The State of Water R&D Pulse Investigation

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WATER RESEARCH COMMISSION

UNIVERSITEIT VAN PRETORIA
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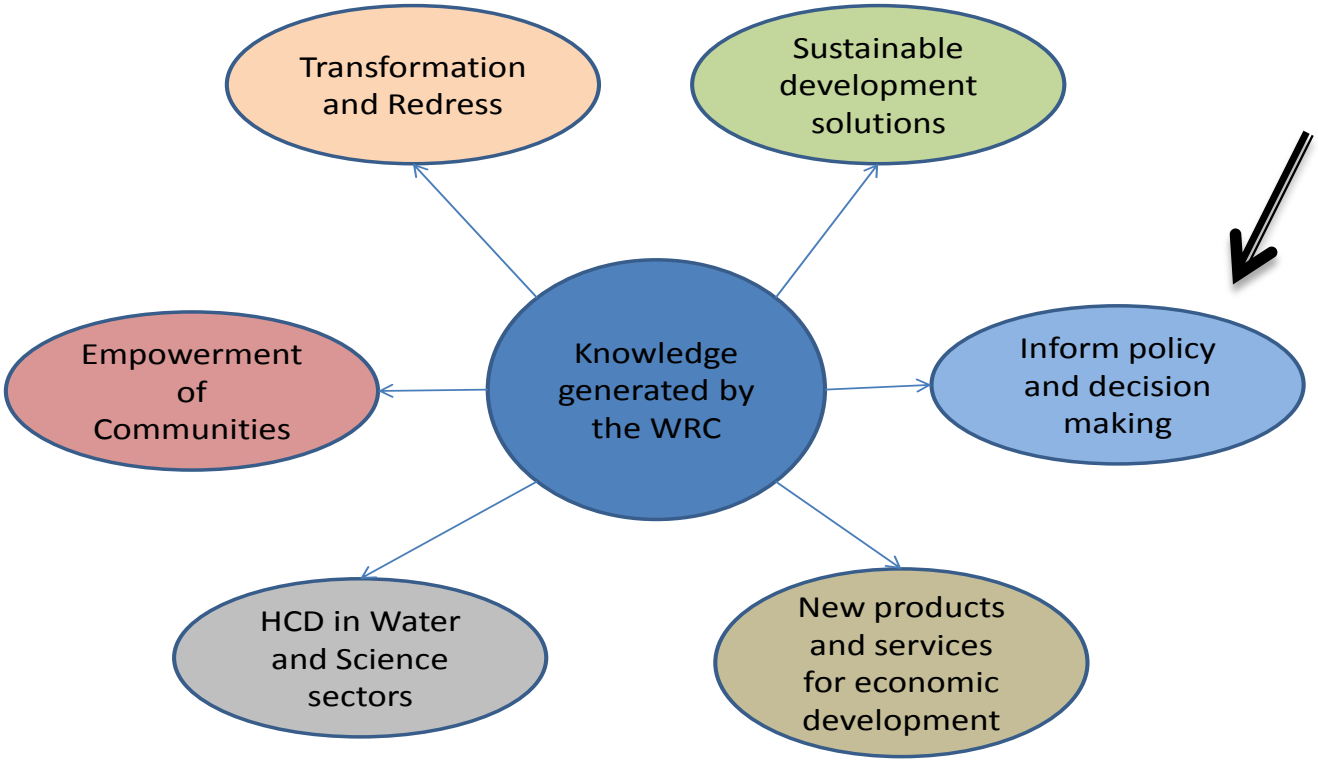
Water Research Commission
Symposium 2013

LOCAL SOLUTIONS - GLOBAL IMPACT

Impact

Impact your research has made



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Objectives

- Inform "The *Pulse Study on the State of Water R&D* in South Africa
- By providing quantitative information about key R&D trends in the field
- A contribution to water research policy development

Science Indicators Systems

Sets of Indicators presenting the various facets of R&D

- They are integral part of policy monitoring & evaluation
- Can characterize total innovation system or research area
- Their use recognized as international best practice
- Indicators should be compatible with international data and useful for time series analysis

