Building Science, Technology and Innovation Capacity for Sustainability in Africa

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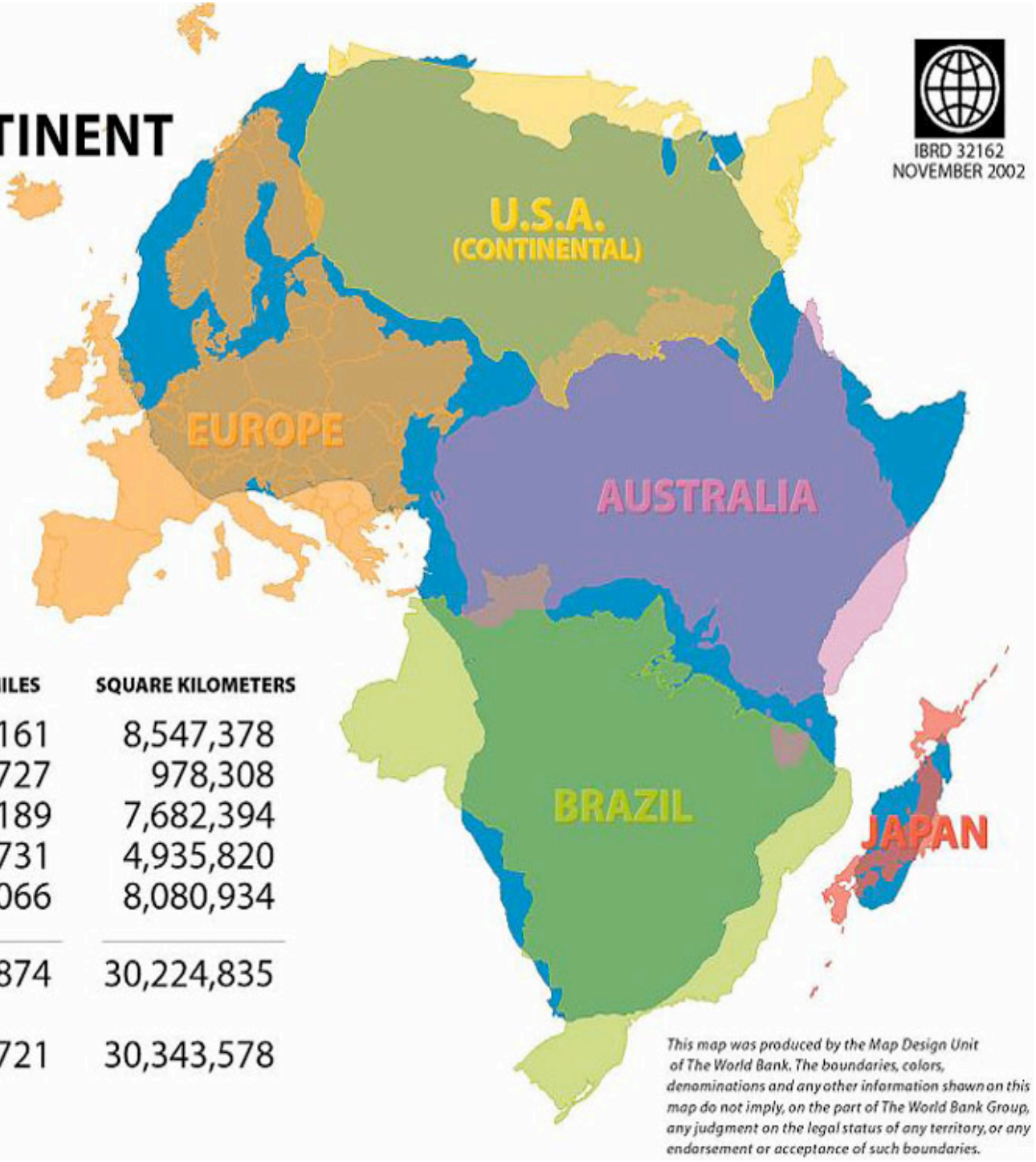
Building STI Capacity for Sustainability in Africa

- **Challenges**
- **Opportunities**

SIZE OF THE AFRICAN CONTINENT COMPARED TO OTHER LAND MASSES



	SQUARE MILES	SQUARE KILOMETERS
BRAZIL	3,300,161	8,547,378
JAPAN	377,727	978,308
AUSTRALIA	2,966,189	7,682,394
EUROPE	1,905,731	4,935,820
U.S.A. (Continental)	3,120,066	8,080,934
TOTAL	11,669,874	30,224,835
AFRICA (including MADAGASCAR)	11,715,721	30,343,578

Challenges

1. Addressing sustainability problems
2. Improving quality and quantity of research output
3. Reducing brain drain

Sustainability problems

- Africa is the poorest region in the world.
- Half of the population live on less than one dollar a day.
- Around a sixth of the entire population of sub-Saharan Africa – more than 100 million people – are chronically poor.

