Global Issues in Water Policy 2

Barbara Schreiner Rashid Hassan *Editors*

Transforming Water Management in South Africa

Designing and Implementing a New Policy Framework



Transforming Water Management in South Africa

GLOBAL ISSUES IN WATER POLICY

VOLUME 2

Series Editors

Ariel Dinar José Albiac Eric D. Mungatana Víctor Pochat Rathinasamy Maria Saleth

For other titles published in this series, go to www.springer.com/series/8877

Barbara Schreiner • Rashid Hassan Editors

Transforming Water Management in South Africa

Designing and Implementing a New Policy Framework



Editors Barbara Schreiner 652 Chamberlain Street Rietfontein Pretoria 0084 South Africa barbara@pegasys.co.za

Rashid Hassan Centre for Environmental Economics and Policy Analysis in Africa (CEEPA) University of Pretoria Room 2-6, Agricultural Annex Hatfield Pretoria 0002 South Africa rashid.hassan@up.ac.za

ISBN 978-90-481-9366-0 e-ISBN 978-90-481-9367-7 DOI 10.1007/978-90-481-9367-7 Springer Dordrecht Heidelberg London New York

© Springer Science+Business Media B.V. 2011

No part of this work may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, microfilming, recording or otherwise, without written permission from the Publisher, with the exception of any material supplied specifically for the purpose of being entered and executed on a computer system, for exclusive use by the purchaser of the work.

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Foreword

The South African contributions to international policy, legislation and the practice of water resources and water services as well as the judicious learning of South Africans from international experience are masterly knitted together in this book by some of the key role players, with a frank and critical analysis of achievements and difficulties before and after liberation in 1994 – against the harsh backdrop of the legacy of centuries of colonialism and decades of apartheid which have shaped the political economy of water in the 'rainbow nation.' This introductory chapter discusses some of the key South African contributions that, from the perspective of the writer, are especially relevant to other developing countries, as well as some international experiences that have been useful to South Africans. The conclusion of the chapter is that South Africa is now well positioned in the international arena to offer a new and important contribution regarding how to deal with the implementation challenges that are affecting most developing countries.

The storyline of the 14 chapters is the contrast of excellent legislation and policies vis à vis implementation impediments. The stage was set by the then Minister of Water Affairs and Forestry, Kader Asmal, when he opened the 1997 FAO Conference to discuss the second draft of the National Water Bill with specialists from Australia, Chile, Mexico, Spain and the USA. He greeted the visitors and stated that he did not want a perfect law... 'only one that works.'

Thirteen years later, the last paragraph of this book reads: 'Such focus on priority areas, and on implementation rather than policy and strategy, will enable the South African water sector to deliver the promise of its remarkable water policy and legislation to the people on the ground. Such delivery will be the true measure of the success of the policy reforms.' The difficulties that South African on-the-ground water management encounters are faced everyday in developing countries where specialists often wait for more information to be gathered and better models to be developed before risking proposing concrete water resource management and protection measures, and non-traditional, but perhaps better, water and sanitation approaches. Paralysis also cripples managers who frequently prefer improving organizational arrangements and even institutional setups and legislation instead of giving implementation a chance. Perhaps the most useful lesson to be drawn from South African experience is how to deal with the political economy of water. Other countries in the developing world have not experienced an institutionalised racist system as cruel as apartheid, but they certainly have been exposed to colonialism and segregation and still suffer the legacies of that common past. In this respect, the South African experience in dealing with integrated water resources management (IWRM) within such a complex socioeconomic environment is relevant to many developing countries.

One of the main assets of the National Water Act (NWA) of 1998 is that not all provisions of the Act would come into force from the day of enactment, but that it would be implemented in a phased and progressive manner, in separate components over time according to geographical need and as soon as was deemed reasonable and practical. This decision was partly inspired by international experience, shared in the 1997 FAO Conference, such as the experience of the Mexican water law which came into effect the day immediately after its publication on 1st December 1992 and provided only for 1 year, and through regulations for an additional 2 years, to formalise all existing water uses. The formalisation process took, in fact, 10 years. This cross feedback shows how south-to south learning - and not only of success stories but of challenges and unsolved problems - can be far more productive than blindly following 'international best practice' from the so-called developed world. However, not setting deadlines in an environment that is constantly looking for technical and institutional perfection may also be dangerous. Therefore, it would be desirable now to set up implementable work programs with rigorous deadlines for actions as important as establishing Catchment Management Agencies where they are needed.

