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ECONOMIC GOOD VS. PUBLIC VALUES:
THE CONSIDERATION OF SOCIAL OBJECTIVES IN THE
WATER PRIVATIZATION PROCESS

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ABSTRACT

The privatization of water services has grown significantly in recent years. This thesis examines if water privatization is a socially responsive solution to alleviating global water concerns. First, selected past privatization attempts were reviewed in the literature. The concerns and purported benefits regarding water privatization identified are then presented in objectives hierarchies. Next, a case study of Oahu, Hawaii, was conducted to demonstrate how values could be considered in the privatization of the water sector. The Analytic Hierarchy Process (AHP) was used in this study to measure the importance, or relative priorities, of such values. The findings from the literature review and case study were then analyzed in conjunction with theoretical reflections and purported desiderata as articulated by both researchers and practitioners. The research results showed that the Oahu stakeholders interviewed regard environmental considerations to be of greatest importance. Additionally, the AHP highlighted the fact that participants would like to have the purported efficiency benefits from privatization, but would also like societal objectives to be adequately met. The case study results serve as an effective guide to use if Oahu is faced with significant water management changes.

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Chapter 1: INTRODUCTION

How well we manage the water we have is becoming a matter of life and death more quickly than we are prepared for (Ward, 2002, p. 14).

1.1 Water resource development and management

Throughout history, water resource development's ever-changing existence has stemmed from societal pressures. More specifically, it has often been recognized that "humans have long sought ways of capturing, storing, cleaning, and redirecting freshwater resources in efforts to reduce their vulnerability to irregular river flows and unpredictable rainfall" (Gleick, 2000, p. 127). As water development has evolved with the desire for greater public convenience, water management practices have also had to adjust to meet these demands. Urban water system planning has long attempted to find the perfect balance between diminishing freshwater supplies and the increasing demands for it. Currently, however, 1.2 billion people in the world lack access to clean drinking water and 2.9 billion lack access to adequate sanitation services (Finger and Allouche, 2002, p. xiii). Despite attempts to satisfy humanity's water needs, a tremendous disparity between the supply and demand of freshwater continues to plague certain regions and is of great concern for urban water resource planning.

Traditionally, the response to meeting the increasing demands has focused predominantly on physical infrastructure, such as dam construction and water diversions, for supply augmentation. Despite engineers' attempts to meet ever-increasing demands, development progress has evidently fallen short of constructing and maintaining adequate water services. In fact, it is projected that by the year 2015 at least 40% of the world's population will live in nations where their basic water needs will not be satisfied (Jehl, 2003). Towards the latter part of the twentieth century it became apparent that structural,

“supply-side” developments could no longer solve every water crisis. Furthermore, Ward (2002) states, “We began the mighty engineering works of the twentieth century in environmental ignorance and ended the century in environmental crisis” (p. 200). By the 1970s, heightened environmental awareness forced critical examination of existing systems of water development. For example, water diversions that reduced instream-flow levels became recognized for their adverse effects on aquatic ecosystems. Reliance on engineering solutions was no longer the optimal solution for increasing freshwater supplies. Water resource managers have, therefore, begun to focus on exploring more nontraditional sources of freshwater production, such as desalination, storm water re-use, and cloud seeding to augment rainfall amounts. In addition, re-allocation of agricultural water as well as increased watershed protection are examples of alternative solutions to satisfy the supply-side approach to the overall balance.

As environmental issues have become ever more evident, however, there is concern regarding the overexploitation of freshwater supplies. With communities now placing a higher value on maintaining the integrity of freshwater, water resource studies have begun to shift away from simply finding new sources. Rather than search for innovative ways to increase supplies, water resource managers have turned towards decreasing *demands* with the hope of preserving future sustainability. With such measures as increased pricing and conservation, there is optimism that the supply-demand balance can achieve stability. Many believe that behavioral and environmental changes in the community are imperative to reduce freshwater demand. This can be accomplished through voluntary and/or mandatory changes in use, as well as through modifications in incentives and penalties. Additionally, improvements in technology,

such as increasing system efficiency, can contribute to decreasing the consumption of freshwater. Reducing demands can also be achieved through changes in land use (e.g., conversion to less irrigated lands). This policy reorientation away from a focus on continually increasing the supply of freshwater towards one of decreasing its demand has influenced the water management community, which has led to changes in how each community's freshwater needs are evaluated.