Source: *Our Common Interest: Report of the Commission for Africa*

166 million Africans live in slums

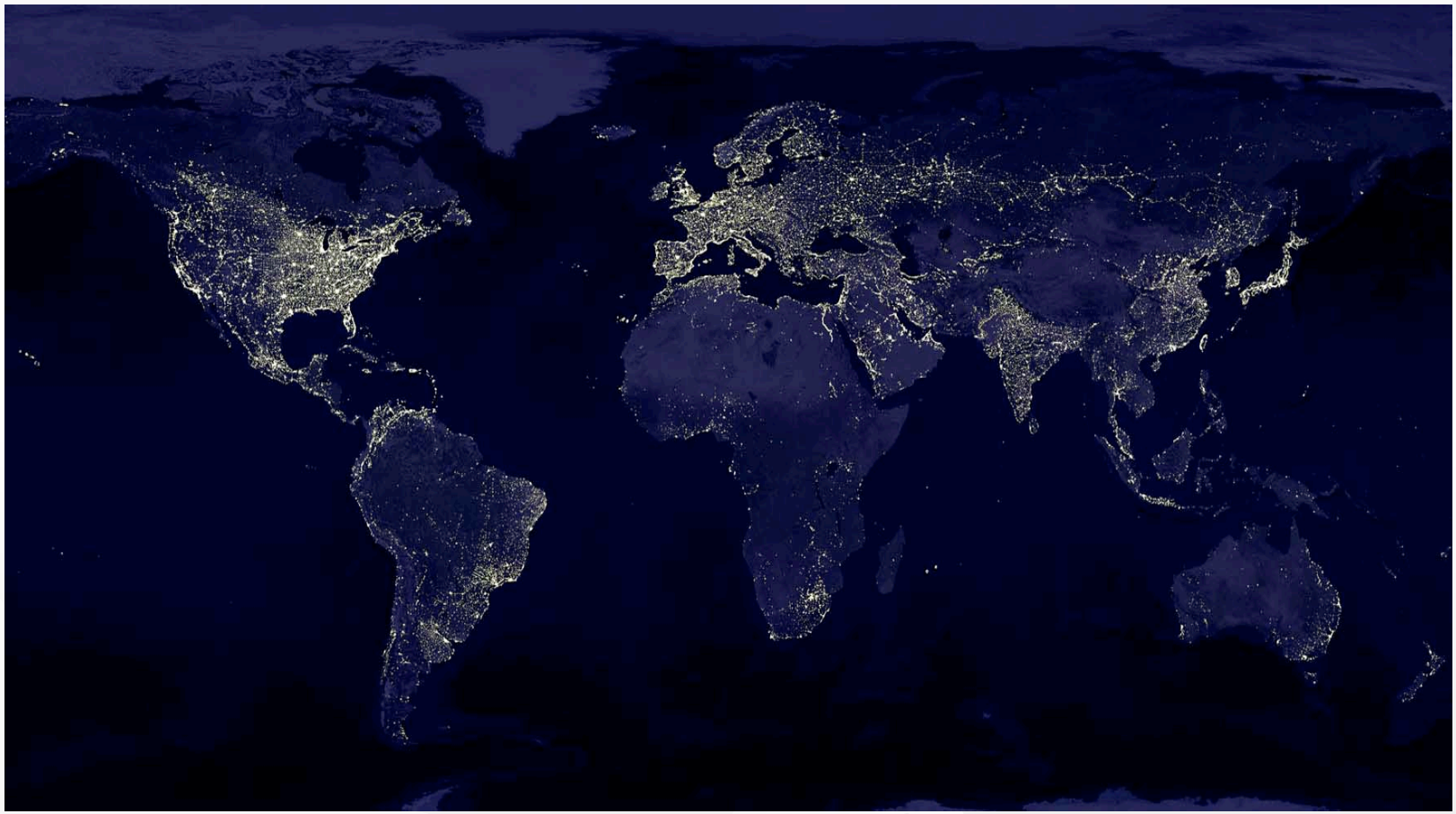
Source: *Our Common Interest: Report of the Commission for Africa*

