

CHALLENGES AND OPPORTUNITIES TO ADVANCE HYDROLOGY IN SOUTH AFRICA

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THE STATE OF HYDROLOGY (RESEARCH) IN SOUTH AFRICA:
TOWARDS A 10-YEAR SCIENCE PLAN

31 MARCH 2014



Water Cycle



IAHS - PREDICTION IN UNGAUGED BASINS (PUB)

Shift prediction from calibration-based to new, and largely understanding-based methods.

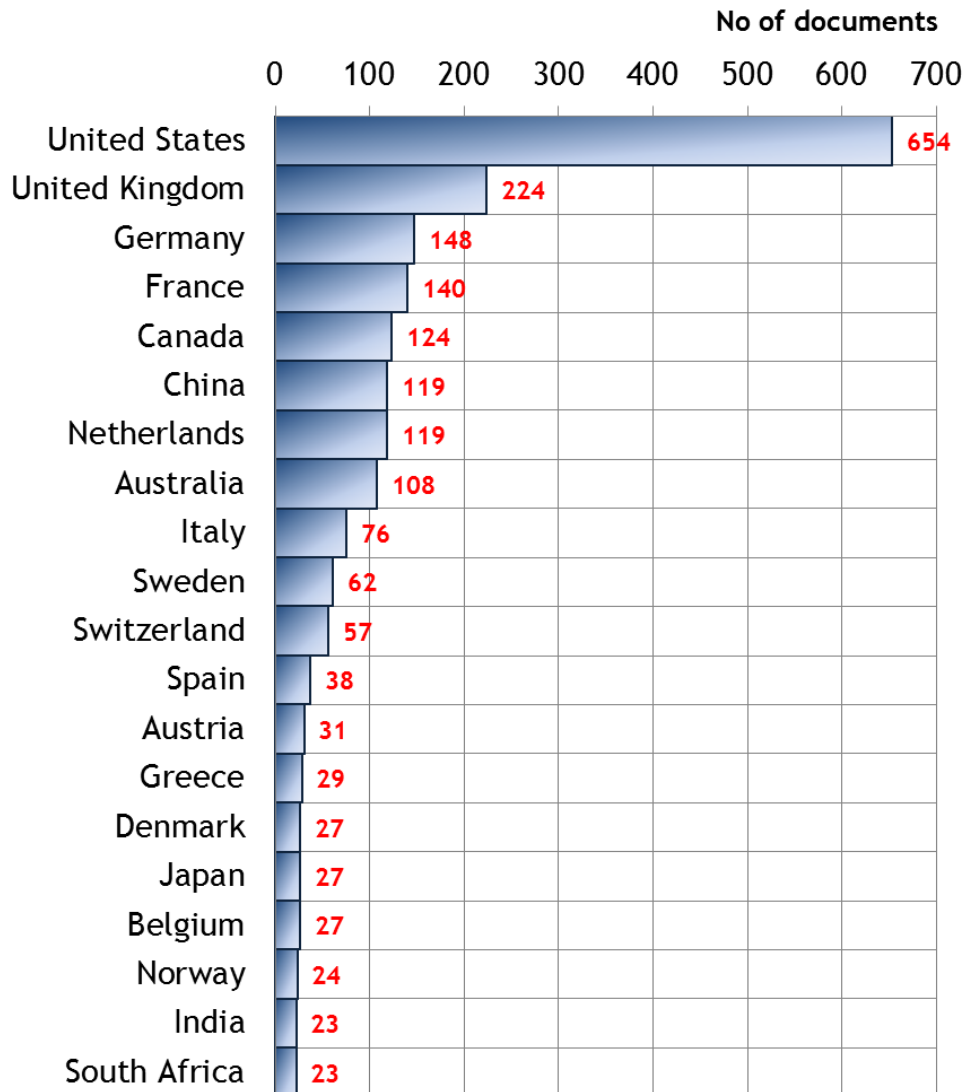


Target 1: Examine and improve existing models

Target 2: Develop new, innovative models

1. New Approaches to Data Collection
2. Conceptualization of Process Heterogeneity
3. New Approaches to Modelling
4. Uncertainty Analysis and Model Diagnostics
5. Catchment Classification
6. New Hydrological Theory

SA'S CONTRIBUTION TO RESEARCH ON UNCERTAINTY



“Uncertainty” and Hydrology in document titles, abstracts and keywords

1690 documents
23 from South Africa

IAHS - *PANTA RHEI* (EVERYTHING FLOWS).

IAHS decadal initiative (2013 – 2022)

Focus on hydrological change and its connection to society.

Panta Rhei meaning “**Everything flows**”.