Because of historical, economic, and sociopolitical contexts which may be unique to a community, one particular supply or demand option for a given area may be preferred to another. Therefore, it is important that all supply and demand alternatives be thoroughly evaluated. Several criteria and questions that ought to be considered in the evaluation process are as follows:

1. Financial and economic costs – How much is the capital investment? Who is responsible for the costs? How large are the recurrent costs, and how long into the future will they last? Do the benefits outweigh the costs? What are the opportunity costs to other sectors?
2. Environmental impact – What is the degree of the ecological impact? If there is an adverse impact, is it borne immediately or in the future, and is it reversible? Is it felt locally or regionally?
3. Efficiency – Does increasing the supply require less time, energy, resources, or money than decreasing the demand? Or vice versa?
4. Equity – Who most greatly benefits, and who most greatly feels the burden? Is the option “fair”, and how is “fairness” defined?

5. Reliability – Is the payoff of the option certain? Is it known under what conditions it may vary, and to what degree?
6. Acceptability – Is the option acceptable on a cultural, individual, political, and institutional basis?
7. Flexibility – Is the option reversible? Can it be modified easily?
8. Effectiveness – Does the option accomplish its aim?
9. Moral message – Does the option send a message regarding desirable behavior, such as the inappropriateness of wasting or overexploiting water?

Therefore, it is each community's responsibility to critically and objectively analyze its own freshwater resources, needs, and obstacles when developing its water management plan. It follows that what may work in one community may not be the correct prescription for another community. Each community has its own unique concerns and thus would require its own unique and distinct solution. As the global water crisis worsens, it is even more imperative that individual communities take direct responsibility for their freshwater circumstance.

With the least expensive sources already exhausted and higher environmental standards becoming ever more restrictive, even greater focus has been placed on the specific role that water management plays in carrying out supply-demand options. As the global population continues to grow and water resources continue to be depleted, the traditional methods of public management have clearly come into question regarding their capability of allocating water efficiently. More significantly, governments – which have thus far been principally responsible for freshwater services – have shown their incapability of improving efficiency. Gleick et al. (2002) note that since governments are

“now faced with many competing demands for limited capital” they are “increasingly reluctant or unable to pay for new water infrastructure” (p. 2). Spulber and Sabbaghi (1998) argue that the fundamental problem with public ownership has been governments’ inability “to establish incentives for relevant agencies, not only for the efficient production and distribution of water, but also for its efficient usage and for technological and managerial innovations” (p. 195). Furthermore, they argue that public enterprises simply do not provide the effective incentives necessary to force consumers to confront the true value of freshwater services representing its actual opportunity cost (Ibid.).

The foremost contemporary answer to water management alternatives has been the expansion of the private sector. It has been argued that private enterprises will be able to ensure appropriate development and modernization through increased reliance on private capital. In comparison to public control, privatization can provide the economic incentives for both water suppliers and customers to efficiently manage water resources. Spulber and Sabbaghi (1998) state,

We feel the evidence supports the general assumption that private firms have greater incentives to be innovative, to search for and to develop new, less costly production, treatment, distribution, and transmission of water resources. They also may be more capable of implementing innovations, since they are less constrained by public bureaucratic processes and by inflexible work rules (p. 218).

The push for privatization has also managed to gain recognition due to its ties with the prevailing thoughts of neoliberalism (Laurie and Marvin, 1999). Understood as a neoliberalist strategy, it is perceived that the economic incentives privatization can provide will compel people to use water more efficiently. With this current shift from government to market control, the neoliberalist ideologies have managed to transfer water

from being perceived as a public good (i.e., something that is nonrivalrous and nonexcludable) to an economic commodity.