42% of Africans have no access to safe drinking water

Source: *Our Common Interest: Report of the Commission for Africa*

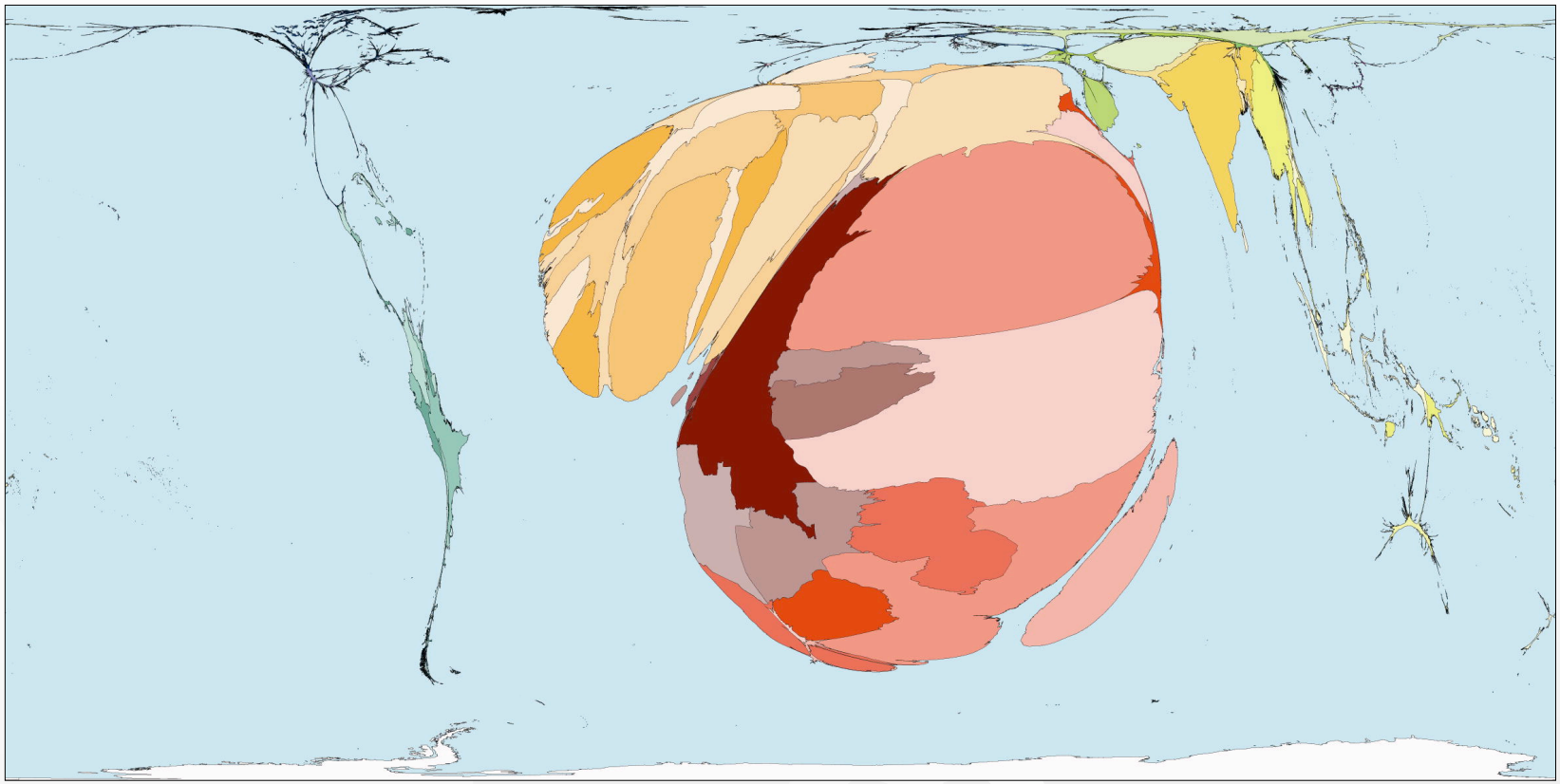
73% of Africans have no access to electricity

"In countries for which data are available around 27 percent of the population has access to electricity."
Source: *African Development Indicators 2006*. World Bank



Malaria kills 900,000 Africans each year

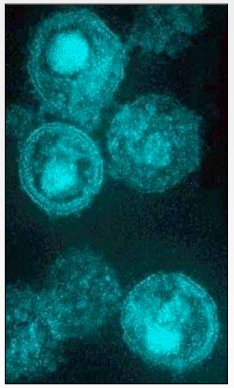
"Each year, it kills more than 1 million people around the world — 90 percent of them in Africa."
Source: *African Development Indicators 2006*. World Bank

