

IFF PRESS WATER POLICY SERIES

Water Trading and Global Water Scarcity

International experiences

Edited by
Josefina Maestu

 IFF PRESS
Innovations from the past, now.



Water Trading and Global Water Scarcity

International Experiences

Edited by Josefina Maestu

This first edition published 2013
by RFF Press
Routledge 2 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN

Simultaneously published in the USA and Canada
by RFF Press
Routledge 711 Third Avenue, New York, NY 10017

RFF Press is an imprint of the Taylor & Francis Group, an informa business

© 2013 for selection and editorial material, Josefina Maestu and the EXPO Zaragoza;
individual chapters, the contributors

The right of Josefina Maestu to be identified as editor of this work has been asserted by her
in accordance with sections 77 and 78 of the Copyright, Designs and Patents Act 1988.

All rights reserved. No part of this book may be reprinted or reproduced or utilized in any
form or by any electronic, mechanical, or other means, now known or hereafter invented,
including photocopying and recording, or in any information storage or retrieval system,
without permission in writing from the publishers.

Trademark notice: Product or corporate names may be trademarks or registered trademarks,
and are used only for identification and explanation without intent to infringe.

Disclaimer: The views expressed in this document are those of the authors and do not
necessarily reflect the views of the United Nations. The designations, analysis and materials
presented in this book are those of the authors and in no way represent opinions of the
Secretariat of the United Nations or those of the United Nations Office to Support the
International Decade for Action: Water for Life 2005–2015. They neither represent their
opinions concerning the legal status of any country, territory, city or area, or of its
authorities, or concerning the delimitation of its frontiers or boundaries.

Disclaimer: The findings, interpretations, and conclusions offered in RFF Press publications
are those of the authors. They do not necessarily represent the views of Resources for the
Future, its directors, or its officers. Similarly, any geographic boundaries and titles depicted
in RFF Press publications do not imply any judgment or opinion about the legal status of a
territory on the part of Resources for the Future.

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

Library of Congress Cataloging-in-Publication Data
Water trading and global water scarcity : international experiences / edited by Josefina
Maestu. – 1st ed.

p. cm.

Includes bibliographical references and index.

1. Water transfer. 2. Water-supply–International cooperation. I. Maestu, Josefina.

HD1691.W3655 2013

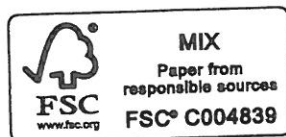
333.33'9–dc23

2012021794

ISBN13: 978-0-415-63821-0 (hbk)

ISBN13: 978-0-203-08415-1 (ebk)

Typeset in Baskerville
by FiSH Books Ltd, Enfield



Printed and bound in Great Britain by
TJ International Ltd, Padstow, Cornwall

Contents

<i>List of illustrations</i>	viii
<i>Preface</i>	xi
<i>Contributors</i>	xiii
1 Introduction: myths, principles and issues in water trading	1
RONALD C. GRIFFIN, DANNELE E. PECK AND JOSEFINA MAESTU	
PART I	
Water trading experiences	15
<i>Introduction: how we are implementing water trading – learning from experience</i>	15
JOSEFINA MAESTU	
2 Managing water stress, drought and climate change in the twenty-first century: water trading as part of integrated approaches in water management	20
CODY L. KNUTSON	
3 New frontiers for water management: the California experience	38
ELLEN HANAK	
4 Water trades in the western United States: risk, speculation and property rights	55
KRISTIANA HANSEN, RICHARD HOWITT AND JEFFREY WILLIAMS	
5 Water markets and their environmental, social and economic impacts in Australia	68
HENNING BJORN LUND, SARAH WHEELER AND PETER ROSSINI	
6 Trading into and out of trouble: Australian's water allocation and trading experience	94
MIKE YOUNG	

7	The evolution of water markets in Chile	111
	GUILLERMO DONOSO	
8	The experience of water markets and the market model in Chile	130
	CARL J. BAUER	
9	Breaking the gridlock in water reforms through water markets: experience and issues for India	144
	NIRMAL MOHANTY AND SHREEKANT GUPTA	
10	Areas of conflict and the role of water trading: the case of Spain	163
	ANTONIO SERRANO RODRÍGUEZ	
11	Voluntary water trading in Spain: a mixed approach of public and private initiatives	180
	ALBERTO GARRIDO, JOSEFINA MAESTU, ALMUDENA GÓMEZ-RAMOS, TEODORO ESTRELA, JESÚS YAGÜE, RICARDO SEGURA, JAVIER CALATRAVA, PEDRO ARROJO AND FRANCISCO CUBILLO	
PART II		
Concerns about water trading and how are we dealing with them 195		
	<i>Introduction: concerns about water trading</i>	195
	CARLOS MARIO GÓMEZ, EDUARD INTERWIES AND STEFAN GÖRLITZ	
12	The myth of markets for water	199
	JOSEPH W. DELLAPENNA	
13	Cash flows: markets for environmental flow allocations	214
	DAVID KATZ	
14	Experiences with water quality trading in the United States of America	233
	ROBERT J. ROSE	
PART III		
Reforms to overcome legal and institutional barriers to trading 243		
	<i>Introduction: considering institutional frameworks and legal reforms in trading</i>	243
	CARLOS MARIO GÓMEZ	