However, as the current debate continues as to whether or not water should be viewed as an economic good – subject to the power and control of the market and multinational corporations – communities around the world are formulating their own opinions related to the topic. For example, Charles W. Howe (2000) observes, “communities are...often concerned about the implications of privatization for employment and other community values, such as aesthetics and water’s cultural values” (p. 7). Another objection to privatization that a community may have is the fear that private managers will place too much weight on profit goals. Furthermore, questions regarding whether profits and assets will leave the community, or even the country, have generated concern. As the trend towards privatization of freshwater supplies continues to increase, opposition to this movement has also intensified due to doubt over privatization’s ability to address a community’s social and cultural value of water. Since water does have vital cultural, social, and ecological relevance, market forces alone may not protect these concerns. In fact, “[s]ome of the consequences of privatization may be irreversible; hence they deserve special scrutiny and control” (Gleick et al., 2002, p. 1). In order to achieve ‘success’ within the context of the community, “effective protection of both consumer and industry interests will require that privatized industry be subject to quality controls and pipeline-channel network specifications, as well as to price constraints” (Spulber and Sabbaghi, 1998, p. 218). Whether or not private companies can function better than public companies, the level of acceptance from the community will

hinder its level of economic success as well as its hope of alleviating water scarcity concerns.

Understanding the dynamics of the relationship between the agents establishing a private enterprise and the ideals of the local community can help facilitate this shift from government-controlled water services to privately owned operations. Therefore, a study of social concerns regarding water privatization has significant relevance for future endeavors. Recognizing public values before instituting a private water sector has the potential to result in fewer complications later on. However, the new hydrologic discourse that has emerged during the late 20th Century often overlooks the importance of including values in the privatization process.

Despite the many factors (i.e., economic, political, cultural, ecological, health) that can influence the success of privatization, it is a topic primarily looked at from an economic perspective. Even though the subject clearly encompasses the multiplicity of dimensions that characterize much research within the discipline of geography, geographers have in fact done remarkably little research on the subject. Since privatization's economic achievements are affected by public acceptance, it will not accomplish the goals it claims to offer (e.g., reduce water pollution and health risks, increase population coverage, achieve better economic efficiency) unless the public embraces this new understanding. Ultimately, the broad, integrative view of the geographer can help with the privatization process by explaining these complex relationships between societies and environments. Additionally, studying the topic of water privatization and its relation to social objectives is timely since the global water industry is rapidly expanding to all corners of the world. With this geographical

expansion, a geographer's multi-faceted perspective can help in understanding any differences that may arise from regional and/or spatial variation in the type and level of privatization efforts. In order to eliminate any potential negative impacts, this accelerating trend towards water privatization needs to be regarded in its various contexts, not just in its economic form.

1.2 Goals and objectives

Based on the above observations on water privatization, the remainder of this thesis attempts to achieve a number of goals and objectives, as well as answer several specific questions. The following outline not only enumerates the main objectives of this thesis, but also clearly highlights their interrelationships.

Overall goal: To determine if water privatization is a socially responsive solution to alleviating global water concerns.

Sub-problem 1: To examine what values are, and can be, considered in the water privatization process.

Specific questions:

- a. Do privatization efforts meet certain suggested criteria and incorporate specific principles that focus on values?

- b. In past experiences, how has the water industry weighed the costs, benefits, and risks involved when considering values?

Sub-problem 2: To assess the potential for privatizing the water sector on Oahu, Hawaii.

Specific questions:

- a. What are the values selected residents impute to freshwater supply on Oahu?
- b. Based on the research findings, should privatizing the water sector for Honolulu be recommended, and if so, to what degree?

1.3 Methodology and data analysis

The methodology employed in this thesis reflects that followed in a standard systems analysis (e.g., Miser and Quade, 1995). As described by Miser and Quade (1995), the framework for systems analysis is comprised of five main tasks. A crucial early task in the systems analysis process is for the decision-maker to formulate the problem, in which objectives and criteria are clearly articulated. In the second task, the possible alternative courses of action are identified and designed. A third task in the process involves forecasting future situations. In the fourth task, a model, or procedure, is developed and used to predict the results of implementing any of the alternative actions. The last task in the systems analysis process involves choosing the most preferred alternative through an examination of preferences, priorities, and tradeoffs. The

following section below describes more clearly how information and data for this study has been collected and synthesized within this systems analysis framework.

1. Identifying objectives and concerns

In order to ascertain if people promoting privatization attempt to meet specific objectives, a literature review of past experiences was conducted. The selected texts (i.e., government data, publications from non-governmental institutions, journal articles) were used to help identify the main goals privatization is anticipated to achieve, and provide analysis and commentary as to whether or not such goals have been met. Also, documents that provided guidelines discussing how to privatize, such as manuals produced by the World Bank, were used. Texts discussing previous management regimes' relations to and understanding of the community and its traditional values provided additional valuable information. Furthermore, selected texts containing previous case studies helped elucidate essential world-views that represent various perspectives.

