

ALLEYES ON ADDIS

Next week, African leaders will come together to talk about science and technology at a summit in Ethiopia. This presents an opportunity to allot some foreign aid and, if they get it right, to launch projects that will draw further donations from abroad, says **Michael Cherry**.

If asked to name Africa's highest priorities, most people would cite poverty, disease and conflict, not science and technology.

But at next week's summit of African leaders in the ancient Ethiopian capital of Addis Ababa, science and technology research for African development is top of the agenda. "The challenge," says South African director-general of science and technology Phil Mjwara, "is to impress upon the heads of state that science and technology is of such critical importance to the continent's development that it should be a policy priority for every African nation."

For many, this meeting of the five-year-old African Union (AU) offers a historic opportunity. David King, chief scientific adviser to the British government, argues that, apart from boosting the economy and creating employment opportunities, "the important point about investing in science and technology is that it raises the level of aspiration throughout the educational system." Indeed, some now view science and technology as a vehicle for spending foreign aid wisely.

Eyes in the developed world as well as in Africa will be watching the summit keenly, especially because the new United Nations secretary-general, Ban Ki-moon, is scheduled to put in an appearance. Africa's leaders could use this summit as an opportunity both to convey their own financial commitment to the development of science and technology, and

to begin work on detailed plans that foreign donors can support.

During the past 18 months the world's rich nations have expressed renewed interest in addressing Africa's fate. In July 2005, the G8 summit committed the G8 countries both to eliminating debt and to providing a significant injection of aid. This renewed interest in Africa is accompanied by the realization that past aid was often squandered, either on corrupt officials in developing countries or on foreign consultants. The latter problem can be addressed by removing restrictions on where aid is spent; spending new money wisely is a challenge that Africa must meet, and the hope is that science and technology offers one route to doing so.

The AU has been gearing up to this summit over the past two years, charging its ministerial council on science and technology (AMCOST) to come up with a wish list of appropriate research and development for the continent — the Consolidated Plan of Action. The list of research clusters covers 12 flagship projects, and with the exception of space science, all are targeted at fairly obvious African concerns (see 'Africa's 12-point plan'). Surprisingly, biomedical science is omitted, but

according to Bothale Tema, the AU's director of human resources, science and technology, this is not because the AU is unconcerned about research on human disease, but because it falls under a different department (social affairs) of the AU. Mjwara is positive about the plan: "All of the proposed projects are in fields in which there is already existing momentum based on at least some local expertise."

The more difficult issue of implementation is largely unresolved. A small meeting of African scientists in Alexandria, Egypt, last October produced some very vague recommendations, and a further meeting of science ministers in Cairo in November made some suggestions for implementing the Consolidated Plan of Action, embodied in the Cairo declaration. "More important than the actual recommendations that came out of either meeting is the fact that they

took place at all," says Andy Cherry, science and technology adviser at the Association of Commonwealth Universities in London, who attended both meetings as an observer.

The Cairo declaration, which is likely to be ratified by the leaders at the Addis summit, contains recommendations on potential funding mechanisms and 'centres of excellence' for

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moving the plan forward, as well as possible agreements on biotechnology and biosafety. Biotechnology is one area on which the summit could conceivably reach agreement, because a fairly detailed report on both priorities for biotechnology research, and biosafety measures for genetically modified (GM) organisms, will be on the table.

Increasing integration

Kenyan Calestous Juma of Harvard University, a member of the panel that compiled the report, hopes that biotechnology development and regulation can proceed hand-in-hand. He believes the initial focus should be on making effective use of products that are relevant to local needs and are ready for commercialization, including techniques for disease control, pest tolerance and weed management. "I will consider the summit a success if a handful of leaders return home emboldened to champion the role of technological innovation in developing their country and region," he says.

The report also encourages African nations to abandon their individual policies on GM crops in favour of a common, or at least regional, stance. South Africa and Kenya, for example, have promoted the introduction of GM crops such as corn (maize), cotton and soya, whereas Zambia has banned all such crops. Until 2004, the European Union had a five-year moratorium on GM imports, and getting approval for new products is still difficult and time-consuming. As Europe is the main importer of African agricultural products, and because most African nations lack facilities for separating GM and normal crops, many have been reluctant to pursue the technology.