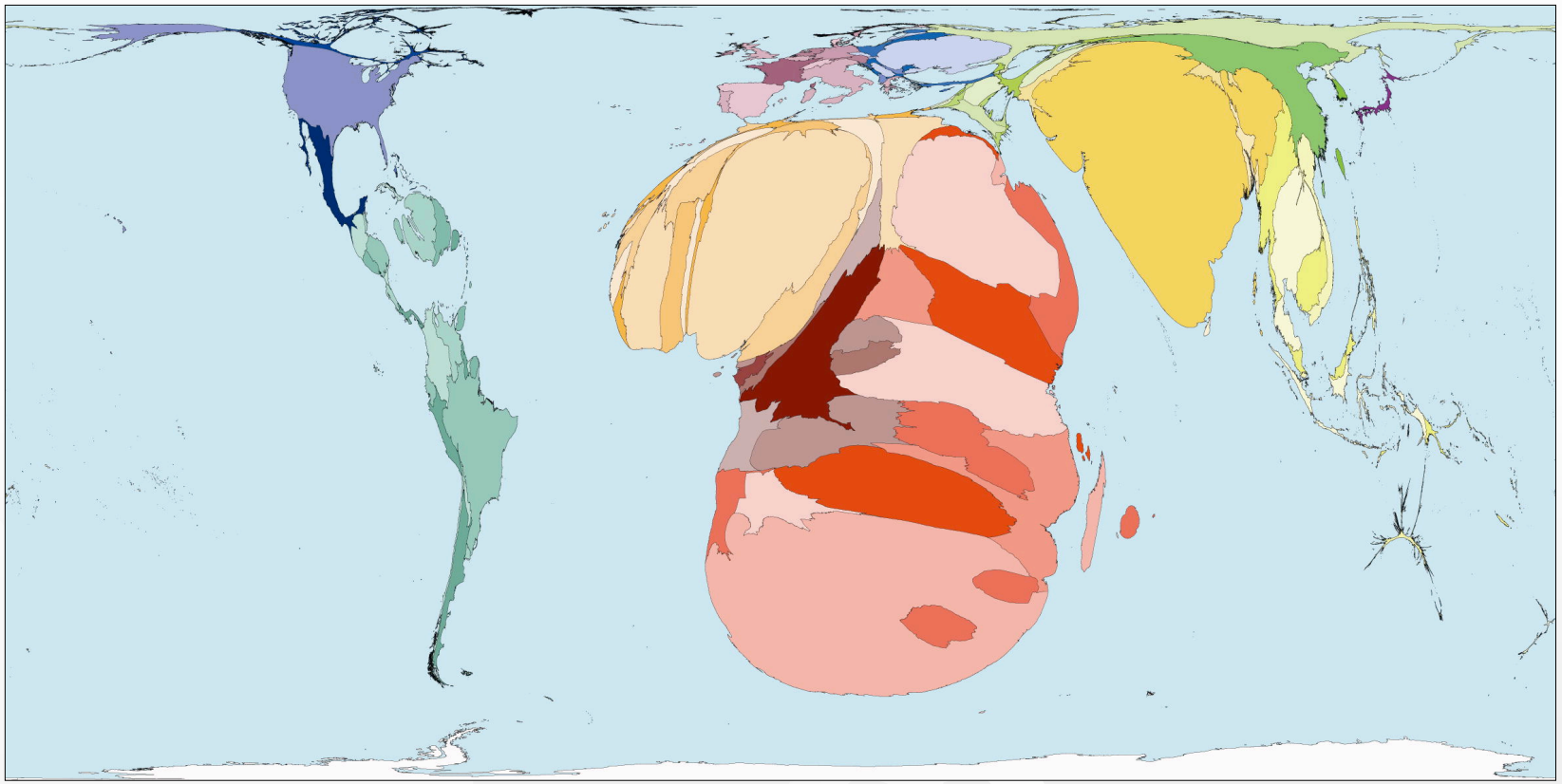


Source: Worldmapper. PLoS Medicine | www.plosmedicine.org

25 million Africans carry HIV

Source: *African Development Indicators 2006*. World Bank





Source: Worldmapper. PLoS Medicine | www.plosmedicine.org

Africa and climate change

- Africa is most vulnerable to climate change because of its fragile ecosystems
- Weak resilience and adaptation capacity

Challenge 1

- How can STI capacity be built and sustained in Africa to assist in solving critical sustainability problems and in achieving the Millennium Development Goals?