It is noteworthy how developing countries can influence international IWRM paradigms. For instance, thanks to South Africa's vision and persistence, they now include the social and ecological values of water on an equal footing with its economic value, and embrace concepts such as the primary role of national government, public ownership of water and the need for gradual implementation. In practice, South Africa has demonstrated the benefits of closely linking water resources and water services management, as well as the need to link the water sector with its multi-layered environment, through coordinated government and modern approaches to equitably shared international water. This can be illustrated with a modified 'Global Water Partnership Comb' showing that water development and management do not exist in isolation.

The perception of the authors of most chapters of the book is that the key factor for underperformance both in sustainable water resources management and effective and sustainable water services is the country-wide lack of scientifically and technically well trained and socially sensitive personnel combined with severe financial challenges at the municipal level in particular. The actions required to remove these barriers lie often out of the realm of South African water resources and water services managers. Nevertheless they seem to be in a position to voice their concerns in national debates and help to empower society by



- 1. Being frank about the consequences of 'business as usual.'
- 2. Acknowledging capacity limitations for policy implementation.
- 3. Providing transparent information to ensure integrity and accountability, and counteract vested interests.
- 4. Challenging unfit macro-policies.

This would trigger a dialogue with the upper level tiers of government responsible for providing the requested additional resources and removing obsolete bureaucratic restrictions to hiring adequate personnel with competitive salaries and opportunities for career development. Of special interest is the educational system that should provide better graduates with sound scientific and technical basic knowledge but also with water resource and water services management skills.

The progress reported in various chapters of this book regarding water resources and water services development and management clearly shows there is the will in different spheres of government to contribute to this process. The dialogue could be structured around various water resources and water services scenarios, showing the need for water reallocation, and/or demand management measures such as wastewater reuse. Each scenario would also make explicit the required financial resources and cooperative government measures. The next step would be to compare these requirements with government's budgets and cooperative programs for similar items during the past 10 years or so. Most probably the trend would be less than required and a request to Parliament for increasing budgets would have to be made. In case this was not feasible under the current level of national income, DWA could make a point for increasing taxes in order to be able to abide by the constitutional and NWA mandates of redressing past inequities, by making the consequences of not having the required moneys clear.

However, increasing taxes is always politically difficult and the goodwill of those who have benefitted from apartheid and colonialism to share with those historically disadvantaged would be indispensable. South Africa, led by Nelson Mandela, in spite of, or thanks in part to, years of blood-shedding, was capable of achieving a peaceful political revolution. Achieving the still-required economic revolution for more inclusive economic development will not be easy, but the rainbow country is closer than other developing countries, such as Mexico, where the inheritance of colonialism and current status is such that we still are in need of both a political and an economic revolution.

Going back to the modified 'GWP comb,' it is useful to bring in a broader aspect of the international backdrop. In his inaugural speech, President Barack Obama said:

... The question we ask today is not whether our government is too big or too small, but whether it works -

...Our economy is badly weakened, a consequence of greed and irresponsibility on the part of some, but also our collective failure to make hard choices and prepare the nation for a new age.

...Nor is the question before us whether the market is a force for good or ill. Its power to generate wealth and expand freedom is unmatched, but this crisis has reminded us that without a watchful eye, the market can spin out of control – and that a nation cannot prosper long when it favors only the prosperous.

These quotes, coming from the first black President of a country which for decades favored the Washington Consensus that nurtured the widespread fantasy that an unregulated private sector and 'slim' government would solve all problems, *inter alia* water problems, are quite relevant since this book clearly highlights lack of government capacity at national, municipal and local levels as one of the most important impediments to sustainable water resources and water services development and management.

Barack Obama after being recently awarded the Peace Nobel Prize must rise to the high expectation he has created with his excellent reconciliatory speeches by taking action to really help bringing peace to the world. Similarly, South Africa must now rise to the high expectation she has generated by successfully dealing with her political economy of water by finding ways to simplify procedures and increase financial resources for ensuring implementation of sustainable water resources and water services development and management.

International Water Resources Planning and Management Consultant, Mexico City hector.garduno@live.com.mx Héctor Garduño

Acknowledgements

Our thanks go to Ariel Dinar who originally came up with the idea for this book, who set us on the path of getting the book together, and who provided guidance and support along the way. Our thanks also go to Jenny Fidler and Phillipa Kanyoka for providing invaluable support in checking the manuscript, dotting the i's and crossing the t's. Thanks to Centre for Environmental Economics and Policy in Africa (CEEPA) for their financial support. Finally, our thanks to our families for their patience with the late nights and the long days that went into pulling this manuscript together.