Water is in a state of never ending change.

Target 1 – Understanding;

Target 2 – Estimation and prediction;

Target 3 – Science in practice.

Research themes to be announced (2013 – 2015)





Sub-committee of the IAHS. Brings the local perspective.

- Provide platform for discussion.
- Promote the science of hydrology.
- Provide a forum for discussion of research, education and training related to hydrology through the [bi-annual symposia](#).

The role of SANCIAHS has been under discussion and the [Network of National Hydrological Associations](#) has been formed.

AFRICAN CENTRE FOR GLOBAL CHANGE AND WATER RESOURCES RESEARCH

UNESCO Category 2 Water Centre

To contribute to **sustainable** land, soil and water management through thematic research and linked **capacity building** at individual and institutional levels in the context of Global Environmental Change and its Impact on Water Resources in Africa.

Specific research themes will be identified

NATIONAL PRIORITY AREAS (2009 – 2014)



Smallholder farmer in Entabeni

- SP1. Speeding up growth and transforming the economy to create decent work and sustainable livelihoods.
- SP2. Massive programme to build economic and social infrastructure.
- SP3. Comprehensive rural development strategy linked to [land and agrarian reform](#) and [food security](#).
- SP4. [Strengthen](#) the [skills and human resource base](#).
- SP5. Improve the health profile of all South Africans.

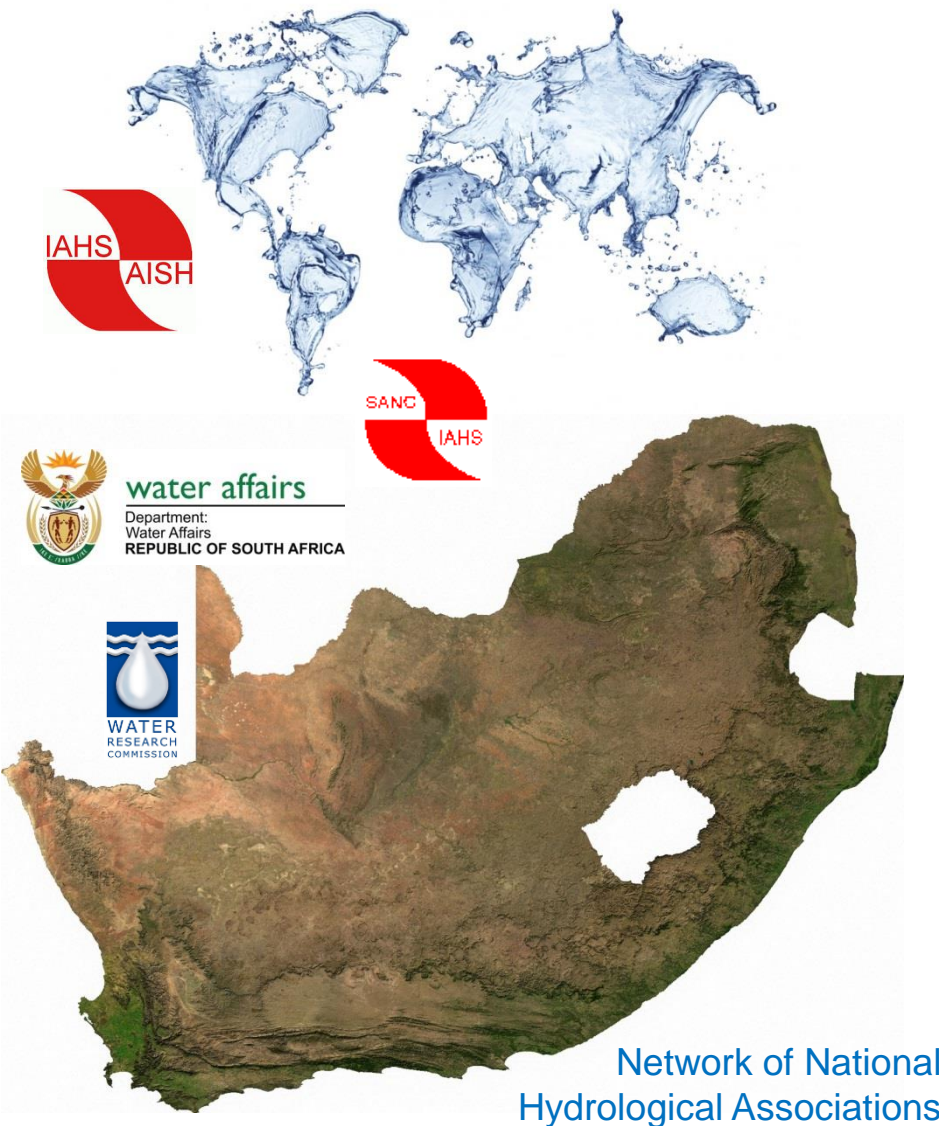
NATIONAL PRIORITY AREAS (2009 – 2014)



*Woman drinking water contaminated
by heavy metals*

- SP6. Intensify the fight against crime and corruption.
- SP7. Build cohesive, caring and sustainable communities.
- SP8. Pursuing African advancement and enhanced [international co-operation](#).
- SP9. [Sustainable Resource Management and use](#).
- SP10. Building a developmental state including improvement of public services and strengthening democratic institutions.

