Water Resources Allocation:Policy Socioeconomic Issues in Cyprus

Koundouri, Phoebe and Birol, Ekin

2011

Metadata of the chapter that will be visualized online

Series Title		
Chapter Title	Introduction	
Chapter SubTitle		
Copyright Year	2011	
Copyright Holder	Springer Science+Business Media B.V.	

Corresponding Author	Family Name	**Koundouri**
	Particle	
	Given Name	**Phoebe**
	Suffix	
	Division	Department of International and European Economic Studies
	Organization	Athens University of Economics and Business
	Address	76 Patission street, GR-104 34, Athens, Greece
	Email	pkoundouri@aueb.gr
Author	Family Name	**Birol**
	Particle	
	Given Name	**Ekin**
	Suffix	
	Division	Department of Land Economy and Research
	Organization	Fellow at Homerton College, University of Cambridge
	Address	London, United Kingdom
	Division	
	Organization	International Food Policy Research Institute (IFPRI)
	Address	2033 K St, 20006-1002, NW, Washington DC, USA
	Email	e.birol@cgiar.org

Abstract	This chapter aims to communicate the two main rasons d'être of this book, namely: (1) to present and analyze the Cyprus experience in water resources management policies (2) communicate this experience to other countries that can inform, develop and improve their water resources policies by understanding the strong and weak elements of the Cyprus experience. Moreover, the chapter introduces the specific themes and issues that are analyzed in the consecutive chapters of the book.

Keywords (separated by '-')	Water scarcity - Water resources management - Sustainable development - Sustainable policies and politics

Chapter 1
Introduction

Phoebe Koundouri and Ekin Birol

Abstract This chapter aims to communicate the two main rasons d'être of this book, namely: (1) to present and analyze the Cyprus experience in water resources management policies (2) communicate this experience to other countries that can inform, develop and improve their water resources policies by understanding the strong and weak elements of the Cyprus experience. Moreover, the chapter introduces the specific themes and issues that are analyzed in the consecutive chapters of the book.

Keywords Water scarcity • Water resources management • Sustainable development • Sustainable policies and politics

Water management is an important problem in the island of Cyprus.[1] Cyprus is representative of arid and semi-arid regions, typified by lack of rain; spatial separation of water supply and demand; irrigation-based agriculture, and overuse of groundwater sources. Water scarcity in the island occurs across many dimensions. Firstly, there is growing demand for water in residential, industrial and agricultural sectors, stemming largely from economic growth. Secondly, supply side augmentation options have become increasingly constrained, and restrictively costly. The combination of

[1] See Fig. 1.1 below, for a map of Cyprus with major cities and locations of rivers.

P. Koundouri (✉)
Department of International and European Economic Studies, Athens University of Economics and Business, 76 Patission street, GR-104 34 Athens, Greece
e-mail: pkoundouri@aueb.gr

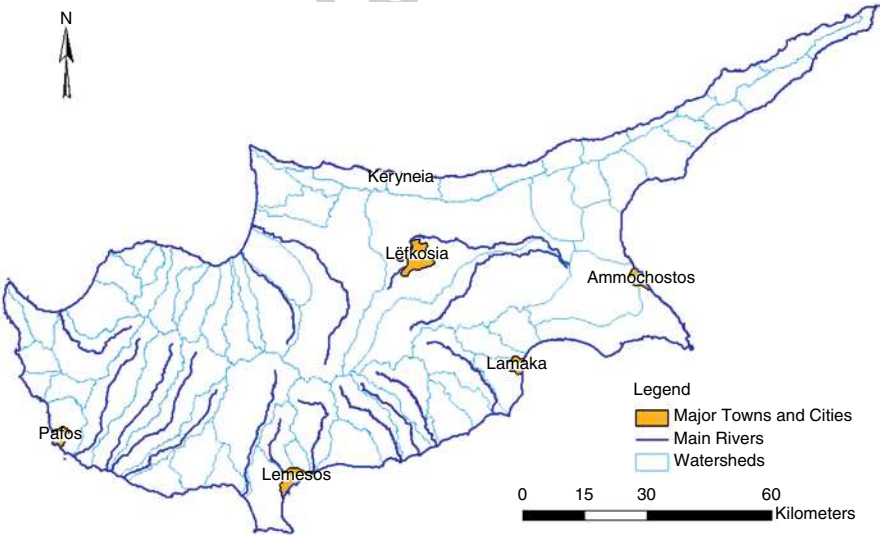
E. Birol
[AU1] Department of Land Economy and Research, Fellow at Homerton College, University of Cambridge, London, United Kingdom
and
International Food Policy Research Institute (IFPRI), 2033 K St, NW, Washington DC 20006-1002, USA
e-mail: e.birol@cgiar.org

