

Harnessing the power of systems analysis – a regional perspective

Ursula Scharler

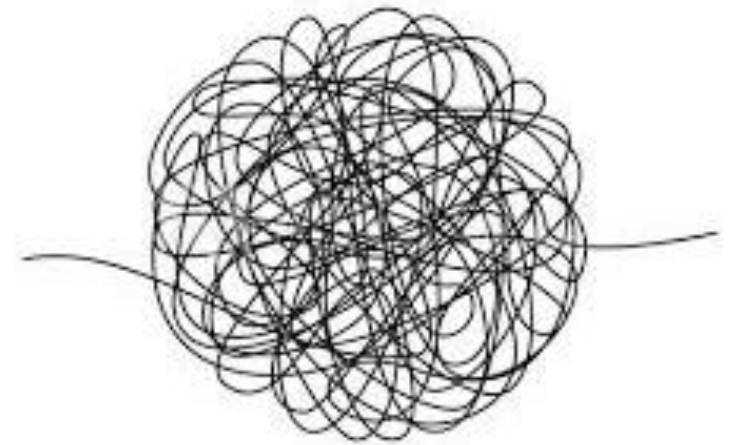
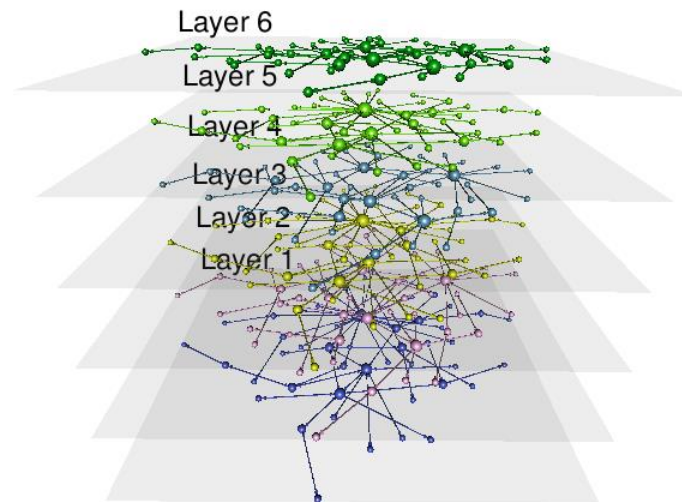
School of Life Science, University of KwaZulu-Natal

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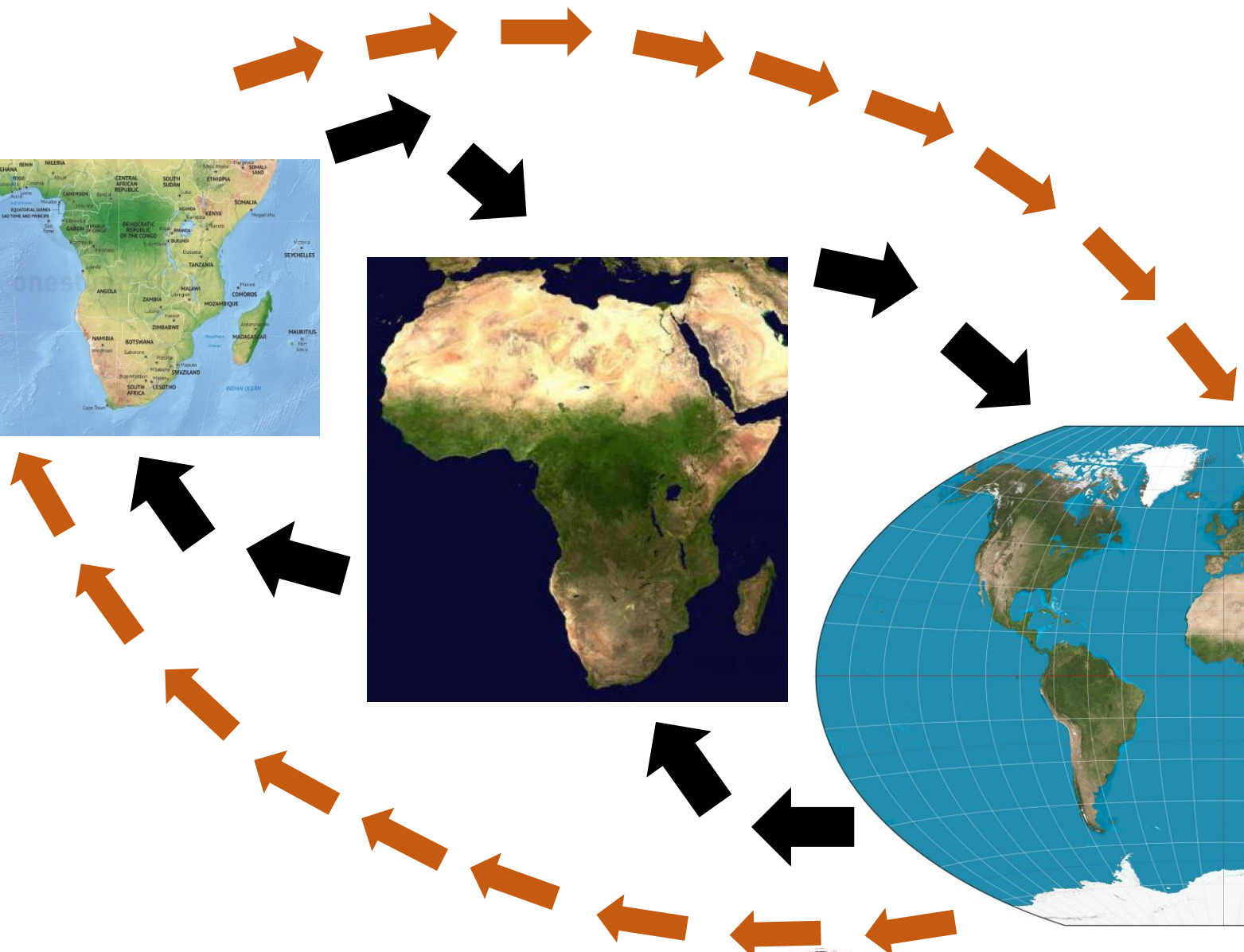
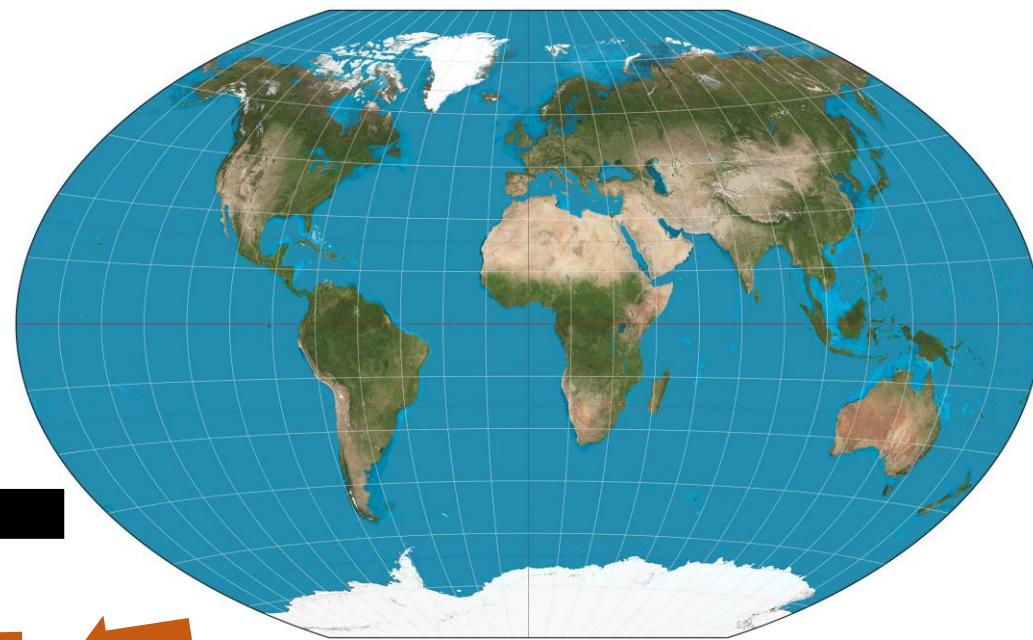


Systems Analysis

- Why is systems analysis so useful?
 - Consolidates the many challenges connected to development and at the same time assesses impacts.
 - Look into the future (scenarios)
 - What and who can be involved: everything and everyone



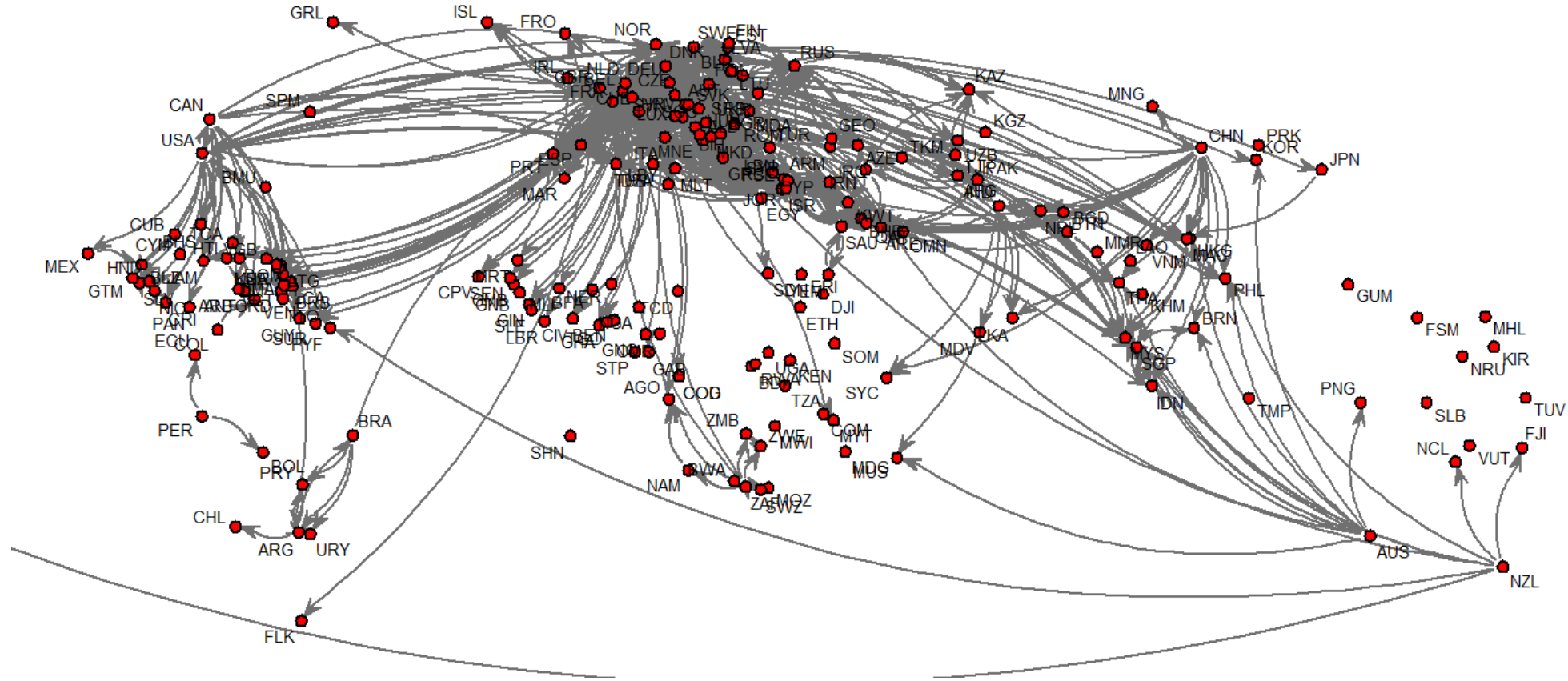
Regional perspective.....



