



Building relations: China's financing of African industries, such as construction and mining, is extending to research collaborations.

ENTER THE DRAGON

China is pumping money into African science.
But what do both sides stand to gain — and lose?

BY LINDA NORDLING

Before Emeka Oguzie went to China, he had only read about potentiostats in journals. The Nigerian materials scientist knew that he needed the electrochemical analysis tool to advance his search for indigenous plant extracts that can slow the corrosion that rots industrial machinery. But his cash-strapped department at Nigeria's Federal University of Technology in Owerri could not afford a US\$25,000 piece of equipment. And his lack of skill with the device meant that scientists in the United States or Europe would not offer him a postdoc position abroad. "I had no experience with the facilities they work with," he says.

Oguzie's luck turned in 2005, when he won a fellowship from the Chinese Academy of Sciences and TWAS, the academy of sciences for the developing world, to spend a postdoctoral year in China. At the Institute of Metal Research in Shenyang, northeast China, he was trained on the potentiostat he had lacked for so long. Chopsticks, however, he had to master

on his own. "In the early days I always moved around with a fork in my pocket just to ensure I could eat happily," he says.

The year in China was a turning point for Oguzie. Now he is back in Nigeria, but he presents his research at international conferences and publishes in high-impact journals. His department has not one, but three potentiostats. One of them, he bought with a grant from TWAS; the other two were hand-me-downs from researchers in the United States and Britain. He uses them to analyse potential environmentally friendly corrosion inhibitors from plants such as the native bitter kola (*Garcinia kola*) or the tropical roselle

(*Hibiscus sabdaffia*) — something Nigeria's own oil and gas industry might use. He also returns to see his Chinese colleagues, and admires their strong sense of community. "I really think it is a great nation. They seem to believe in collective action: 'we' achieving greatness together as a people rather than 'I' as is common in Nigeria," he says.

Oguzie's story is not unique. Over the past few years a patchwork of initiatives has increased the number of African researchers and students spending time in China and has boosted collaborations. The number of African students in China rose by 40% to nearly 4,000 between 2005 and 2006, and the trend has continued. China is also emerging as a science collaborator with Africa, a role traditionally occupied by the United States and Europe. In Nigeria, one of China's biggest African trade partners, Chinese researchers co-authored 1.5% of the country's total research publications in international journals between 2004

P. WOODS/ANZENBERGER/EVEVINE



SCIENCE IN AFRICA

For more content, go to:
nature.com/africa

and 2008 — up from 0.3% in 2000 (see 'Nigeria-China collaboration'). Cheap Chinese loans are funding a new teaching research hospital in Nairobi, Kenya, and a new science and technology university in Thyolo, Malawi.

In November 2009, the Chinese government launched its most ambitious plan to date for boosting African science. The Forum on China-Africa Cooperation (FOCAC), involving 49 African countries, includes a Chinese pledge to fund 100 joint demonstration projects on scientific and technological research and to host 100 African postdoctoral fellows and 5,500 African scholarship students in China, all by 2012. The plan also promises clean-energy projects and agricultural research centres as well as the dispatch of Chinese agricultural experts to Africa — and by this year, Chinese authorities say they have made progress towards many of these goals (see 'Building bridges with Africa').

CARING FOR A CONTINENT

The science investment is still outpaced by US and European funding. But it is a part of a bigger game that China is playing in Africa. The fast-growing economy is thirsty for Africa's resources: its oil, minerals and agricultural land. Investing in science and technology helps China to show that it also cares about the continent's development. "China is responding to criticism that it is not building enough capacity in Africa," says Sven Grimm, director of the Centre for Chinese Studies at Stellenbosch University in South Africa. African countries, meanwhile, have welcomed the Chinese investment, which is seen as less tied up with cumbersome conditions than is financial support from the West.

But hard questions are still being asked. The quality of the Chinese assistance is one issue: some Africans are disappointed by their stay in China — perhaps the hosting institution wasn't as advanced as hoped. A lack of follow-through from African countries is another. Although the Chinese authorities have pledged to support African researchers when they return home, for example, the scarcity of resources in many countries raises concerns that Chinese-trained researchers will languish at home and move elsewhere. And if Africa cannot capitalize on the Chinese investments, then will they really benefit the continent?

One thing is clear: the Chinese are everywhere in Africa. By 2008, trade between the world's second largest economy and the poorest continent had increased ten-fold from 2000 (see 'China's trade with Africa'). The Chinese are selling telecommunications equipment in Uganda, chickens in Zambia, building roads in Ethiopia and pumping oil out of Angola.

China's foray has received much criticism, especially from rich countries in the West. Many experts on Sino-African relations cry hypocrisy,

pointing out that Western countries have their own sometimes-exploitative history with the continent. Still, China has come under fire for dealing with regimes with bad human-rights records, such as Sudan, and Chinese companies have been accused of cutting corners. Stories abound of newly built roads that collapse after one rainy season, buildings proclaimed structurally unsound months after they are opened, and deplorable working conditions in Chinese-

"DON'T ASSUME THAT THERE IS ONE CHINA IN AFRICA."

owned mines. Some investments come in return for diplomatic favours — China's loan to Malawi for the science university only became possible after Malawi severed its diplomatic ties with Taiwan in 2007.

The science partnerships with Africa are signs that the relationship is becoming more complex. FOCAC and other collaborative initiatives have emphasised 'win-win' scenarios. The Africans get loans without too many questions asked. And Chinese funding for science infrastructure — research hospitals, universities, labs — is typically channelled directly to the contractors, usually Chinese. Many initiatives focus on industries in which China has a clear interest in exploiting Africa's resources — petroleum science in Nigeria, or agriculture in Mozambique.

So is China training Africans because it helps the nation to extract the resources it needs, or is it a genuine attempt to help Africa develop? It's both, says Simon Zadek, a visiting fellow at Harvard University's John F. Kennedy School of Government in Cambridge, Massachusetts, who has consulted with the UK government on China. "Don't assume that there is one China in Africa, or that the plan is sophisticated or even internally consistent," he says. "It is a maturing process with many moving parts, diverse and often uncoordinated

Chinese actors and many hit and miss experiences."

Outside Maputo in Mozambique, one of the agricultural technology centres promised in the 2009 FOCAC agreement is taking shape. The \$5.5-million Agricultural Technology Resource and Transfer Centre will aim to improve the productivity of Mozambican farmers by testing the suitability of new breeds of crops — including maize (corn), rice, vegetables and fruit — in the country's pest- and flood-prone climate. Among other things, China has pledged to increase rice production in the country fivefold. There will be a lab for soil analysis and facilities for demonstrating different types of irrigation systems. Initially it will be staffed with Chinese

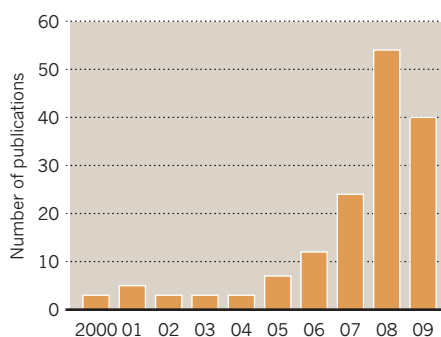
researchers, who will extend the knowledge to farmers through interpreters. The laboratories may also be open to local university researchers to conduct studies on locally important issues such as pest resistance and fish farming.

One of the main differences between working with China and working with Western donors is the speed with which things get done, says Vasco Lino, research and innovation director of Mozambique's science and technology ministry. "They bring everything, they set up everything in place; infrastructure, expert assistance. We never see the money, everything is handled by them," he says. "It's very easy and fast. In one year they finished everything."

But speed can also cause problems. Adams Bodom, a Ghanaian social scientist at the University of Hong Kong who has lived and worked in China for 14 years, believes that the Chinese are trying to fulfil their pledges to African research by meeting quantitative targets. In surveys that he has conducted with African students and researchers in China he has formed the impression that the student recruitment could be happening too fast, at the expense of quality. Many Africans were dissatisfied with the selection process for their scholarships, he says. The surveyed scientists told Bodom that the criteria for selection were often based not on excellence, but on connections with the officials

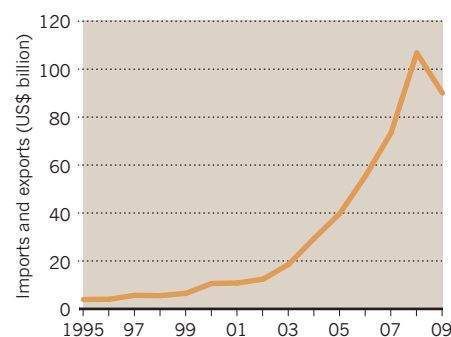
NIGERIA-CHINA COLLABORATION

The number of scientific publications involving at least one Nigerian and one Chinese institution has risen.



CHINA'S TRADE WITH AFRICA

China's imports and exports with Africa have accelerated, but dipped after the global financial crisis.

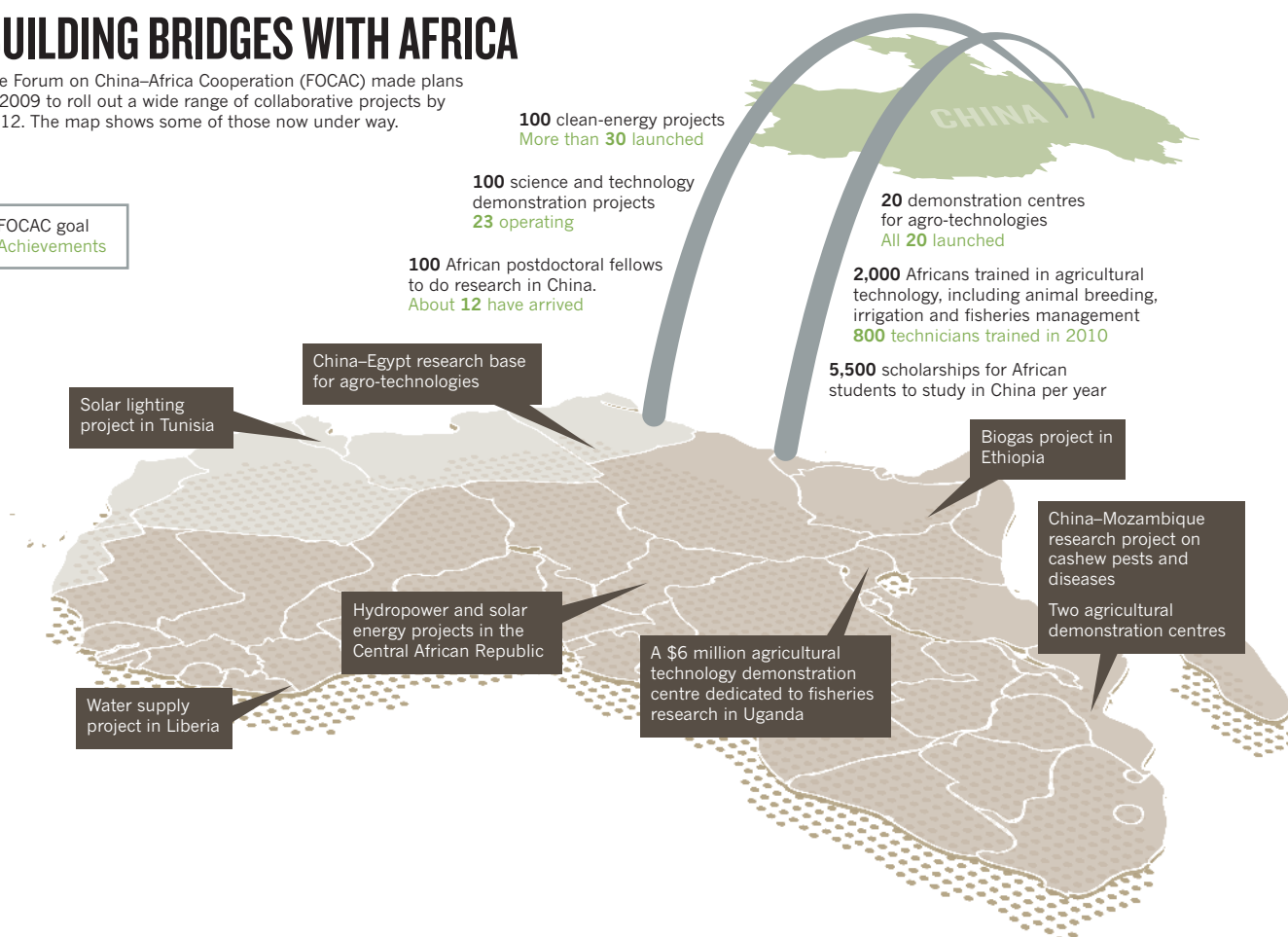


SOURCES: TRALAC/THOMSON REUTERS

BUILDING BRIDGES WITH AFRICA

The Forum on China–Africa Cooperation (FOCAC) made plans in 2009 to roll out a wide range of collaborative projects by 2012. The map shows some of those now under way.

FOCAC goal
Achievements



in their home country. “The aim should not be to add more students to meet the target, but to improve the quality of the education,” he says.

“In China, not all universities are good,” says Hassan Hussein Musa, an animal-health scientist at Nyala University in Darfur, Sudan. “Some universities are still growing; their staff are still training and some of them don’t speak English well.” If Africans end up in poor-quality institutions, they could waste their time. But Africans can minimize their chances of getting a raw deal on their fellowship in China by thoroughly researching the institutes they have an opportunity to be based at, says Musa, so they can make an informed choice. He spent five years at the Yangzhou University in Jiangsu province for his PhD and postdoc, returning to Nyala in October 2009. He made many friends and still works with colleagues in China, but knows others who did not fare as well.

What happened when Musa returned home illustrates another major challenge that Africans can face: the inability of their home countries to capitalize on the gains. In 2009, he became one of five African scientists to receive 150,000 renminbi (US\$23,000) from the Chinese government to spend on equipment for his lab. The funding was announced alongside the China–Africa science collaboration plan.

But Musa needed more money to fulfil his dream — establishing an institute of molecular

biology at his poorly resourced university. He managed to get some funding from the Sudanese government for research, and has sent a number of students to get their PhDs in China. But now he is at a loss for how to fund them when they return. There won’t be enough funding from the Chinese to sustain their work, and he is not sure that his country’s government will step into the breach. The whole dream seems a distant prospect. “I am struggling at the moment, and if a chance comes to move to a good institute abroad I will leave,” he says.

NATIONAL CHALLENGES

A similar fate could meet other Chinese-funded science projects in Africa if the host countries don’t invest their own money. The agricultural resource centre in Mozambique will receive funding from China for three years, after which the Mozambican government is expected to take over the running and financing, something it may not be able to afford. Malawi’s new science university — supposed to be staffed by government-funded scientists once it is built — faces similar uncertainty. Experts agree that an increase in national research funding is essential to make sure the continent does not get saddled with expensive institutes that it can’t staff or sustain, and that its freshly trained academics have something to return to.

“The key problem is on the African side,” says Grimm. “If governments don’t develop their science, for instance by tapping into returnees from other parts of the globe, it’s really wasting human resources,” he says. Ludger Kuehnhardt, a political scientist at Bonn University in Germany, adds that African countries also need to push their own scientific agenda to ensure that they get the research institutes and expertise that they need to tackle national challenges, and that China’s interest doesn’t skew African research priorities. Decades of US and European investment have already left African science propped up by foreign funding and sensitive to foreign priorities. If Africa doesn’t leverage this new investment, these woes could be exacerbated.

In the end, then, the outcome will depend on the African partners, and how wisely they manage their special relationship with China, says Oguzie. “Most of us believe, wrongly though, that the Chinese investment programme in Africa is a sort of grant-in-aid, that they are doing it as a favour.” Africans need to assert themselves, he says. “Partnerships and collaborations should be for mutual interests and benefits, and the earlier we in Africa realize this, the better for everyone.” ■

Linda Nordling is a freelance writer based in Cape Town, South Africa.