P. Koundouri (ed.), *Water Resources Allocation: Policy and Socioeconomic Issues in Cyprus*, DOI 10.1007/978-90-481-9825-2_1,

demand growth and supply side interventions has stretched current water availability to its hydrological limits. In addition to these quantity constraints, the limits to the assimilative capacity of water resources for human and industrial waste have been reached in most of the regions of the island, and consequently the quality of freshwater has been degraded. In turn, water scarcity has become an important constraint on the economic development of Cyprus, and resulted in fierce competition between economic sectors that rely upon scarce water resources. Moreover, the sustainability of the island's economic development is threatened as a result of the many threats on the ecological services of the water resources. This led Cyprus to invest both resources and 'hopes' in the implementation of cutting edge water producing technologies, such as desalination and wastewater reuse policies (Fig. 1.1).

Cyprus is certainly not unique in the water resources management challenges it faces. These challenges are typical of almost all arid and semi-arid regions of the world and certainly relevant for the whole of the Mediterranean coast; hence the wider regional and international interest for this book. Moreover, the recent accession of Cyprus to the European Union (EU) in May 2004 enhances the relevance of the management approaches considered in this book, as they now become potential solutions for the wider European area. Along with the other EU directives and regulations, Cyprus is now required to implement the EU Water Framework Directive (WFD, 2000/60/EC); not an easy task by any means. This challenge is one of the central issues considered in the book.

One other interesting characteristic of Cyprus, relevant for many other countries, is that the administration of the island is divided, due to political reasons, between the area controlled by Cypriot Government and the Turkish-Cypriot administered area. This book represents one of the first attempts to co-ordinate resource



[AU2] **Fig. 1.1**

management between the two administratively separated parts of the island. In particular, the book includes joint contributions from representatives of both parts of the island, in order to discuss some of the management issues and sociopolitical complexities that arise due to the separation of the island. It is argued that the way forward for sustainable and efficient management of water resources on the island should not be fragmented and region-specific. This argument is in alignment with the requirement of the EU WFD that spells out that the whole of the island should be treated as a unique river basin. The problems that arise from the incompatibility of political boundaries with geo-hydrological ones are not unique to Cyprus: hydrological boundaries of rivers, aquifers and wetlands do not usually coincide with political boundaries, due to either historical or current political complexities. Hence regions that face such issues could benefit from following the experience of Cyprus as far as common water resources management is concerned.

Overall, Cyprus is an interesting case study that can inform water resources management in water scarce, arid and semi-arid regions, characterized by (1) a long history of supply-side management while ignoring demand management, (2) growing pressures on water resources supply, both in terms of quantity and quantity, deriving from economic development, (3) incompatibility between hydrogeological and political boundaries due to political disputes and (4) an eminent need to implement the sophisticated and demanding water related directives of the EU. These four themes constitute the international motivation for writing this book (the Cyprus-specific motivation is, I hope, explicit and obvious) and are central its structure. Chapter 2 presents the supply-side of water resources in Cyprus, while Chapter 3 describes the demand-side. These two chapters set the geo-hydrological background of the book. Chapter 4 introduces the main current challenge of water resource management in the island: the implementation of the EU WFD, which in effect calls for an integrated water management approach that can balance water demand and supply in an environmentally sustainable (good ecological water status), economically efficient and social equitable allocation. Chapter 5, presents a thorough review of the evolution of water resources administration in Cyprus and identifies recent administrative responses to the implementation of the WFD and more general harmonization with the EU. Chapter 6 identifies and analyzes the political complexities of policy-making and policy-reforming in Cyprus' water sector, with particular emphasis on its capital, Nicosia. Chapters 7–10 focus on the socio-economics of water resources management in the island, given the geo-hydrological, political, administrative and legal background presented in the first six chapters of the book. The concluding chapter proposes a holistic way forward for water resources management in Cyprus, given the climatic, hydrogeological, historical, political, ethical and socio-economic, dimensions of this interesting resource allocation problem.