Contents

1	The Political, Social and Economic Context	
	of Changing Water Policy in South Africa Post-1994	1
	Barbara van Koppen, Barbara Schreiner, and Saliem Fakir	
2	Water Resource Situation, Strategies and	
	Allocation Regimes in South Africa	19
	Johan van Rooyen, Marna de Lange, and Rashid Hassan	
3	Water Services in South Africa 1994–2009	33
	Kathy Eales	
4	Water, Sanitation and Wastewater Management:	
	Some Questions for National Water Security in South Africa	73
	Kathy Eales	
5	Transforming Legal Access to Water to Redress	
	Social Inequity and Economic Inefficiency	97
	Gavin Quibell, Robyn Stein, Ashwin Seetal, and Noxolo Ncapayi	
6	Protecting Aquatic Ecosystem Health for Sustainable Use	119
	Harrison Pienaar, Antonia Belcher, and Dana F. Grobler	
7	Catchment Management Agencies: A Case Study	
	of Institutional Reform in South Africa	145
	Eiman Karar, Gugu Mazibuko, Thomas Gyedu-Ababio,	
	and Derek Weston	
8	National Water Security: Planning and Implementation	165
	Chris Moseki, Toriso Tlou, and Cornelius Ruiters	
9	Pricing of Water for Cost Recovery, Economic Efficiency	
	and Social Equity	181
	Mahomed Vawda, Nicola King, and Mike Muller	

10	Mainstreaming Gender in Water Management in South Africa Barbara van Koppen, Barbara Schreiner, and Eiman Karar	203
11	The Role of Information Systems Management in the Management of Water Mark Dent	215
12	The Water Research Commission Jayant Bhagwan	237
13	Transboundary Water Management Issues Under the NWA and Regional Collaboration, Policies and Conventions Reginald Tekateka	253
14	Lessons and Conclusions Barbara Schreiner and Rashid Hassan	271
Ind	ex	277

Biographies of First Authors

Barbara Schreiner is Practice Director for Water Strategy at Pegasys Strategy and Development in Pretoria. She is the former Deputy Director General: Policy and Regulation at the Department of Water Affairs and Forestry. She joined the Department in 1995 as Special Advisor to Minister Kader Asmal. She was involved in the writing of the White Paper on a National Water Policy for South Africa and the drafting of the National Water Act. She holds a Masters Degree in Environmental Science from the University of Cape Town. She has been active in the water sector internationally including as a member of the Global Water Partnership Steering Committee, and the Gender and Water Alliance. She is a member of the Board of the Challenge Programme on Water for Food. She has a particularly interest in gender and poverty aspects of water management.

Barbara van Koppen (Ph.D.) is principal researcher Poverty, Gender, and Water in the Southern Africa Regional Program of the International Water Management Institute, based in Pretoria, South Africa. Her research focuses on pro-poor and gender equitable rural water development for multiple uses and plural institutional and legal frameworks in Africa and South Asia. She has authored and edited four books and over 60 international publications. Before joining the International Water Management Institute, she was a lecturer in Gender and Irrigation at Wageningen University and Research Center, Netherlands. She also worked as a Technical Assistant for the Netherlands Development Cooperation in Burkina Faso.

Chris Moseki works at the Water Research Commission in Pretoria. He has more than 7 years experience as teacher and lecturer. He holds a Bachelor degree in Geology from the University of California Los Angeles and a Masters degree in Geohydrology from the University of the Free State. He has 5 years experience in groundwater development and management as well as another 5 years in water resource management in the Department of Water Affairs in South Africa. He is a member of the International Association of Hydrogeologists, Groundwater Division of South Africa, and a registered earth scientist with South African Council for Natural Scientific Professions.

Eiman Karar is a scientist with more than 16 years experience in the water sector ranging from hard modeling and geomorphological sciences to institutional matters

that focus on collective action, organizational transformation, governance, performance bench marking, devolution and empowerment, decentralization and democratic management of water resources. She is a research manager at the Water Research Commission in Pretoria

Gavin Quibell has 21 years experience in the water and environment sector, including 13 years in the Department of Water Affairs in South Africa. He has worked on a wide range of water resources management issues, including water quality management, IWRM and studies on water for the environment. He is currently involved in development projects in the water sector, particularly in Africa. He has worked on a number of donor-funded projects in the water quality and water resource management sectors, and has worked as a freelance consultant to the DWA project on water allocation reform.

