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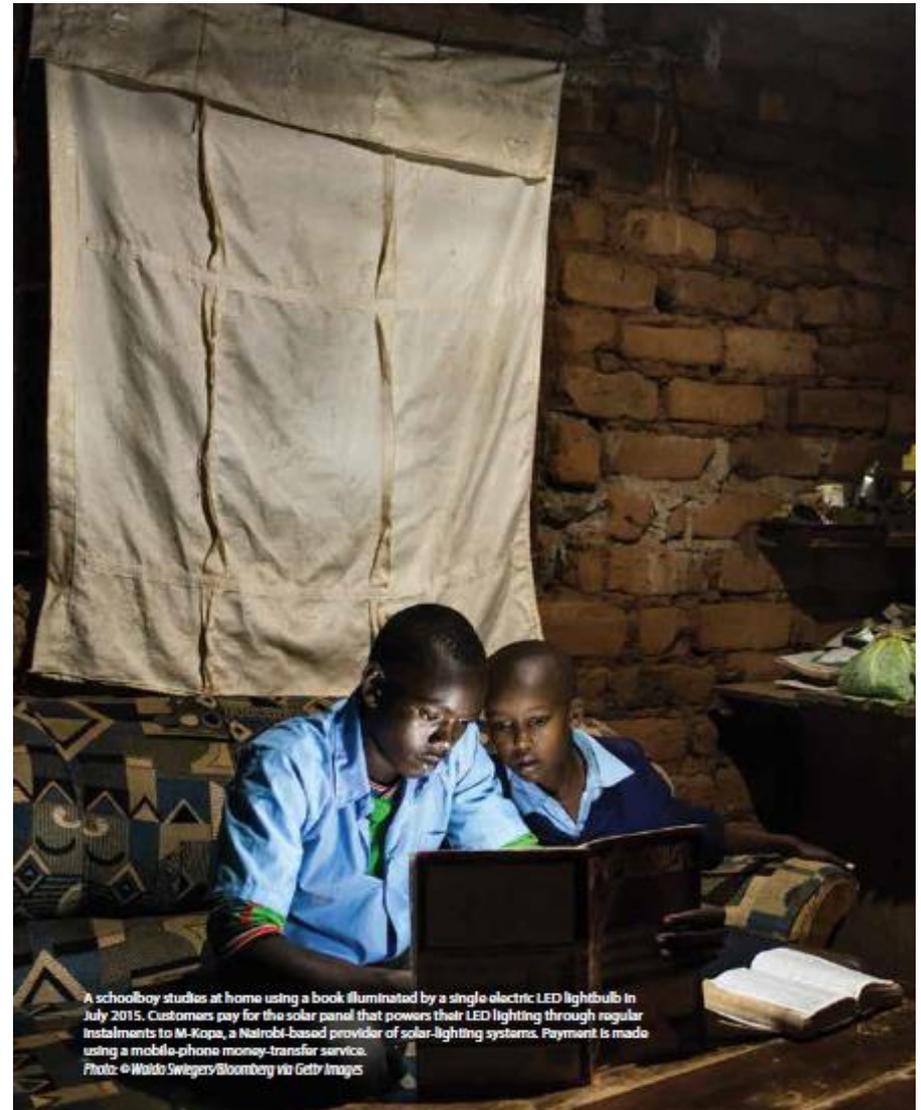
Science Report

Towards 2030

Africa is on the move

Prepared by Susan Schneegans

Editor-in-Chief, UNESCO Science Report



A schoolboy studies at home using a book illuminated by a single electric LED lightbulb in July 2015. Customers pay for the solar panel that powers their LED lighting through regular instalments to M-Kopa, a Nairobi-based provider of solar-lighting systems. Payment is made using a mobile phone money-transfer service.
Photo: © Waldo Swiegers/Bloomberg via Getty Images



Greater interest in science, technology and innovation

There are three main thrusts for many African 'vision' planning documents to 2020 or 2030:

- better governance ;
- more inclusive growth ;
- sustainable development.

Both national and subregional 'vision' documents acknowledge the importance of science, technology and innovation for sustainable development.

