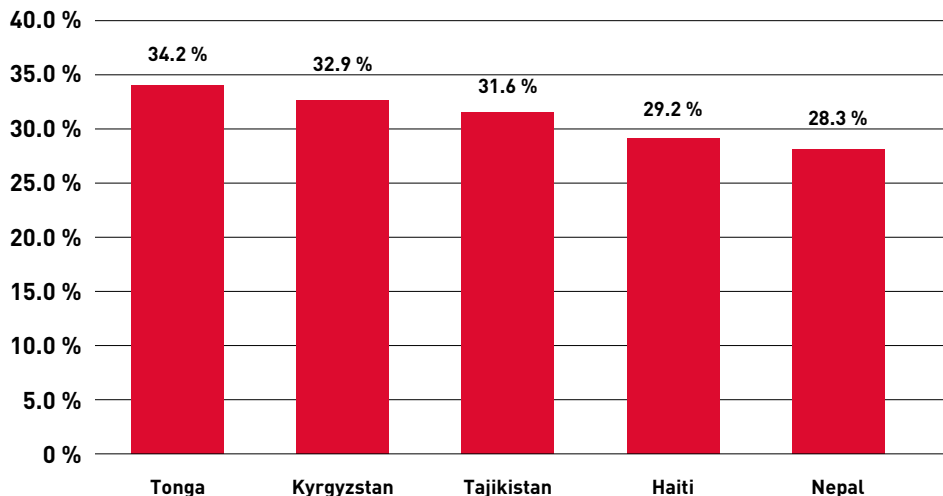
sociated with an inflow of money into Kyrgyzstan, migration inside the country mostly involves an exchange of money and food. Family members who have moved to the city receive food, mainly potatoes, vegetables, fruits and meat, so that many people do not have to spend much money on food. In turn, the new city citizens send money back home.

### CHANGING RURAL HOUSEHOLD STRUCTURES

In terms of its economy, Kyrgyzstan is divided into north and south. The northern part with Bishkek is richer than the southern part of the country. The south faces high population pressure and shortage of land, and in general is more rural and dependent on agriculture than the north. This is reflected in migration numbers, as the share of households with at least one migrant is highest in these southern provinces, at 34 per cent for Batken, 29 per cent for Jalalabat and 25 per cent for Osh. In the northern provinces this share of households is only between 1.5 per cent and 4 per cent. In the southern provinces, with their high share of rural inhabitants, many households depend on migration in order to satisfy their daily needs for food.

Migrants from Kyrgyzstan are mostly younger than 30 years and are mainly men, although women are catching up. Twenty per cent of the migrants hold a higher education degree, 27 per cent have had vocational education and training, about 40 per cent have completed school education, while 13 per cent have no formal education certificate. Slightly less than a

Amount of remittances as percentage of GDP for the five countries ranked highest regarding this percentage

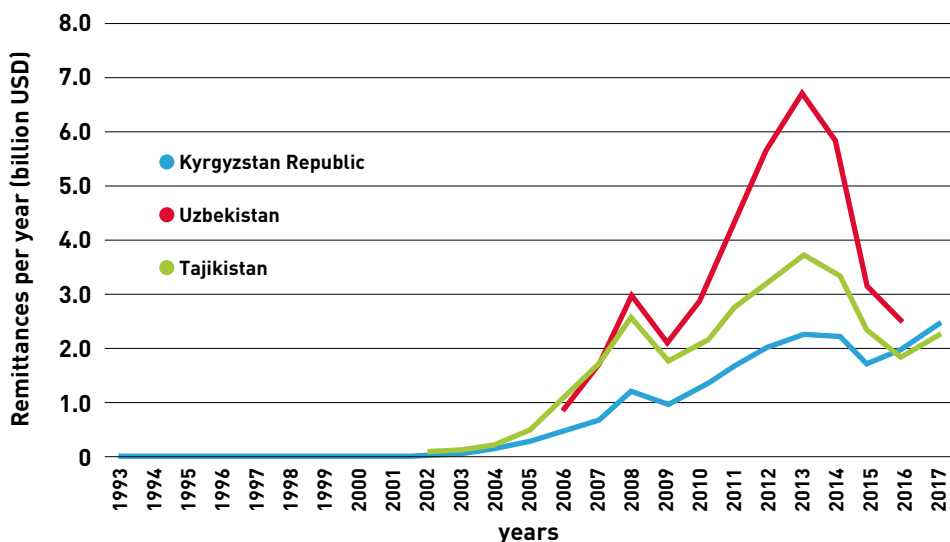


third of the country's population (64 per cent) are rural. Since most migrants are men, many households lack labour in agriculture. This is aggravated by the share of the migrants who work in construction, as they out-migrate during the summer. Many households respond to the lack of labour at home by switching to crops with lower labour requirements. Instead of maize or wheat, they grow lucerne, for example, which is used as animal feed for the households' own requirements or for sale. These crops are planted every five years and just need to be harvested two or three times a year. Others concentrate on gardening and fruit trees, though mostly for subsistence or to deliver small amounts to local markets. While gardening is very labour-intensive, it is tradi-

tionally regarded as a "woman's task". This is also because it is hardly or not at all mechanised. Nevertheless, one effect of this migration-driven gender imbalance is that women are empowered since they often have to act as household heads.

Remittances sent back home are mainly used to meet basic needs. About 50 per cent of the remittances are spent on food and clothing by the family members back home. Around 30 per cent are used to buy apartments or build or renovate houses. Next to these purposes, remittances also contribute to supporting education and healthcare of family members, buying farm equipment, livestock and cars, and paying for celebrations (weddings and funerals).

Development of remittances from Kyrgyzstan, Tajikistan and Uzbekistan over the past three decades



For the latter purposes the various studies give somewhat different degrees of importance. Here, it should be noted that livestock has a banking function for many families all over the country. The overall picture suggests that only a very small proportion is used for investments or as a basis to set up a business.

## REMITTANCES CUT BOTH WAYS

The impact of remittance flows is ambivalent. On the one hand, households are brought into a dependence on remittances, which may transport a wrong and too optimistic picture of the financial situation and perspectives of the households, because the inflow of remittances is often taken for granted and is perceived as a continuous part of household income. However, whether this income can be sustained at certain levels and for long-term perspectives is beyond the control of the households and migrant workers. If a crisis sets in, such as the economic crisis in Russia after 2013 (see below), migrant workers are the first to be laid off and sent home, with a severe reduction in household income and overall remittances.

The occurrence of such crises or other political changes that impact on migration cannot be controlled by the migrants and their dependent families. It is noteworthy in this context that, according to World Food Programme (WFP) standards, Kyrgyzstan is not so food insecure that it justifies interventions by the WFP, but because of the importance of migration and remittances, Kyrgyzstan is considered very vulnerable, so that the WFP remains in the country. For governments, migration provides a biased picture of their countries' economic situation due to the constant inflow of money. Governments may become lazy doing reforms, as they count on the steady inflow of remittances.

On the other hand, returning migrants bring new skills from abroad, chiefly in construction, services, catering and trade. Migration has sparked improvements in communication infrastructure, and the need for and pressure of reliable and efficient money transfers has resulted in an enhanced banking system.