OECD Recommended Indicators

- R&D Expenditure Statistics
- Bibliometrics
- Patent Data
- Technology Balance of Payments Statistics
- Human Resources
- Innovation Data

Indicators for Water Research Monitoring and Assessment

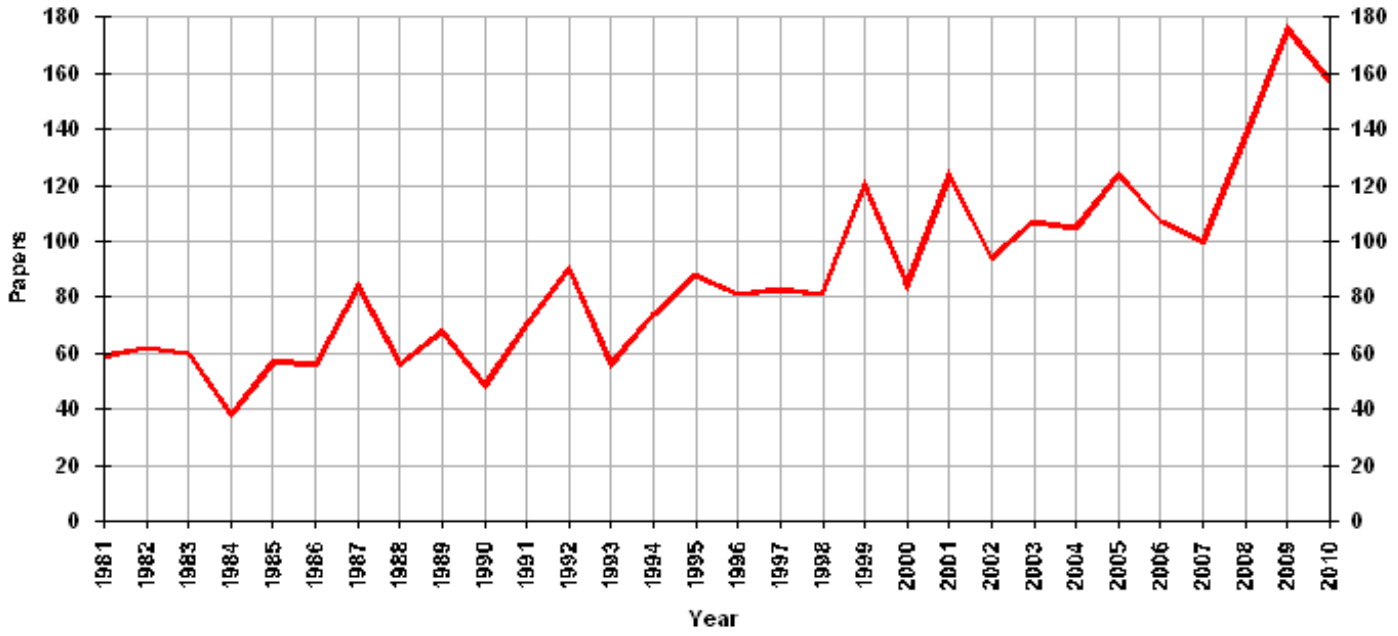
- Balance availability with necessity

- Available data
- Bibliometrics
- Patents
- Necessary data
- R&D Expenditures
- Post-graduate numbers