Challenges

1. Addressing sustainability problems
2. Improving quality and quantity of research output
3. Reducing brain drain

North-South Disparities

World's top 25 countries, ranked by their share of world's papers in science, medicine and engineering

Average 2005-2006

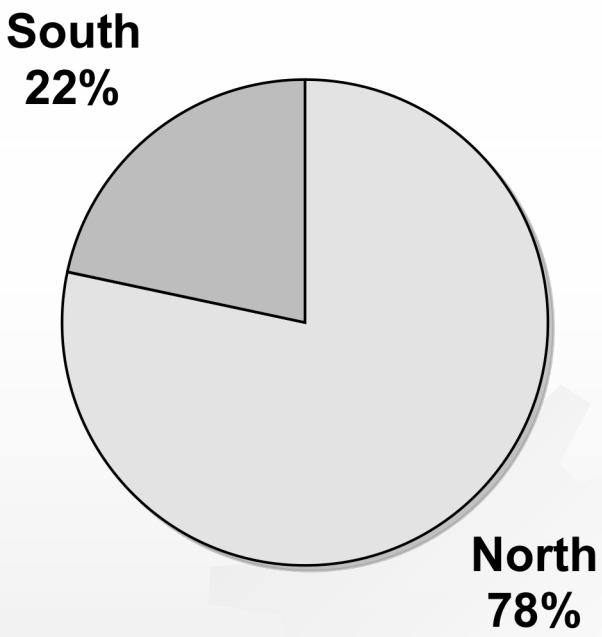
Country/Territory	Share of papers %
USA	28.32%
China	6.60%
Japan	6.23%
Germany	6.15%
United Kingdom	5.80%
France	4.45%
Italy	3.38%
Canada	3.38%
Spain	2.59%
South Korea	2.36%
India	2.23%
Australia	2.11%
Russia	1.98%
Netherlands	1.86%
Brazil	1.50%
Taiwan, China	1.44%
Sweden	1.39%
Switzerland	1.39%
Turkey	1.24%
Poland	1.22%
Belgium	1.05%
Israel	0.84%
Denmark	0.74%
Austria	0.72%
Finland	0.70%