## NO RELIABILITY

After disintegration of the Soviet Union, the newly independent countries fell into a severe economic crisis, and industry largely broke down. In Kyrgyzstan, the collective farms (Kolkhozes and Sovkhozes) were dissolved very



The majority of Central Asian migrants in Russia work in the sectors of construction, gastronomy, trade and retailing.

Photo: Konstantin Zavrazhin/Gamma-Rapho/laif

quickly, which resulted in a huge number of smallholder family farms often lacking good access to machinery and other inputs. Agriculture shifted largely to subsistence agriculture to feed the households in the countryside, but also to support family members in the cities.

After the 1990s, when the Russian economy started to grow, people from Kyrgyzstan, but also from neighbouring Tajikistan and Uzbekistan, began to migrate and take up work in Russia. There was a steady increase of remittances – in some years with annual growth rates of 50 per cent – until 2013, interrupted only shortly by the economic crisis in 2008. After 2013, Russia suffered from an economic crisis, which resulted in a significant reduction of migration and flow of money to Central Asia, in particular in Uzbekistan. From 2015 on, migration picked up again, and Kyrgyzstan has surpassed its former peak of 2013 with annual remittances of USD 2,485,778,060 in 2017 (see bottom Figure on page 30).

Now Kyrgyzstan is the major origin of migrants to Russia, since the country joined the Russia-led Eurasian Economic Union in August 2015. Before Kyrgyzstan eventually became a member, simplifications for Kyrgyz migrant workers had been one of the most, if not the most important issue for the country. Now, many simplifications (e.g. registration is easier, work permits are no longer needed, la-

bour market quotas have been lifted, and there is access to social benefits) are in place for Kyrgyz migrants, but not for Tajiks or Uzbeks, because their countries are not members of the Eurasian Economic Union. Therefore, migration from the latter two countries lags behind Kyrgyzstan. Before mid-2015, 194,000 Kyrgyz citizens were blacklisted by the Russian authorities for immigration rule violations. At the end of October 2015, some 76,000 Kyrgyz citizens were deleted from these lists. This has eased access to the Russian labour market. Kyrgyzstan is a driver for Tajikistan and Uzbekistan to move closer to Russia or at least keep ties with it and benefit from migration.

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For a list of references, see online version of this article at: [www.rural21.com](http://www.rural21.com)

## “REVITALISING” CHINA’S COUNTRYSIDE – OLD WINE IN NEW BOTTLES?

China’s political leadership has set out to “revitalise” the countryside and turn it into a pleasant place with “beautiful villages”. Only a decade ago, the leadership at the time had attempted something similar in the form of the large-scale “Building a New Socialist Countryside” programme. But China’s official vision of a rural modernisation based on fewer peasants and more industrialised agriculture has not changed. The question therefore remains whether rural regions and, above all, the rural population, are really going to benefit from the new policy.

By Elena Meyer-Clement

China’s rapid urbanisation has not failed to leave its mark on the countryside. Over the past few decades, millions of people have left their villages to find work and a new life in the cities. Hundreds of thousands are still moving between the countryside and the city. Many villages have emptied out or are mainly inhabited by those who have been “left behind” in China’s migration movement: the elderly, the children and the disabled. Other villages have been swallowed up by the expanding cities – a process that has destroyed valuable farmland and left millions of peasants landless.

### RUN ON RURAL CONSTRUCTION LAND FUELLING LAND CONFLICTS

Mr Zhang (name changed) is a village party secretary in Henan province. In 2014, he led us through his tidy village just a few kilometres outside an economically ambitious county-city. The village seemed well-off. On the main road, people were meeting and talking, and children were playing. Only five years earlier, under the “Building a New Socialist Countryside” programme, the village had received financial support for renovation. Mr Zhang explained how they had built new, wide roads (some of them asphalt), cleaned up the village and renovated the houses. But, he sighed at the time of the interview, everything would soon be demolished, and everyone would have to relocate. The relocation area, a grey residential complex with four-story buildings located next-door to the original village, is called a “new rural community”. The first floor, which has rolling shutters, can be used as a shop or garage.

Such new communities have sprung up everywhere in the Chinese countryside. They often consist of several merged villages, and all of them have a modern, urban-like appearance. Villagers can purchase subsidised apartments, but in return, they usually have to demolish their old houses. As part of the “New Socialist



Construction of a “new rural community” in Henan province.

Photo: Elena Meyer-Clement

Countryside” rural development programme, the new communities were praised as a solution to improve the provision of social welfare to residents of villages that were scattered or emptied out by migration. However, what made them particularly interesting for local governments was the more efficient use of rural construction land.

### EXPROPRIATION, VIOLENT DEMOLITION, CORRUPTION

Construction land is becoming more and more precious in rapidly urbanising China, where

urbanisation equals modernisation and GDP growth, and economic success produces political career opportunities for local officials. Moreover, local governments fill their coffers with land deals on the urban land market. Despite some pilot projects, a rural land market has not developed yet, and only China’s central and local governments hold the authority to expropriate rural land and convert it into urban land. In order to protect the country’s farmland, the central government allocates strict quotas for the different land types, and local governments cannot expropriate more farmland for urban expansion than the quotas allow. However, there is a loophole. If they





The village in Henan province.

Photo: Elena Meyer-Clement

increase the farmland quota in their locality, local governments, in turn, also have more construction land quota at their disposal. Thus, merging villages and constructing multi-story residential blocks in the countryside have become a popular means of saving construction land and winning more farmland. With the new quota, cities can continue to expropriate farmland on the urban fringe.

Confrontations between villagers and local governments or developers are a common phenomenon in China's urbanisation process. Complaints refer to anything from violent demolitions and farmland expropriation to corruption and a lack of compensation payments. In 2006, there were an estimated 90,000 mass incidents, more than 60 per cent of which were over land disputes. Subsequently, no further numbers were published, but the trend was clear. Social unrest was growing and becoming more violent. The large-scale village demolitions of recent years have even drawn the attention of the urban middle classes, who fear the loss of cultural heritage.

### “NEW RURAL COMMUNITIES” – FURTHER PROMOTING RURAL OUT-MIGRATION

The reluctance of many villagers to move into the “new rural communities” is also connected to the neglect or inability of several local governments, particularly in less prosperous agricultural regions, to turn the communities into liveable places. There is often a lack of infrastructure and service facilities, including an absence of public transport to the nearest city and, sometimes, low-quality construction. Planning and design reflect conceptions of modern urban life but may not reflect villagers’

demands. The younger generation often looks forward to having new apartments, but particularly the elderly, who cannot climb stairs and are used to having their own plot of land where they grow their vegetables and might even keep some animals, often find it difficult to adapt. Life in a residential complex with all its utilities, such as piped water, electricity and garbage disposal, is also more expensive than in a simple farmhouse.

Local governments, moreover, often channel the villagers’ compensation payments for the demolition of their houses and their relocation directly into purchasing new apartments. Finally, the “new communities” do not usually come with many new employment opportunities. In agricultural regions, this often means that villagers have to cover longer distances every day to reach their fields. When local governments manage to attract investors, villages can make deals to lease out their farmland. Then the villagers become low-skilled employees in agricultural enterprises. However, if the central or local governments expropriate their land for other kinds of development, the villagers will have to commute to the nearest city in order to find some work. But this is only an option for those who have their own vehicle.