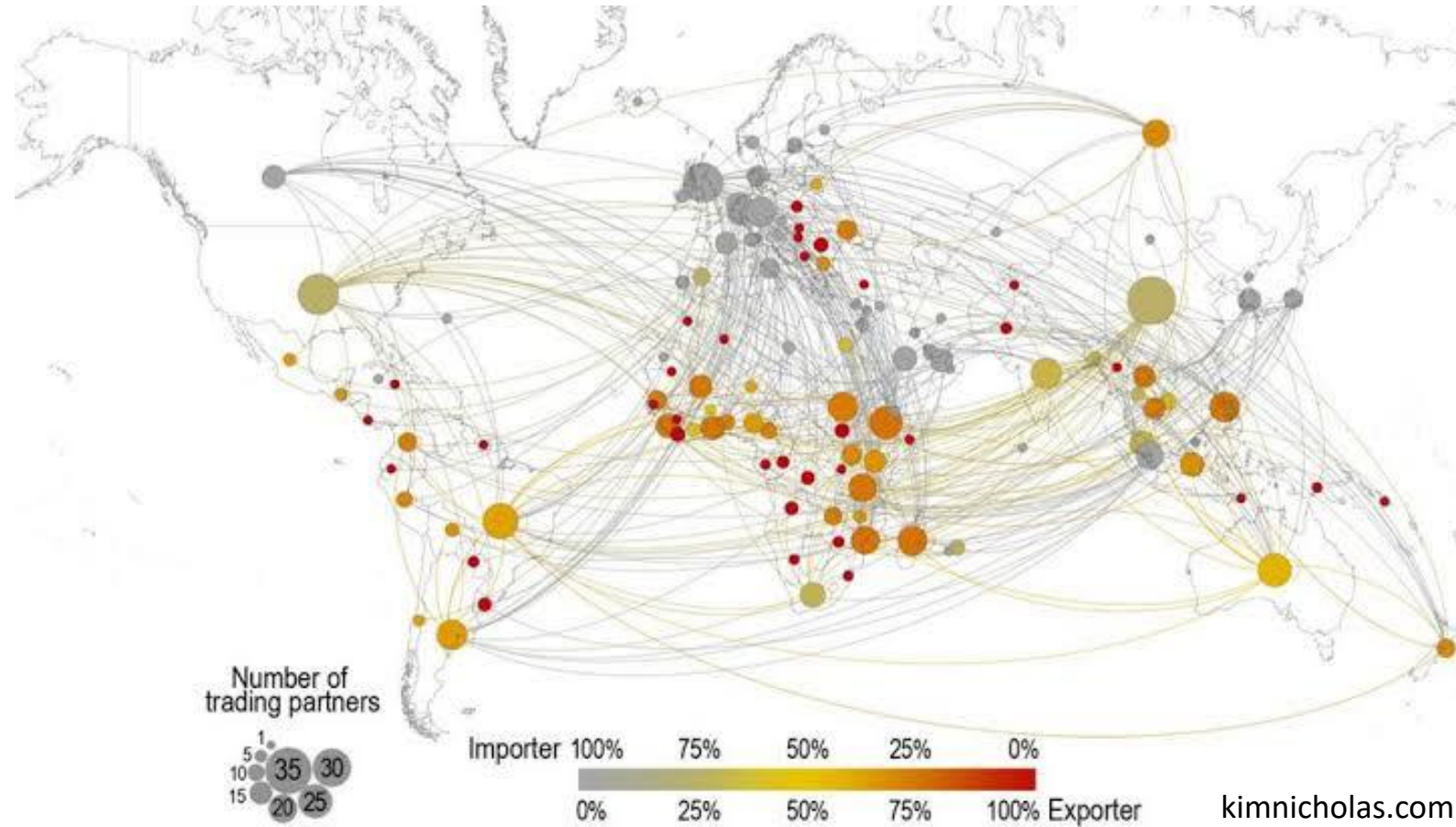
Globalisation:



World trade in fresh potatoes, flows over 0.1 m US\$ average 2005-2009

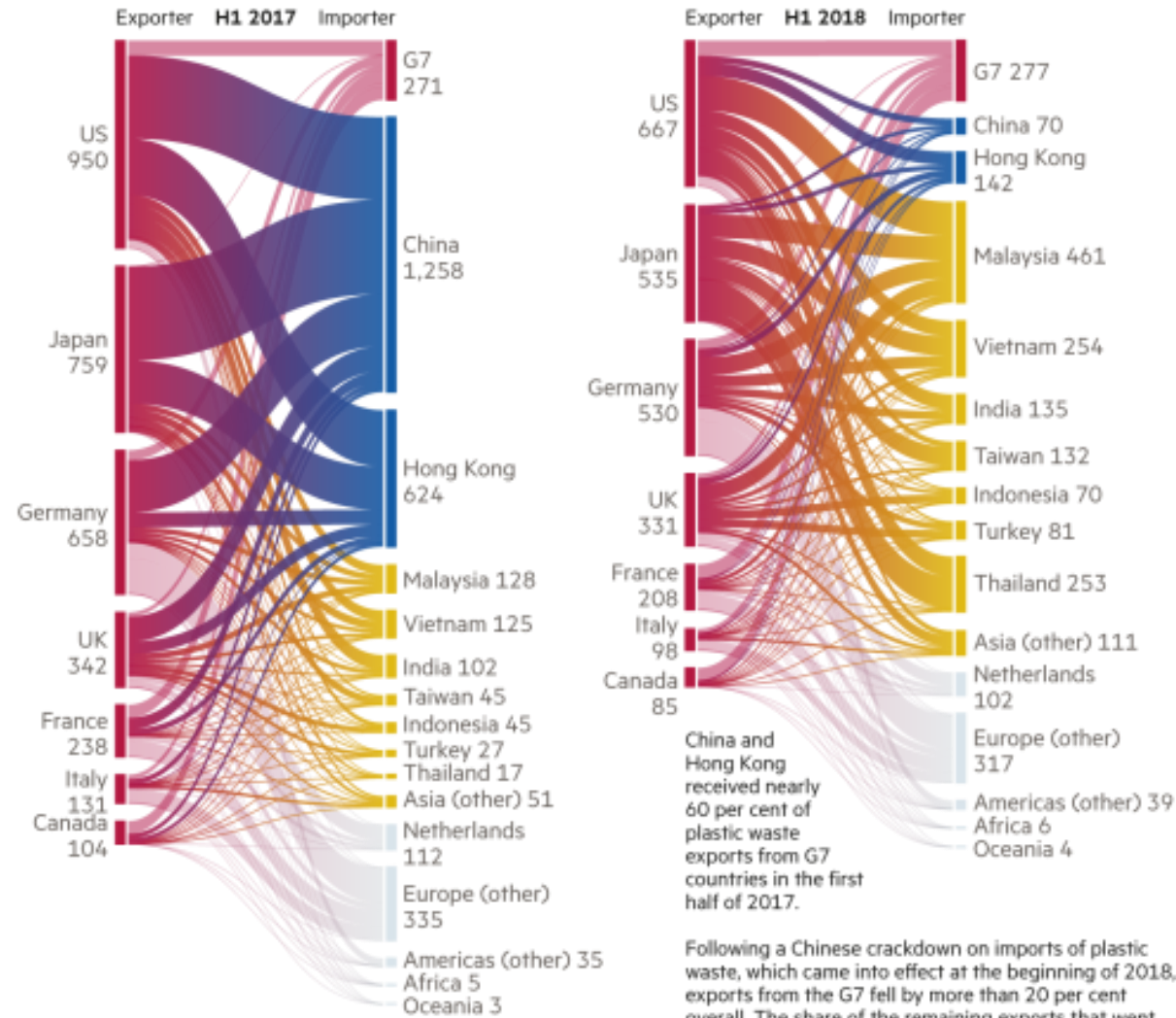


Globalisation:



How the global river of plastic waste changed course in just 12 months

Exports of plastic waste, parings and scrap from G7 countries ('000 tonnes)



Region groupings from UN Statistics Division M49 standard
 Data accessed Sep 19-Oct 1, 2018
 Sources: US Census Bureau; Japan e-Stat; Eurostat; Statistics Canada
 © FT

Visual journalism: David Blood, Liz Faunce, Andrew Rininsland



Staying in the region..... Systems Analysis Centres, e.g.

The Climate System Analysis Centres, but most important specialties, but most important apply to

Twice the global rate



Twice as fast as the globe? In one of the the Climate Strike event in front of SA parliament on Friday, a statement was broadcasted over the (unfortunately) moderately sized crowd that was warming twice as fast as the globe". That



Home **About Us** Research Evidence Synthesis Policy Briefs Publications Teaching

About Us

The Centre for Health Policy (CHP) is one of the few multi-disciplinary health policy units in South Africa. The primary focus of our research is to support the development of the South African health system. As an academic research group, CHP actively seeks to draw together theoretical insights and empirical evidence to inform policy change and in proposing strategies for future health systems development. We conduct both independent and commissioned research for the South African government and other South African organisations. We work with stakeholders to promote appropriate health policy analyses. CHP strives to advance the field of health policy research and international relationships.

Mission statement:

As an independent, multi-disciplinary research organisation, CHP seeks to contribute to excellence in health policy research and to be a critical participant in health policy processes. CHP aims to:

- Conduct research that advocates for and promotes policies in support of equity and social justice in health
- Support and engage with a variety of stakeholders to promote appropriate health policy analyses
- Provide learning opportunities which build and strengthen capacity in health policy/health economics research and analysis, and
- Advance the field of health policy by developing meaningful national and international partnerships.