In Chapters 2 and 3, Iacovos Iacovides presents a holistic ecosystem-based assessment of the natural water systems availability, and water use in the main water management regions of the island. He first investigates in Chapter 2 the supply-side of water resources, including inter-annual characteristics of precipitation and its geographic distribution; surface catchments and runoff; groundwater basins and their current water balance; surface water impoundment works; inter-basin

transfers; treated municipal wastewater reuse; water ecosystem services and support of the diversity of plant and animal species, and desalination. Given that desalination is an important parameter for the situation of water resources in Cyprus, this chapter highlights the island's experience in this supply-side enhancement method, and explains its advantages and disadvantages. The author concludes by presenting the water policies and projects planned to regulate and manage water shortages and assessing their adequacy.

Chapter 3 assesses the demand-side of the island's water resources, and presents a detailed picture of current water use by each sector, as well as an extrapolation of water use by each sector into the future. More specifically, the author describes water allocation and use by different economic sectors and geographical areas, with special emphasis on the main water user in the island: the agricultural sector. The time profile of the population-water resources equation; the impact of the seasonality of tourism, as well as the value-in-use of water in various economic sectors are also examined in detail in this chapter. Demand management measures are finally addressed and the author discusses their potential to safeguard conservation and future sustainability of water resources.

In Chapter 4, Ekin Birol, Phoebe Koundouri and Kyriaki Remoundou, provide a critical review of the aspects of water management in Cyprus related to the implementation of the WFD.[2] The water allocation problem, and the need for an integrated management approach for sustainable use of European water resources, have been recognized by the EU policy makers, and resulted in the development and implementation of the WFD. This chapter presents the main provisions and deadlines of the WFD, and reviews the various measures that Cyprus has already undertaken, and is currently undertaking to implement the Directive. The authors also discuss several challenges Cyprus faces during the WFD implementation process, especially those that arise due to regional and/or local situations and conditions that are specific to Cyprus. The issue of creation of a single basin on the island is also discussed. Finally, the possible future socio-economic benefits of the WFD implementation are reviewed, and the affordability of water by different water users is examined in the light of the WFD's requirement for cost recovery of water services.

In Chapter 5, Iacovos Iacovides provides a concise review of the evolution of water resources administration in Cyprus, and documents the current changes in water resources related legislation and institutions within the context of EU harmonization. Moreover, the author highlights the inherited problematic institutional arrangements for water resources management in Cyprus. In particular, he focuses on previous legislation, which divided the responsibility for water resources administration between several ministries that exercised overlapping jurisdictions, caused duplication of efforts, and occasionally lack of action. These weaknesses and deficiencies have been targeted and corrected through the development of the new and unified legislation in accordance with the

[2] The consecutive chapters of this book contain more details with regards to the effects of the WFD implementation on the specific water issue dealt within each chapter.

requirements of the EU WFD. The new legislation is also explained in detail in this chapter.

In Chapter 6 Anthi Dionissia Brouma and Cahit Ezel identify and analyze the political complexities of policy-making and reforming policy in Cyprus' water sector, with particular emphasis on its capital, Nicosia. The Nicosia case-study was selected primarily for three reasons: (1) it is the island's capital, and therefore the center of the policy-making, as well as the decision-making apparatus; (2) it is the last divided capital in the world, which raises an international interest besides the national and regional one, and (3) the old Nicosia district already demonstrates forms of bi-communal co-operation, with regards to the drinking water distribution system, the sewage system, and the Nicosia 'Master Plan' for the rehabilitation of the within-the-walls city.