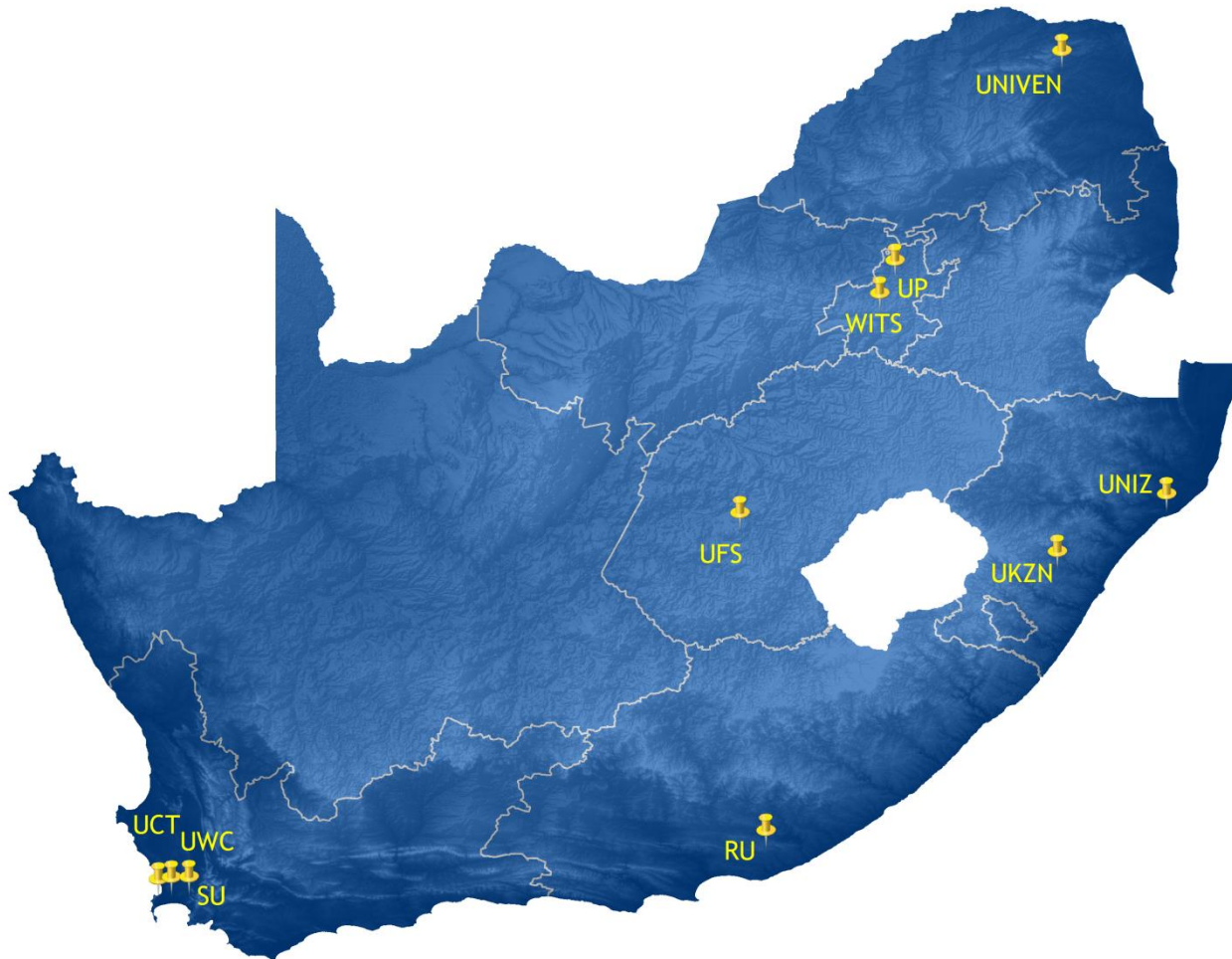
ALIGNING RESEARCH AGENDAS



AFRICAN CENTRE FOR
GLOBAL CHANGE
AND WATER RESOURCES
RESEARCH



SOUTH AFRICAN UNIVERSITY AND HYDROLOGY



Hydrologist,
water engineer or
water res. Manager.