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Resilient health systems deliver necessary services without placing financial burden on poor households



WITS School of Public Health

The Consortium for Health Policy and Systems Analysis in Africa (CHEPSAA)

Health Policy and Systems Teaching Resources



A website dedicated to supporting the teaching of health policy and systems research by discussing principles of curriculum development, highlighting good teaching practice and sharing teaching resources

This resource site is supported by:



The Consortium for Health Policy and Systems Analysis in Africa (CHEPSAA) is a network of seven African and four European universities working to strengthen the field of Health Policy and Systems Research and Analysis (HPSR+A) in Africa. Funded by the European Union from 2011 to early 2015, CHEPSAA focuses on the development of teaching materials, networking and developing the next generations of researchers, teachers and practitioners.

In the past two years CHEPSAA achieved the following, among other things:

- Designed and published new health policy and systems training curricula for use in Masters programmes or short courses. (The curricula will be used by all member organisations in their own courses and are freely available online as Open Educational Resources on the CHEPSAA website: <http://www.hpsa-africa.org/>.)
- Begun a collaborative endeavour to develop a professionally-oriented doctorate in public health in Africa.
- Created a social media presence to share events and resources for Health Policy and Systems Research (HPSR) in Africa: CHEPSAA@hpsa_africa.
- Implemented an Emerging Leaders programme aimed at supporting and strengthening the capacity of young researchers, educators or practitioners.



Staying in the region..... Systems Analysis Centres, e.g.



Prof. Mary Scholes
Research Chair, Systems Analysis

tion Programm
entre (SASAC)



News



Home Page / Southern African Young Scientists Summer Program (SA-YSSP) Home

UFS hosts the 3rd Southern African Young Scientists Summer Program

The Southern African Young Scientists Summer Program (SA-YSSP) is a 3-month program designed to develop capacity in systems analysis and expose scholars to an array of additional competencies and skills required to be successful in knowledge-driven societies. It is jointly organized by the University of the Free State (UFS), the South African National Research Foundation (NRF), the Department of Science and Technology (DST) and the International Institute for Applied Systems Analysis (IIASA). As UFS welcomed participants of the third SA-YSSP, two exciting announcements were made at the opening ceremony held on 3 November 2014. Firstly, the Deputy-Minister of Science and Technology, Mrs Zanele Magwaza-Msibi, announced that the DST will fund a second 3-year cycle of the summer program. Secondly, Mr Nathaniel Tindall, Ms Delin Fang and Ms Seuneu Tchamga from the class of 2013 were announced as recipients of the first IIASA-NRF systems analysis scholarship which affords them the opportunity to spend up to 6 months at IIASA to continue their research. The three top participants of the class of 2014 will also receive the same opportunity following an internal and external review of the papers resulting from their SA-YSSP research project.



The young scientists presented their preliminary findings at the mid-program workshop which was held on 10-11 December 2014 and streamed live to audiences around the globe. They will depart shortly for a week-long capacity development seminar on translating research to policy and practice, hosted by the African Doctoral Academy at Stellenbosch University. The week will culminate in a policy colloquium with presentations by inter alia Dr Phil Mjwara, Director-General, Department of Science and Technology; Prof Daya Reddy, President of the Academy of Science of South Africa and Dr Vuy Mahlati of the National Planning Commission.

At the conclusion of the 3-month summer program, the young scientists will present their findings in a colloquium scheduled for 29-30 January 2015 in the CR Swart Auditorium on the Bloemfontein campus of the UFS. The presentations will also be streamed live via <http://livestream.ufs.ac.za/> and questions or comments to the speakers can be relayed in real time on twitter using the hashtag #SAYSSP. On 30 January, the program will commence with a lecture entitled **World population trends and adaptive capacity to climate change** presented by Prof Wolfgang Lutz, Director: World Population Program, IIASA, Laxenburg, Austria and Founding Director of the

Wittgenstein Centre for Demography and Global Human Capital in Vienna, Austria.

The SA-YSSP is a strategic partnership between the DST, NRF, IIASA and UFS which allows for an interdisciplinary approach to problem-solving and solution-finding in the areas of energy security, climate change, food and water security and poverty alleviation and equity, all of which are aligned with the research priorities outlined in the DST's *Ten-Year Innovation Plan*. Visit www.ufs.ac.za/sa-yssp or www.iiasa.ac.at/sa-yssp for additional information on the SA-YSSP.



Please use this identifier to cite or link to this item: <http://hdl.handle.net/10321/2493>

Title: Systems analysis of the transformation of South African cities

Authors: [Simelane, Thokozani Silas](#) 

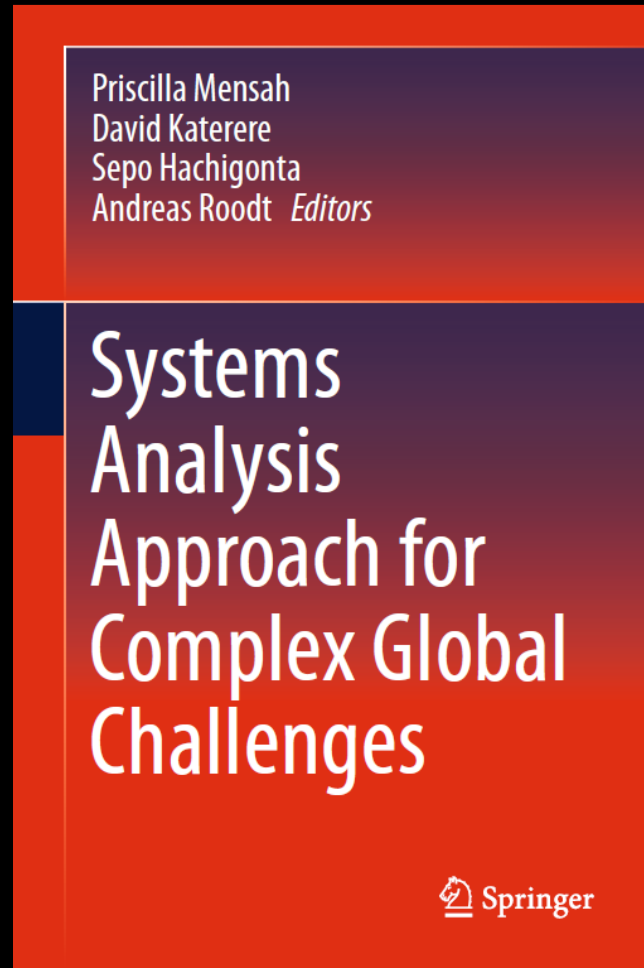
Keywords: System analysis;Mathematical modelling;System dynamics;City transformation;City heterogeneity

Issue Date: 2017

Abstract: The need to quantify and model transformations that have taken place in the cities of South Africa is one of the grand challenges linked to country's transition to Democracy. Given the complexities associated with different stages of city transformation, it is imperative that models used to unpack processes of city transformation are novel. In this study it emerged that statistical methods alone are not adequate to fully present, in a comprehensible way, all facets of drivers of city transformation. As a result, statistical methods have been combined with mathematical and system dynamics models. Results revealed that city transformations derive from a number of triggers. Underlining these are income, migration and houses. The empirical data collected through questionnaire survey that was later incorporated into mathematical models demonstrated that income is a primary driver that fuels city migration. System Dynamic Models



SA-YSSP projects 2012-2015



SASAC projects of cohorts starting 2016-2018

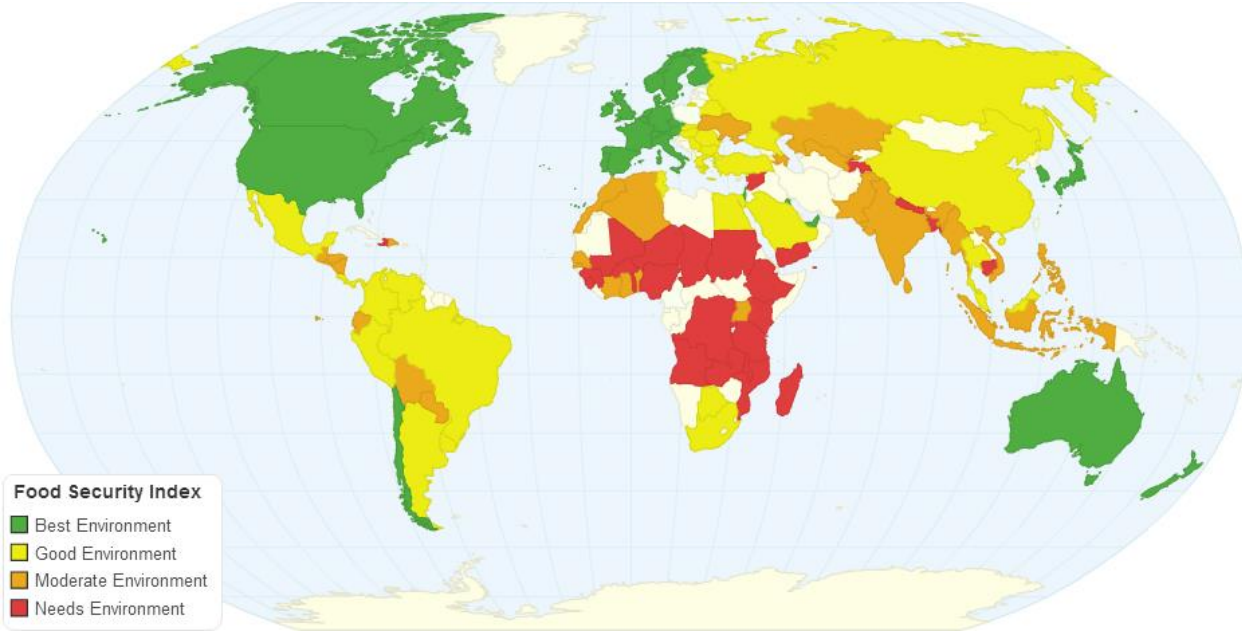
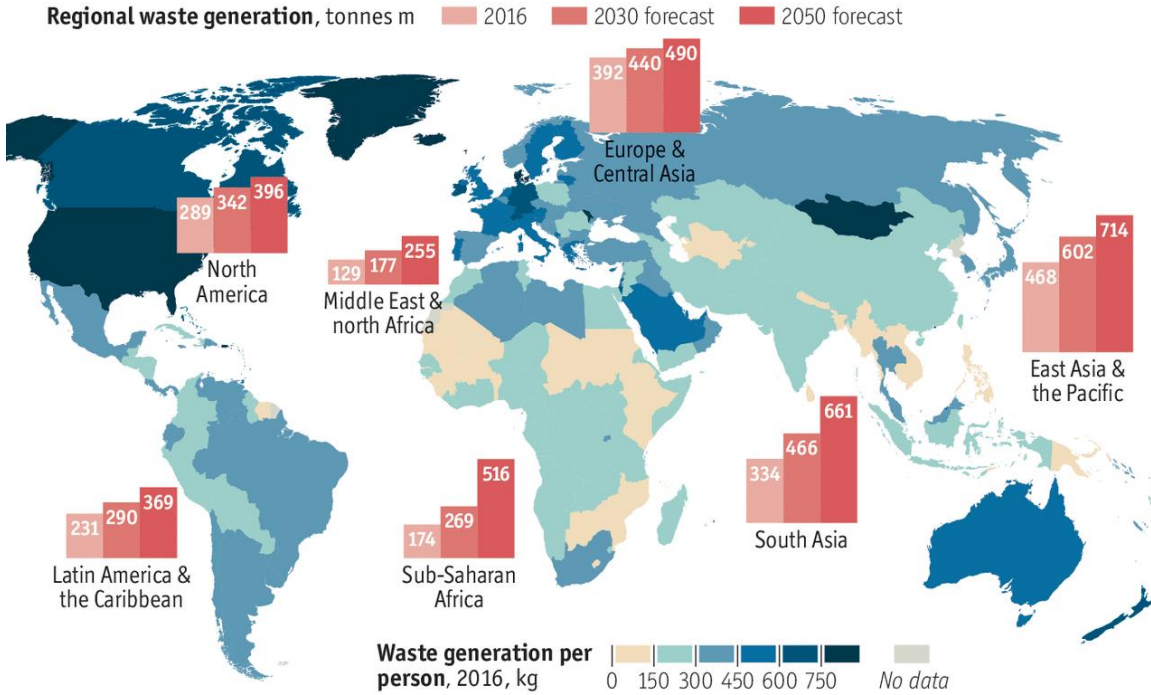