Many African countries now have STI policies (e.g. 11 out of 15 SADC countries). Several have increased their financial commitment to R&D substantially since 2009, including:

Egypt: 0.43% ➡ 0.68% of GDP

Ethiopia: 0.24% ➡ 0.61% of GDP

Kenya: 0.36% ➡ 0.79% of GDP

Mali: 0.25% ➡ 0.66% of GDP

Senegal: 0.37% ➡ 0.54% of GDP

Uganda: 0.36% ➡ 0.48% of GDP



Energetic efforts to boost private-sector R&D

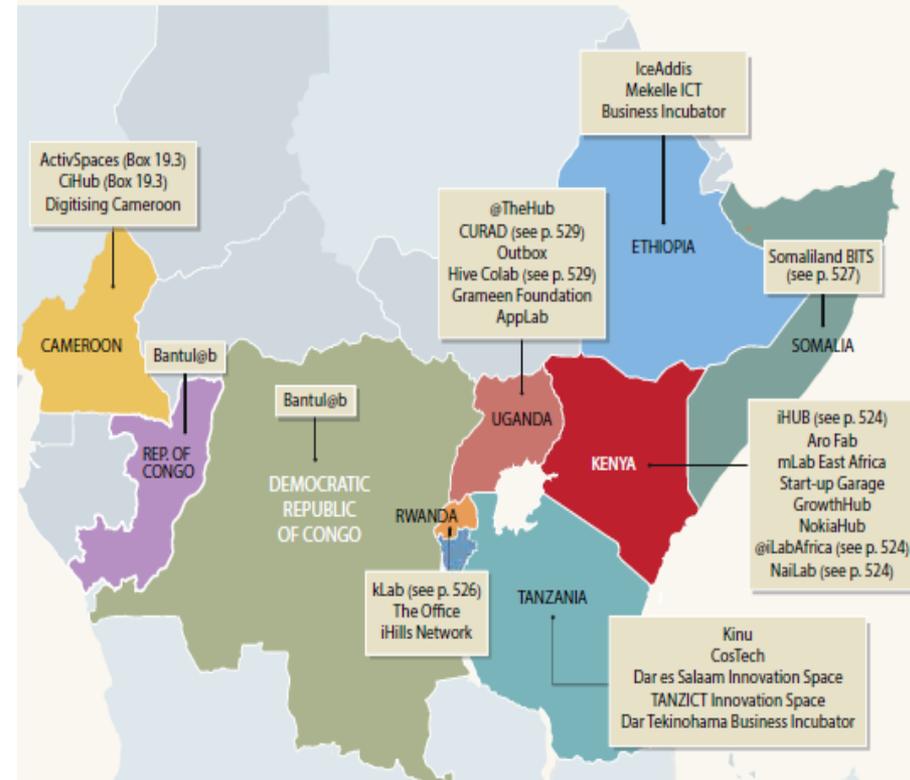
African countries have put **policies in place to foster R&D and innovation** in the private sector, such as through:

- technology innovation hubs (*see map*)
- specific funding mechanisms, such as the Malawi Innovation Challenge Fund
- the construction of technopoles, like Konza Technology City in Kenya
- Cybervillages and technology parks (e.g. Ghana, Nigeria, Tunisia)

The **success of innovation hubs** in Africa is encouraging governments to invest more in R&D, which should in turn boost private-sector R&D.

Much of the **social innovation** reported in East and Central Africa focuses on overcoming sustainability challenges such as food security, renewable energy and climate change mitigation, e.g. Hive Colab (Uganda) is helping entrepreneurs innovate in climate technologies, ICTs and agribusiness.

Figure 19.4: Technology hubs in East and Central Africa, 2014





African regional communities are fostering scientific integration

Regional economic communities are fostering intra-regional and pan-African scientific integration, e.g. the *ECOWAS Policy on Science and Technology* (ECOPOST, 2011) is an integral part of *Vision 2020* adopted by ECOWAS in 2011. ECOPOST was informed by *Africa's Science and Technology Consolidated Plan of Action, 2005-2014 (CPA)*. The CPA has also been used as a template for formulating the S&T policy of IGAD and inspired the *SADC Protocol on Science, Technology and Innovation* (2008).