These three existing areas of collaboration seem to follow the logic of policy networks, and if appropriately supported, can encourage the rapprochement of the two communities. The academic and ethnic background of the authors of this chapter facilitated the collection and analysis of the related data. The chapter argues that policy networks are a new form of governance for water resources, one that may lead the island out of its political and resource impasse. Policy networks provide a non-hierarchical arena for non-strategic, communicative interaction to overcome deadlock situations and problems related to collective action. Policy networks reflect a changed relationship between state and society. They signal a real change in the structure of policy making, along with the European orientation of Cyprus. They represent an alternative form of governance that has been studied extensively in the context of European integration, and transferring this framework into the water sector may prove effective. Cyprus' accession to the EU in May 2004 has signaled the beginning of a new era for water policy, which will, through the implementation of the WFD require the mutual co-operation of the island's divided communities. Besides leading to a more rational and integrated water management, policy networks can also plant the seeds for co-operation and engagement between the two Cypriot communities. This is because the negotiations for water management need to be based on multi-stakeholder communication, mutual trust and voluntary bargaining. By examining the three joint policy areas, the Nicosia case-study presented in Chapter 9, reveals the potential for transition from water management to water governance for the whole island, with the EU harmonization being the target for, as well as the leading force of this change.

In Chapter 7, Ben Groom and Phoebe Koundouri critically review, from an economic perspective, the gap between the current status of water management in Cyprus and the requirements for the implementation of the WFD. Moreover, the authors propose a socio-economic approach for eliminating this gap, and apply this approach to the Kouris watershed, the main watershed in Cyprus, to illustrate in practical terms the way forward for the implementation of the WFD implementation. The proposed approach is composed of two stages. In the first stage, economic valuation techniques are used to estimate the economic value of the competing demands for surface and groundwater, by incorporating, where necessary, issues pertaining to water quality and ecosystem sustainability. This valuation exercise allows for the objective

balancing of demands based upon the equi-marginal principle to achieve economic efficiency. In the second stage, a policy impact analysis is proposed. This analysis addresses social equity issues, as well as the value of water for environmental and ecological purposes.

In Chapter 8, George Socratous argues that the impressive development of the conventional water sources that was achieved in Cyprus after the independence in 1960, has proved to be insufficient for tackling of the extreme droughts of the last decade. The new water policy, or 'Master Plan' (Demetriades 1998), presented in this chapter is flexible and safeguards sustainability. Its objectives include the balance of supply and sector-specific water demands; the maintenance and enhancement of the water quality, and the integrated management of the water resources. The measures to be undertaken and the actions to be implemented are in harmony with the requirements of the EU WFD. In essence, these measures and actions, which will be undertaken in a holistic manner, will secure additional sources of water supply, including desalinated seawater; introduce "demand management" strategies, especially economically efficient water pricing; modify the current crop/water allocation matrix; curtail the irrigated land area wherever possible; recover the aquifers; maintain and enhance the quality of the water and the environment, and establish a 'Water Entity' for effective and efficient management of water resources. To safeguard sustainability, the analysis in this chapter deals with matters discussed in previous chapters, and explains the measures and actions, which will be implemented to achieve the required reorganization; the improved reallocation of resources; the correct pricing of raw water, and the protection and monitoring of water quality.

As discussed in previous chapters, the challenge facing Cyprus, and in fact all water deficient areas, is that of limited water supplies in the face of steadily increasing water demand. The problem is expected to reach crisis levels within a few years unless there is a shift from water policies based on water supply management towards new policies that favor water "demand management". Too often, conservation, demand management and least-cost planning are viewed as separate from conventional urban water planning and management, rather than as an integral part of it. In Chapter 9 George Socratous investigates water "demand management" policies in conjunction with management practices in urban water supply, before and after the accession of Cyprus to the EU. As discussed in Chapter 5, previously the water sector in Cyprus was largely fragmented, and lacked a single institutional body able to exercise overall control and monitoring over the whole water cycle. In this chapter institutional aspects related to urban water supplies are reviewed, and suggestions are made for harmonization with the requirements of the EU WFD. Water "demand management" policies discussed in this chapter include water pricing and cost recovery; efficient and effective use of water in all water use sectors; economies and diseconomies of scale associated with larger autonomous regional water authorities; reduction of water losses from the distribution networks based on active leakage management policies; water conservation with emphasis on quality maintenance and enhancement, and finally, public awareness. Moreover, specific water-saving measures and programs are identified and evaluated, alongside the role of watershed protection and management in meeting urban water drinking needs. These policies

discussed in this chapter are in accord with the requirements of the WFD. Although, special emphasis is given to the pricing and costing policy, which is widely regarded as the most immediate and effective measure in promoting efficiency and conservation in water use, this chapter also discusses in depth water conservation and efficiency measures beyond pricing incentives.