15	Water and development in Latin America: rights, markets, economic context and institutional requirements	247
	MIGUEL SOLANES	
16	The theory and practice of Australian institutional reforms to incorporate water markets in integrated water resources management	259
	JENNIFER MCKAY	
17	Legal reforms that facilitate trading of water use rights in Spain	274
	ANTONIO EMBID IRUJO	
18	Drought management, uncertainty and option contracts	286
	ALMUDENA GÓMEZ-RAMOS	
PART IV		
	Incentives and prices in water trading	299
	<i>Introduction: incentives and prices in water trading</i>	299
	CARLOS MARIO GÓMEZ	
19	Models for optimal water management and conflict resolution	302
	FRANKLIN M. FISHER	
20	Optimization modeling in water resource systems and markets	321
	JAY R. LUND	
21	Conclusions and recommendations for implementing water trading: how water trading can be part of the solution	334
	JOSEFINA MAESTU AND ALMUDENA GÓMEZ-RAMOS	
	<i>Index</i>	347

Part II

Concerns about water trading and how we are dealing with them

Introduction: concerns about water trading

Carlos Mario Gómez, Eduard Interwies, and Stefan Görlitz

Evidence from experience and case studies presented in the previous chapters demonstrate that allocating water to its most valuable uses provides opportunities to increase economic and social welfare. Allowing for water trading is a way to leave water users the way to spontaneously agree on a better allocation of a pre-existing set of water property rights.

In a properly working water trading scheme both the current and the would-be owners of water property rights are able to find a mutually beneficial agreement serving two purposes simultaneously: on one side, the increase in the value obtained by the economy with the amount of water available, and, on the other, sharing the financial surplus thus obtained. By definition the water transactions that take place are those that are mutually beneficial for all the individuals directly involved in the trade and, at the same time, those that increase the market value of the concerned water-using activities such as agriculture, manufacturing, hydropower, or drinking water production. There is little doubt that allowing for water trading is an alternative to foster some economic development goals in areas such as expansion of agriculture, urban development, or hydroelectricity, and it is particularly so in the face of water scarcity.

However, the main concerns are whether what is good for the individuals engaged in water trading can also be judged as equally desirable for the entire society. At the same time, we can also ask whether the changes induced by the trade in the water-using economic activities are compatible with the goals of sustainable development. The different concerns surrounding water markets that are discussed in this part of the book are connected to these social goals of water governance that definitively cannot be taken for granted in water trading schemes: the equity and/or the ecologic sustainability of the water allocation resulting from water trading.

In fact, the apparently strong evidence in favor of water trading may become weak when the scope of the analysis is extended beyond the local

short-term efficiency gains resulting from reallocating water. The chapters in this section of the book illustrate how water-trading advantages become more uncertain when, for example, we add to the picture the third parties not directly involved in water bargaining. The same may happen when we consider the water resource rather than the particular amounts of water used for individual purposes. In a similar way, the evident short-term welfare gains can become uncertain when we consider that in the medium and the long term water uses cannot exceed the ability of water ecosystems to continue providing the economy with the critical water services it depends on.

Trading is a clear mechanism to foster economic efficiency but markets do not necessarily do it in an equitable manner. Not only are markets not a valid means to provide access to water and sanitation to the poor; in the particular case of water, markets also do not include in the bargaining process all the parties and individuals to whom water is important. Among those who risk to be excluded there are the so-called third parties. They include all the water users that can be affected because of the effect transactions may have over the amount of water available at any point in the basin: those affected by, for example, changes in river flows, water returns or groundwater recharge along the river basin. In addition to that, water resources are not only valuable because of the services provided to different economic activities to which water contributes as an essential input. Water resources also support many environmental services, such as recreation, health, and biodiversity, that cannot possibly be part of water trading deals. In fact water transactions involve only a rather limited set of water users while the interest of all others including those affected by the non-use environmental services provided by water connected ecosystems can only be protected by properly working water governance institutions. In mature water markets, governance includes institutions with expertise, consolidated water administration, comments and approval processes, and regulation of social, environmental, and third party effects, including the tax base of areas of origin. The most important regulation is limitation of trade to historical use and consumed volumes, to minimize third party and environmental impacts.