SASAC projects are directly related to SDGs



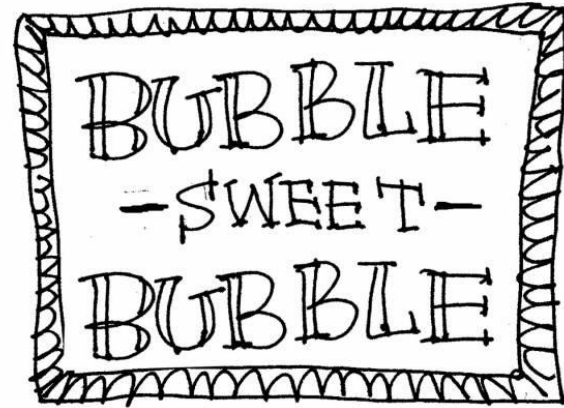
Future challenges in 'the region'.... Solutions for 'the region'....

Many challenges, few solutions



Source: World Bank
The Economist

Negotiating humans and the systems they work in:



Politicians

Big cooperations

People with means

Other people in power

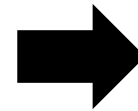
Scientist

.....

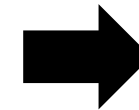
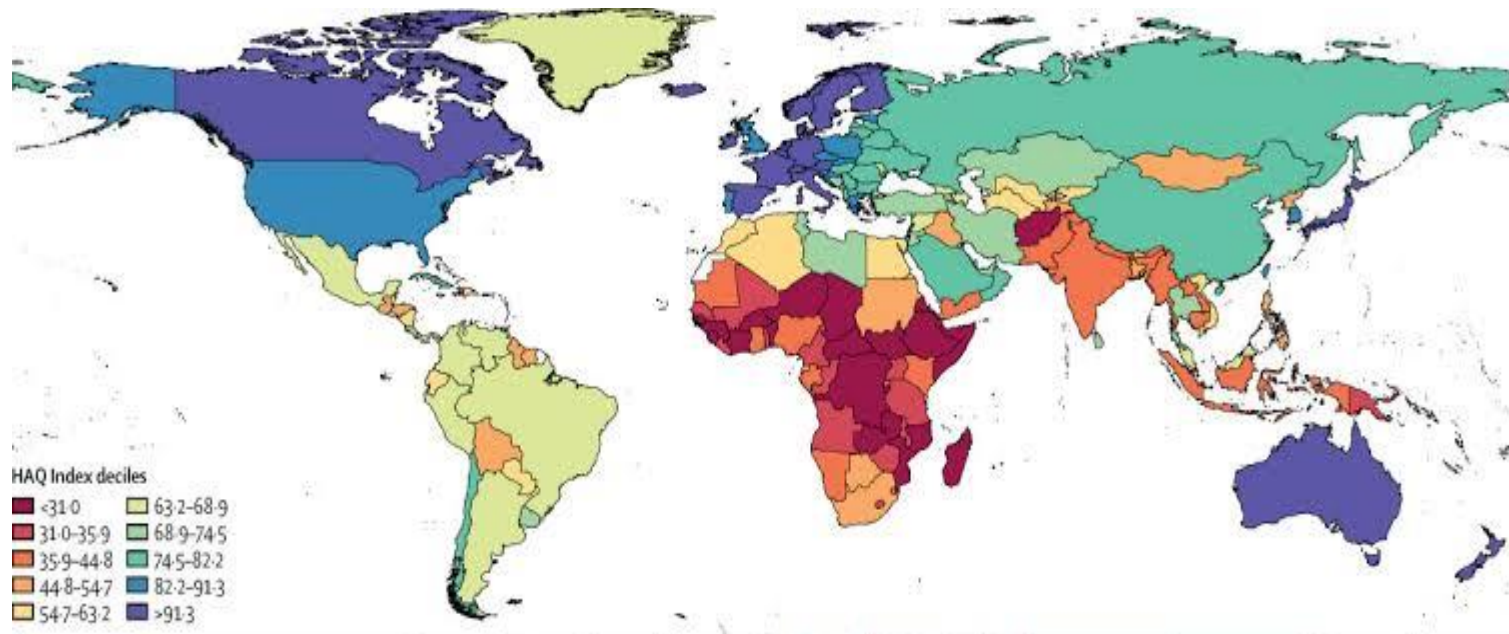


Systems analysis is important to *generate new systems* that are better applicable to certain situations (e.g. where traditional infrastructure is absent), and to *optimise* for social, economic and environmental benefits in a comprehensive manner.

New systems: banking, health care, communication, information, etc.,
Breaking away from tradition.



New systems: banking, health care, communication, information, etc.



Communication systems: agriculture, smallholder farms/commercial farms



Crop diseases
Fertiliser application



Communication systems: knowledge production and utilisation

ABALOBI – A RANGE OF INTEGRATED MOBILE PHONE APPLICATIONS FOR SOUTH AFRICAN SMALL-SCALE FISHERS



ABALOBI FISHER

The foundation of the app suite where fishers co-produce knowledge
Personal logbook with sharing options
Safety-at-sea integrations



ABALOBI MONITOR

Digitized community catch monitoring at the landing site and along the shoreline



ABALOBI MANAGER

Real-time fishery data and communications for co-management



ABALOBI CO-OP

Co-operative member and fleet management
Transparent collective accounting
Catch value-adding



ABALOBI MARKETPLACE

Fish with an ecological and social "story"
Towards community-supported fisheries
Empowerment in the value chain



Planning in terms of systems: sustainability

FIGURE 39
EXAMPLES OF PROJECTED IMPACTS AND VULNERABILITIES ASSOCIATED WITH CLIMATE CHANGE IN OCEAN SUBREGIONS (TOP), WITH EXAMPLES OF RISKS TO FISHERIES FROM OBSERVED AND PROJECTED IMPACTS (BOTTOM)