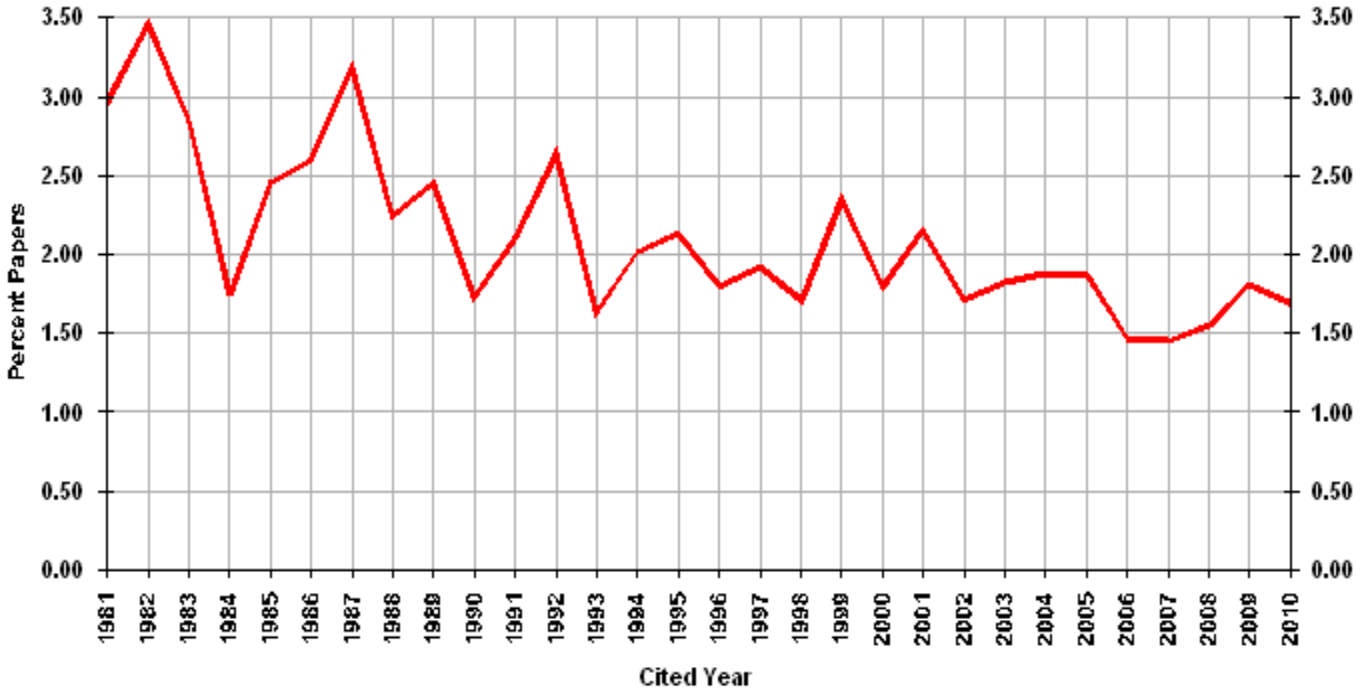
Bibliometric Analysis

- Publications = Indicator of research activity
- Citations = Indicator of impact

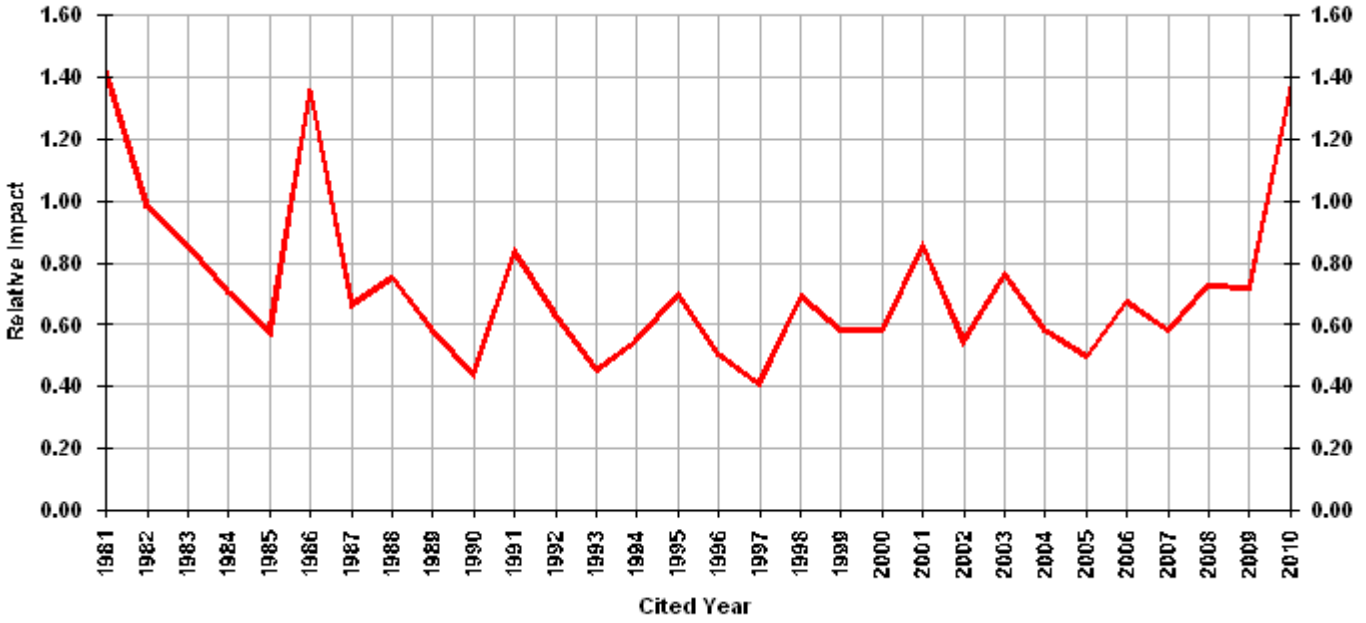
Number of SA water research publications 1981–2010