Harrison Pienaar (MSc Hydrogeology) started his career in the energy sector with Eskom where he successfully planned and managed a wide range of environmental projects for sustainable linear development. He then pursued his career as a consultant, undertaking and managing numerous large scale projects in integrated environmental management in association with various consulting firms. He joined the Department of Water Affairs in 2001 and currently holds the position of Chief Director responsible for the development of policies, strategies, systems, methodologies and guidelines for resource directed measures (RDM), particularly the Reserve determination, water resource classification and specification of associated resource quality objectives.

Héctor Garduño worked for 30 years (1967–1997) as researcher, private consultant and official of the Mexican Government. After completing his last government task designing and implementing the national water rights administration system, he started his international consulting career by participating in the 1997 FAO Conference in Pretoria to discuss the second draft of the South African National Water Bill. He came back in September 1997 and February 1998 to work with DWA in anticipating implementation issues when they were designing the water rights system and to propose a training program. From July 2004 to July 2005 he returned to South Africa where the World Bank Institute invited him to write a case study on South Africa's experience in implementing Integrated Water Resources Management within its new water policy (Garduño and Hinsch 2005¹). On July 2006, he came back as member of the International Review Panel for the Institutional Review of the Water Research Commission and on November 2008 he participated in the Round Table Discussion on 'Water for Development' invited by DWA. Since 2000 he has been a core member of the World Bank's Groundwater Management Advisory Team (GW-MATE) working in Asia, Africa, Latin America and the Middle East in Groundwater Resource Planning, Management and Institutions.

¹Garduño, H and Hinsch, M. 2005. IWRM Implementation in South Africa: Redressing past inequities and sustaining development with a view to the future. World Bank Institute. Washington D.C.

Jayant Bhagwan is Director of the Key Strategic Area of Water Use and Waste Management at the Water Research Commission in Pretoria. He is a civil engineer with post-graduate degrees in Municipal Engineering and Tropical Public Health Engineering. He started his career with a small NGO providing water supply and sanitation support to disadvantaged and poor communities. He then moved to the CSIR focusing on research and development on water and sanitation issues. He has contributed to shaping the research portfolio on the institutional and management aspects of water services delivery, has contributed to many initiatives in the preparation of the new water legislation and serves on a number of key committees. He was Chairperson of the Minister of Water Affairs and Forestry National Water Advisory Committee and a Steering Committee Member of the Water Supply and Sanitation Collaborative Council.

Johan van Rooyen is the Director: National Water Resource Planning in the Department of Water Affairs responsible for strategic level planning at the national and catchment scale. He is a civil engineer by training and has been working in the Department of Water Affairs since graduation, a total of 34 years of which the last 27 years were in planning. His experience includes the planning of water resource infrastructure from small scale rural projects to mega projects like the Lesotho Highlands Water Project; the development of water resource management strategies at both the catchment and national scale, as well as for shared international basins; and managing the development of water.

Kathy Eales has worked in the water sector since the early 1990s from within DWA, in consulting, in Africa's largest water and sanitation NGO, and in municipal government. Her work spans research, policy and strategy development, project implementation, and now regulation. Kathy has played a prominent role in shaping debate around ways of remedying South Africa's sanitation service backlogs, and has worked on several international research projects. She has worked for the City of Johannesburg, where she was responsible for regulatory oversight of the City's corporatised water services provider, Johannesburg Water, and related policy research, and for the Water Research Commission. She now works independently as researcher and consultant, focused primarily on the institutional dimensions of effective water and sanitation services.

Mahomed Vawda is Director: Water Resources Pricing and Financing at the Department of Water Affairs. He comes from a commercial and financial background with experience in both the public and private sector. His experience includes Accountancy, Finance, State Subsidies, Taxation and International Marketing and Investment. Mr. Vawda joined the Department of Water Affairs in January 2004, where one of his responsibilities is the Raw Water Pricing Strategy.