In addition, the social perception on the purpose and the means of water policy has radically changed since the first modern experiments of water trading were implemented in the early 1980s. The initial priorities – to support agricultural, industrial, and urban development, and to overcome the constraints resulting from a limited supply of water resources – have slowly shifted towards a new vision focused mostly on preserving water assets rather than administering water flows and also on balancing economic progress with the other important goals of attaining social fairness and ecological sustainability. This recent and still-in-progress change in water policy affects the perception about the performance of water trading. Some advantages are now less evident partly because most of the

environmental outcomes of water trading remain simply unobservable (for example, a proper monitoring of water transactions in Chile is still pending), or have not been given political importance so far. An example of the latter is the recent recognition that trading opportunities can increase water scarcity as they may put into use water rights that would remain otherwise unused. Water markets allowing the transaction of hitherto non used waters and of nominal-as opposed to effectively used volumes-entitlements have raised concerns regarding sustainability and social equity.

In fact there are many individual opportunities and actions that are connected to each other through the water environment (involving users up- and downstream, those who benefit from water use and those who appreciate the preserving non-use services more, the current importance of water uses versus the future generations options, etc.). The recognition of that is but one of the elements below the many concerns about the potential advantages and disadvantages of allowing water trading.

Regarding water trading, the chapters in this part of the book draw attention to the importance of social and environmental concerns and values, on the one hand, and to the subsequent importance of the scheme's design on the other. Water markets need to be assessed not only by their local short term efficiency gains but by their contribution to foster economic progress, social justice and ecological sustainability. The difficulty of this task demonstrates clearly the importance of design and institutional arrangements in shaping – and judging – water trading systems. Naturally, there is no generally accepted approach to the framework and design of water markets. On the contrary, questions regarding the amount of economic liberty granted in a water trading scheme, the level of regulation by public authorities, the necessary legal security concerning private property rights, the inclusion of externalities, the issuing of permits or water use rights etc. are hotly debated topics. Generally, however, it has to be stated that there can be no generalized approach to forming water markets, as each trading scheme's design has to take into account the scheme-specific circumstances, both spatial (e.g. hydro-geological background of watershed/river basin; specifics in water use etc.) and factual (e.g. economic, ecologic and social objectives).

In Chapter 12, Joseph W. Dellapenna firmly criticizes the temptation, supported by some economists, of pushing water markets as the single most effective solution to water allocation challenges. He states that the exigent conditions required for a water market to work efficiently, which are present in few existing markets, but are especially unlikely regarding water – exclusive, secure, well-defined, non-attenuated, transferable and enforceable private property rights, absence of market distortions among buyers and sellers, and absence of uncovered external benefits and costs – are nearly impossible to install in the case of water, and that the yet existing water markets are only functioning through heavy intervention of public authorities. Moreover, he argues that advocates of water trading

schemes often fail to recognize the public good nature of water and the considerable transaction costs inherent in attempts to treat it as a private good, thus neglecting a further restraint to the proper functioning of a non-regulated water market. Dellapenna calls in his article for a careful consideration of water markets as a tool for reallocating water use rights. Because of the importance of water as a social good, the public authorities need to take an important role as regulator. Therefore, water markets are, according to the author, a potentially effective (and efficient) economic instrument among others that, in any case, can only work in a proper regulatory environment.

In Chapter 13, David Katz explores the kind of reforms that have the potential to make water markets work also for the environment (e.g. for guaranteeing and going beyond minimum environmental flows and for protecting crucial ecosystem services). The author provides a review of the theory and empirical literature concerning water markets and environmental flows, as well as possible third party impacts incurred by transferring great volumes of water along great distances. Katz provides compelling evidence on the economic value the public assign to the maintenance of environmental flows and shows how water markets are a potentially significant option for securing these flows. He recognizes, however, the various challenges that impede a proper market allocation of environmental flows – gaps in information regarding economic and ecologic benefits of environmental flows, regulatory constraints, and the nature of water as a non-stationary, both public and private good.

In the third and final chapter in this section, Robert J. Rose (Chapter 14) focuses on the potential of transferable emissions schemes to reduce widespread water pollution loads. The critical importance of the institutional set-up is underlined by the analysis of its more necessary components, such as the enforcement of strict caps, and also through the discussion of the role of the command-and-control instruments in place that need to be adapted, when not removed, in order to guarantee an effective functioning of such a trading alternative. The developed theoretical framework is then applied hypothetically to the Po River Basin in order to highlight the type of analysis necessary to create the least constraining policy that sufficiently addresses existing hot spots and issues regarding fate and transport of pollutants. The author concludes by highlighting the importance of a progressive strategy during the transition. The best option, according to Katz, is to start with simple options, and only allow more complicated alternatives as the advantages and disadvantages become more evident and social acceptability increases.