Source: SCI, January 2007

North-South Disparities

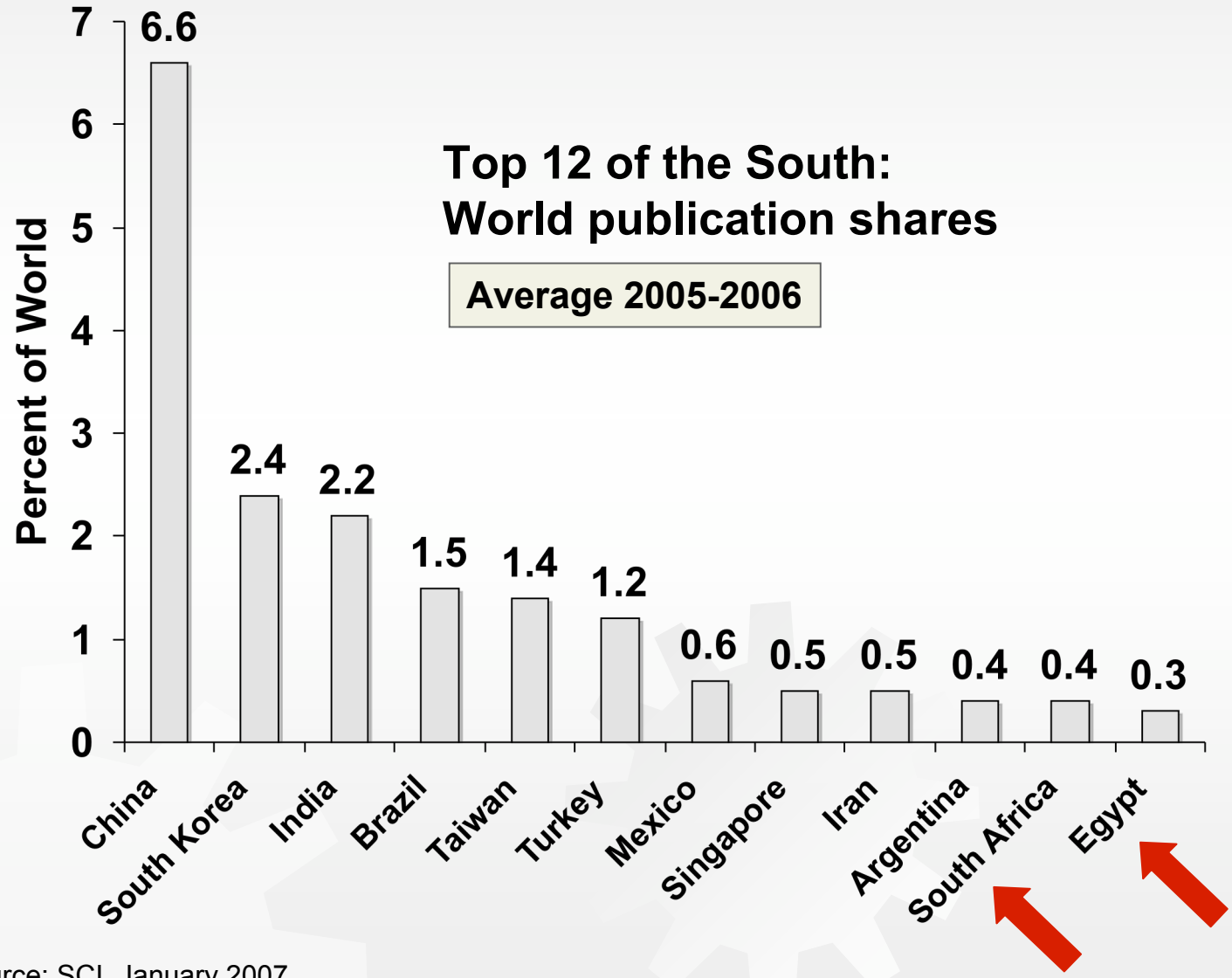
Shares of publications North vs. South

Average 2005-2006



Source: SCI, January 2007

South-South Disparities



Source: SCI, January 2007

Disparities in STI

	AFRICA	Share of World
1	South Africa	0.37%
2	Egypt	0.26%
3	Tunisia	0.11%
4	Morocco	0.09%
5	Nigeria	0.08%
6	Algeria	0.08%
7	Kenya	0.05%
8	Cameroon	0.03%
9	Tanzania	0.03%
10	Ethiopia	0.03%
11	Uganda	0.02%
12	Ghana	0.02%
13	Senegal	0.02%
14	Zimbabwe	0.02%
	Rest of Africa (39 c.)	0.16%
	Total Africa	**1.37%**

Source: SCI, January 2007

African countries contributing ≥ 0.02% of world share of ISI-listed S&E papers

Average 2005-2006

Challenge 2

- How to improve quality of scientific research and education and create a culture of scientific excellence to reduce disparities between Africa and the rest of the world?

Challenges

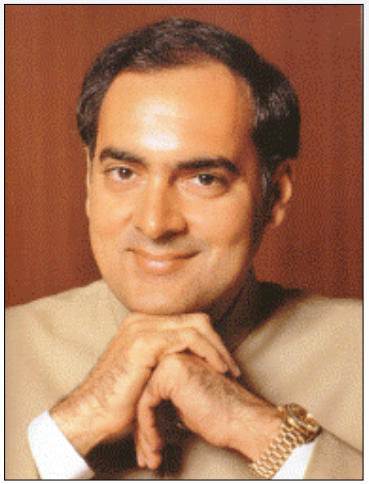
1. Addressing sustainability problems
2. Improving quality and quantity of research output
3. Reducing brain drain

Brain Drain

- Serious problem for African countries
- International market for scientific talent becoming more competitive
- Globalization of higher education growing competition among best universities for best and brightest students

Brain Drain

- USA and EU still greatest market place for talent from Africa
- Providing adequate research facilities and attractive work conditions to talented African scientists is the only way to reduce brain drain



Rajiv Gandhi:

“Better brain drain
than brain in the drain”

Challenge 3

- How to convert brain drain into brain gain and brain circulation?

Source: The Economist, 2005

Opportunities for STI Development in Africa

1. Cutting-edge technologies
2. Natural resources
3. Renewed political commitment in Africa
4. Greater commitment by G8 countries
5. Renewed South-South cooperation
6. New commitment by African academies

Opportunity 1: Cutting-edge Technologies

- Opportunities to contribute to sustainable well-being
  - Wireless information and communication technologies (ICTs)
    - Instant access to scientific and technical information from anywhere in the world
  - Biotechnologies
    - Substantial improvement in agriculture and health
  - Space science and technology
    - Monitoring environmental change and natural resources
  - Nanotechnologies
    - New generation of nanomaterials with broad-ranging applications to critical problems (*e.g.*, water purification, clean energy)

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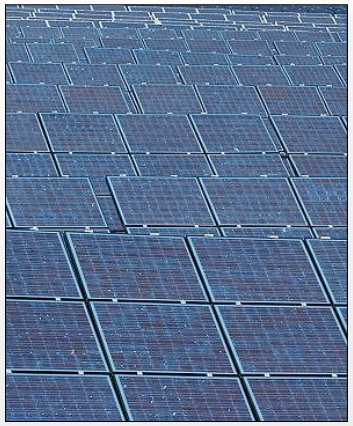
Opportunity 2:
Natural Resources