2. Structuring the objectives hierarchy

Often it is difficult to discern what specifically the public may value in water resources and its management. Therefore, an assessment regarding public *concerns* proved to be an effective tool in highlighting public standards. In order to clearly and precisely identify public concerns in the privatization of water and sanitation services, the information gathered was graphically depicted in an objectives hierarchy as described by Keeney (1988). Additionally, an objectives hierarchy was also constructed for the purported benefits of water privatization. This analytical approach was based on the information gathered in the literature review. Gregory and Keeney (2002) state, "An

important consideration for resource managers is to include all relevant objectives as part of the decision, not just those that may be considered legitimate or science based” (p. 1605). Therefore, arranging the information into an objectives hierarchy not only helped to clearly illustrate what the essential criteria were, but also helped to elicit all relevant information from the literature review. More specifically, the means-end distinction, which involves asking the dual questions “why is that important?” and “what do you mean by that?” served as the essential guides for linking specific, “low-level” concerns with more general, “high-level” objectives.

3. *Identifying and describing privatization options*

A literature review helped to identify and distinguish water-privatization arrangements. The privatization options described by the World Bank and the National Research Council were the principal ones analyzed. Past experiences in various parts of the world, as documented in the literature, also helped to illustrate the differing degrees of privatization in the water industry.

4. *Case study for Oahu, Hawaii*

Building on the information obtained in the previous tasks, the thesis then assesses the potential for further expansion of water privatization on Oahu, Hawaii. The holistic nature of a case study helps to explain the complexes of social actions and reactions in the decision-making process. By conducting an in-depth examination of a single phenomenon, this study is able to delve deeply into an intricate set of decisions that will have to be made for water management on Oahu. It specifically examines which aspects of freshwater and its management stakeholders value, and how those values may be used to guide the choice of privatization arrangement.

The study used informal interviews and conversations with professionals who are either directly or indirectly involved in water resource use and decision-making in Hawaii. More specifically, a broad range of individuals – from economists and legal consultants to water resource managers and cultural specialists – were asked to share their knowledge and experience for this study. The interviews not only helped support the findings from the literature review, but they also provided insight into the process of privatization. Furthermore, the experiences and interpretations by those actually involved in the process provided a diverse range of perspectives. All participants in this study have remained anonymous unless they chose otherwise. All interviews took place in person.

Using the information presented in the objectives hierarchy, the Analytic Hierarchy Process (AHP) was then implemented. Thomas L. Saaty (2001) states, “This hierarchy graphically depicts the interdependence of elements in the problem; it both isolates the relevant factors and displays them in the larger context of their relationship to each other and to the system as a whole” (p. 15). Furthermore, the AHP is a good tool for decision analysis and support since it is “designed to accommodate our human nature rather than force us into a mode of thinking that may violate our better judgment” (Ibid., p. 23). Using the information derived from the interviews eliciting professional opinions for Oahu, the criteria and subcriteria were prioritized according to their relative importance. The quantitative (ratio-level) priorities obtained through the AHP’s pairwise-comparison process identify not only which elements (goals and objectives) are the most important in the eyes of the participants, but specify how many times more important they feel one is than another. The alternative plans used in the analytic

hierarchy process are the varying types of privatization as outlined in section three. The alternatives, defined and discussed in more detail later, are:

1. Remain entirely as a public entity
2. Service contracts
3. Management contracts
4. Lease contracts
5. Concessions
6. Design, build, and operate services
7. Joint ownership
8. Full privatization

1.4 Overview of thesis

Having provided the rationale for and basic approach to a study of social values in water privatization, this introductory chapter is followed in chapter two by identifying the different water privatization options ranging from purely government-controlled to the purely private. Chapter three includes a discussion of several noteworthy developments that are intrinsically associated with the heightened interest in water privatization. Also included in this chapter is an assessment of past experiences as well as the purported benefits and drawbacks of privatization. In addition, the associated benefits and concerns regarding water privatization are presented in objectives hierarchies for better clarity. Chapter four of the thesis explores the history and development of water resources on Oahu. Also in that chapter is a discussion of water rights in Hawaii, and the rationale as to why Oahu has the potential for water privatization to occur. Chapter five specifically

examines the importance of decision-making with “unquantifiable” objectives. There the Analytic Hierarchy Process (AHP), a multicriterion decision-modeling methodology, is introduced. Chapter six then examines the use of the AHP for assessing public values regarding freshwater on Oahu, as well as present the results and potential scenarios from the AHP. In the concluding chapter, the insights gained are synthesized to suggest and assess possible directions for future water privatization efforts.