Chapter 10 focuses on the importance of sustainable management and conservation of wetlands, as a crucial component of integrated management of water resources. Wetlands are a crucial component of water resources, providing several ecological functions and services, including groundwater recharge and water quality maintenance. Consequently, the role and importance of sustainable management and conservation of wetlands in integrated management of water resources cannot be overlooked. Wetlands also generate various other ecological functions and services, such as conservation of biodiversity and provision of recreational activities, all of which benefit the society. In Cyprus wetlands have been degraded and drained due to increasing intensity of the agricultural production; water pollution, and the failure of policies to efficiently and effectively manage them. On the other hand, the demand for wetland amenities has, as in other developed countries, increased with the increase in per capita income.

In this chapter Ekin Birol, Phoebe Koundouri and Yiannis Kountouris argue that in order to be able to design and implement efficient and effective policies for wetland management and conservation, the total value of the benefits generated by their several services and functions need to be realized and captured. Emphasis is given to the use of non-market valuation methods to capture wetland values, since most of the values that wetlands generate are public goods, which are not traded in markets. In this chapter we employ a non-market valuation method, namely a contingent valuation survey, to capture the value of the economic benefits generated by the Akrotiri wetland. The chapter proposes how the results of this survey can be employed to design and implement efficient and effective wetland conservation policies, as a part of integrated water resource management in Cyprus.

The concluding chapter by Phoebe Koundouri, Ekin Birol and Cahit Ezel, proposes a holistic way forward for water resources management in Cyprus, given the climatic, hydrogeological, socio-economic, historical, political and ethical dimensions of this interesting resource allocation problem. Moreover, the beneficial effects of WFD implementation on water management are identified, and the potential of treating the whole of the island (both the area controlled by the Cypriot Government and the Turkish-Cypriot administered area) as one management unit are discussed.

In closing this chapter I want to re-emphasize that this book does not only aim to present and analyze the Cyprus experience in water resources management policies. This book also opts to communicate this experience to other countries that can inform, develop and improve their water resources policies by understanding the strong and weak elements of the Cyprus experience. The dilemma facing Cyprus – that of limited water supplies in the face of steadily increasing water demand – is characteristic of most arid and semi-arid countries, not only those located in the southern European and Mediterranean regions, but also regions in the US, Middle East, Africa, Asia and Latin America. Water scarcity has become one of the major problems

the world is facing today with rivers running dry, aquifers depleting and lakes disappearing worldwide. World Bank reports demonstrate that Near East and North Africa are the most water-short regions in the world. Jordan, Yemen, Israel and Saudi Arabia are few examples of countries withdrawing more water from rivers and aquifers than is being replenished. Meanwhile, large countries such as China, India and United States also report severe water shortages and depleted groundwater reserves. According to the European Environmental Agency (EEA 2005) nine European countries can be considered water stressed (Cyprus, Bulgaria, Belgium, Spain, Malta, FYROM, Italy, UK, and Germany). Further, information from member states reporting under article 5 of the Water Framework Directive provides additional evidence that many EU regions suffer from water scarcity(COM (2007) 128 final). The available data show that at least 10.4% of the EU territory has been affected so far by water scarcity situations. Since the primer cause of the serious water crisis the world is enduring is unsustainable management of water resources and not water availability as such, lessons from the Cyprus' experience towards sustainable water resources management could provide useful guidance to policy-makers worldwide. Valuation techniques that are presented in Chapter 7 of the current volume as well as their application to selected case studies in Cyprus (Chapter 10) also provide useful tools for decision-making in other arid and semi-arid areas. Given that water resources are public goods and hence do not have readily available monetary values attached to them, valuation methods allow researchers to capture the social benefits associated with sustainable water resources management and provide resources managers and policy-makers with valuable information about public preferences for many states of the aquatic environment. Indeed, the case studies under this book do not only provide area-specific valuation results but intend to inform the implementation of environmental policies and provides methodological and practical insights water resources management in other parts of the world.