Faculties of science and
Engineering

Aging cadre and
scientific staff

HYDROLOGIST – WATER ENG. WATER RES. MANAGER

Hydrologist - apply scientific knowledge and mathematical principles to solve water-related problems in society: problems of quantity, quality and availability.

Water engineer - engineers who specialise in water-based projects; many have a civil engineering or environmental background.

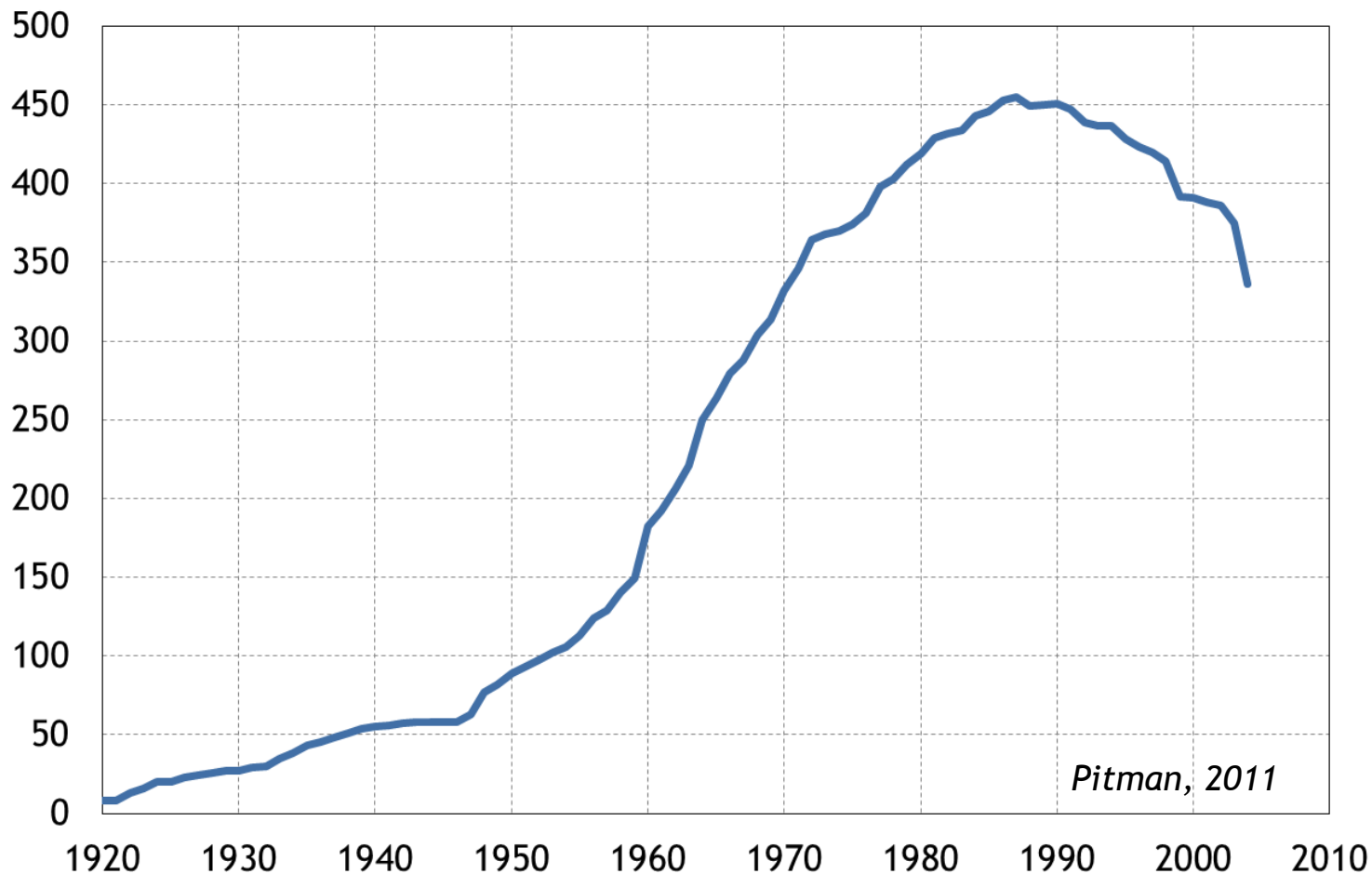
Water resource manager - plan, develop, distribute and manage the optimum use of water resources.