- Africa is rich in biodiversity and natural resources
- Centuries-long traditional knowledge
- Conservation and rational utilization of these resources require regional and international cooperation

Opportunity 2:
Clean energy from African deserts

- Solar power plants in the Sahara desert can supply Europe with vast quantities of energy
- Each square kilometre of African desert every year receives solar energy equivalent to 1.5 million barrels of oil
- Solar energy received by deserts worldwide is nearly 1,000 times the world's entire annual energy consumption



African ‘exports’

50 million tons of dust transported every year — including top soil rich in nutrients

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Opportunity 3: Renewed Political Commitment by African Leaders

- Decisions of African Union Summit
  - Regional strategies to promote S&T in Africa: NEPAD Networks of Excellence
  - 2007: Year of Science and Innovation
  - S&T Expenditure at least 1% of GDP

African Union Summit, Addis Ababa, Ethiopia, Jan. 2007

Opportunity 3: Renewed Political Commitment by African Leaders

- Several **Sub-Saharan African** countries have substantially increased investment in S&T
  - Ghana
  - Kenya
  - Mozambique
  - Nigeria
  - Rwanda
  - Senegal
  - South Africa
  - Tanzania
  - Uganda
  - Zambia

Opportunity 3: Renewed Political Commitment by African Leaders

- Nigeria
  - Provided US$ 5 million to AAS
  - Decided to establish a National Science Foundation with US$ 5 billion

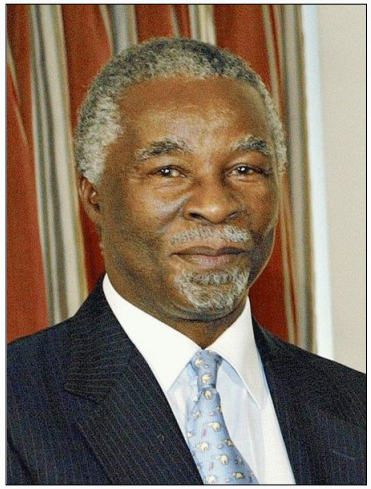
President O. Obasanjo

- Rwanda
  - Increased S&T expenditure to 1.6% of GDP
  - Plans increase to 3% within next 5 years

President P. Kagame

Opportunity 3: Renewed Political Commitment by African Leaders

- South Africa
  - Announced over 50% increase of science budget for 2007/2008
  - Plans to reach AU target of 1% of GDP by 2009/2010



President T. Mbeki

Opportunity 3: Renewed Political Commitment by African Leaders

- Uganda
  - US$ 25 million loan from World Bank in support of S&T initiatives
- Zambia
  - US$ 30 million loan from African Development Bank to build S&T capacity

President Y. Museveni

President L.P. Mwanawasa

Opportunity 3:
Renewed Political Commitment in Africa

- Africa is beginning to witness emergence of new champions of S&T in several countries
- These countries deserve more support by international and regional financial institutions

Opportunities for STI Development in Africa

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Opportunity 4:
Greater commitment by G8 countries

- Commission for Africa Report (2005)
  - US$ 5 billion to rebuild universities
  - US$ 3 billion to establish centres of excellence in Africa

Opportunity 4:
Greater commitment by G8 countries

- Support to NEPAD Action Plan
  - US$ 160 million support for networks of centres of excellence (water, biotech, lasers, mathematics)

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Opportunity 5:
Renewed South-South Cooperation

- China
  - Development Fund for Africa
  - US$ 5 billion over the next 3 years for infrastructure, institution building and technical training

Opportunity 5:
Renewed South-South Cooperation

- Brazil's pro-Africa programmes
  - Support S&T capacity building in Sub-Saharan Africa
- Brazil, India and Senegal
  - Biofuels project in Senegal
- India, Brazil and South Africa
  - Support for joint problem-solving projects

Opportunity 5:
Renewed South-South Cooperation

- TWAS agreement with Brazil, China, India, Mexico and Pakistan
  - Postgraduate/postdoctoral fellowships to researchers from other developing countries

Dr. H.M.I. Ahmed from Egypt at the Universidade Federal de Viçosa in Brazil *(TWAS-CNPq Fellowship for Postdoctoral Research)*

Opportunity 5:
Renewed South-South Cooperation

- Consortium on Science, Technology and Innovation for the South (COSTIS)
  - Ministries of S&T
  - National research councils
  - Science academies

  in the developing world

Opportunity 5:
Renewed South-South Cooperation

- COSTIS
  - Established by the Ministers of S&T and endorsed by the Foreign Ministers of the Group of 77 (2006)