### NEW POLICIES, NEW SOLUTIONS?

In 2014, the political leadership introduced the plan for “new-type urbanisation”, which aims to put an end to large-scale village demolition and an urbanisation that is mainly motivated by local governments’ land grabbing. Instead, an improvement in rural migrants’ conditions in the cities and better protection of rural land rights are supposed to initiate the shift towards an urbanisation based on population demands. This year, the leadership introduced the policy of “rural revitalisation”. The goal is to revive the countryside as a pleasant place to live, improve environmental protection and preserve rural traditions. Not only large-scale industrial agriculture but also smaller agricultural undertakings are now expected to lead to agricultural restructuring.

In some places, the new policies have already led to a slowdown in demolition and relocation. For example, in the county that Mr Zhang’s village belongs to, the construction of several rural communities was halted. However, his village was located too close to the county city to be affected by the policy change. Local governments were able to redefining the project as an urban renovation project. Urban renovation is a strong focus in the new

### “NEW SOCIALIST COUNTRYSIDE” AND “REVITALISATION OF THE COUNTRYSIDE”

“Building a New Socialist Countryside” was the rural development programme of the political leadership under President Hu Jintao (in office 2003–2013). The programme combined different old and new reform initiatives in the fields of infrastructure, housing, social welfare and agricultural restructuring. It was heavily subsidised and implemented in a campaign-like manner. At the time, it presented a new political awareness of the rural crisis.

In 2018, the current leadership under President Xi Jinping introduced the “Revitalisation of the Countryside” programme. Many aspects resemble earlier policies. Together with the programme for “New-Type Urbanisation”, however, the leadership has also disengaged from some shortcomings of the predecessors’ policies. In particular, rural revitalisation emphasises the protection of villages with specific characteristics and of rural traditions, the protection of the environment and the protection of villagers’ land rights. Concrete policies are still awaiting implementation.

policies and can tap crucial funding. Thus, for local governments, it comes in handy that urban districts in China often cover vast rural areas. At any rate, in the village in Henan, demolition and relocation proceeded under the new policies, and by now, it has become a new area in an urban sub-district.

As this example shows, it is important for us to look at the local practices of policy implementation throughout China in order to know what the new policies really do. Will they only be drops in the bucket? Or can they make a difference? Whatever the case may be, China’s official vision of a rural modernisation based on fewer peasants and more industrialised agriculture has not changed. The only question that the political leadership is trying to answer is: How to get there without ever-growing social disruptions?

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## “ NIGERIAN POTATOES – A ONE-STOP SHOP FROM FARM TO FORK ”

Managing Director Steve Bawa explains how he operates and what challenges, opportunities and limitations he is facing with his company Fruits & Veggies Global Limited located in Jos, Nigeria.



Photo: Author

### » Dear Mr Bawa, please describe how you became an entrepreneur.

I studied economics in Nigeria and did my MBA in the UK. I have always had interest in the agribusiness and worked during school and studies in the agricultural sector. In 2002, I quit my job as an investment banker based in Lagos to partner with an investor to acquire a dairy business in Jos. We were producing fresh milk, yoghurts, butter and cheese. I managed the business for eight years and left in 2010 to set up Fruits & Veggies Global Limited. I currently deal with potato farmers' co-operatives with a membership of over 10,000 people, comprising both men and women. This relationship gives me tremendous opportunity to impact a greater number of people both directly and indirectly.

### » Where is your company located, and how do you operate?

Fruits & Veggies Global Limited was founded in 2010 in Jos, Plateau State, where 95 per cent of the potatoes are grown in Nigeria. The region has an altitude of about 1,300 metres above sea level and to a large extent climatic conditions suitable for vegetable production especially potatoes. We produce potatoes or aggregate from other farmers, process them into diced frozen potatoes, peeled whole potatoes, diced fresh potatoes and fresh French fries. Our main focus has been value-added, ready-to-use products for food services oper-

ators such as hotels, restaurants, caterers, fast food (quick service restaurants) and large supermarkets. We operate our own logistics with a total of eight refrigerated vehicles comprising three refrigerated trucks for long haul deliveries in Abuja, Kaduna, Ibadan and Lagos, while five refrigerated vans do city redistribution in Abuja and Lagos.

### » Do you only supply cities, or do you also deliver potatoes to rural areas?

Most of our processed products are sold in semi-urban and urban areas because electricity is required even for short-term storage, and thus it is not easy for food service firms to set up operations in rural areas.

### » Where does the processing take place?

Our processing factory is located in a semi-urban area because our staff and their families need access to schools, medical services and other social facilities. Some of the potato fields are located between one kilometre and as far as forty kilometres away.

### » Looking at the lower end of the value chain, where do you get the potatoes from?

While running a farm of our own, we nowadays also receive a significant proportion of our potatoes from contract farmers. These contract farmers are organised in co-operatives, includ-

ing women co-operatives located in the nine local government areas on the Plateau. Our agronomist works as Contract Farming Coordinator with farmers and the co-operatives to implement Good Agricultural Practices – from land selection and preparation, seeds and other input applications to harvest, which ensures quality.

### » What does the contract farming look like in terms of quality, quantities and prices?

The price of potatoes varies with the season. Generally, farmers receive between 200 Naira (0.55 US dollars) per kg when there is a surplus of products in the market and 350 Naira per kg when there is scarcity of products on the market. Twenty to 25 per cent of the raw material is process losses. Since we started contract farming, supported by our co-ordinator, potato quality has improved and post-harvest losses have been reduced.

To some extent, quantities are complied with. However, the general scenario is that when the price of potatoes is low, there is no incentive for side-selling, but when prices are high, side-selling takes place in some cases, and agreed quantities will not be complied with. We reward farmers with a guaranteed market and prompt payment of their invoices. We are also working on an incentive structure that is tied to the market price plus a ten per cent premium at the time of delivery. This will endear us to farmers and encourages trust between farmers and our company.

### » Where do you get qualified staff from? Do you train your own employees?

We only employ local staff on a permanent basis. A total of 50 employees are involved in processing, handling supply chain and marketing; 60 per cent are women. Additionally, we engage indirect labour during the seed and ware potatoes production. Our staff are mostly trained in-house, and also on the job. At inception, a Dutch process engineer, who incidentally was the supplier of our equipment, trained our staff on the handling of the equipment. For one year, we also hired an Indian technician for maintenance training.

» **Would you say you are a farmer or “telephone farmer” in your role of employing potato farmers?**

I am a farmer. I own a farm and produce from the farm. However, we support other farmers with inputs, especially potato seeds in an out-growers scheme, do contract farming with co-operative groups as well as off-taking products from these out-growers and co-operative groups.

» **What are the advantages of having the complete value chain in your hands?**

One advantage of being involved in the complete value chain is that you will be in control of your business and determine your service level delivery to customers. We also had to do a backward integration into the provision of quality potato seeds to farmers. This has ensured quality raw materials input for our factory. Most of what we did in setting up the business was deliberate, to ensure that we would minimise risks of failure. Some steps, such as setting up the cold chain logistics, cold storage and marketing, were deliberate and considered upfront in our business plan, but others, such as seed importation and multiplication, were done later out of necessity.