BRANCHES OF HYDROLOGY



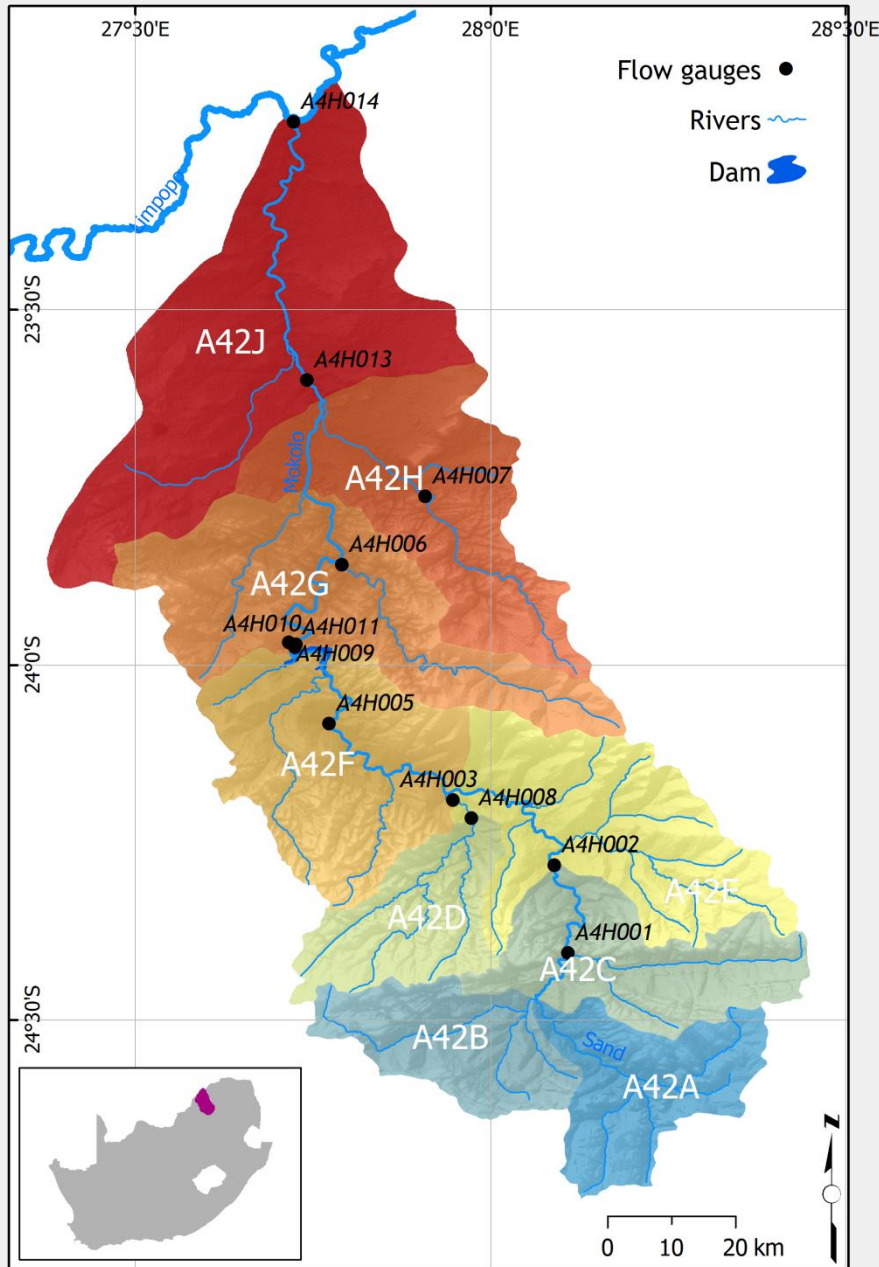
DATA AVAILABILITY AND ACCESS – STREAM FLOW

No. of useful
flow gauges



Pitman, 2011

MOKOLO



Weir or dam?

Targeted short field investigation and reporting.



DATA AVAILABILITY AND ACCESS – STREAM FLOW

DWA project: “Review, Evaluation and Optmization of the National Water Resources Monitoring Network”.