Mark Dent is Director of the Environmental Management Programme at the Centre for Environment, Agriculture & Development (CEAD) at the University of KwaZulu-Natal (UKZN). A water resources engineer by profession, Mark has enjoyed a varied career as lecturer, researcher, manager, consultant and Director of

the Graduate School of Business, UKZN. He holds a Ph.D. in water resources engineering and a Masters in Business Leadership from UNISA. Mark's passion is for systems integration, continuous improvement of teams, leadership development and organisational change and more particularly the role that information and our approach to it, plays in the knowledge management, that is essential to success

Rashid Hassan is Professor of Natural Resource and Environmental Economics and Policy and Director of the Centre for Environmental Economics and Policy in Africa (CEEPA), Faculty of Natural and Agricultural Sciences, University of Pretoria in South Africa. He has taught and supervised academic and non-degree training and research of many students from Africa and other parts of the world in economics and policy of managing natural resources. He has published a number of contributions on water resource management and economic policy in key national and international journals and books printed by various publishers.

Reginald Tekateka is an independent consultant who was previously Specialist Advisor in International Relations at the Department of Water Affairs. Prior to that he was Chief Delegate to the Lesotho Highlands Water Project. During his term of office with LHWP his responsibility shifted to include dealing with international water issues including in SADC, NEPAD, CSD and AMCOW. During period this period he was the RSA representative in the SADC senior officials water sector. He is now a member of the AMCOW TAC focusing particularly in the finance working group within the EU Water Initiative. His background and training is international relations.

Contributors

Saliem Fakir

WWF, Millennia Park, 16 Stellentia Avenue, Stellenbosch, 7630, South Africa sfakir@wwf.org.za

Marna de Lange Socio-Technical Interfacing, PO Box 1250, Ladanna, 0704, South Africa marna@global.co.za

Robyn Stein

Mandela Institute, Department of Law, University of the Witwatersrand, Private Bag 3, Wits 2050, South Africa rstein@icon.co.za

Ashwin Seetal

Golder Associates Africa (Pty) Ltd, PO Box 6001, Halfway House, 1685, South Africa aseetal@golder.co.za

Noxolo Ncapayi

Department of Water Affairs, 183 Schoeman Street, Pretoria, South Africa ncapayin@dwa.gov.za

Antonia Belcher

Independent Consultant, P.O. Box 195, Stellenbosch, 7599, South Africa toni.b@iburst.co.za

Dana F. Grobler

BlueScience Consulting cc, PO Box 54, Private Bag X 8, Kuilsriver 7579, South Africa dana@bluescience.co.za

Gugu Mazibuko

Pegasys Strategy and Development, 193 Bronkhorst Street, Brooklyn, Pretoria, South Africa gugu@pegasys.co.za

Thomas Gyedu-Ababio

South African National Parks, Kruger National Park, Mpumalanga, South Africa ThomasGa@sanparks.org

Derek Weston

Pegasys Strategy and Development, 193 Bronkhorst Street, Brooklyn, Pretoria, South Africa derek@pegasys.co.za

Toriso Tlou

Tlou Consulting, PO Box 1309, Pretoria, 0001, South Africa toriso@tlouconsult.co.za

Cornelius Ruiters

Department of Water Affairs, 183 Schoeman Street, Pretoria, South Africa ruiterc@dwa.gov.za

Nicola King

Mintek, Private Bag X3015, Randbung 2125, South Africa NicolaK@mintek.co.za

Mike Muller

School of Public and Development Management, University of the Witwatersrand, Private Bag 3 Wits 2050, Johannesburg, South Africa mikemuller1949@gmail.com: mike.muller@wits.ac.za

xviii

Abbreviations

AMCOW	African Ministers' Council on Water
ANBO	African Network of River Basic Organisations
ANC	African National Congress
ARC	Agricultural Research Council
AU	African Union
BBM	Building Block Methodology
BEE	Black Economic Empowerment
BNR	Biological Nutrient Removal
CBA	Cost Benefit Analysis
CEDAW	Convention on the Elimination of all forms of Discrimination Against
	Women
CMA	Catchment Management Agency
CMF	Catchment Management Forum
CMS	Catchment Management Strategy
CSIR	Council for Scientific and Industrial Research
CSM	Combined Services Model
CUC	Capital Unit Charge
DBSA	Development Bank of Southern Africa
DEAT	Department of Environmental Affairs and Tourism (in 2009 this
	Department became the Department of Environmental Affairs)
DWAF	Department of Water Affairs and Forestry (in 2009 this became the
	Department of Water Affairs, DWA, as it had been prior to 1994)
EFR	Estuarine Flow Requirements
EMF	Environmental Management Framework
EMP	Environmental Management Plan
EWR	Environmental Water Requirements
FAO	Food and Agricultural Organisation
FETWater	Framework for Education, Training and Research in Water
GEF	Global Environmental Facility
GTZ	German Technical Assistance
GWP	Global Water Partnership
HDI	Historically Disadvantaged Individual
ICOLD	International Commission on Large Dams