» **Isn't it easier, then, to link up with other service operators?**

In our operating environment, there are low linkages in businesses, and in a number of cases, such linkages are completely non-existent. Therefore, relying on another person or business to provide you a service or a critical input for your business can be a very frustrating experience. For instance, in the course of developing our business plan in 2010, we realised that without an effective cold chain logistics in place, we would not be able to deliver our products consistently and in the required quality to our prospective customers. There was no-one to see to this, and to date, there is no reliable cold chain service provider. This became the weakest link in the business. We are not a logistics business, but we had to invest in refrigerated cold vans and trucks. Otherwise, one of our valuable selling points, that of being a consistent and reliable partner to food service operators, would be a mirage.

» **Are there any other agribusiness companies in Nigeria that have a similar concept or does your company represent a unique selling point?**

I think we represent a unique value proposition to our customers. Our business model

has been and is still focused on consistently providing value-added ready-to-use products to food service operators. This takes off some of their back-end processes, which are usually time consuming, inconsistent, unreliable and, in most cases, expensive. There may be others doing similar things, but I am not aware of anyone rigorously executing this model. I am, however, aware that some people have tried setting up something similar even on the Plateau, but no one is in production yet.

» **Are you planning to continue to grow? Where do you see bottlenecks?**

It has been quite challenging in the last eight years, with positive results emerging only in the last one and half years. Our revenues are growing, and we intend to continue improving our processes to enable us to serve our current customers better, as well as getting more customers especially in the biggest commercial cities in Nigeria. Production is increasingly becoming challenging due to the security situation on the Plateau.

In addition, investments in infrastructure that will reduce post-harvest losses are an issue that impedes farmers' income and also hampers our business. Others will be consistent and sustained improvements in farmers' capacity to manage their crops profitably. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) are doing a lot in terms of capacity building with their various training in Good Agricultural Practises and Farmer Business Schools.

» **What are the main challenges you have been facing?**

If I were to list the challenges we face in doing business in terms of the biggest to the smallest ones, I would say that without doubt, the biggest challenge confronting us is security. Without adequate security, every other challenge looks like a non-issue because you need a secured environment to do any meaningful human endeavour.

Second on the list is, getting people with the right skills set for our business. This aspect of business is usually underestimated because there are so many people looking for jobs. Small business operators usually do not have the capacity for large Human Resources departments who can organise recruitment, selection, hiring and training of staff for specific skills required before deploying them to work. We need time and money to invest in the kind of manpower that is suited for our

operations. Access finance or credits for agribusiness generally is a huge challenge, too. This is in addition to the high cost of finance and the unsuitable tenors for such credits where they are available. Of course subsidies are virtually non-existent, at least in the potato and other vegetable sectors that we are involved in.

Others worthy of mentioning are import bottlenecks and, in some instances, restrictions, multiplicity of taxes and our almost legendary complete lack of infrastructure such as power, water and roads.

» **What needs to be done to overcome these problems?**

Improvements in security will help business tremendously. Education, especially the right type of education, will provide the manpower needed not only for our type of business but for all kinds of small businesses. They are actually the engine of growth. There must be a deliberate and sustained effort to ease access to finance/credits to agribusiness. It should also be the right type of funding at the right cost.

» **What does an entrepreneur need? What is key to success from your perspective?**

Passion, discipline and perseverance. If you don't have passion for whatever business you are thinking of doing, it will be difficult to have sustained success in that business. Entrepreneurship is certainly not an easy way to make a lot of money; it requires lots of blood, sweat and tears on your part. It is a labour of love, and if you don't have that love, you will not likely make it far.

The second thing is discipline. If you are your own boss, you must acquire the discipline to remain focused in the face of many distractions around and the challenges you must overcome. You must keep your eyes on the big picture, knowing fully well that cutting corners will hurt you later.

Perseverance is the third thing. In addition to passion and discipline, you must have the staying power to persevere to the end otherwise your effort becomes an abandoned project. You need these three things in abundance in a very daunting environment like ours. I will say that we do business in spite of the existence of so many challenges, and with virtually no concrete support to ensure success.



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Photo: Author

## “ WE NEED MORE THAN APPS ”

**Mobile services and smartphone apps, so-called m-services, can help to empower farmers with information and access to services and markets. But we should not neglect looking at their downsides. Strengthening farmers requires far more than just smart digital tools, our author maintains.**

Imagine a smallholder farmer in Zambia – let’s call her Rhoda. Every morning, Rhoda feeds her cows following the advice of an app on her smartphone. She then feeds her children, again listening to an app. Once the children are at school, she plants maize. An app has told her when to do that. The same app has suggested her the type of seeds to be used and will later tell her when to apply fertiliser.

One can read the story of Rhoda with excitement. Perhaps rightly so – after all, don’t all these apps help Rhoda to be a better farmer? But one may also read it feeling concerned. The story of excitement has been repeated many times, so let’s take a concerned perspective here. Rhoda readily follows the advices of her apps. This raises two questions. How good are such advices? And more fundamentally, how do we envisage future farmers to be?

The crucial issue is how trustworthy the recommendations are that the farmers receive via their smartphones. Eduardo Nakasone and Maximo Torero have reviewed many of these apps and come to mixed conclusions. Clearly, the consequences of bad advice become bigger the more far reaching m-services envision to be. The International Crops Research Institute for the Semi-Arid Tropics, ICRISAT, is currently developing an app that promises to guide farmers through the entire farm season. For example, using algorithms and artificial intelligence, farmers are recommended, what to plant. Based on their decision the next steps are suggested, such as what fertiliser to use. This is reminiscent of the 1960s and 1970s, when experts thought they knew more about farming than local farmers, which often led to disastrous results. Today, our hope again lies in the knowledge of experts, this time combined with algorithms and artificial intelligence. The ICRISAT app aims to consider local elements. But can it really capture all the locality-specific factors that are needed for good advice, the diversity of the farms and farmers, their labour constraints, their soil types, their skills and their market access?

Let us assume that the ICRISAT app can work perfectly well – perhaps it will. Even then, it can be used to illustrate my second point. The app envisions to automatically guide farmers through

the farm season. But do we really want this? Do we want farmers that merely follow commands, farmers that function like factory hands? Or do we want farmers who have the knowledge and skills to question such advice? Farmers that understand why some advice makes sense and then follow it, but who also have the knowledge and confidence to readjust, question and resist bad advice. One may say that this line of argument underestimates the capacities of farmers or that apps merely support decisions. But the line between supporting and making decisions may be thin.

Portraying m-services so blankly may seem extremely unfair, and I apologise for this. But portraying them as silver bullets may be equally unfair. If the history of agricultural development has told us anything, it is that there are no silver bullets. Admittedly, some m-services do have the potential to truly empower farmers (see also Daum, 2018). A farmer knowing the market price of the maize he or she wants to sell can bargain better than one who does not have this knowledge. A farmer knowing the local weather for the days to come clearly has an advantage – although truly local and reliable forecasts are still hard to come by. But the hype about m-services should not make us blind about their downsides. Some of them can easily be addressed, for example, by providing quality control and complementary ICT-literacy. Others require more efforts. M-services may help to advice farmers, yes, but for farmers to truly be empowered, they also need to understand the logic behind such advices. For this, traditional extension and vocational training will continue to be key. M-services can supplement these efforts, but they should not substitute for them.