World share of SA water research publications 1981–2010



Relative impact of SA water research publications 1981–2010



World share of selected disciplines: South Africa 2006-10

Discipline	Percent papers in field	Activity Index
Religion	5.44	9.22
Area studies	4.46	7.56
Mining and mineral processing	3.99	6.76
Literature	3.80	6.44
Ornithology	3.76	6.37
Biodiversity Conservation	2.83	4.76
Archaeology	2.74	4.64
Mineralogy	2.68	4.54
Language and linguistics	2.48	4.20
Entomology	2.22	3.76
Ecology	2.17	3.67
Tropical medicine	2,17	3.67
Virology	1.98	3.35
Geology	1.91	3.23
Zoology	1.89	3.20
Plant sciences	1.67	2.83
Water resources	1.61	2.72
Marine and freshwater biology	1.52	2.57
Astronomy and astrophysics	1.00	1.69
Biotechnology and applied microbiology	0.82	1.39
Meteorology and atmospheric sciences	0.74	1.25
Energy and fuels	0.60	1.01

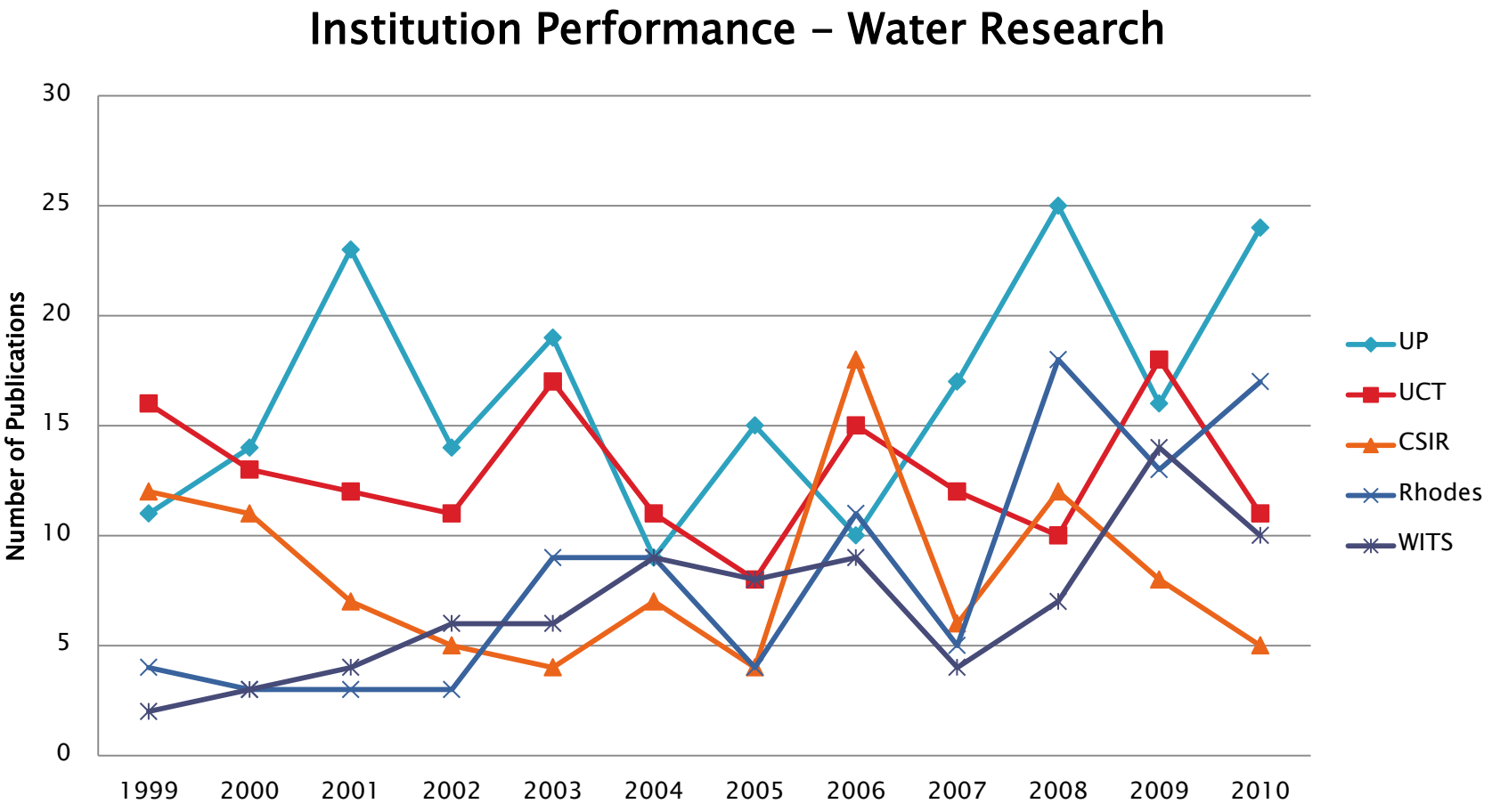
Water research SA Science Specialities 1999-2010

Water Research SA - Science Categories	
Categories	**Record Count**
Water Resources	2 323
Environmental Sciences	581
Engineering Environmental	419
Geosciences Multidisciplinary	316
Meteorology Atmospheric Sciences	187
Engineering Civil	148
Engineering Chemical	76
Marine Freshwater Biology	49
Agronomy	42
Soil Science	27
Ecology	20
Limnology	20
Oceanography	18
Engineering Mechanical	17
Chemistry Applied	12
Economics	12
Management	12
Public Environmental Occupational Health	10
Toxicology	10

Water Research SA
Prolific Institutions 1999–2010

Institutions	Record Count
Univ. Pretoria	287
Univ. Cape Town	239
CSIR	183
Univ. Kwa-Zulu Natal	180
Rhodes Univ.	159
Univ. Witwatersrand	148
Univ. Natal	136
Univ. Stellenbosch	133
Univ. Johannesburg	94
Univ. Orange Free State	91
Rand Afrikaans Univ.	72
Univ. Western Cape	54
Dept Water Affairs & Forestry	51
Tshwane University of Technology	39
Univ. Zululand	39
Water Res Commission	38
Potchefstroom Univ.	35
Univ. FT Hare	35
Univ. Free State	33
Univ. Venda	32
Umgeni Water	31

Prolific producers of Water research: SA 1999–2010



Institutional emphasis: water resources publications

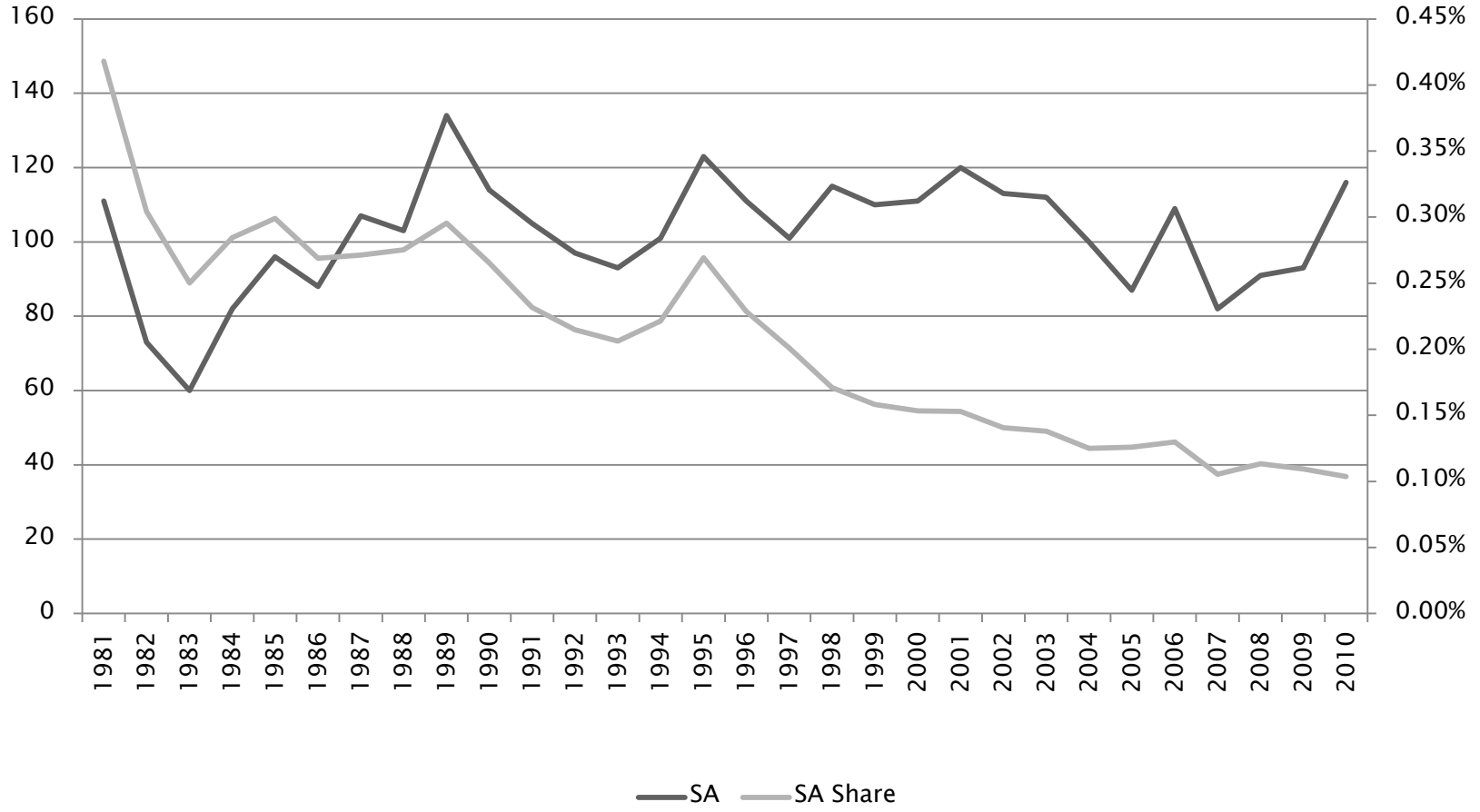
Institutional Emphasis					
Science Categories	%	Science Categories	%	Science Categories	%
UP		**UCT**		**CSIR**	
Environmental Sciences	33.79%	Environmental Sciences	33.89%	Environmental Sciences	46.44%
Engineering Environmental	28.92%	Engineering Environmental	28.03%	Engineering Environmental	38.25%
Engineering Chemical	6.27%	Geosciences Multidisciplinary	7.53%	Geosciences Multidisciplinary	9.29%
Geosciences Multidisciplinary	6.27%	Engineering Civil	4.18%	Marine Freshwater Biology	7.65%
Agronomy	4.18%	Marine Freshwater Biology	3.34%	Ecology	6.01%
UKZN		**RU**		**WITS**	
Geosciences Multidisciplinary	29.44%	Environmental Sciences	17.61%	Geosciences Multidisciplinary	23.64%
Meteorology Atmospheric Sciences	15.00%	Geosciences Multidisciplinary	16.35%	Engineering Civil	16.21%
Environmental Sciences	12.22%	Engineering Civil	8.17%	Meteorology Atmospheric Sciences	14.18%
Engineering Civil	10.55%	Engineering Environmental	8.17%	Environmental Sciences	13.51%
Engineering Environmental	6.11%	Meteorology Atmospheric Sciences	5.66%	Engineering Environmental	6.08%

Water resources articles: South Africa and selected countries 2006–10

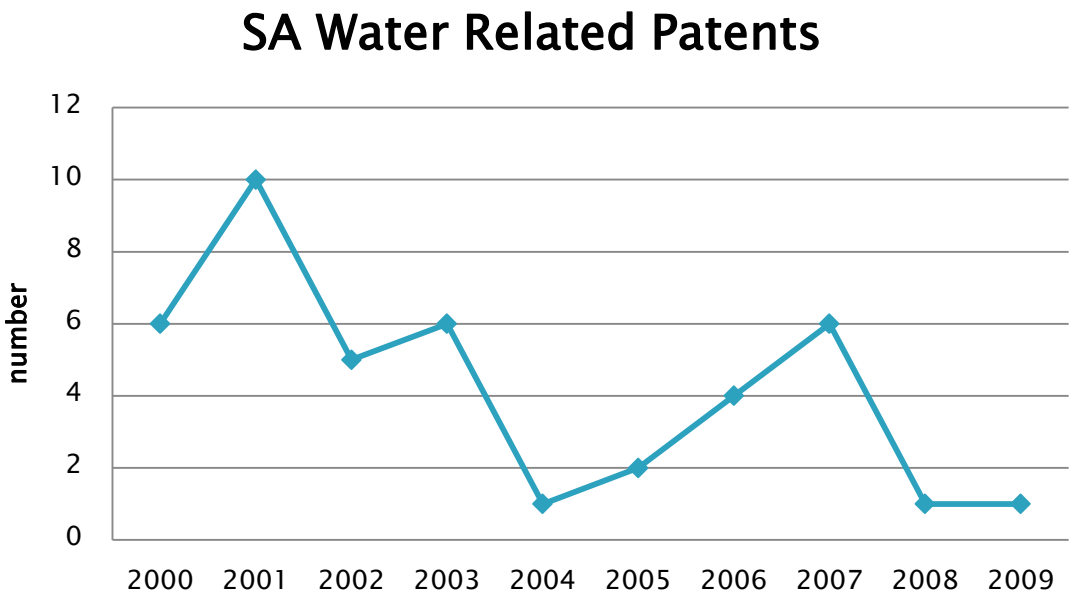
Rank	Country	Number of Publications
1	USA	10 530
2	China mainland	3 619
3	UK	2 779
4	Germany	2 754
5	Canada	2 486
6	France	2 348
7	Spain	2 097
8	Australia	2 027
9	Italy	2 024
10	India	1 796
11	Japan	1 655
12	Netherlands	1 340
13	South Korea	1 286
14	Taiwan	979
15	Switzerland	914
16	Brazil	751
17	Iran	726
18	Greece	707
19	South Africa	677
20	Belgium	650
21	Sweden	598

Patents to SA Inventors by USPTO

All disciplines



SA water Patents: USPTO



USPTO water related patents: 2000-10 South Africa and selected countries

Country	Patents granted
Japan	2 469
Canada	573
UK	397
Australia	180
China	112
India	66
Finland	61
Russia	56
South Africa	42
Brazil	28

Water patents as % of total granted: 2000-2010

Countries	Water Patents	Total Patents	Ratio
Japan	2469	384738	0.64
Canada	573	38941	1.47
UK	397	29097	1.36
Australia	180	12055	1.49
China	112	8675	1.29
India	66	5085	1.30
Finland	61	9293	0.66
Russia	56	2141	2.62
South Africa	42	1134	3.70
Brazil	28	1207	2.32

Findings

The field is performing above expectation in comparison with the country's research size

South Africa's water research is ranked 19th in the world while the total country is ranked 33th

Still water research is relatively small in the country

Subcritical research groups

Recommendations

- Government can use the WRC success as an example for implementation and institutionalization of R&D in other areas of national priority.
- WRC to examine the small size of research groups and take appropriate action
- WRC to identify research priorities and allocate resources accordingly to promising areas.
- The “Pulse Study” should be institutionalized
- The “Pulse Study” to include indicators on R&D expenditures and prost-graduates produced by SA universities

ANY QUESTIONS?