ICT	Information and Communications Technology
IDP	Integrated Development Plan
IFR	Instream Flow Requirements
IMP	Industries, mining and power generation
IRP	Integrated Resource Planning
ISPs	Internal Strategic Perspectives
IWRM	Integrated Water Resource Management
LIMCOM	Limpopo Basin Commission
LWHP	Lesotho Highlands Water Project
MC	Management Class
MUS	Multiple Use Systems
NEPAD	New Africa Partnership for Development
NWA	National Water Act
NWRIA	National Water Resource Infrastructure Agency
NWRI	National Water Resource Infrastructure
NWRS	National Water Resource Strategy
O&M	Operation and Maintenance
OKACOM	Okavango River Basin Commission
ORASECOM	Orange Senqu River Basin Commission
PWC	Permanent Water Commission
R&D	Research and Development
RDM	Resource Directed Measures
RDP	Reconstruction and Development Programme
ResDSS	Reserve Decision Support System
RHP	River Health Programme
RQO	Resource Quality Objectives
RWP	Regional Water Policy
RWQOs	Resource Water Quality Objectives
RWS	Regional Water Strategy
SADC	Southern African Development Community
SALGA	South African Local Government Association
SAREP	South African Rainfall Enhancement Programme
SDC	Source Directed Controls
SDF	Spatial Development Framework
SFR	Streamflow reduction
TCTA	Trans Caledon Tunnel Authority
TDA	Transboundary Diagnostic Analysis
TPTC	Tripartite Permanent Technical Committee
WC/WDM	Water Conservation/Water Demand Management
WDCS	Waste Discharge Charge System
WMA	Water Management Area
WMO	World Meteorological Organisation
WRC	Water Research Commission
WRCS	Water Resource Classification System
WRMC	Water Resource Management Charge

WSA	Water Services Authority
WSDP	Water Services Development Plan
WU&WM	Water Use and Waste Management
WUA	Water User Association
Currency	All figures are presented in US\$, calculated at a conversion rate
	of ZAR7.4: 1US\$

List of Boxes

Box 4.1	Access to water and sanitation in South Africa	75
Box 4.2	South Africa's rights-based approach to sanitation	
	improvement	76
Box 5.1	Curtailing Water Users Already Licensed Under the NWA	103
Box 5.2	Small Scale Irrigation Challenges	10
Box 6.1	Case Study: A Comprehensive Reserve Determination	
	for the Thukela River	134
Box 9.1	The Umgeni water example of bulk water tariffs	193
Box 9.2	Kouga example of the working for water programme	
	to improve water flow in rivers1	199

List of Figures

Fig. 2.1	Rainfall and evaporation in South Africa	21
Fig. 2.2	Percentage deviation from mean annual rainfall	21
Fig. 2.3	Annual rainfall at Vaal Dam	22
Fig. 2.4	Annual inflow into Vaal Dam	23
Fig. 3.1	Types of municipalities	45
Fig. 3.2	Categorisation of municipalities by wastewater	
	management risk rating	51
Fig. 3.3	Wastewater management risk rating by type	
-	of local municipality	52
Fig. 3.4	Grants and transfers to municipalities, 2004/05–2011/12	64
Fig. 4.1	Access to water and sanitation in South Africa, 2008	
	(Source: Derived from StatsSA 2007; DWAF 2008a)	75
Fig. 4.2	Wastewater compliance in the Free State Province,	
	February 2008 (Source: DWAF 2008c)	83
Fig. 4.3	Funding transfers to municipalities, by type, 2003/04–2009/10	
	(Source: National Treasury)	86
Fig. 4.4	Key trends in networked water and sanitation, 1989–2008	
	(Source: Derived from Lawless, 2007; StatsSA, 2001,	
	2007; DWAF 2008)	86
Fig. 5.1	The Compulsory Licensing process outlined	
	in the National Water Act	102
Fig. 7.1	Institutional arrangements for water management	
	in South African	148
Fig. 7.2	The 19 Water Management Areas declared	
	under the National Water Act (Source DWAF)	149
Fig. 7.3	Example of structure of CMA establishment reference	
	group from Luvuvhu/Letaba water management area	152