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For references and further reading, see online version of this article at: [www.rural21.com](http://www.rural21.com)



Rice production is key for the Vietnam economy, yet today there is the urgent need to restructure the sector towards sustainability.

Photo: Vanessa Meadu/CAFS

## CONSUMERS AS KEY DRIVERS OF CHANGE FOR SUSTAINABLE RICE PRODUCTION

Although Vietnam is one of the world's biggest rice producers and exporters, the productivity growth of its rice sector has reached a plateau since 2010. There is an urgent need to restructure the sector towards sustainable cultivation. Here consumers can become a key driver of change. Promoting sustainability-related labels for quality rice can be an effective market-driven mechanism to respond to Vietnamese consumers' demand for safer, higher-quality and better-value rice while also encouraging farmers to start a transition towards sustainable rice cultivation practices.

By Carolina Barcella, Nguyen Hoang Diem My and Matty Demont

Vietnam is the world's fifth-largest rice-producing country and is also one of its leading rice exporters. Rice production remains a key sector in the economy of Vietnam. Rice is cultivated on 82 per cent of the country's arable land, it employs the majority of its working age population in the agricultural sector, and it provides 80 per cent carbohydrate and 40 per cent protein of the average Vietnamese.

Rice production in Vietnam has continuously increased, from 25 million tons in 1995 to almost 44 million tons in 2017 when rice exports were at 6 million tons. This remarkable achievement has mainly been the result of the agriculture-specific reforms that Vietnam launched in 1986 as part of the Doi Moi reforms that triggered the modernisation process

of its economy. Due to the importance that rice has in the overall economy of Vietnam both as a source of income for its farmers and a food staple for its population, a lot of efforts have been made to ensure food security and rice self-sufficiency. Institutional reforms and trade liberalisation along with the expansion of rice harvested area and the growing use of fertilisers and pesticides encouraged Vietnamese farmers to produce more rice, which led to increasingly higher yields and significant improvements in the country's rural economy.

However, this trend is unlikely to continue. Vietnam has already started to experience a decrease in rice output and export volumes since 2010. The continuous emphasis on the intensification of rice production has resulted in en-

vironmental degradation and overexploitation of resources that together with urbanisation, climate change and high emissions of greenhouse gases (GHGs) have started to negatively affect rice productivity. For this reason, the Vietnamese government has already adopted several measures to spur a transition towards more sustainable rice farming practices where improvements in rice productivity and quality are pursued together with enhancements of environmental protection, farmers' welfare and consumers' food safety.

Yet, simply adopting public policy measures and engaging farmers may not be sufficient in catalysing the transformation needed. Promoting the effective adoption of sustainable rice farming in Vietnam may require a collabo-

rative approach towards sustainability where consumers can become a key driver of change. To address this issue, it is important to investigate Vietnamese consumers' demand and find market-driven solutions to effectively engage them in the transition towards more sustainable rice value chains.

## QUALITY LABELS AND CERTIFICATIONS TO RESPOND TO URBAN CONSUMERS' DEMAND

Recent research carried out in two big cities in the south of Vietnam, Ho Chi Minh and Can Tho, in 2015 and 2016, shows that the main drivers of Vietnamese urban consumers' rice purchasing behaviour are: sensory and convenience aspects of rice, food safety and health concerns and price. In other words, Vietnamese consumers look for rice that fits their preferences and that is not only safe and healthy, but also of high-quality at an affordable price. Furthermore, the research highlights that Vietnamese consumers are becoming increasingly aware that through their consumption habits, they can contribute to protecting the environment and improving farmers' welfare, although these factors come second when consumers make their rice purchasing choice. But how can Vietnamese consumers be assured that the rice they are buying is safe, healthy and of high-quality? Quality labels and certifications are one of the most effective communication tools that can boost consumers' trust and confidence that certified rice has been produced according to specific standards that assess rice quality and safety. However, for quality labels and certifications to work, it is important that consumers are familiar with them and understand the quality aspects that each label certifies.

A follow-up study of the same research conducted with consumers in Ho Chi Minh in June this year reveals that Vietnamese urban consumers are getting more familiar with quality labels and certifications, and look for them among the information provided on the rice package about the safety and the quality of rice. Yet, familiarity with quality labels still does not translate into understanding other quality aspects that each quality label certifies. However, this result shows that quality labels and certifications can be adopted as a promising communication tool by rice producers and retailers to boost consumers' trust and confidence in certified rice thanks to the increasing reliance of Vietnamese urban consumers on rice quality labels when they make their rice purchasing choices.

## FOOD QUALITY LABELS

**Vietnamese Good Agricultural Practices (VietGAP)** and **Global Good Agricultural Practices (GLOBALG.A.P.)** are considered "sustainability-related labels" because they certify that a product has been produced in compliance with the three dimensions of sustainability (ecological, economic and social) that ensure the protection of the environment, the welfare of the farmers and the safety of the consumers. **Hazard Analysis and Critical Control Points (HACCP)** is con-



sidered a "food safety-related label", while organic labels can also be considered "sustainability-related labels", but with more emphasis on synthetic agrochemical-free production methods and food safety.

## DOES SUSTAINABILITY MATTER?

If quality labels and certifications are to be used as an effective communication tool not only to respond to consumers' demand for safer, higher-quality and better-value rice, but also to encourage farmers to adopt more sustainable rice farming practices, there is then the need to investigate which rice quality labels Vietnamese consumers are already familiar with and whether Vietnamese consumers are interested in and recognise the value of rice that is produced following sustainable production standards.

Today, the main food quality labels that can be found in the Vietnamese rice market are VietGAP, GLOBALG.A.P. and HACCP. Organic certified rice is also available in the Vietnamese market, but since Vietnam lacks a national certification system for organic food especially for specific product categories, Vietnam organic rice is certified according to standards which are recognised by external organisations, such as the United States Department of Agriculture (USDA) and the European Union (EU).

The quality label most Vietnamese consumers are familiar with is VietGAP, which consumers mainly get to know from TV news and health programmes and information provided by the supermarkets. Although VietGAP is already considered a "sustainability-related label" because it covers the three dimensions of sustainability (ecological, economic and social) in food production, the research shows that Vietnamese consumers mainly associate the VietGAP label with food safety, hence ignoring other sustainability aspects that the certification covers. This is the result of the quality and amount of information that consumers have been provided on VietGAP quality label. The information campaigns to promote VietGAP label has only focused on the food safety aspect of the standard.

Yet, the research also proves that if consumers are provided with clearer and better information on the different dimensions of sustainability, they will recognise the importance of the values conveyed by sustainably-produced rice and will also show willingness to pay for it. Therefore, the promotion of rice sustainability-related labels needs to be accompanied by more comprehensive information campaigns to increase consumers' awareness of and trust in the safety, quality and value of rice that has been produced in compliance with sustainable rice cultivation standards and provide consumers with clear and transparent information on the origin of the rice they want to purchase.

## SUPERMARKETS – PROVIDERS OF SAFE RICE AND TRUSTWORTHY INFORMATION

A significant finding of the research is the importance that supermarkets are playing in shaping Vietnamese urban consumers' purchasing habits, especially among upper middle-income consumers. Supermarkets are considered trustworthy providers not only of safe and high-quality food, but also as providers of reliable information on food quality labels and certifications.