In addition, the fact that water scarcity becomes more acute due to the existence of point and non-point source pollution, as well as over-abstraction from renewable groundwater aquifers, is not unique to Cyprus. Many European countries and US regions, as well countries of the Middle East, face these problems and are currently using or contemplating the use of desalination, water reuse and/or water recycling, in order to overcome them. Moreover, the current fragmented structure of the water sector in Cyprus and the lack of a single institutional body able to exercise overall control and monitoring over the whole water cycle, is the status quo in most European and in general water deficient, countries. Hence the way Cyprus is dealing, either successfully or unsuccessfully, with these management and policy problems can inform and guide similar efforts in other countries. Further the book reviews all the administrative and institutional reforms undertaken to facilitate efficient water resources management in Cyprus. The implications for other countries experiencing institutional failures and inefficiencies are straightforward. Another very interesting characteristic of Cyprus is that the water management administrative boundaries do not coincide with the hydrological ones while there is considerable lack of collaboration between the two administrations (the Cypriot Government and the Turkish-Cypriot administered area). This results in inability to manage the whole of the island as a

unique basin, which is highly inefficient. Similar situations that sometimes resulted even in wars, have been arising throughout history and all over the world, due to the importance of water resources for the development of communities and states. Hence, the experience of Cyprus can add to the knowledge of how to manage water resources owned in common by non-cooperative governments. Finally, Cyprus' way towards the implementation of the EU WFD can be very instructive for the newly accessing EU countries.

[AU3]

References

Charalambous CN (2001) Water management under drought conditions. Deasalination 138:3–6

Demetriades L (1998) The Nicosia Master Plan. J Mediterr Stud 8(2):169–176

European Commission (2000) Directive 2000/60/EC of the European Parliament and of the Council of 23rd October 2000 establishing a framework for Community action in the field of water policy, Official Journal 22 December 2000 L 327/1, European Commission, Brussels

Commission of the European Communities (2007) Towards sustainable water management in the European Union. First stage in the implementation of the Water Framework Directive 2000/60/EC. Accompanying document to the Communication from the Commission to the European Parliament and the Council. COM (2007) 128 final

European Environmental Agency (2005) European environment outlook. EEA Report No 4/2005

Georgiou A (2002) Reassessment of the island's water resources and demand – assessment of groundwater resources of Cyprus. WDD/FAO TCP/CYP/8921, Nicosia, Cyprus

Socratous G (2001) Management of water in Cyprus, speech presented at the 1st Congress Balears 2015. Water, prospectives for the future, available at http://www.pio.gov.cy/wdd/eng/scientific_articles/archieve2001/article01.htm. Last accessed November 2008

Tsiourtis NX (2001) Seawater desalination projects. The Cyprus experience. Desalination 139:139–147

Author Queries

Chapter No.: 1 0001191809

Queries	Details Required	Author's Response
AU1	Please check if this affiliation can be deleted from the text.	
AU2	Please provide fig caption for Fig. 1.1.	
AU3	Following references are not cited in text: Charalambous CN. Water management under drought conditions. Deasalination. 2001;138:3–6. European Commission (2000) Directive 2000/60/EC of the European Parliament and of the Council of 23rd October 2000 establishing a framework for Community action in the field of water policy, Official Journal 22 December 2000 L 327/1, European Commission, Brussels. Georgiou A (2002) Reassessment of the island's water resources and demand – assessment of groundwater resources of Cyprus. WDD/FAO TCP/CYP/8921, Nicosia, Cyprus. Socratous G (2001) Management of water in Cyprus, speech presented at the 1st Congress Balears 2015. Water, prospectives for the future, available at http://www.pio.gov.cy/wdd/eng/scientific_articles/archieve2001/article01.htm. Last accessed November 2008 Tsiourtis NX. Seawater desalination projects. The Cyprus experience. Desalination. 2001;139:139–47.	