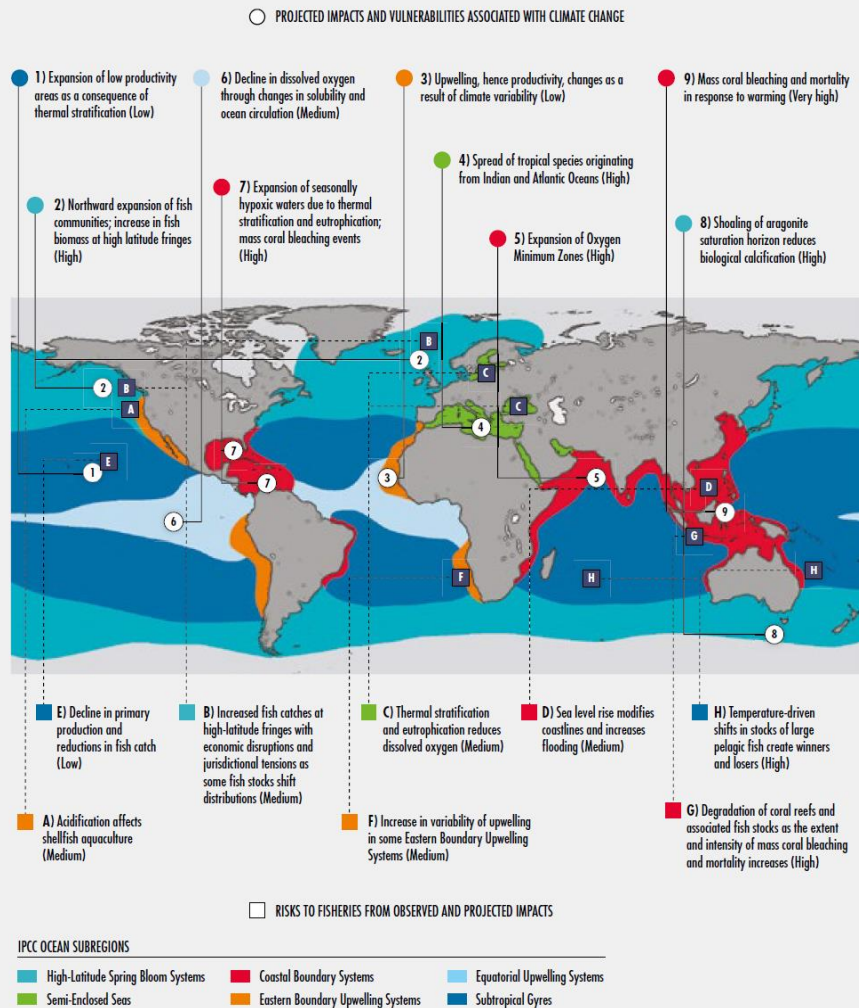
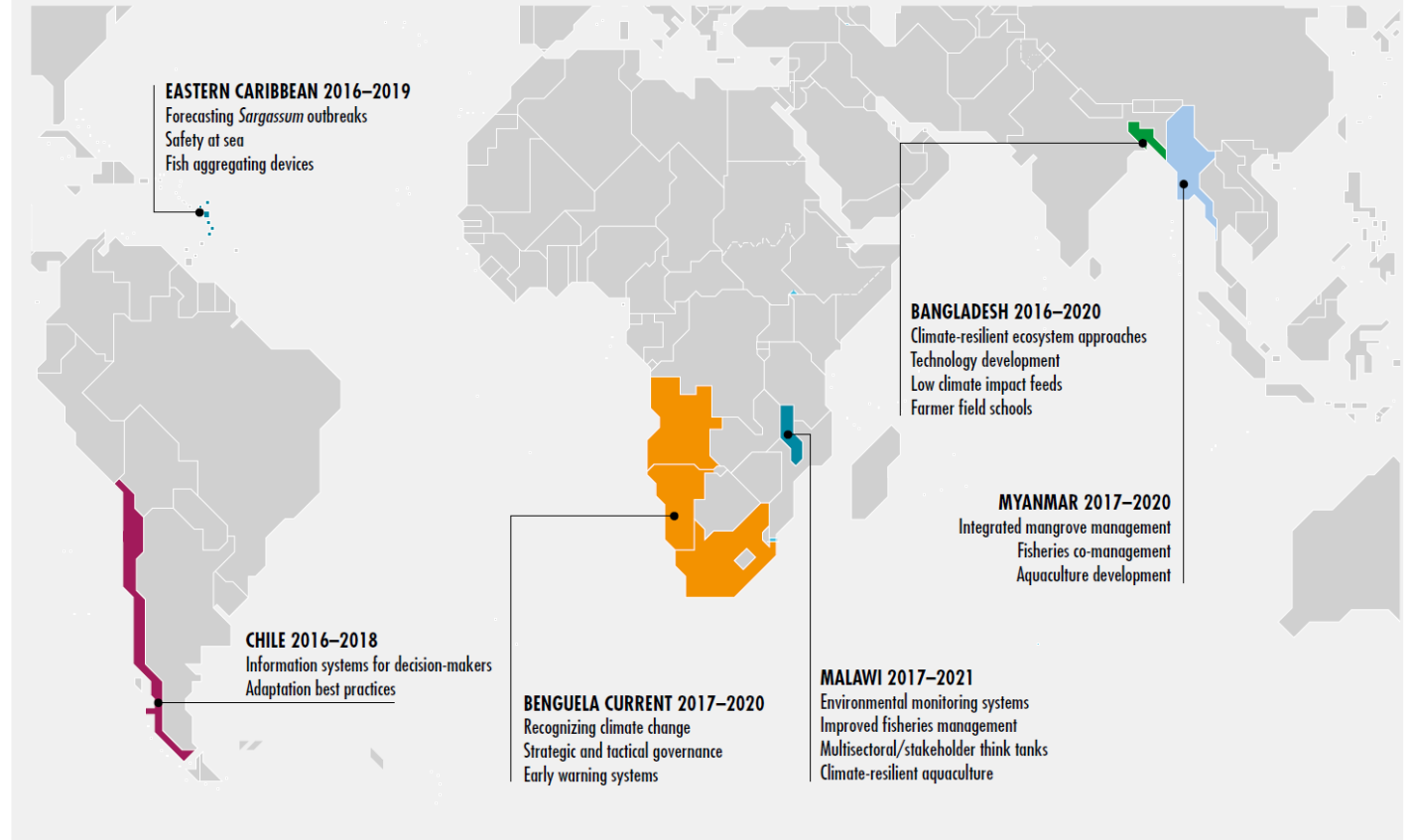


FIGURE 41
FAO CLIMATE CHANGE ADAPTATION PROJECTS



Planning in systems: sustainability

FIGURE 39
 EXAMPLES OF PROJECTED IMPACTS AND VULNERABILITIES ASSOCIATED WITH CLIMATE CHANGE IN OCEAN SUBREGIONS (TOP), WITH EXAMPLES OF RISKS TO FISHERIES FROM OBSERVED AND PROJECTED IMPACTS (BOTTOM)

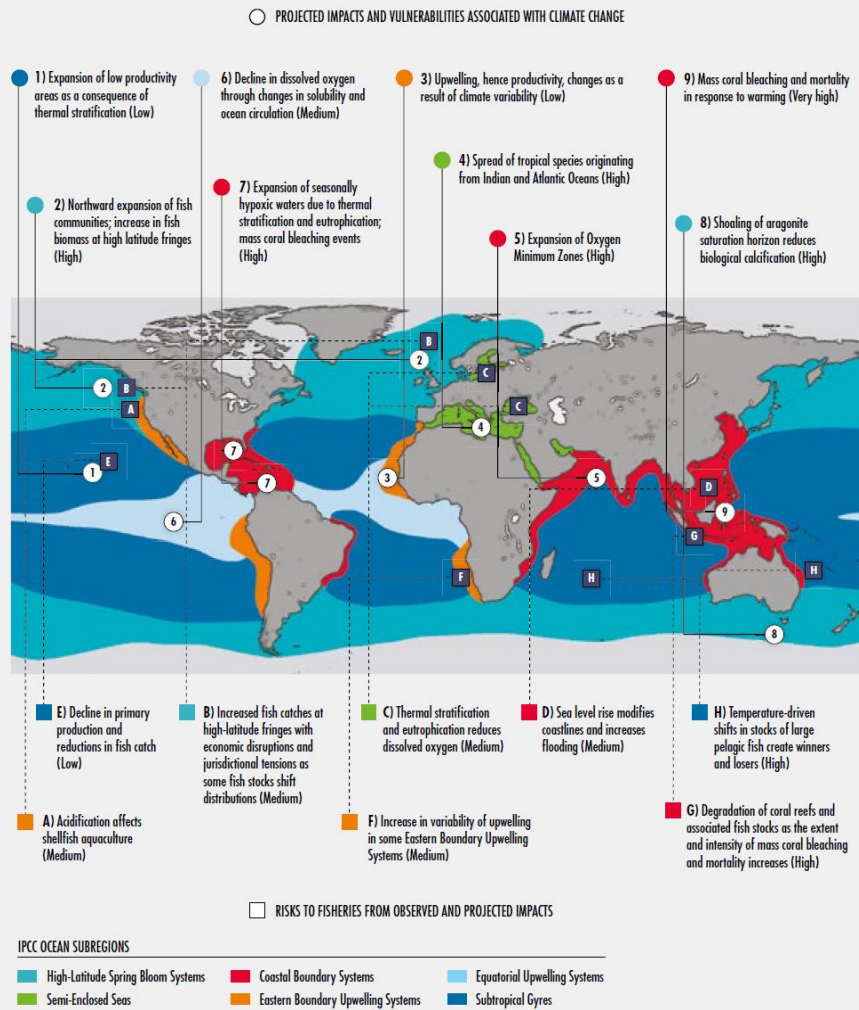
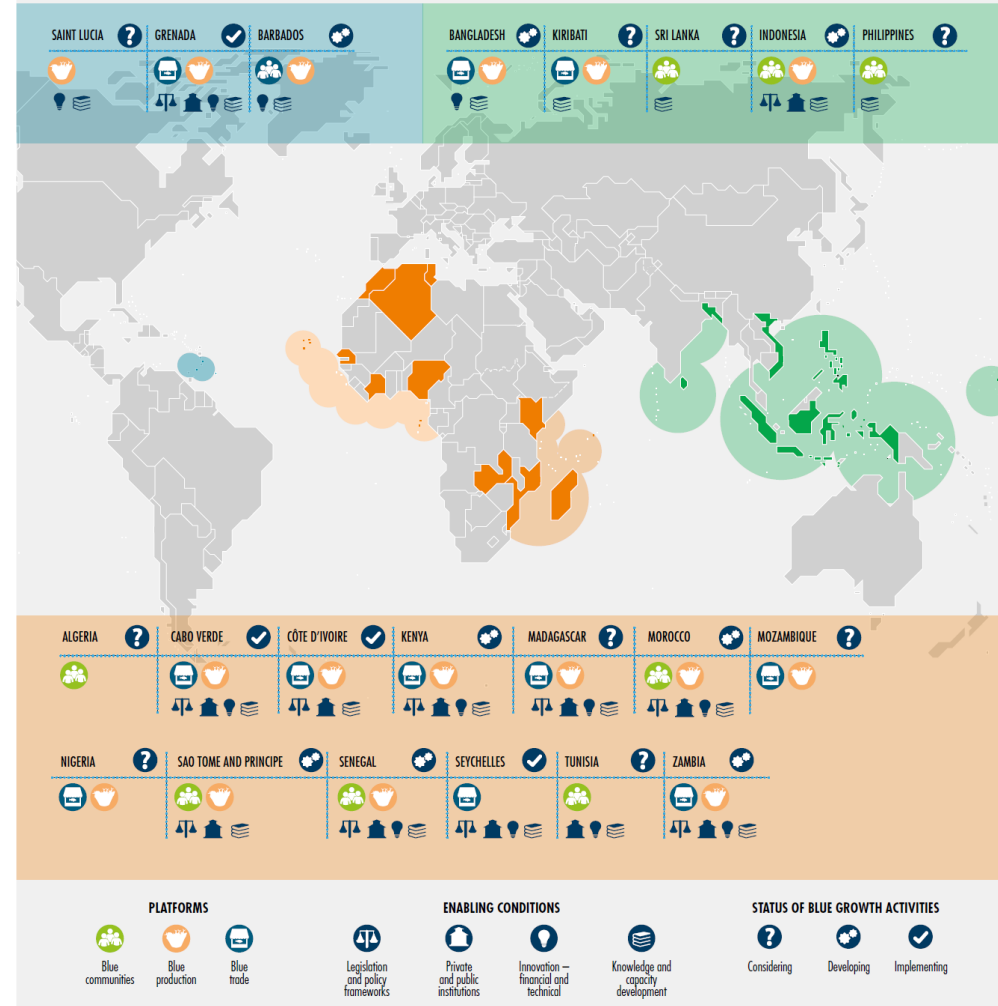


FIGURE 46
 GLOBAL DISTRIBUTION OF BLUE GROWTH INITIATIVE PROJECTS



Present and future solutions:

Many dilemmas appear increasingly common to a wide range of countries, such as that of trying to find a balance between **local and international engagement in research**, or between **basic and applied science**, the generation of **new knowledge and marketable knowledge**, or **public good science versus science to drive commerce**.