Being afraid of buying rice that is mixed, fake and does not have a clear indication of origin, Vietnamese urban consumers are increasingly getting used to buying quality rice at the supermarket instead of at the traditional market. At the supermarket, consumers can find packaged rice featuring more and clearer information (such as rice variety, labels, country of origin, expiration date, nutritional profile, method of production and cooking instructions, etc.) on the package, and they feel assured that rice has been controlled before finding its way to the supermarkets' shelves. Supermarkets also appeal to Vietnamese urban consumers because

## SUSTAINABLE RICE PLATFORM (SRP)

The Sustainable Rice Platform (SRP) was convened in 2011 by the United Nations Environment Programme (UNEP) and the International Rice Research Institute (IRRI) to improve the overall biophysical, environmental, and socio-economic sustainability of the rice sector. In 2015, the SRP launched the world's first international standard for sustainable rice, which assesses the sustainability of any rice cultivation system via 46 requirements under 8 broad themes. Progress toward compliance is measured through an increased score against the SRP Standard or through the use of a set of 12 quantitative performance indicators. Following two years of field testing, the SRP Standard and Performance Indicators have been evaluated and a new version 2.0 of the Standard as well as the Performance Indicators is being prepared.

they offer them a pleasant shopping experience in a cleaner, cooler and more hygienic environment, where consumers can find everything they need at any time without the need to bargain.

### SRP – A NEW STANDARD FOR VIETNAM'S SUSTAINABLY-PRODUCED RICE?

Considering Vietnamese consumers' increasing familiarity with and trust in quality labels and certifications, promoting sustainability-related labels to certify sustainably-produced rice will be an effective market-driven tool to increase Vietnamese awareness and trust in sustainably-produced rice and increase their willingness to pay for it. Thus, the next question is: which standards and certification system should be adopted to promote sustainable rice farming in Vietnam?

Although rice that is certified VietGAP or GLOBALG.A.P. can already be considered to follow food safety and sustainability practices, their standards are not specific for rice cultivation. To assess the sustainability of rice cultivation, in 2015, the Sustainable Rice Platform (SRP) released the world's first standard for sustainable rice cultivation. The SRP can be seen as complementary to the existing GAP standards as it sets new, more efficient and specific standards for sustainable rice cultivation (see Box above).



Vietnamese urban consumers prefer buying packaged rice at supermarkets because it provides them with information on the country of origin, nutritional content, quality and safety of rice.

Photo: Carolina Barcella

The Loc Troi Group, a leading provider of agricultural services and products in Vietnam, joined the SRP in 2015 and has started to adopt the SRP Standard to work towards sustainable rice farming practices. Loc Troi's adherence to the SRP Standard can be a leading example for the adoption of sustainable rice farming by other leading rice producers. If more Vietnamese rice producers join SRP and start to produce rice according to the SRP Standard (or verify their impact against the SRP Performance Indicators), there is a promise that in the near future, Vietnamese urban consumers will have the opportunity to purchase rice that has been produced according to the new, specific and more efficient SRP Standard for sustainable rice cultivation.

### SUMMING UP ...

Since Vietnam has already recognised the need to make its rice sector more sustainable, consumers' demand needs to be made an integral part of the solution. The results show that sustainability-related labels can be an effective market-driven tool to respond to urban consumers' demand for safer, higher-quality and better-value rice, while also encouraging farmers to comply with sustainable rice cultivation standards in order to be awarded with benefits, such as a reduction of production costs, increased health and better prices for quality rice.

However, consumers need to be familiar with and understand the information conveyed by the label. Therefore, promoting sustainability-related labels needs to go hand in hand with effective information campaigns that provide consumers with trustworthy, transparent and comprehensive information on the quality aspects certified by sustainability-related labels.

Rice packages, supermarkets, TV, family and friends and social media are the key communication channels through which this information can be provided to consumers. Only if consumers are adequately informed will they trust and recognise the values of sustainability-related labels for sustainably-produced rice and become more willing to pay for it.

Last but not least, to increase consumers' interest in and demand for sustainably-produced rice, the most important thing is that sustainably-produced rice fits consumers' taste at a reasonable price. Consumers may recognise the importance of protecting the environment and enhancing farmers' welfare, but it will be hard for them to eat a sustainably-produced rice that they do not like. Hence, fostering sustainable production practices should go hand in hand with quality governance and consumer-focused rice value chain development.

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For further readings, references and related articles, visit: [www.rural21.com](http://www.rural21.com)

For more information about the SRP and to download the SRP Standard and Performance Indicators, visit: [www.sustainablericeplatform.org](http://www.sustainablericeplatform.org)

## BACK TO THE SOIL – TAMIL NADU’S RURAL YOUTH RETURN TO ORGANIC AGRICULTURE

The average age of an Indian farmer is almost 50 years. With more and more young people migrating from rural areas to cities, the number of farmers practising agriculture will decline in the long run. In a pilot initiative called “Retaining Village Youth in Agriculture”, the Centre for Indian Knowledge Systems, along with India’s National Bank for Agriculture and Rural Development and Rabobank Employee Foundation, Netherlands, partnered together to invoke interest among the rural youth of Tamil Nadu to practise and sustain their traditional occupation, agriculture – with success, as the following examples show.

By Sharada Balasubramanian

On a late morning, M. Parthibaraj, a 28-year-old farmer, runs vividly around his ten-acre plot of land, chasing almost a dozen goats, one after another. The goats were left for grazing, and now have to be led back to their sheds. After almost five rounds of running around the farm, he manages to bring all the goats together inside the shed and closes the gate. The hens and the goats are all safe now. Relieved, Parthibaraj looks up his coconut tree, pulls out a few of them with a long stick and brings them down. Sipping coconut juice straight from his farm, he asks: “Can you experience this in a city?”

After gaining a Master’s Degree in Computer Application (MCA), like many rural youths, Parthibaraj had migrated to the city for work. Cocooned in a nine-to-five cubicle job, he was frustrated and unhappy. One day, he decided to quit his plush software programmer job in the city of Chennai and return to his village in Adamangalam, Sirkazhi district of Nagapattinam in Tamil Nadu to work as a farmer. “After shifting to the city, I put on a lot of weight, and my health was getting ruined more and more by the day,” he recalls. “I felt out of place in the job. Now, back in the village, I am physically active, taking care of my father’s farm.”

### YOUTH EXCITED ABOUT ORGANIC FARMING

His decision to move back to his village was mooted by his interest in agriculture from childhood. But it was not just agriculture that he was interested in. Unlike his father, he did not want to use chemicals in the farm. Instead, he chose to implement organic practices. “I saw many YouTube videos which talked about the perils of chemicals such as urea. That shifted my perception, and I decided not to produce food from chemicals,” he explains. The young farmer built a farm pond and started aquaculture. The water from the pond is



M. Parthibaraj, a software professional working in Chennai, shifted back to farming in his village.

Photo: Sharada Balasubramanian

diverted to the paddy field and vegetable farm. He explains: “Like everyone else, I did not want to just grow paddy. I started to cultivate many vegetables. I then went to the nearby town of Sirkazhi and delivered the vegetables door to door. That was sometimes difficult, as there are days when vegetables do not sell. Then, they are only left to rot.”