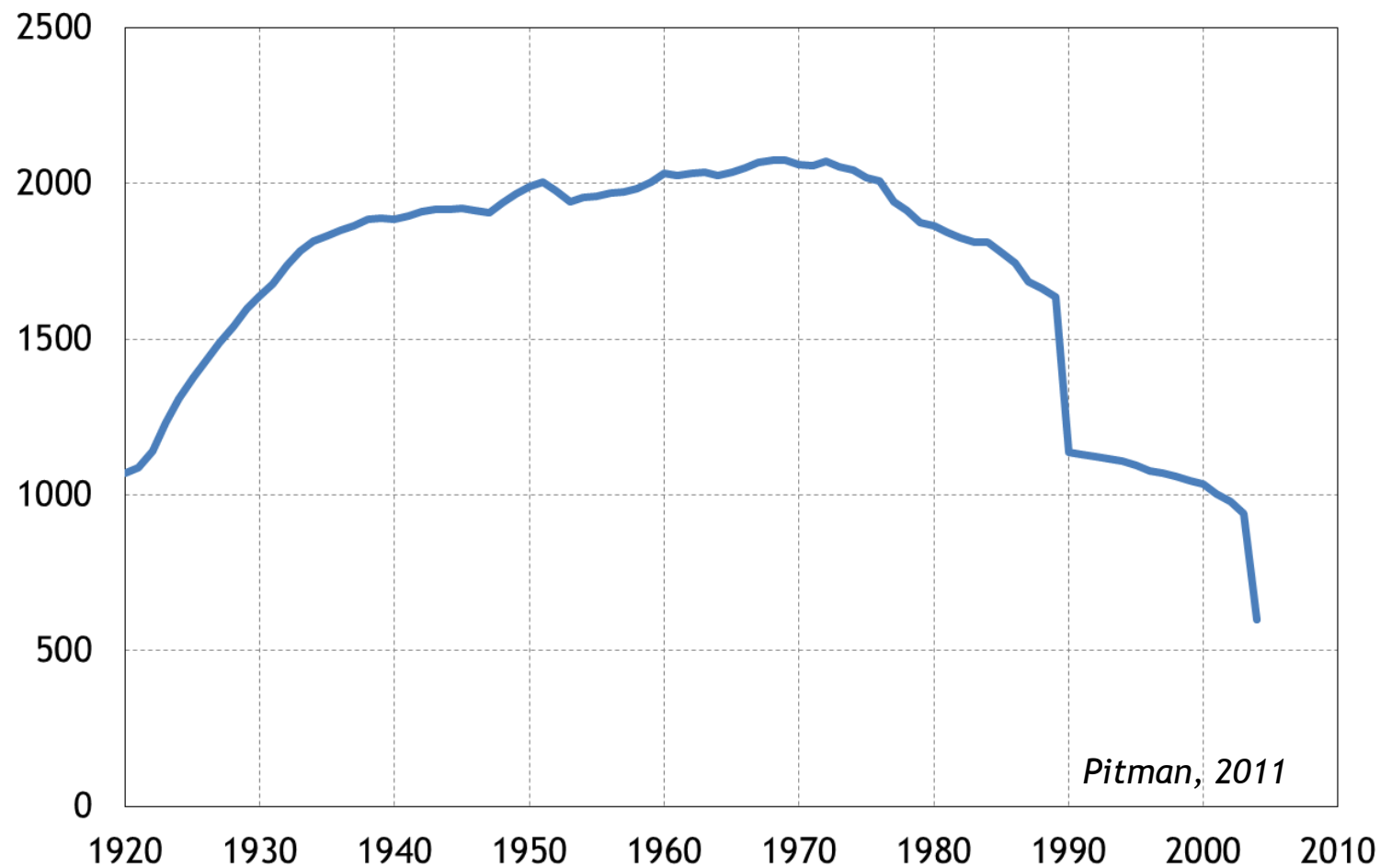
1. [Hydrological monitoring Programme](#)
2. Geo-hydrological monitoring Programme
3. Microbial Monitoring Programme
4. Aquatic Ecosystem Health Monitoring Programme
5. Chemical Monitoring Programme
6. Eutrophication Monitoring Programme
7. Radioactivity and toxicity programme
8. Estuaries monitoring programme
9. National wetlands monitoring programme