Quote from: Luc Soete, Susan Schneegans, Deniz Eröcal, Baskaran Angathevar and Rajah Rasiah

In: UNESCO SCIENCE REPORT Towards 2030

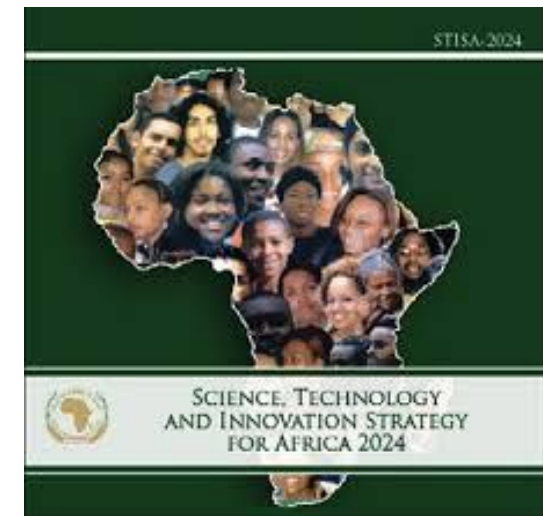


Many efforts to operationalise the continent/regions as a system, e.g.:

Tripartite Programme on **Climate Change Adaptation and Mitigation**, or The African Solution to Address Climate Change (COMESA, EAC, SADC).

Gaborone Declaration for Sustainability in Africa

Regional policy frameworks, a continental strategy
the *Science, Technology and Innovation Strategy for Africa (STISA–2024)*



What's keeping us from progressing faster to....?
Resources? Governance? Scientific know-how?

Good governance is essential, e.g.:
High correlation between scientific productivity and effective governance
(UNESCO, Global Observatory of STI Policy Instruments).

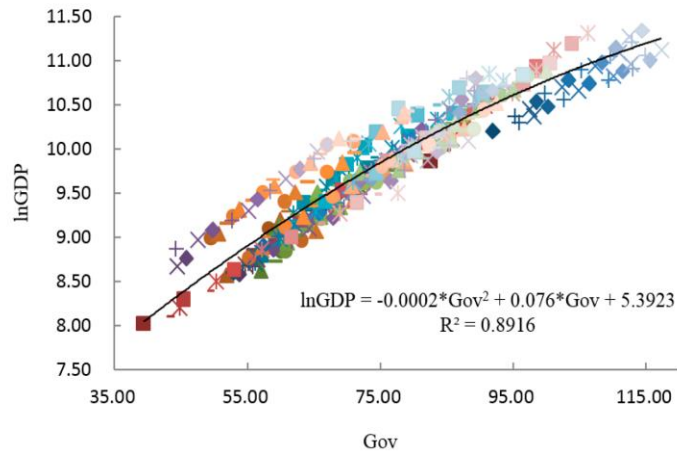


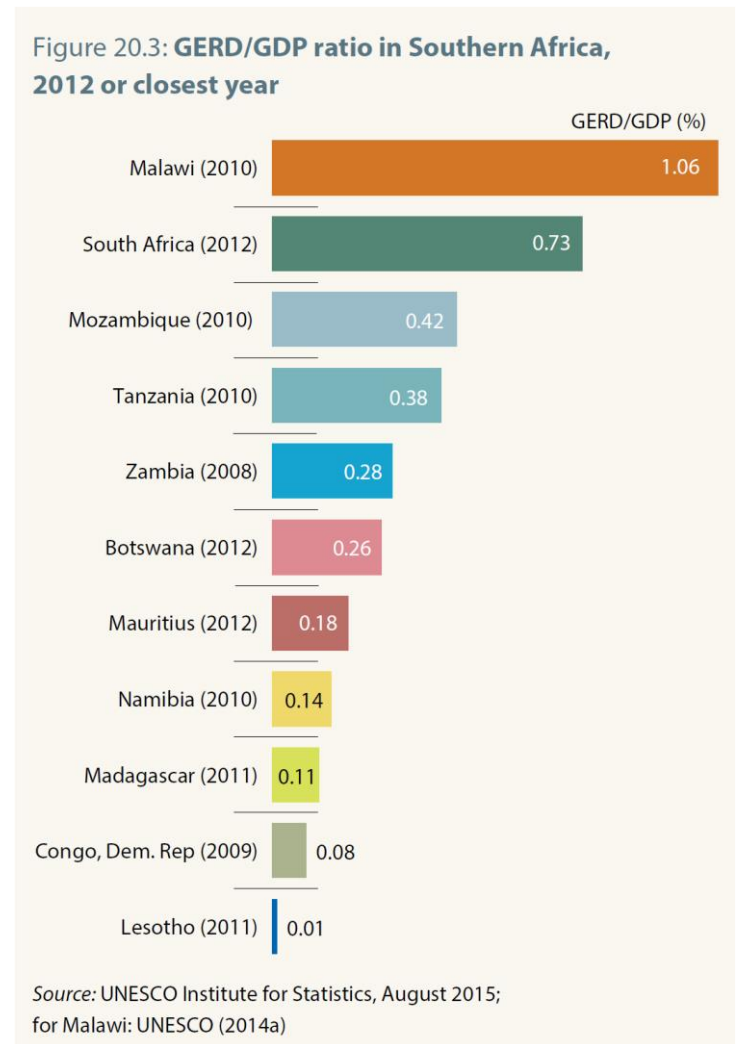
Figure 2. Scatter description of relationship between governance quality and per capita gross domestic product (GDP) (Note: As shown in Table 2, lnGDP is the natural log of real GDP per capita, Gov is the comprehensive index of provincial governance quality. All data are obtained from authors' calculations.) Liu et al., 2018

What's keeping us from progressing faster to....? Resources? Governance? Scientific know-how?

Disparities in resources for research and development (R&D) across the region.

GERD/GDP ratio ranges from a low of 0.01% in Lesotho to a high of 1.06% in Malawi.

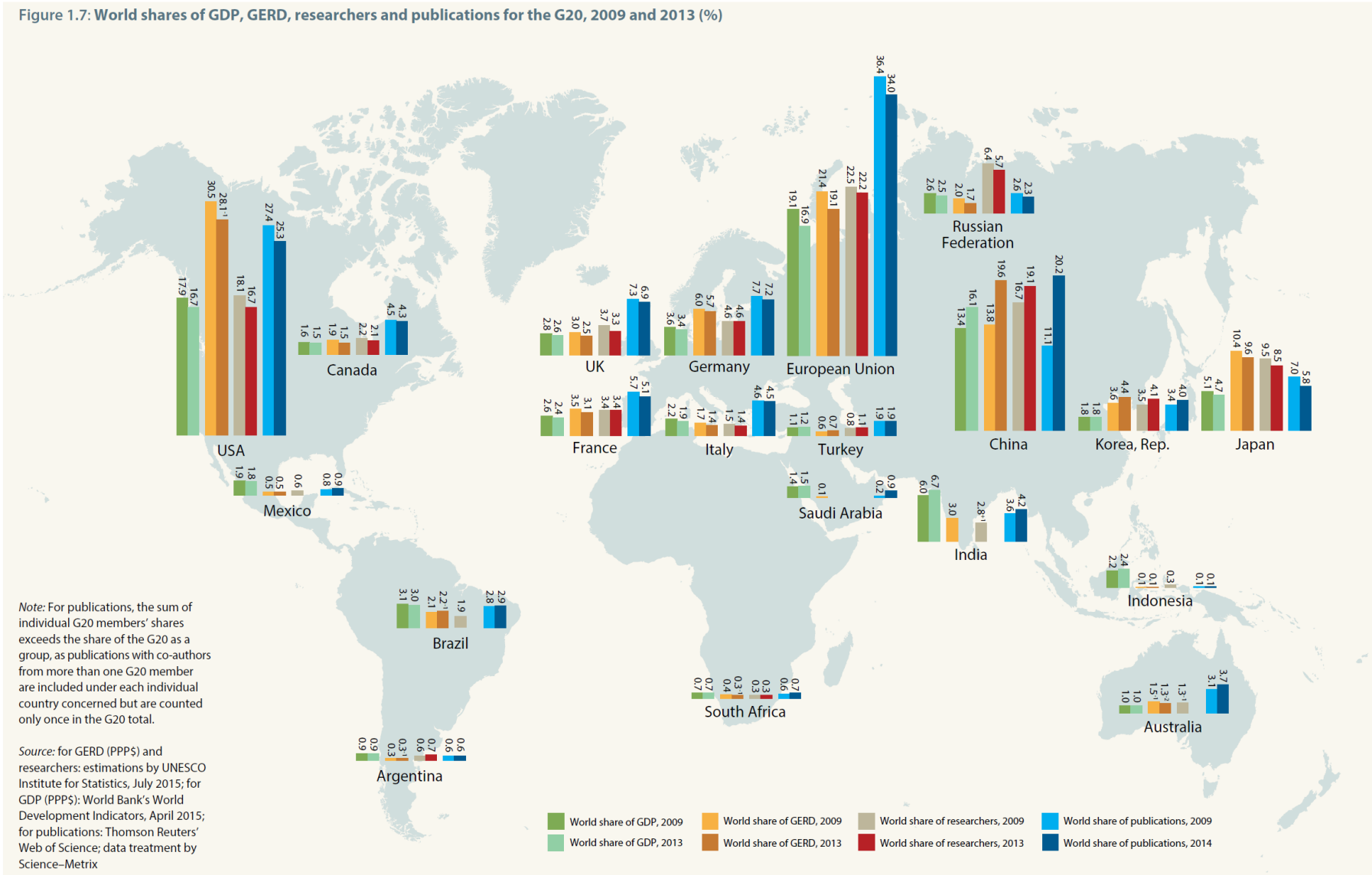
South Africa filed 96% of SADC patents between 2008 and 2013.



What's keeping us from progressing faster to....?