Networks of centres of excellence offer more opportunities for regional scientific integration than ever before. Some networks have been developed within the CPA: African Biosciences Initiative, Bio-innovate, African Biosafety Network of Expertise (*see map*). Others are being developed by WAEMU, ECOWAS, African Dev. Bank, World Bank...

Trade: efforts to develop infrastructure (rail, roads, ports) and intra-African and pan-African trade should create markets for value-added and manufactured products.

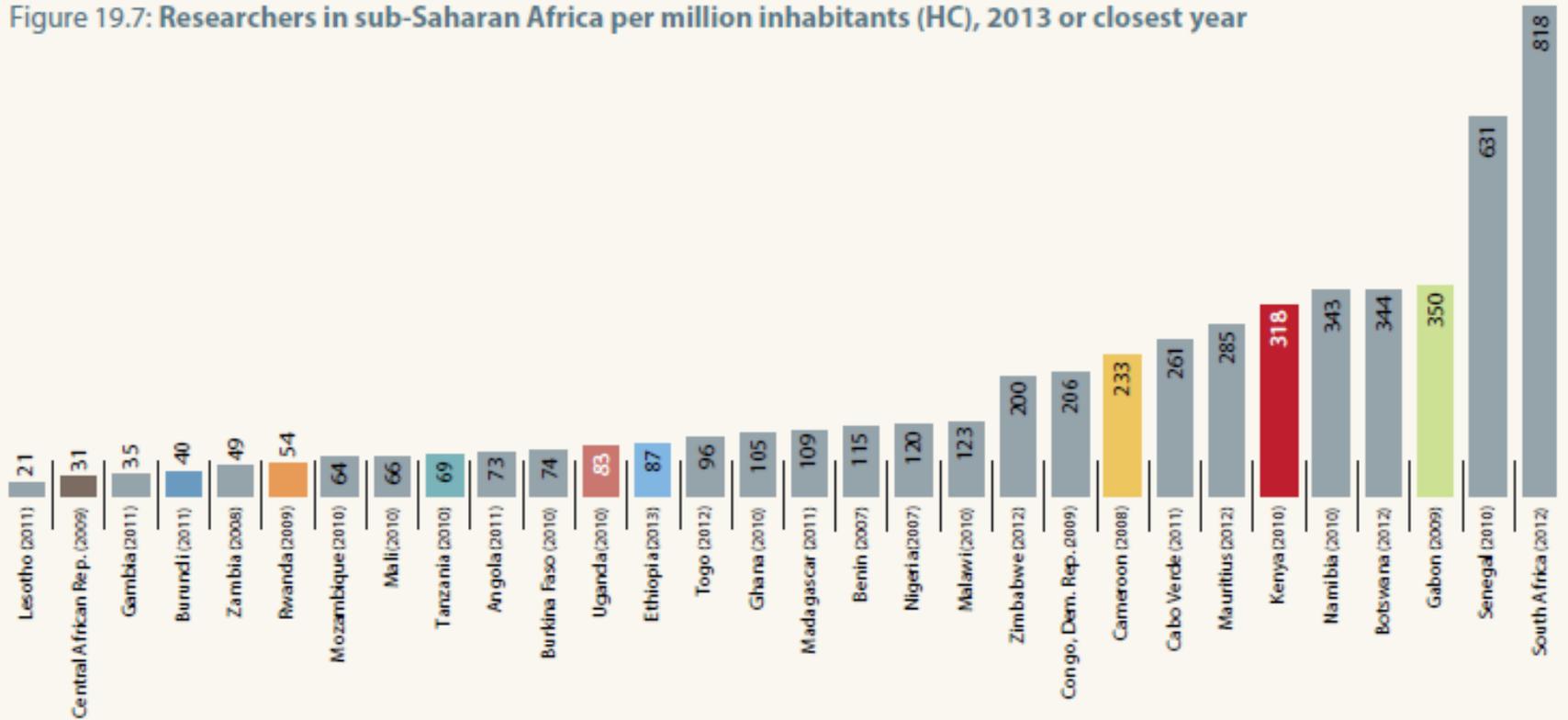




Economic diversification hampered by a skills shortage

Africa needs more scientists, engineers, technicians, agronomists, etc to achieve its development goals
Researchers: 91 (FTE) researchers per million inhabitants in sub-Saharan Africa, 495 in North Africa; this is up from 77 in 2007 (sub-Saharan Africa) and 474 in North Africa but still well below the world average of 1 083