It was through his brother that Parthibaraj came to know of the Centre for Indian Knowledge Systems (CIKS) and the existence of the Valanadu Sustainable Agriculture Producer Company (VSAPCL). CIKS was about to start a programme called “Retaining Village Youth in Agriculture”, based on the concept of integrated farming. “Through the training, I learnt many elements of farming – including goat and cow rearing, how to add value to products, how to market them, and how to approach banks for a loan,” says Parthibaraj. “There were leadership sessions as well.”

The producer company also procures vegetables from Parthibaraj, which has reduced the

burden of selling the vegetables by going to the nearby town every day. With a market price of 35 rupees per kilo (0.50 US dollars), he knows that all his vegetables are sold at the right price and nothing goes waste.

As the project commenced only a few months ago, Parthibaraj is yet to witness any profit, but what he gets through integrated farming, he says, is enough for him to sustain his livelihood. “I catch two eggs every day. There is a daily income with goats and hens. I have also applied for a loan, and the bank has agreed,” he says. The manure for the farm comes from the cow dung. “Earlier, my father resisted this idea of organic farm, but I persisted,” he explains. “Now, youngsters around me are motivated seeing me, and are showing interest. I am greatly satisfied with my life.”

### A PRACTICAL APPROACH

Like Parthibaraj, almost 60 youths were selected for this pilot project by the stakeholders.



Participants were chosen on the basis of various parameters – their age and qualification, and their involvement and interest in agriculture. Ms Subhashini Sridhar, Project Director at CIKS, says: “Today, the average age of a farmer in India is 50. To prevent rural-urban migration in youth, and to prove that agriculture is a profitable business, we started the programme ‘Retaining village youth in agriculture’.” India’s National Bank for Agriculture and Rural Development (NABARD) and the Dutch Rabobank are providing financial support.

In 2017, almost 38 training programmes were conducted for the youth on improving farm production, water saving techniques, certified organic and integrated farming approaches, production of bio fertilisers and bio pesticides, paddy weed management, traditional paddy seed production, and the use of new varieties. Further topics included entrepreneurship skills development, preparation of business plans and bankable proposals, animal husbandry, poultry, functioning of producer companies, high density of horticulture crops, honey bee rearing, farm mechanisation, value addition and packaging. On exposure visits, the trainees were able to link theoretical learning with practical experience. They were also taken for field visits to gain first-hand experience. Almost 90 per cent of the sessions were field-based. The training programme was run in the Sirkazhi, Vedaranyam and Maliyaduthurai regions of Tamil Nadu.

“It is not wrong to go to cities, but whoever is in agriculture should be retained in agriculture,” says D. Ganesh, District Development Manager, Nagapattinam, NABARD. And Subhashini Sridhar adds: “The youth should be role models for others to come and join.” The concept seems to be working, for, encouraged by the positive experience gained by the first 60 participants, further youths who are interested in the scheme have already registered with the CIKS. Now the pilot project is to enter its next phase.

## YOUNG PEOPLE OPTING FOR NETWORKING

Where Parthibaraj chose to cultivate vegetables in organic way, S. Anish Kumar ventured into preparing vermicompost with earthworms. With a Master of Science degree and teacher’s training, he is a part-time teacher in a school. With a keen interest in organic farming practices, he returned to agriculture. He says: “Earthworms are a farmer’s friend. To

get compost, one needs to maintain the moisture in the compost bed by regularly spraying it with water. We can get inputs in 45 days and use them for organic farming.”

Of course there were challenges for Anish when he shifted to organic practices on his farm. “Everyone looks at more yield, but not at the quality of food. It is more about appearance,” Anish notes. “The greatest challenge was to do organic farming while having chemical farms around us. Our farm could be contaminated through insects.”

Anish strongly believes that the older generation and his forefathers had a longer life span (some of them lived for over 100 years) primarily because of the food they consumed. “I took this small effort to bring back organic practices in agriculture. At the training programme in CIKS, I was taught a host of things including goat rearing, cow rearing, seed saving, and about various other schemes,” he recalls. “I was personally interested in earthworm rearing, and I am doing it successfully now. It is too early to talk about income, but I am hopeful. People can do vermicomposting on their own if they have a cow, or they can buy the compost from people who rear the worms.”

According to Anish, he and other youths in the village gained confidence that they too could pursue agriculture with simple methods. For instance, for the cow dung that is needed, having a cow is enough to start with. CIKS helped them with a loan to buy the cows. “We now have a farmers’ club where we can sell our products to each other,” says Anish. “It should not stop with us. It should reach more people and show a way for others to do it.”

Rajesh Kumar from Vettayambadi village is another teacher who has entered goat rearing. “From a small age, I was interested in farming, and joined my father after education”, he says. Rajesh’s father also used chemicals on his farm. “On Facebook, I came to know of CIKS, and of how to do farming without chemicals,” he explains. For goat rearing, he procured a loan. Seeing the success of Rajesh, 20 youths have come forth, and have formed a farmers’ club.



A farm in Sirkazhi, Nagapattinam district of Tamil Nadu.

Photo: Sharada Balasubramanian

## BREAKING WITH TRADITIONS

For these young farmers, coming back to agriculture means not just continuing their traditional livelihood, but also reforming the way agriculture is done today. As their fathers practised chemical farming, post-green revolution, these youngsters, knowing the impact of chemicals on food production, are going back to old ways of organic farming. Further, they stepped away from just growing paddy. They diversified into integrated farming, vegetable cultivation, goat rearing, vermicomposting, etc. This change was not easy, as the youths were criticised for shifting to organic by the local people and their families. This is demonstrated by the example of J. Natarajan, a 35-year-old farmer from Kottayamedu village. “I am traditionally from a farmer’s family. After class 10, I started farming on the land with my father. I was planning to go abroad for work, but after hearing about the village for youth programme here, I enrolled for it,” Natarajan recalls. “I visited a lot of farms and received trainings intensively. There was tremendous opposition in the family when I told them that I would stop using chemicals for brinjals, and use organic manure instead.”

Today, Natarajan’s farmland teems with brinjal plants that stand very tall. He also rears rare black hens, the eggs of which, if consumed, are good for human health. Natarajan says: “We need to do organic farming. The next generation should be able to use this soil.”

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## SCIENTISTS WARY OF CROP PROTECTION PROGRAMME

Evolutionary biologists and law scholars in Germany and France have criticised a US project aimed at developing the use of insects to spread genetically modified viruses to crops. The viruses featured in the “Insect Allies” programme are meant to alter crop plant chromosomes through genome editing. However, there are fears that the method could also be put to military use.

By Mike Gardner

Insect Allies was launched by the US Department of Defense in 2016, whose Defense Advanced Research Projects Agency (DARPA) was provided with a total of 45 million US dollars to run the programme over a four-year period. According to Programme Manager Dr Blake Bextine, Insect Allies aims to develop “scalable, readily deployable, and generalizable countermeasures against potential natural and engineered threats to the food supply with the goal of preserving the US crop system”. Bextine warns that naturally occurring threats to crops, such as pathogens, drought, flooding or frost, can quickly jeopardise national security, and refers to an even greater danger of “threats introduced by state or non-state actors”.