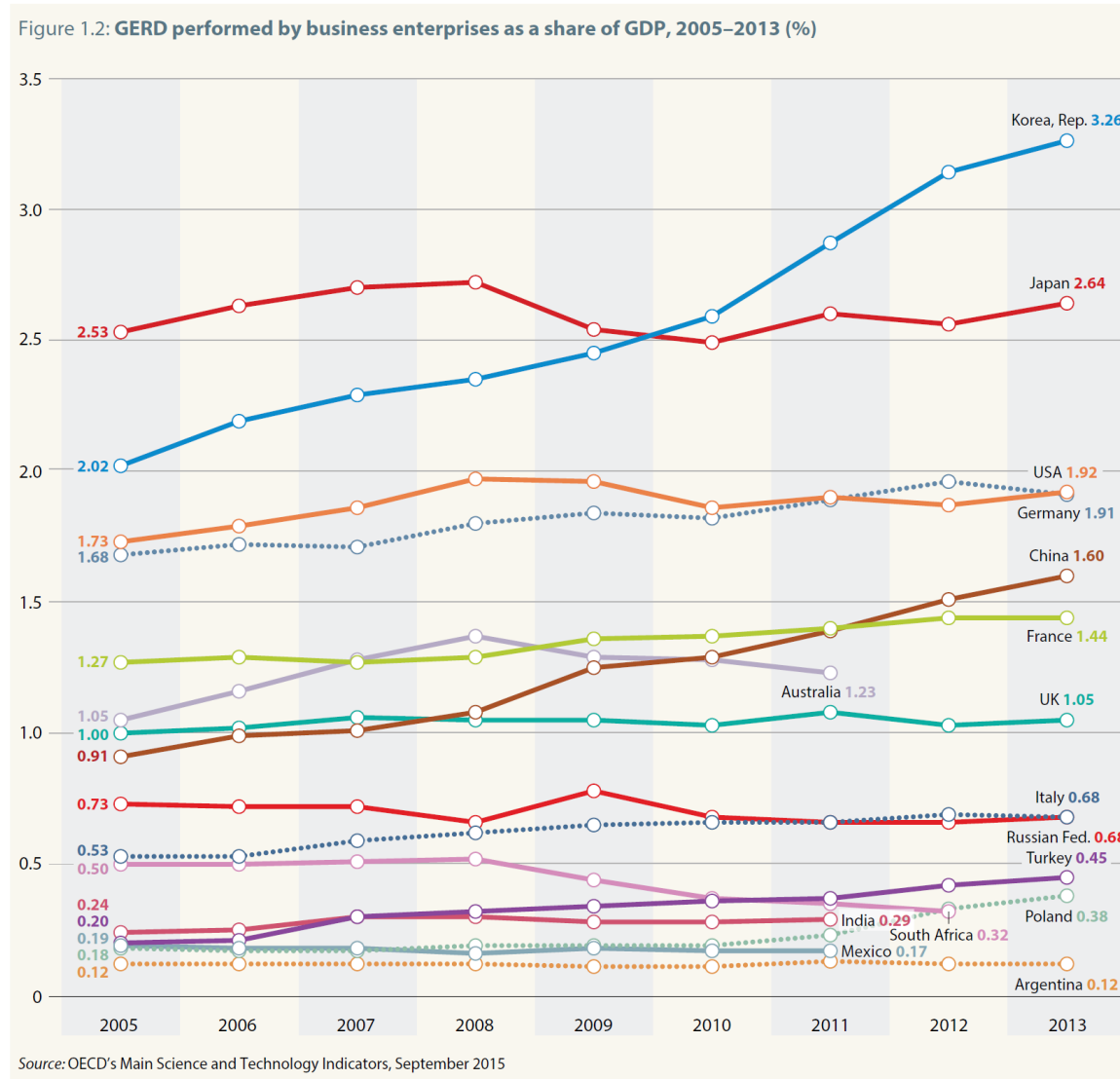
Resources? Governance? Scientific know-how?

Figure 1.7: World shares of GDP, GERD, researchers and publications for the G20, 2009 and 2013 (%)



What's keeping us from progressing faster to....? Resources? Governance? Scientific know-how?

South Africa exceptional in the region for the fairly equal division between the government (45%) and business enterprise (38%) sectors in terms of R&D funding.



Rep. Korea: 3.26

Germany: 1.91

South Africa: 0.32



What's keeping us from progressing faster to....? Resources? Governance? Scientific know-how?

South Africa is a powerhouse of the region:

A main investor in the region.

Its outward flows of Foreign Direct Investment (FDI) rose to US\$ 5.6 billion, powered by investment in telecommunications, mining and retail in mostly neighbouring countries.

In 2012, South Africa invested in more new FDI projects in Africa than any other country in the world

Table 20.5: **Status of national innovation systems in the SADC region**

Category	
Fragile	Democratic Republic of Congo, Lesotho, Madagascar, Swaziland, Zimbabwe
Viable	Angola, Malawi, Mozambique, Namibia, Seychelles, Tanzania, Zambia
Evolving	Botswana, Mauritius, South Africa

Note: National innovation systems can be analysed and categorized in terms of their potential to survive, grow and evolve. The assessment of viability thresholds is a complex exercise beyond the scope of the present chapter. The authors nevertheless propose the present set of three categories for a preliminary classification of national innovation systems in the SADC region. **Fragile systems** tend to be characterized by political instability, whether from external threats or internal political schisms. **Viable systems** encompass thriving systems but also faltering ones, albeit in a context of political stability. In **evolving systems**, countries are mutating through the effects of policy and their mutation may also affect the emerging regional system of innovation.



What's keeping us from progressing faster to....?

Human Development Index (HDI)

DIMENSIONS

Long and healthy life

Knowledge

A decent standard of living

INDICATORS

Life expectancy at birth

Expected years of schooling

Mean years of schooling

GNI per capita (PPP \$)

DIMENSION INDEX

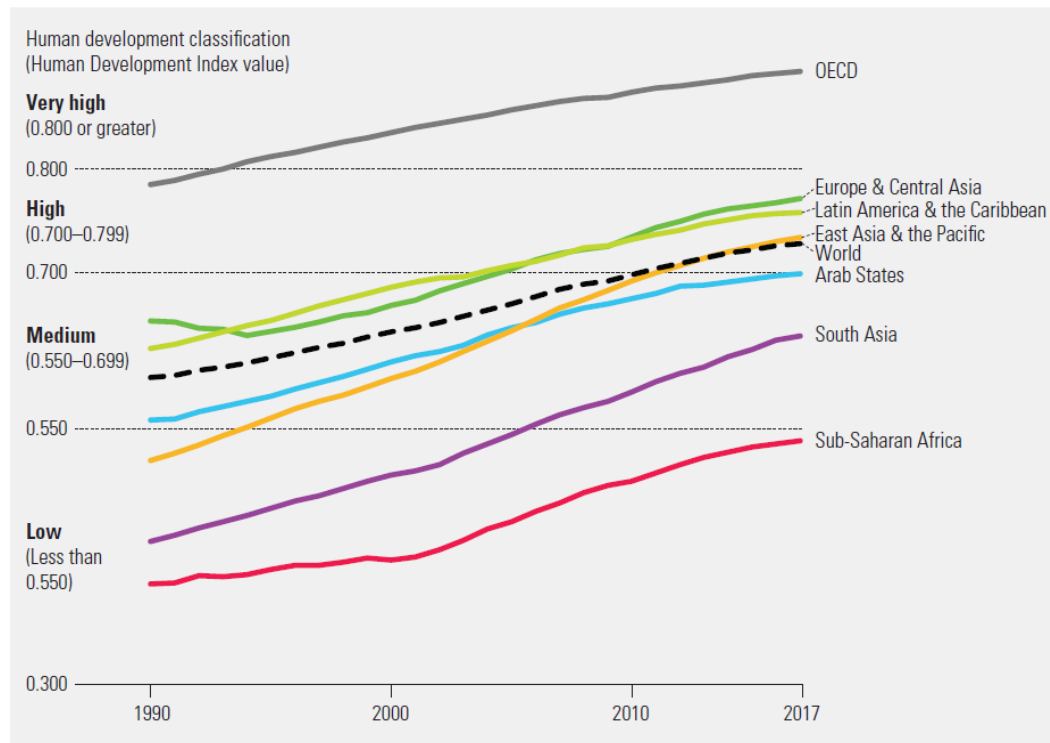
Life expectancy index

Education index

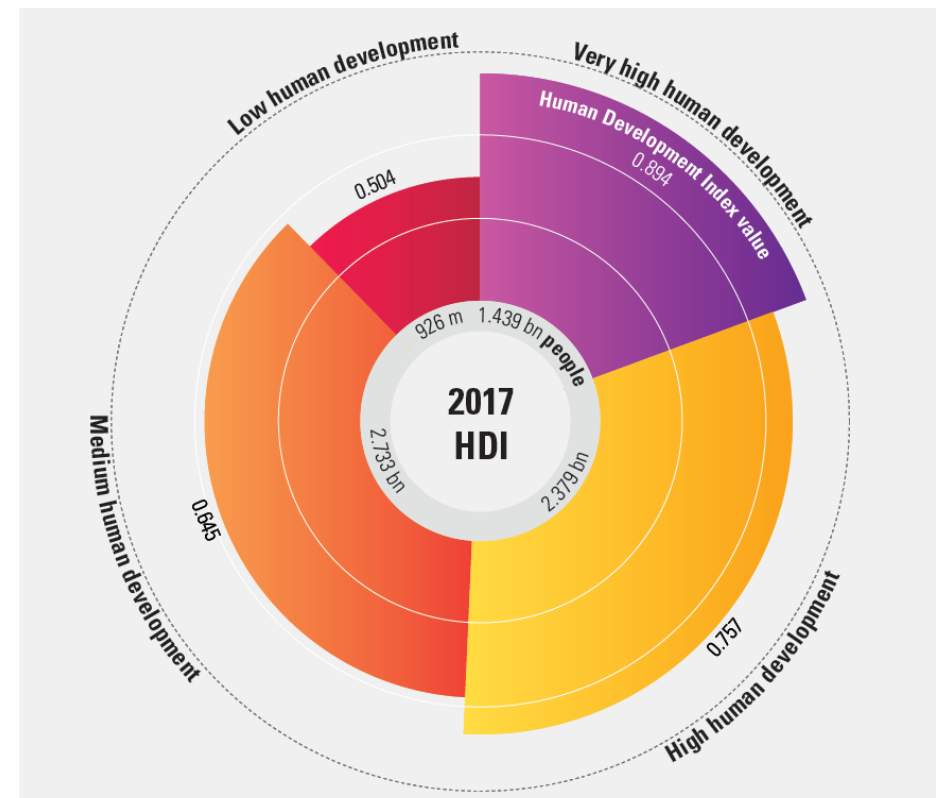
GNI index

Human Development Index (HDI)

Human Development Index values, by country grouping, 1990–2017

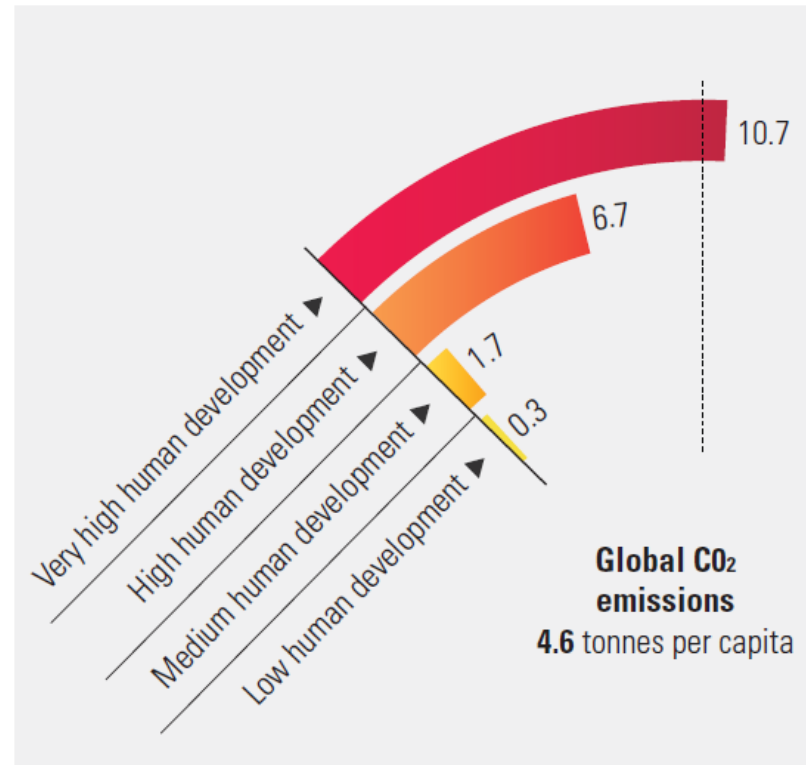


Source: Human Development Report Office.