*Acoustic Doppler Current Profiler
Real-time continuous flow monitoring*

DATA AVAILABILITY AND ACCESS - RAINFALL

No. of rainfall
stations



DATA AVAILABILITY AND ACCESS - OTHERS

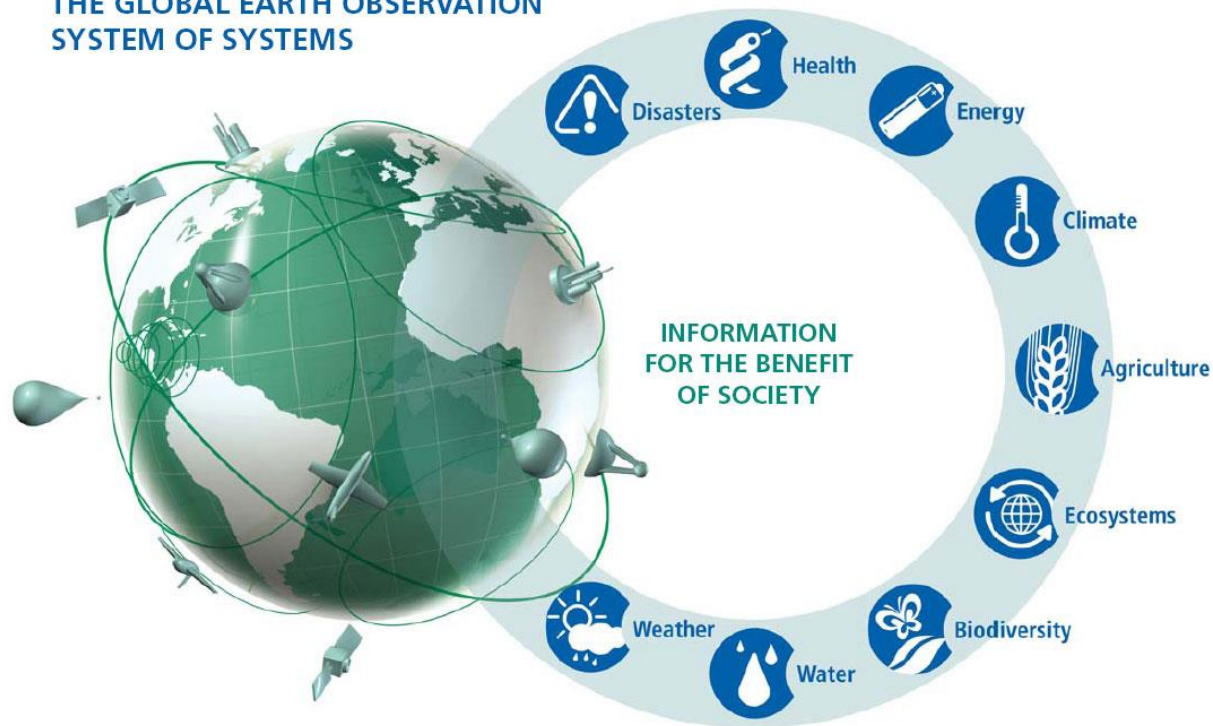


ET (Wind speed, Humidity
Solar radiation,
Temperature)
Evaporation

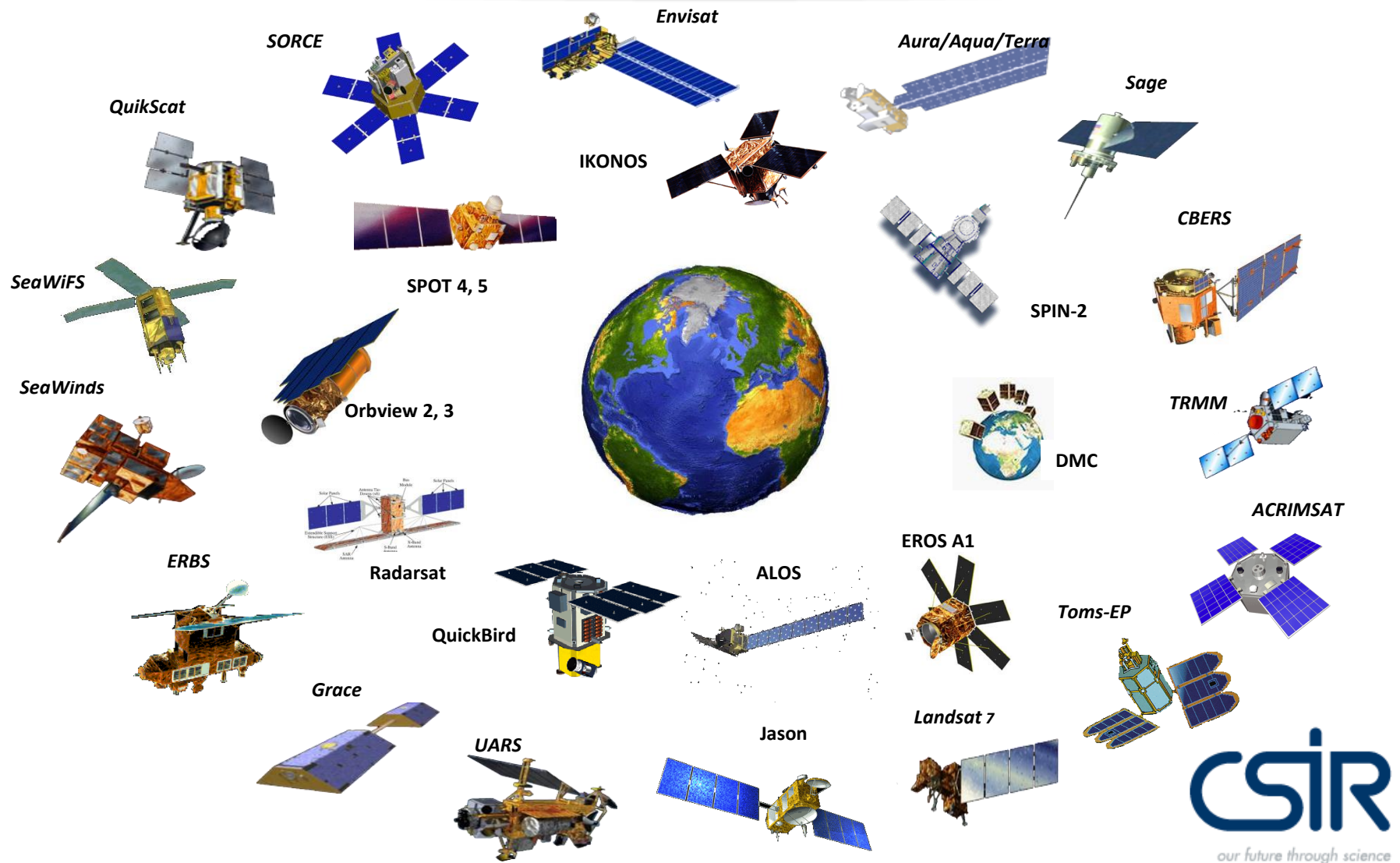
Soil moisture
Soil
Land use
Groundwater

DATA AVAILABILITY AND ACCESS – EARTH OBSERVATION

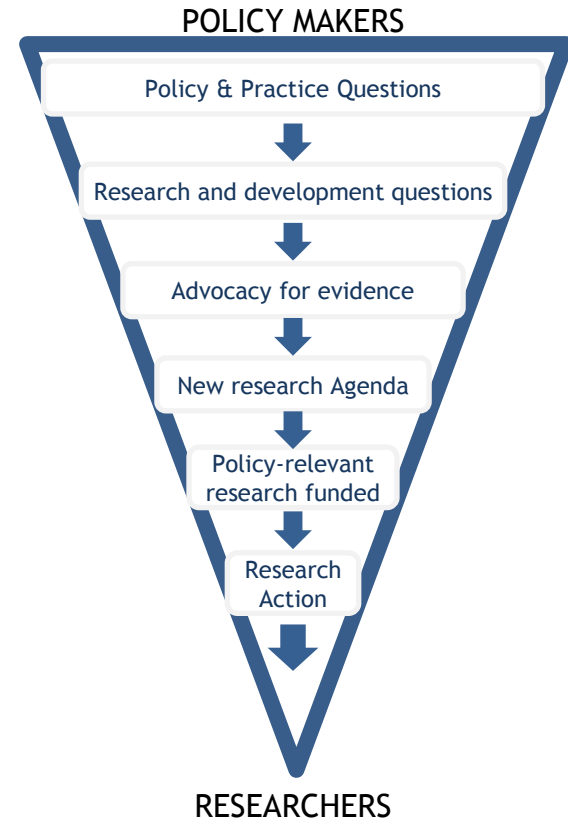
THE GLOBAL EARTH OBSERVATION SYSTEM OF SYSTEMS



REMOTE OBSERVING SYSTEMS



RESEARCH AND POLICY



The large base of knowledge and evidence, are inadequately used in shaping policy and practice

Is the research agenda relevant to pressing policies and practice questions?

CHALLENGES AND OPPORTUNITIES IN THE Hydrologic Sciences

NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES

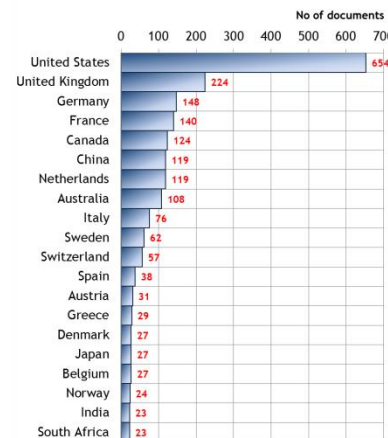
Project Title: Challenges and Opportunities in the Hydrologic Sciences

Project duration: 24 months

Major Unit: Division on Earth and Life Studies

Sub Unit: Water Science and Technology Board

Subject/Focus Area: Earth Sciences; Environment and Environmental Studies



Thank you