Because Africa is much less integrated than the European Union, with economic integration existing at a regional, but not a continental, level, Juma thinks regional consensus on biotechnology and biosafety is most likely. "If biotechnology development and regulation are to go hand in hand, then the AU needs to develop a strategy broad enough to empower regional economic communities to take differing positions," he says.

Fund management

On the thorny issue of funding mechanisms, the Cairo declaration backed the establishment of an African Science and Innovation fund to take forward the research themes proposed in the Consolidated Plan of Action. As an inter-governmental entity, under the auspices of the AU, the fund would support five of the recommended 12 flagship research projects in its first two years of operation, and eventually have 12 running at any given time.



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But the Cairo meeting was unable, despite intense debate, to make recommendations about either the governance or the administration of the facility, apart from deciding that it should be based on existing organizations rather than an entirely new one. One option would be to contract fund management to the African Development Bank. But it seems unlikely that such details will be decided and agreed in Addis.

The most that can be expected at the summit would be pledges towards initial funding from individual African governments. An initial AU estimate for funding the Consolidated Plan of Action over the next 5 years asks for US\$158 million. One AU-backed proposal suggests that funding sources should include African governments, foreign donors — including bilateral and international aid agencies and foundations — and private-sector contributions from Africa and elsewhere.

Africa's 12-point plan

Africa's Science and Technology Consolidated Plan of Action is made up of research clusters covering 12 projects.

- Conservation and sustainable use of biodiversity
- Safe development and application of biotechnology
- Securing and using Africa's indigenous knowledge base
- Building a sustainable energy base
- Securing and sustaining water
- Combating drought and desertification
- Building Africa's capacity for material sciences
- Building engineering capacity for manufacturing
- Strengthening the African Laser Centre
- Technologies to reduce post-harvest food loss
- Information and communication technologies
- Establishing the African Institute of Space Science

Khotso Mokhele, former president of the South African National Research Foundation, the continent's largest funding agency, argues that African states need to start by making a financial commitment themselves. "If an agency or fund is established simply as a vehicle for handouts by the West, it is doomed to failure," he says.

Similar pledges have been made before by African science ministers, but they need to be supported by heads of state. In 2003, at the launch of AMCOST, African states pledged to work towards a spending target of 1% of gross domestic product on science and technology, compared with a global average of 2.36%. At the time, Egypt was the only African state reaching this target, with Algeria and Uganda coming close. South Africa announced in December that anticipated increases should allow it to reach the 1% target by 2008. But most other nations are still some way off.

High hopes

Another element of the Cairo declaration requiring additional funding is the establishment of centres of excellence to take forward some of the research in the Consolidated Plan of Action. Proponents of the concept point to India's four large science and technology institutes, which arguably provided the foundation for the country's sound base in science and technology. Britain's Commission for Africa proposed last year that the international community provide up to \$3 billion over the next ten years to develop such centres.

The problem with establishing centres of excellence is that, by definition, funding becomes localized in certain areas in preference to others. This makes any decisions about which institutes to build and fund very political. In certain scientific fields Africa will have to create new institutes, whereas in others existing ones can be expanded. In the area of biotechnology (which has been broadly defined), for example, AMCOST has recommended building on existing institutions, or regional networks of institutes.

Not surprisingly, these reflect regional strengths and priorities: pharmaceutical biotechnology would be the focus in north Africa, with other healthcare biotechnology (including medical diagnostic testing kits, and stem-cell research) in southern Africa. In east Africa, biotechnology research on breeding and feed for livestock would build on expertise at the International Institute for Livestock Research (ILRI) in Nairobi, Kenya, and, in west Africa, biotechnology for crop improvement would extend the work of the West Africa Rice Development Association. Finally, central Africa would target biotechnology for forest

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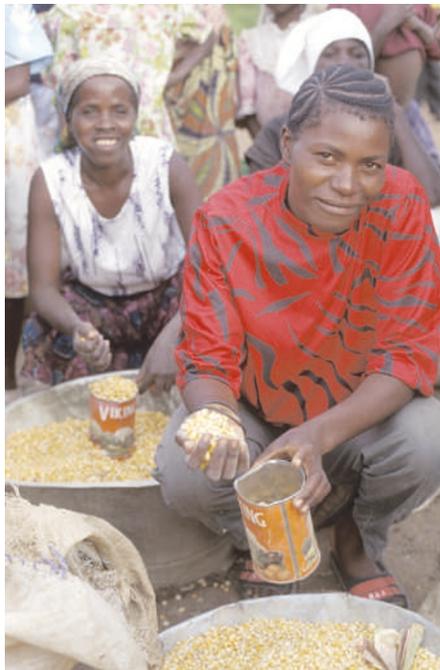
conservation and development — one possibility being the use of DNA barcoding to conduct taxonomic studies in forests.