The question remains: **How** to reach goals?

Carbon dioxide emissions per capita, by human development group, 2014 (tonnes)



Source: Human Development Report Office.



What is the connection to systems analysis?

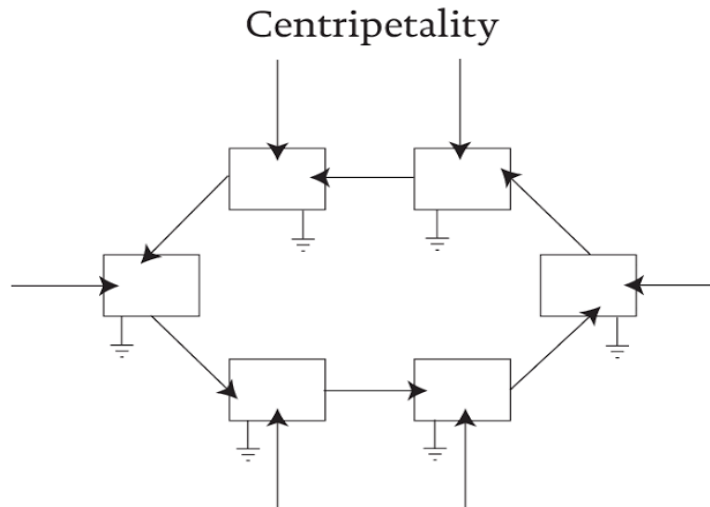
Analyse and model at the system level

→ Evaluate system behaviour and development

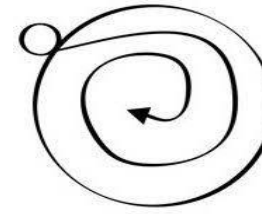
Lessons from ecosystems: adaptive, resilient, sustainable and persist over time

Ecosystems:

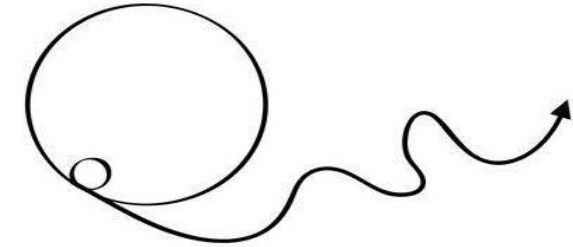
Autocatalytic loops (self reinforcing) accumulate more energy (Ulanowicz, 1986).



Economic and political power:



Localism: a centripetal force



Globalisation: a centrifugal movement

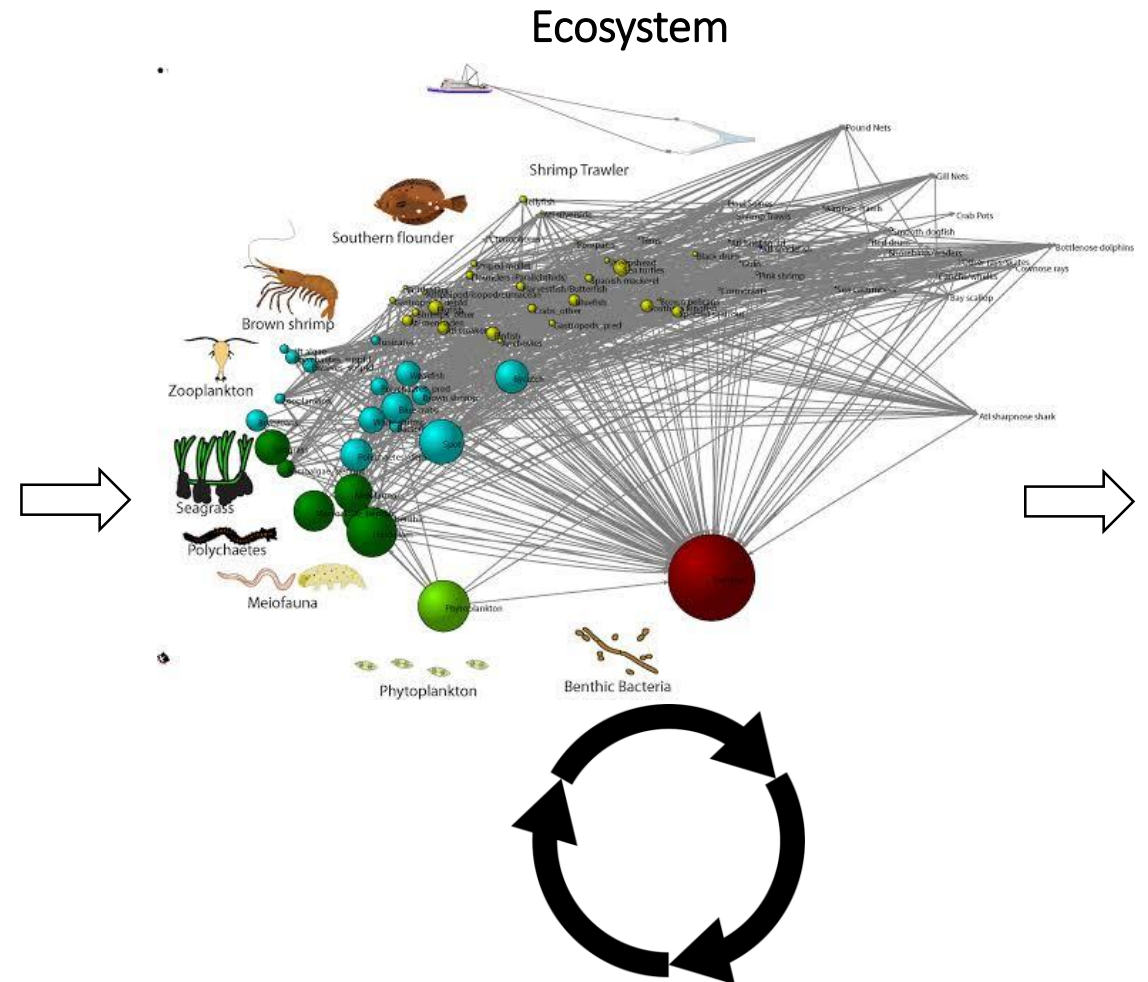
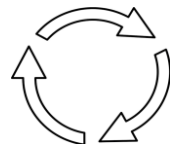


**Centripetal Movements
involve the migration of
people into towns and cities**



Connections to systems analysis – Lessons from ecosystems

Resilience and sustainability:
Dependence on system boundary imports and exports



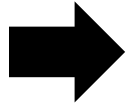
Connections to systems analysis – Lessons from ecosystems

Resilience and sustainability:

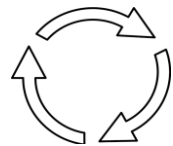
Dependence on system boundary imports and exports

Agricultural system

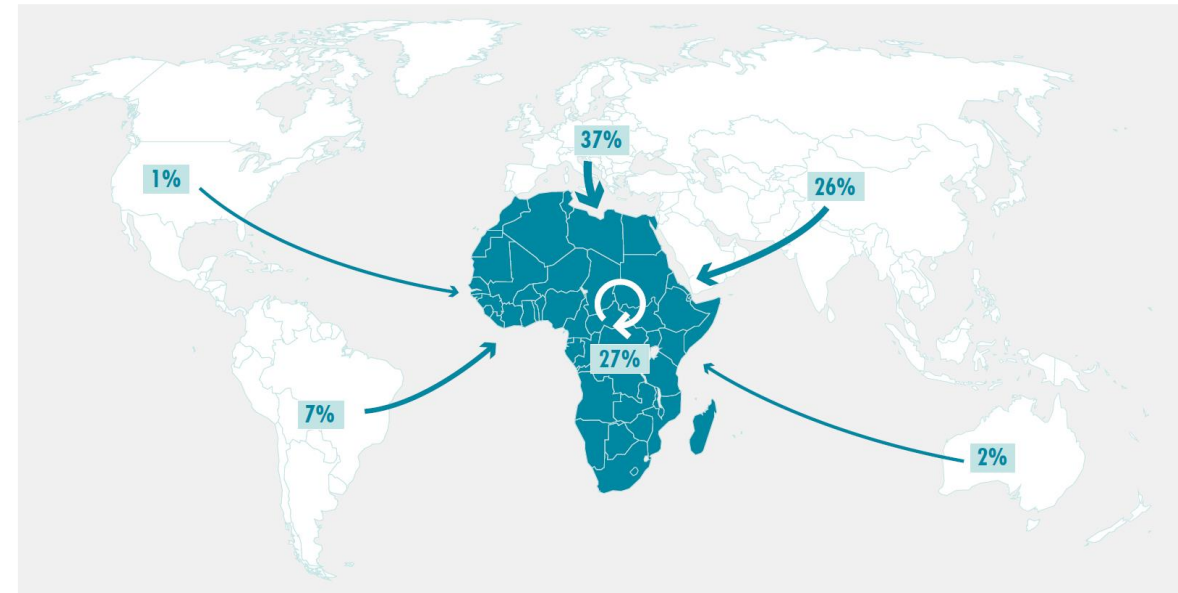
Fertiliser, etc



Crop biomass



Fish protein



Each step towards an ecosystem-like configuration is a step towards sustainability of that particular system. The southern African region features low centripetality (economic, social) low cycling of resources.

Growth will require an impetus (outside funding), whereas each step towards cycling of resources can generate more growth (and thus wealth etc.) in the region.



Outlook and future efforts:

We deal with:

- Current economic framework
- Rising inequality
- Instability
- Environmental degradation
- Population growth/increased living standard
- Resource use of old and emerging economies

We should focus on:

- New economic framework (local, regional)
- Society-environment feedbacks
- Better resource use
- Communication of information
- Governance frameworks
- Diverse approach
- Upsetting existing frameworks



Outlook and future efforts:

