

## Impact Objectives

- Learn about livelihoods and internal logic of local societies through in-depth fieldwork
- Understand how to return the nutrients that have accumulated in cities back to rural areas for tackling the land degradation

# Addressing desertification through local knowledge

*Professor Shuichi Oyama is working closely with collaborators using a multi-disciplinary approach and in-depth fieldwork to address the problems with land degradation in central Sahel, West Africa*



Professor Shuichi Oyama



Ibrahim Mamane

### Can you begin by telling us a little about your research background?

My specialty is area studies. This is a complex field but, in my case, it is based on geography, anthropology, ecology, agriculture, sociology and political science. I have adopted a multi-disciplinary approach through tackling the problems of desertification, hunger, poverty, ethnic conflict and terrorism in central Sahel. Basically, I stay in rural areas and live with the people, communicating in the local Hausa language, helping with farm work and eating what they eat. Through these long stays, I try to analyse the problems of desertification, hunger, poverty and conflicts between farmers and herders, as well as terrorism, from a perspective inside their society.

### How do you hope your research will help overcome some of the issues surrounding desertification?

The causes of desertification are said to be population growth, urbanisation, expansion of farmland, excessive grazing and excessive harvesting of firewood. In addition to these five factors, desertification is also connected to the road networks that have developed due to globalisation. These connect rural areas with cities so that rural people can sell their agricultural products. In addition, people now need to sell their crops and livestock for cash to pay for daily commodities, education and medical care. Increased desertification is a natural result of this kind of global economic system.

### You are collaborating with local people in your research. How important is this?

The people of Niger, especially the farmers and herders, have no discomfort with or resistance to using garbage for greening. While this project has been opposed by government officials who have studied in France, it has moved forward thanks to the understanding of many people. I would like to mention two names in particular. The first is my research collaborator, Ibrahim Mamane, a technical officer with Direction de la Météorologie Nationale du Niger, who for 18 years has helped put up fences and install weather monitoring instruments. The second is Assoumana Abdou, a local JICA (Japan International Cooperative Agency) staff who has helped move the

project forward through arrangements with the governments of Niger, the Niamey city governor and the Dogondoutchi mayor.

### What example of success have you seen from a local perspective?

A Fulbe herder named Alou has been my friend for 20 years. To make a living, he walks about 20 km every day to graze farmers' livestock. When he grazes the animals near cultivated fields, farmers sometimes curse or throw rocks at him. Still, he continues to graze livestock every day. A long time ago, Alou told me, "I want to sit in the shade of trees and chat with my friends while I watch the livestock graze on grass." In 2011, we put a fence around a piece of degraded land 50 m by 50 m, 2,500 m<sup>2</sup> and put a 4 cm thickness (40 kg/m<sup>2</sup>) of garbage on it. Every year, about 200 new trees sprout. We thin out the trees we do not need and leave the ones we do. In 2018, after seven years, the trees had grown and created shade. Alou was able to sit in the shade of the trees with his friends and watch goats eat grass. I remembered what Alou said to me so long ago, and I was glad that it had come true. ▶



# Regreening unfertile land using waste materials, livestock and natural processes

A team from the Centre for African Area Studies is working with the Niger National Meteorological Department to solve issues with desertification and land degradation. The findings will help support farmers and herders, as well as creating a more peaceful society

Desertification is a term denoting the degradation of land, where the biological productivity is lost for a range of reasons, including natural processes and human activities. These pieces of land change from fertile to extremely deteriorated and growing crops becomes increasingly difficult, if not impossible. As the population in Niger doubled every 20 years and desertification is a growing problem in countries around the world.

Semi-arid regions are found in places such as North America, South America, Australia, Central Asia, Western China and the Sahel in Africa. These regions also happen to be the places where much of the food humans consume is grown, with crops planted and harvested in rural areas and then companies and farmers selling large quantities of agricultural and livestock products to the cities for profit. Of course, this means that any issues with desertification in these areas have enormous potential impacts for humans around the world and, as urban populations continue to grow rapidly, so too does the demand for food.

Professor Shuichi Oyama, who is based within the Centre for African Area Studies (CAAS) at Kyoto University in Japan, has dedicated his career to understanding more about this. He explains that the arrangement

between rural residents who grow the food and city residents who consume the food is an unequal one. 'City residents do not return any nutrients to the land where the crops are grown, yet their activity contributes to the degradation and desertification of this land,' he outlines. 'Moreover, city residents actually produce significant amounts of nutrients which could be used, such as urine and organic waste, yet these forms of nutrients are discarded without regard for land where they could be put to better use.' Ultimately, this creates an imbalance in which nutrients are taken away from semi-arid regions, promoting desertification and accumulation in a developed country.