Figure 19.7: Researchers in sub-Saharan Africa per million inhabitants (HC), 2013 or closest year



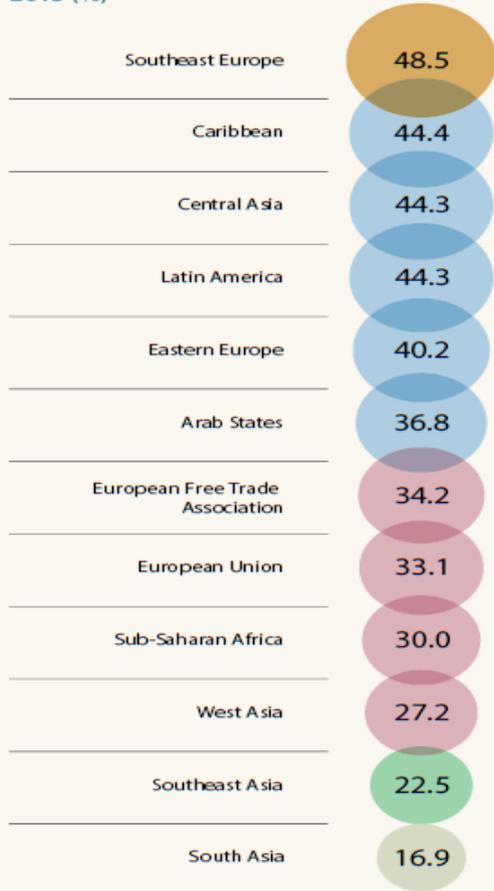
Source: UNESCO Institute for Statistics, April 2015



Three out of 10 sub-Saharan researchers is a woman

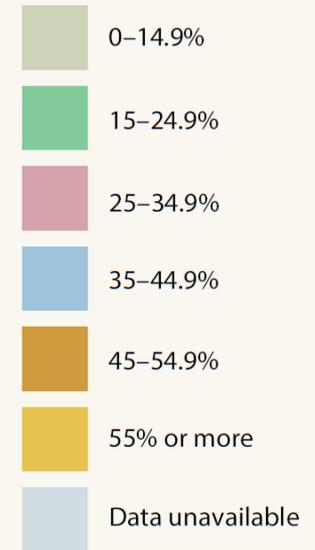
Several governments are putting policies in place to augment the number of women researchers (e.g. Ethiopia)

Regional shares of female researchers, 2013 (%)



Share of women researchers in Africa, 2013 or closest year (%)

(Europe and the Middle East are shown for comparison)





Agriculture in need of greater investment

Low agricultural productivity

Poor land management, leading to degraded soils, etc

Little value-addition to agricultural produce in most countries (soap, etc). Exceptions include Ghana, Kenya, Nigeria and South Africa, which have agro-processing industries.

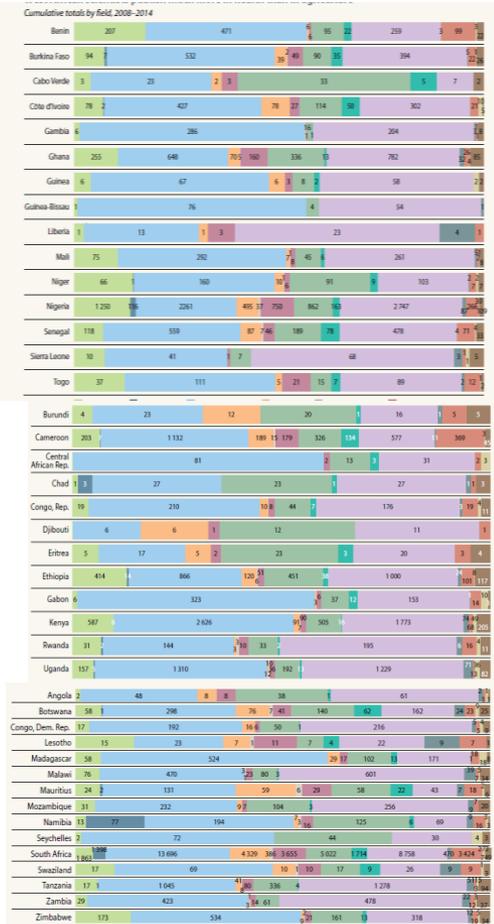
Low levels of investment: few countries devote 10% or more of GDP to agriculture, the target agreed in the *Maputo Declaration* (2003); there has been a worrying drop in government funding for agricultural R&D in the SADC.

Low enrolment in agricultural sciences: the CPA review regretted that young African researchers were reluctant to train in such fields as agricultural science, which lacked popular appeal; it considered that 'the shortage of qualified personnel in such fields is a big challenge for the continent.'

Several new agricultural universities

e.g. Malawi established the Lilongwe University of Agriculture and Natural Resources in 2012, Zimbabwe is setting up two universities with a focus on agricultural science, the Marondera and Monicaland State Universities: one of three public universities set up by Senegal since 2013 specializes in agriculture.

Publications: modest output in agricultural sciences (pale green on left)





Africa's place in the world: visible progress

Between 2007 and 2013, the research gap between high-income and middle-income countries narrowed, mainly due to China, which overtook the USA for the number of researchers and almost doubled its global share of research spending (from 10.2% to 19.6%).

RESEARCH EXPENDITURE

Global research expenditure grew faster (+30.5%) than the global economy (+20.1%) between 2007 and 2013.

Sub-Saharan Africa's share of research spending rose from 0.7% to 0.8%.

RESEARCHERS

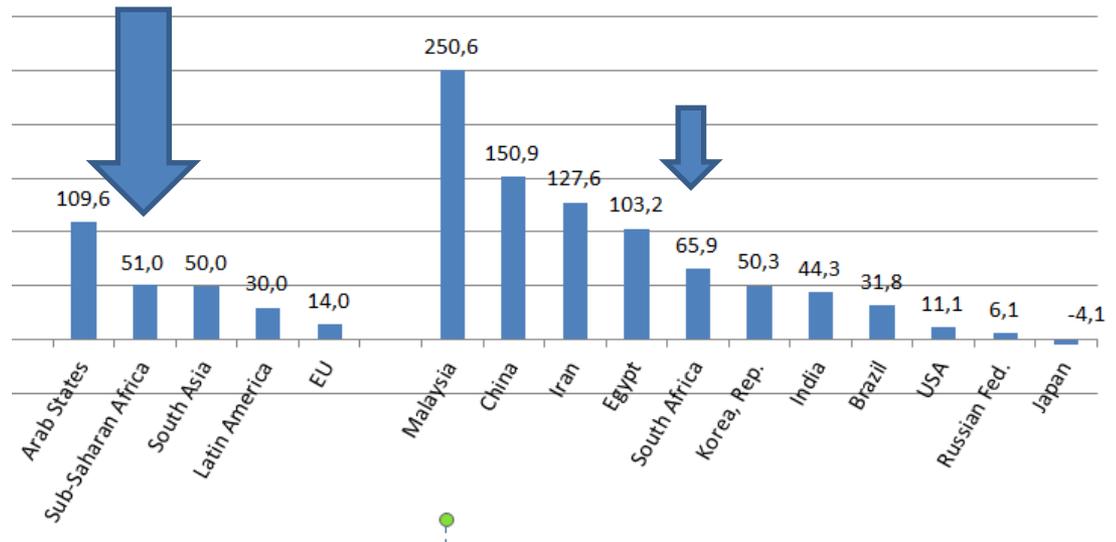
The global number of researchers rose by 21% between 2007 and 2013 to 7.8 million.