Fig. 8.1	Alignment of water and economic planning in	
	three spheres of government	169
Fig. 8.1	Dam storage capacity 1925–2008	
	(Source Eales and Schreiner 2008)	174
Fig. 9.1	Demand and Supply Balances for Water (over time)	
	in South Africa, Excluding Transfers	
	(Source: DWAF 2004)	184
Fig. 9.2	Water cost and pricing chain (Source: DWAF 2003)	187
Fig. 11.1	Major changes in the field of water management (after Turton 1999)	217
Fig. 11.2	The progression from data to wisdom, framed	
C	in the construct of Relational Connection	
	and Systems Understanding	219
Fig. 11.3	Conceptual pathway of data from field observations	
8	to model input and feedback to guide data collection	231
Fig. 13.1	Shared river basins of South Africa (Source: DWA)	254

List of Tables

Table 2.1	Natural mean annual runoff and the ecological Reserve	
	(million m ³ /a) and storage in major dams (million m ³)	27
Table 2.2	Available yield in year 2000 (million m ³ /a)	28
Table 2.3	Water requirements for the year 2000 (million m ³ /a)	29
Table 2.4	Reconciliation of the requirements for and availability	
	of water for year 2000 (million m ³ /a)	30
Table 3.1	Income distribution in South Africa, per quintile	
	(Armstrong et al. 2008), sourced from the 2005/06	
	Statistics South Africa Income and Expenditure Survey	36
Table 6.1	Water resource classes	137
Table 8.1	Reconciliation of water requirements and availability for year 2007 (million m ³ /a)	177
Table 9.1	South Africa's water use in 2000 (million m ³ /a)	183
Table 9.2	Summary of raw water charges in the 2005	
	pricing strategy	191
Table 10.1	Race and gender composition of DWAF by 2005	207
Table 11.1	Rights based versus Interest based bargaining	229
Table 12.1	Research projects providing support to the	
	South African water sector, based on WRC statistics	
	for each area of R&D in 2004 (in US million dollar)	243
Table 12.2	Relative annual investment in research projects	
	in each area of R&D based on the WRC research	
	portfolio (in US million dollar)	243

xxviii

Table 12.3	Contributions of various categories of research providers to water-centred R&D in South Africa	
	based on WRC statistics in 2004, in number of projects	
	(N) and US million dollar per annum 24	4
Table 12.4	Estimated total South African expenditure on	
	water-centred R&D (2004 data in US million dollar) 24	5
Table 12.5	Knowledge dissemination and capacity-building	
	resulting from projects ending over a period of 1 year	
	(based on WRC statistics from 1 April 2003 to	
	31 March 2004)	6
Table 12.6	Value of costs with and without CSM 24	9
Table 12.7	CBA results of the CSM 25	0

Chapter 1 The Political, Social and Economic Context of Changing Water Policy in South Africa Post-1994

Barbara van Koppen, Barbara Schreiner, and Saliem Fakir

Abstract This chapter describes the political, social and economic context in which South Africa's water reform was designed and implemented. The water reform was part of the nation's wider transformation after 1994 from white minority rule and territorial and institutional segregation, to a democratic, non-racial state. This implied a major challenge to redress the legacy of gross inequities in access to water for domestic and productive uses and the persistently high poverty levels, especially in the rural areas. For a better understanding of the continuities and changes from the past for all aspects of water reform discussed in this volume, the history of water development and management in apartheid South Africa is traced. This encompasses the removal of land and water rights from black South Africans by the early 1900s; the hydraulic mission for white agriculture throughout the twentieth century; and the emergence of the centrally planned, urban-industrialized water economy from the 1970s onwards. Many concepts that would globally be seen as 'best practice' Integrated Water Resource Management according to the Dublin principles of 1992 originate in that era. The chapter concludes by introducing the subsequent chapters in this light.

Keywords History • Integrated water resource management • Water infrastructure • Water law and policy • Water reform • Equity • Bill or rights • Catchment mangement agency • Water user association

B. van Koppen (\boxtimes)

International Water Management Institute, South Africa e-mail: b.vankoppen@cgiar.org

- B. Schreiner Pegasys Strategy and Development, South Africa e-mail: barbara@pegasys.co.za
- S. Fakir Stellenbosch University, South Africa e-mail: saliem@sun.ac.za