Chapter 2: WATER PRIVATIZATION OPTIONS AND SCALE IN THE U.S.

2.1 Water privatization options

As Cowen et al. (1997) state, “even where the private sector takes on full responsibility for operations and financing, as in concessions and asset sales, it does so within a framework created by the government” (p. 2). Ultimately, the government is responsible for making arrangements concerning private sector participation. It is the government’s role to “protect consumers from monopolistic pricing and enforce health and environmental standards, and subsidy regimes to ensure access to services for the disadvantaged” (Cowen et al., 1997, p. 2). There exist a range of private sector participation options (e.g., the United Kingdom is an example of full privatization, whereas Atlanta chose a concession agreement). Therefore, since the government is the primary decision-maker, it is accountable for the level of involvement of the private sector. The government must then explore the range of options according to what will best fit the needs of the community as well as achieve its principal goals.

The level of responsibility assumed by the private company typically characterizes the spectrum of options for private sector participation. Although taxonomies differ (e.g., see National Research Council, 2002), it’s convenient to differentiate seven main degrees of private sector participation, with each level representing a different option for the government and community. However, it is important to point out that these seven options are not mutually exclusive; hybrids and combinations of the options do exist (Cowen et al., 1997). The following are the seven main options treated in this thesis, listed in order of increasing involvement of the private sector: (1) service contracts, (2) management contracts, (3) lease contracts, (4)

concessions, (5) design, build, and operate services, (6) joint ownership, and (7) full sale. In the first four forms of private involvement, assets remain in government control, whereas the last three forms of privatization involve at least partial private ownership. Additionally, options one through five are typically financed by government agencies, therefore, risk is also borne by the government (National Research Council 2002). Each of the seven options is further discussed below.

(1) Service contracts

In service contracts, “the public authority retains overall responsibility for operation and maintenance of the system, except for the specific, limited-scope services that are contracted out or outsourced” (Idelovitch and Ringskog, 1995, p. 14). Tasks are coordinated by the public managers, which are typically only for a short period (i.e., six months to two years), but can also be renewed. Service contracts are implemented for a specific task, such as installing meters, meter reading, or repairing pipes. Cowen et al. (1997) comment that they are “at best a cost-effective way to meet special technical needs for a utility that is already well managed” (p. 4).

(2) Management contracts

With a management contract, the responsibility for the operation and maintenance is transferred to the private company. The contracts typically last from three to five years. The private company makes the management decisions, but must do so with the direct involvement of the public authority. The incentive to increase productivity stems from the fact that payments are proportional to some degree of physical change (e.g., volume of water produced or improved efficiency) (Idelovitch and Ringskog, 1995). Therefore, management contracts are most useful where “the main

objective is to rapidly enhance a utility's technical capacity and its efficiency in performing specific tasks, or to prepare for greater private involvement" (Cowen et al., 1997, p. 4). Examples of countries that have used management contracts and service contracts are Colombia, Malaysia, and Turkey.

(3) Lease contracts

In a lease contract, the private operator is responsible for maintenance, operation, and management of the system, while the public authority retains responsibility for financing investments. The private operator has the incentive to maintain efficient operations because they depend on collections for revenue (Idelovitch and Ringskog, 1995). Lease contracts can last anywhere from five to twenty years. France and Italy are examples where lease contracts have been used.

(4) Concessions

With concessions, the private concessionaire is responsible for the maintenance, operation, and management, as well as investments. Asset ownership remains with the government, but the private contractor is entrusted with them for the duration of the contract. Typically a regulatory agency is established, in which penalty fees are applied if the private contractor fails to meet the established goals. Concessions are "an attractive option where large investments are needed to expand the coverage or improve the quality of services" (Cowen et al., 1997, p. 6). Concession agreements are usually made for twenty to thirty years. France and Spain have both used concession agreements with many of their cities' water systems.