Opportunity 5:
Renewed South-South Cooperation

- UNESCO and Malaysia
  - Establishment of an International Centre for South-South Cooperation in Science, Technology and Innovation in Kuala Lumpur, Malaysia

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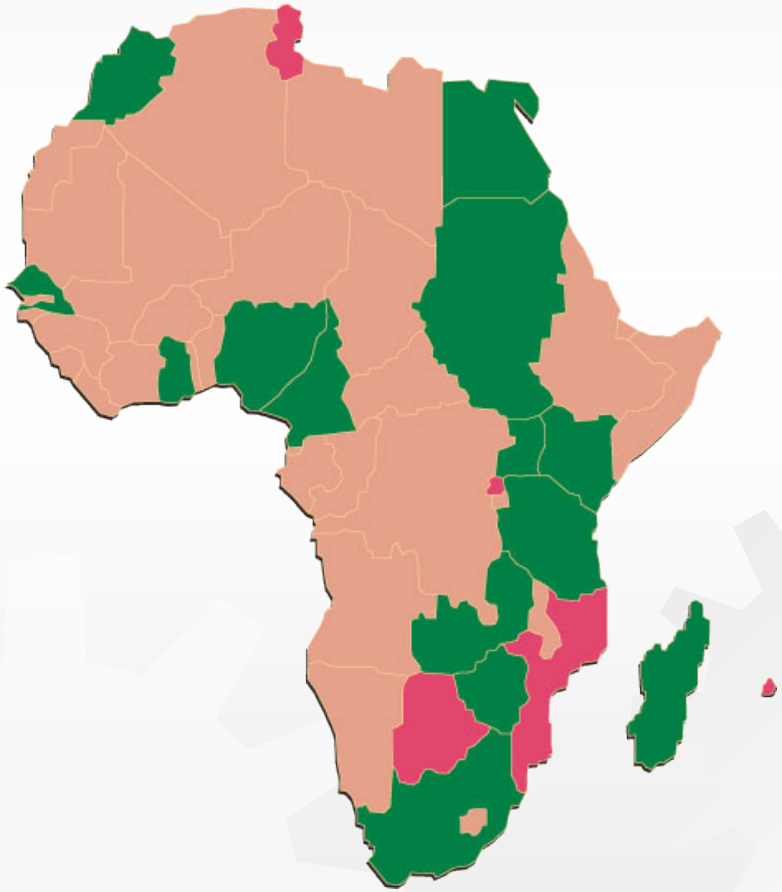
Opportunity 6:
New commitment by African academies

- With IAP support, science academies in Africa are transforming themselves into dynamic boundary organizations able to provide critical services to governments, scientific communities and general public

African countries with merit-based science academies



Green: Existing academies	
Cameroon	Senegal
Egypt	Sudan
Ghana	South Africa
Kenya	Tanzania
Madagascar	Uganda
Morocco	Zambia
Nigeria	Zimbabwe
AAS *(regional academy)*	
Red: Being founded	
Botswana	Rwanda
Mauritius	Tunisia
Mozambique	

Network of African Science Academies (NASAC)

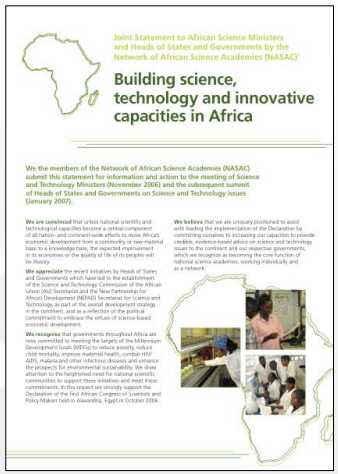
Founded in Nairobi in 2001 as independent forum for African science academies to:

- provide (individually or jointly) independent evidence-based advice to African governments on scientific issues of critical importance to development
- prepare and issue common statements on major issues relevant to Africa

Network of African Science Academies (NASAC)

- Statements
  - Joint statement by academies of G8 countries and NASAC to G8 summit in Scotland, in June 2005
  - NASAC statement to AU summit in Addis Ababa, Ethiopia, in January 2007
  - NASAC statement to G8 summit in Germany in June 2007


Joint science academies' statement:
Science and technology for African development


Joint Statement to African Science Ministers and Heads of States and Governments by the Network of African Science Academies (NASAC)

Building science, technology and innovative capacities in Africa

African academies...

... before 2001

... after 2001 (NASAC)

Thank you for your attention

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- President, African Academy of Sciences

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