On the ground, increased funding would allow these institutions to extend their activities. For example, John McDermott, director of research at ILRI, says it would allow his institute to make its state-of-the-art facilities in genomics and immunology available to other researchers in the region. McDermott wants ILRI to be a regional platform for biotechnology. “This is important because capacity in science and technology is directly linked to capacity for innovation, which the African economy so urgently requires,” he says.

The big picture

But DNA barcoding in forestry research seems far removed from the daily concerns of most ordinary Africans. One criticism African leaders face whenever they focus on science and technology is that it is an élitist concern, distant from the realities of poverty, disease and infrastructure in Africa. Complaints about low representation at the pre-summit meetings in Alexandria and Cairo only strengthen such concerns. The Alexandria meeting in particular was billed as an opportunity for African scientists to provide input, yet it was attended by only 110 African delegates, of whom less than one fifth were active researchers.

Similar charges of élitism have been levelled at the African Institutes of Science and Technology (AIST) initiative, a possible model for African centres of excellence. First proposed by former World Bank president James Wolfensohn, the initiative hopes to establish four élite universities in science and technology in sub-Saharan Africa: one each in the north, west, east and south. Its proponents argue that it addresses crucial manpower needs by offering first degrees in science and engineering (including some business modules), as well as postgraduate degrees. The institutes will



GM crops could be more widely grown across Africa if consensus can be reached on their use.

be overseen by the Nelson Mandela Institute, a non-profit company registered in Delaware, the board of which includes former presidents Nelson Mandela of South Africa and Joachim Chissano of Mozambique.

The first institute will be founded later this year in Abuja, Nigeria, although a president has yet to be appointed. It has substantial support from the Nigerian government, and plans to enrol its first students in September next year. At full capacity, it is expected to have 5,500 students, 40% of whom will be in graduate programmes. Further institutes are planned in Burkina Faso and Tanzania.

Wole Soboyejo, a Nigerian materials scientist at Princeton University who chairs AIST's African Science Committee, rejects the idea that the concept is élitist. He argues that enhancing manpower capability is critical: sub-Saharan

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Africa, for example, produces only about 83 engineers per million of the population annually, whereas, on average, developed countries produce 1,000. He emphasizes that “the institutes will not be islands of excellence, but will be linked to existing research centres and universities in each region, for example, providing them with access to electronic journals”. Soboyejo suggests that closer cooperation with the AU would also be desirable.

Mjwara is concerned that the new institutes “might not be sustainable as they do not seem to be based on local capacity”. He would prefer the AU's proposed centres of excellence to follow the example of the Pretoria-based African Laser Centre, with its network of six national facilities in Tunisia, Senegal, Ghana, Algeria, Egypt and South Africa.

Soboyejo, however, defends the model proposed for AIST by comparing it to another South African success story, the African Institute for Mathematical Sciences (AIMS) in Muizenberg. Like AIMS, the new institutes would combine local expertise with that of foreign academics teaching short courses. “At

present, there is huge goodwill towards Africa worldwide, and the challenge is to channel this into returning lasting benefits for the continent,” he says.

This call is echoed by Juma, who will deliver a keynote address at the summit. “The debate urgently needs to shift from calls for funding to thinking about creative ways of using existing scientific and technical

knowledge to solve local problems,” he says. And in so doing, Juma believes the linkages between institutions of higher learning and research will need to be re-examined. “More attention should be paid to rebuilding these institutions as vehicles of community development,” he explains. Many African universities operate like those in the West did 40 years ago, with few links to either industry or local communities.

King is optimistic about the summit's chances of reaching agreement on the infrastructure required to go forward: “As soon as we have a realistic set of proposals on the table, we will be in a position to discuss how to fund them.” Concrete policy proposals, backed by foreign investment, would surely be welcomed by African scientists. “We've had a lot of rhetoric so far about the potential importance of science and technology in African development,” says McDermott, “but not much action.” ■

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The development of African centres of excellence could see the creation of new institutions and the expansion of existing ones.