Clearly, something needs to be done to redress this imbalance and ensure that the process of desertification is reversed so that crops can be replenished and the future of civilisation can be guaranteed by turning degraded land into the fertile lands they once were.

## A NOVEL APPROACH

Oyama is part of a team that is focused on 'regreening' land that has undergone desertification at the same time as helping to clean up cities across the Sahel, West Africa. His team has taken an innovative approach that solves several problems at once and

involves returning organic waste from the cities to degraded land in rural areas.

Rubbish is a growing problem in cities around the world. In many African cities, rubbish collection systems are not well maintained and waste is scattered around, creating an unsanitary environment. 'Niamey, the capital of the Republic of Niger in the Sahel belt in West Africa, has an enormous amount of rubbish due to a non-functioning collection system,' points out Oyama. 'The seasonal Harmattan winds bring a large amount of sand into the city, because many households keep livestock, this rubbish also includes animal manure and plant residue. We have made progress in greening the degraded land by collecting this organic waste in cities and putting it on degraded land that has been fenced off.'

In the first year, organic waste is put at 2-4 cm thickness onto the degraded land, and food crops, such as pearl millet, sorghum, pumpkin, edible calabash and amaranth grows successfully. After harvesting the crops for people to eat, livestock are let on to the ground. 'There is a shortage of land for grazing in the rainy season, due to increased land use for arable farming,' comments Oyama. 'Hungry livestock can eat the grass inside the fence, but even if there is no grass inside the fence, herders are

asked to keep their livestock there at night for two weeks.' This allows the animals to defecate on the land and trees germinate from the faeces to create pastoral forests, which in turn provide grazing for the livestock.

## EVERYBODY BENEFITS

To conduct the research, Oyama and the team studied the ecological knowledge of local farmers in the Sahel of West Africa. To advance the potential of this branch of the study, Oyama set about learning the local Hausa language and was eventually able to learn the rhythms of their life, including their language, customs and work. 'One of my jobs was to carry rubbish from households into the crop fields. This was a mix of livestock manure, leftover straw, threshed pearl millet straw, groundnuts shells, cowpea husks, worn-out clothes, old sandals, old pots, metal plates and plastic bags. In the towns, the Hausa word for garbage is 'shara', while in the villages it is called 'taki', says Oyama. 'I learned that when taki was added to the

fertility of land used to grow crops - there are also important societal benefits for the local areas in which his studies take place. The ethnic groups in rural Niger include the Hausa and Zarma people, who are farmers, and the Fulbe and Tuareg, who are herders. The Fulbe and Tuareg raise cattle, goats, sheep and camels, while the farmers grow pearl millet, cowpeas and groundnuts. 'During the rainy season, more land is used for farming and there is a lack of grazing land and, as a result, livestock can get hungry at night and go into farmers' fields in search of grass,' says Oyama, 'Inevitably, they end up eating crops, which has led to serious armed conflicts between farmers and herders, and sometimes resulted in massive deaths.'

Oyama's work helps to ensure that there is enough grazing land for the livestock, so there is no need for them to eat crops. Of course, this reduces incidence of conflict and will help benefit all the residents of the community. 'Indeed, it is difficult to think who does not

researchers around the world will take Oyama's lead and help address several problems simultaneously for the benefit of all stakeholders. ●

## Project Insights

### FUNDING

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### COLLABORATORS

- Ibrahim Mamane (Direction de la Météorologie Nationale du Niger)
- Assoumana Abdou (Japan International Cooperation Agency, JICA Niger Office)

### TEAM MEMBERS

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W: (video) [https://www.youtube.com/watch?v=73TGIaj\\_uNg](https://www.youtube.com/watch?v=73TGIaj_uNg)

### BIO

**Shuichi Oyama** is a Professor at the Center for African Area Studies, Kyoto University. He conducted multidisciplinary area studies in Zambia, Uganda, Niger and Djibouti. His main publications include 'Action research and reverse thinking for anti-desertification methods', in *Towards Shared Research: Participatory and Integrative Approaches in Researching African Environments* (Transcript Publishers 2020).

City residents actually produce significant amounts of nutrients which could be used, such as urine and organic waste, yet these forms of nutrients are discarded without regard for land where they could be put to better use

degraded land, the wind would bring sand and termites transform the solid soil layer into the aggregated soil which is suitable to grow crops.' His research began in earnest when he started investigating how fields could be transformed by adding rubbish.

Oyama's research will not just have positive impacts on food production and ensure the

benefit from this research: the cities can rid their streets of waste, the farmers can use the waste to replenish land, the herders have better grazing lands, the community avoids conflict, and the world gets enough to eat,' he enthuses.

Truly, it can be amazing when a plan comes together and the hope is that other



Pastureland created after eight years of urban waste application (September 2019)