Sub-Saharan Africa's share rose from 0.9% to 1.1% (58,800 to 82,000). South Africa's share remained stable (0.3%).

PUBLICATIONS *(see graph on the right)*

Scientific articles progressed globally by 23% between 2008 and 2014.

Sub-Saharan Africa's global share rose from 1.2% to 1.4%; it showed the fastest growth rate after the Arab States: 51% (South Africa's share: from 0.5% to 0.7%)





Africa is embracing sustainable development: examples

The **AU–NEPAD African Action Plan for 2010–2015** expressly underscores the important role that harmonized regional policies could play in adapting to climate change. In 2013, ministers adopted the **SADC Regional Climate Change** programme. COMESA, EAC and SADC have been implementing a joint five-year initiative since 2010 known as **The African Solution to Address Climate Change**.

African Union Competitive Research Grants 2010-2012 focus on postharvest technologies and agriculture; renewable and sustainable energy; water and sanitation; fisheries and climate change.

Biosciences Eastern and Central Africa Network (Kenya): research priorities include climate-smart forage grasses; the **Bio-Innovate network** in East Africa (2010) is improving crop productivity and agro-processing and building smallholder farmers' resilience to climate change.

In 2013, **Algeria** signed an MoU with the EU for technology transfer to Algeria in fossil fuels and renewable energy. Since 2011, 60 solar and wind projects have been approved within Algeria's Renewable Energy and Efficiency programme, which plans to raise the share of renewables to 40% of the energy mix by 2030.

In 2013, **Botswana** initiated the development of a *National Climate Change Strategy and Action Plan*.

The University of Djibouti is establishing an observatory to monitor climate change in East Africa, with Yale University and MIT (USA).

Ethiopia has a *Climate Resilient Green Economy Vision and Strategy* within its *Growth and Transformation Plan for 2011–2015*. It is developing wind power, biofuels and the Great Ethiopian Renaissance Dam.

In the **Gaborone Declaration for Sustainability in Africa** (2012), 10 countries commit to integrating the value of natural capital into national accounting and corporate planning: Botswana, Gabon, Ghana, Kenya, Liberia, Mozambique, Namibia, Rwanda, South Africa and Tanzania.



Africa is embracing sustainable development (continued)

Emerging Gabon: Strategic Plan to 2025 (2012) created a National Council on Climate Change and *National Climate Plan* (2013) and a joint Centre for Environmental Research by Gabon and the University of Oregon (USA) in 2011, with a focus on climate change and environmental governance, including the development of ecotourism; the share of hydropower in Gabon's electricity matrix is to rise from 40% in 2010 to 80% by 2020. By 2030, Gabon plans to export 3 000 MW of hydropower to its neighbours. A law on sustainable development was adopted in August 2014.

Geothermal energy is being developed in **Kenya's** Rift Valley. In 2014, Kenya began building what may become Africa's biggest wind farm, through the Lake Turkana Wind Power Project.

Madagascar's national research policy (2013) is accompanied by five *Master Plans of Research* related to renewable energies, health and biodiversity, agriculture and food security, environment and climate change.

A call for the establishment of a UNESCO centre of excellence on ocean science and innovation for capacity-building and research, as a contribution to the *2030 Agenda for Sustainable Development*, was endorsed by the *Mauritius Ministerial Declaration* adopted by **Mauritius, Comoros, Madagascar and the Seychelles**.

Morocco inaugurated the continent's biggest wind farm in 2014 and is building Africa's biggest solar farm.

Rwanda intends to create a Climate Change and Environment Innovation Centre. In September 2008, **Rwanda** banned plastic bags by law. These have been replaced by biodegradable bags made from materials such as cotton, banana and papyrus. Since 2008, there has been a National Fund for Environment and Climate Change in Rwanda (FONERWA), within the *National Green Growth and Climate Resilience Strategy*. FONERWA is identifying funding for the pilot 'green city' to be launched by 2018.

Within its *Solar Plan* (2009), **Tunisia** plans to raise the share of renewables in the energy mix to 16% by 2016 and 40% by 2030. The Ecosolar Village (technology park) should soon be operational.