

Preface

Who is this for? What should they know?

Because of the powerful insights that economics brings to water management, books like this should reach beyond an audience of economists. Therein lies a challenge. Due to other pressing demands, few water managers or planners have invested in economics. Because they come mainly from the engineering and science disciplines, most water professionals have limited exposure to economic fundamentals. For these people, it's rarely practical to study microeconomics and natural resource economics before getting schooled in water resource economics. Few have that kind of time or patience. For these reasons, this text is designed for economists, engineers, and natural scientists.

Economist readers possess conceptual knowledge that is readily adapted to water resources, especially if they have studied natural resource economics. The comparative advantage for audiences from the engineering and natural science disciplines is their strong math skills. With the aid of mathematics, important economic principles can be accessed quite quickly. It turns out that the initial wisdom emerging from economics is quite practical, yielding positive feedback regarding the merits of knowing "some" water resource economics. You don't have to go all the way to the end to enjoy benefits. Such affirmations inspire continued study too. Fortunately, many dedicated individuals consider themselves to be publicly assigned stewards of water resources, making it easier for them to welcome new tools. Of course, there will always be old-school defenders who didn't have to learn any economics and can't imagine why anyone should. Oh well.

The intended level of reader includes graduate students of many disciplines, water planning professionals with baccalaureates, and upper-level undergraduates possessing solid math backgrounds. The needed mathematics pertain to optimization (setting derivatives equal to zero) and integral calculus (finding areas under curves). In addition, the presentation will not be shy about using vector notation, although our use of linear algebra will be confined to simple vector products. A lot of the economics

contained in this book is not mathematically oriented, but at times the insights enabled by mathematics are indispensable.

It is helpful to have prior familiarity with microeconomics or natural resource economics, but all the needed economics is developed in the text. Hopefully, by developing all the required tools in a self-contained book, a point of access to this important topic will be fruitfully realized. In this way, self-study becomes practical too. Special diligence by noneconomist readers will be needed, for the path is a steady and rigorous climb. Do not skip things. Do not move forward until you have a good grasp of the present topic. Missed ideas and concepts will become detrimental later on, as no economic tools are developed here unless they are useful in water planning or management. Chapters 2–4 are pivotal in this regard. For those readers desiring only a foundational exposure to water resource economics, chapters 1–4 and 6–8 should serve nicely.

One of the book's goals is to assemble and apply the minimal set of economic theory needed to understand and operationalize water resource economics. To bind empiricism (number crunching) and theory more tightly, all graphic portrayals of economic theory and most calculations will be performed using Mathematica, an analytic mathematics software package. Consequently, this material is less abstract than what is usually encountered in economics. The programming code for these graphics and routines is not included with the text, but the programs are freely available for anyone who wants to “follow along,” and it is hoped that this code can serve as a model for readers' future work in water resource economics. Perhaps readers will contribute additional material of this type too. The makers of Mathematica (<http://www.wri.com>) distribute a free application known as MathReader that enables users of any computer platform to read the programming code and output of Mathematica programs. The accompanying programs of this book, including programs for reproducing many of the figures, are accessible through the author's Web site, (<http://waterecon.tamu.edu>). Most of this code is sufficiently transparent to guide programming in other languages. Although these tools are useful learning and “doing” aids, their retrieval is completely optional.

Many of the water topics discussed here, if not all of them, are also addressable using the doctrines of other disciplines (sociology, geography, political science, law, etc.). In most instances, a good policy design will draw insight from many places. We will embark on a purer course—adhering strictly to economic directives in developing management advice. This approach does not dilute or muddy the messages of economics—which would occur if one pursued some manner of blending, as performed in typical water management books. We will be true to the economics source material so as to let it stand on its own two feet and be clearly visible—for its successes, possibly its faults, and certainly for its differences. As a result, it will be inter-

esting to contrast economic ideals about water to your usual thinking as you proceed through this text.

To keep the topic manageable, we will focus on the scarcity of water *quantity*. Yes, water quality is a serious topic too, and economics has a lot to say about it. There are even important social problems in which issues of water quantity and quality interface. It suits an introductory text, however, that the scope be workably delimited.

A final orientation deserving of explanation is the geopolitical focus. We will emphasize U.S. situations and applications whenever it is important to select an institutional or physical context. The fundamental water resource economics presented in this book is devoid of U.S. definition, but water resource economics is an inherently policy-oriented field of inquiry. That is, the ultimate contributions of water resource economics have to do with improving management policies. To speak about improving policy it is often useful to have a starting place. Wherever necessary in this text, U.S. policy constitutes the primary background.