### USING INSECTS AS “FREIGHT PLANES”

The rationale for Insect Allies is simple. “Insects eat plants, and insects transmit the majority of plant viruses,” Bextine explains. “DARPA plans to harness the power of this natural system by engineering genes inside plant viruses that can be transmitted by insects to confer protective traits to the target plants they feed upon.” Following this concept, the Insect Allies programme comprises three technical areas: viral manipulation, insect vector optimisation and selective gene therapy in mature plants. Viruses are genetically engineered to enable them to edit the chromosomes of targeted crops and give them new resilience genes. These viruses, known as Horizontal Environmental Genetic Alteration Agents (HEGAAs), are carried by the insects, which have also been genetically altered, to crop plants growing in fields. Here, they enter the chromosomes of the plants and can edit their genome. Applying HEGAAs to mature plants is expected to yield effects within a single growing season, and could make crop plants

less susceptible to pests or inclement weather within a very short space of time. “Such an unprecedented capacity would provide an urgently needed alternative to pesticides, selective breeding, slash-and-burn clearing, and quarantine, which are often ineffective against rapidly emerging threats and are not suited to securing mature plants,” Bextine maintains.

The 14 US research facilities funded in the programme include the Boyce Thomson Institute at Cornell University, New York, Pennsylvania State University, Ohio State University and the University of Austin, Texas. Bextine explains that the research teams involved in the project apply their expertise in molecular and synthetic biology in closed laboratories, greenhouses or other secured facilities, and he stresses that the programme observes several levels of biosecurity and biosafety at each of its levels. According to DARPA, the goal of Insect Allies is to “stably transform multiple mature crop plants in a complex, multi-species plant and insect community with enhanced trait(s) of agricultural interest” by mid-2021.

### CROPS TO BE MODIFIED WHILE GROWING

Phase One of the programme, to be concluded in late 2018, is to result in the successful delivery of a genetically modified virus to an insect. Phase Two, scheduled for late 2018 to early 2020, would involve genetically adjusting the viruses, insects and plants so that gene delivery works in a monoculture. Phase Three would then last until mid-2021, and would concentrate on observing the project on a larger scale in complex crop environments. Current experiments focus on maize and tomatoes, and leafhoppers, whiteflies and aphids are among the insects used as disease vectors.

So far, the use of genetically modified organisms in farming has been restricted to farmers using commercial seeds that were genetically engineered in laboratories. A farmer opts for a seed type the plants of which are suited to survive in conditions that the farm is expected to face, such as drought or certain pests. Insect Allies centres on performing genetic engineering in the fields, giving farmers the opportunity to have the properties of their crops altered at any time, which would amount to a radical breakthrough in farming.

### WARNINGS OF BIOLOGICAL WARFARE POTENTIAL



However, scientists from the Max Planck Institute for Evolutionary Biology in Plön, Germany, and the Institut des Sciences de l'Évolution de Montpellier in France as well as legal scholars from Germany's University of Freiburg have raised a number of concerns in a study published in the journal *Science*. Dr Guy Reeves, a researcher at the Plön institute, and lead author of the study, complains that the programme has received hardly any attention in public. He and his co-authors call for a broad social, scientific and legal debate on the issue of Insect Allies.

Reeves stresses the danger of losing control of the insects carrying the specially engineered virus, and he argues that using traditional overhead sprays to deliver HEGAAs is much safer. No global regulatory framework is in place to support insect transportation of HEGAAs to crops, and without appropriate supervision, Reeves fears that mishaps could occur. He also points out that killing or sterilising a plant using genome editing is far easier than making it herbicide or insect-resistant.



The authors of the new study maintain that knowledge gained from the Insect Allies programme could be re-purposed and used for biological warfare, e.g. through switching off genes, which is usually easier than optimising them. A simplified version of the DARPA programme could therefore find military application as a means of making plants die.

In 1975, the Biological Weapons Convention entered into force. The 182 states that have so far become party to the Convention, including the USA, undertake never to develop or produce microbial or other biological agents or toxins “whatever their origin or method of production, of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes”. They also commit not to develop “weapons, equipment or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict”. The researchers argue that the insects employed to deliver the viruses in the DARPA programme might be perceived as such “means of delivery”.

“Because of the broad ban of the Biological Weapons Convention, any biological research of concern must be plausibly justified as serving peaceful purposes,” states Professor Silja Vöneky, who holds the Chair of International Law and Ethics of Law at the University of Freiburg. “The Insect Allies programme could be seen to violate the Biological Weapons Convention if the motivations presented by DARPA are not plausible. This is particularly true considering that this kind of technology could easily be used for biological warfare.” The new study also warns that such new weapon technology could encourage other countries to initiate similar insect programmes for military purposes.

## DARPA STRESSES TRANSPARENCY

Bextine rejects any suggestions that DARPA is developing biological weapons, but acknowledges concerns about potential dual use of technology. “Those concerns are precisely why we structured the Insect Allies programme the way we did, as a transparent, university-led fundamental research effort that benefits from the active participation of regu-

lators and ethicists and proactive communication to policy-makers,” he explains.

As a US Defense Department agency, DARPA is only too aware of dual purpose issues. Created as the Advanced Research Projects Agency (ARPA) in 1958 by then US President Dwight D. Eisenhower in response to the Soviet Union’s launch of Sputnik 1 a year before, its mission was to form and run ground-breaking research and development projects reaching way beyond immediate defence requirements. Even in its early stages, ARPA was playing a key role in preparing technologies such as today’s Global Positioning System (GPS), and later on, it supported the creation of the Internet. ARPA became DARPA in 1972.

The new crop protection programme appears to fit in with DARPA’s general research policy. “We created Insect Allies specifically to develop technology that can deliver positive, protective traits to plants to help them survive unanticipated and/or fast-moving agricultural threats,” the Agency recently stated. “We see it as a critical addition to the national security toolkit, part of a layered strategy to preserve the security of the food supply.”

## SIGNIFICANCE OF INSECT ALLIES CONTESTED

Referring to insect transportation of HEGAAs, DARPA maintains that this is the only viable solution, since overhead spraying would require increased spraying infrastructure, which is not available to all farmers. But Jason Delborne, a genetic engineering expert and Associate Professor at North Carolina State University, USA, disagrees. “The infrastructure and expertise required for spraying agricultural fields – at least in the US context – is well established, and this delivery mechanism would offer greater control over the potential spread of a HEGAA,” Delborne claims.

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## Imprint

**Rural 21 –**  
The International Journal  
for Rural Development

**Published by:**  
DLG-Verlag GmbH  
Frankfurt, Germany

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**Translated by:**  
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Tazir International Services

**Cover:**  
Boats carrying vegetables from village to city in Bangladesh. (Photo: Jörg Böthling)

**Design & Layout:**  
Andrea Trapani, DLG-Verlag

**Editorial office, distribution, advertising:**  
DLG-Verlag GmbH  
Eschborner Landstraße 122  
60489 Frankfurt, Germany

**Printed by:**  
Brühlsche Universitäts-  
druckerei GmbH & Co KG  
35396 Gießen, Germany

Rural 21 is published four times a year. The subscription rate is EUR 33.– (Germany), EUR 37.– (EU countries), EUR 51.– (non-EU countries) and EUR 8.30 per issue, plus postage. All rights reserved. The contents may not be translated, reproduced in whole or in part, nor may information be passed on to third parties without permission of the publisher. Please direct all correspondence to the editor-in-chief.

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