(5) Design, build, and operate services

These contracts are typically used for “greenfield projects,” such as water and sewage treatment plants (Cowen et al., 1997). The contracts generally have duration of twenty to thirty years. There exist several variations of design, build, and operate services, which are listed and described below:

1. Build-operate-transfer (BOT) or Build-own-operate-transfer (BOOT) or Design-build-own-operate-transfer (DBOOT): The private company constructs a plant and operates it for several years. The private company is responsible for arranging the finances as well as managing the capital. Eventually, the facility is transferred back to the public authority.
2. Design-build-operate (DBO): The public and the private sectors share responsibility for capital investments.
3. Build-operate-own (BOO): The assets remain with the private partner.
4. Reverse BOT or Reverse BOOT: The public sector first builds and finances the plant, and the plant is then contracted out to a private company for operation.

(6) Joint ownership

Joint ownership occurs when “a private sector firm and the public authority incorporate a firm under the normal commercial code” (Idelovitch and Ringskog, 1995, p. 19). In the beginning the private company and the public authority will have equal shares, but eventually the public authority can sell off its shares. Idelovitch and Ringskog (1995) comment, “In countries with a weak regulatory tradition, joint ownership may

satisfy regulatory requirements because the public sector is represented by a board of directors and will have broad insights into the firm's operations" (p. 19).

(7) Full sale

Full sale involves the outright sale of assets or shares of the public water sector. This is typically done through a management buyout. Cowen et al. (1997) observe, "Although widely used in other infrastructure sectors, divestitures in the water and sanitation sector have been limited to England and Wales" (p. 8).

2.2 Scale of water privatization in the United States

In 2002, the United States had about 4,000 privately-owned water utilities, which comprised approximately 14% of the nation's water services (National Research Council, 2002). Of this 14%, private ownership was found to be most common in smaller community water systems. National Research Council (2002) found that the highest percentage of private ownership, approximately 39.5%, was for water utilities serving less than one hundred households. The second highest percentage at 34.6% was found for water systems serving between 101 to 500 households (Ibid.). On the other hand, public ownership had the highest percentage at 87.7% for water utilities serving more than 10,000 households (Ibid.). In sum, public ownership in the United States is much more common for larger community water systems.

Chapter 3: EXPANSION OF WATER PRIVATIZATION – CHANGING DISCOURSE, POTENTIAL BENEFITS, AND THE ASSOCIATED CONCERNS

3.1 Hydrologic discourse's shift from public good to economic good

During the latter part of the 20th century there was a notable shift in focus for water resources management, as it began to depart from an emphasis on infrastructure development to a greater concentration on making water services more economically efficient. This shift from managing water as a public good to managing it as an economic good has, ultimately, opened the door for extensive privatization efforts. This emphasis on improving the economic efficiency of water services has clearly been displayed in the decisions made at important international gatherings of leading water-resource experts. For example, the Dublin Statement issued in 1992 by the International Conference on Water and the Environment reflects the desirability for a shift away from government provision of water services and towards looking at the introduction of the private sector. Finger and Allouche (2002) state that this new approach toward water resource management is clearly expressed in the Dublin Statement's Principle Four, which states "water has an economic value in all its competing uses and should be recognized as an economic good" (p. 25). The Dublin Statement signifies an international recognition as well as acceptance toward understanding that water has an economic value and therefore, should be managed as such. Acknowledging an economic approach to water management, the Dublin Statement allowed for privatization efforts to become more readily recognized as a successful way to better manage the water sector.

Another influential change in hydrologic discourse that has contributed to the expansion of privatizing water supplies and sanitation services is the debate as to whether or not water should be considered as a human *right* or a *need*. Typically, human *right*

defines water as an entitlement, something that cannot be denied with sanction (Rothfeder, 2001). In comparison, the concept that water be regarded as a human *need* defines water as something necessary, but may not be guaranteed (Ibid.). The most influential players in the world's water supply first recognized in writing the belief that water be considered a human need at the March 2000 World Water Forum in The Hague, the Netherlands. Non-governmental organizations, however, quickly dispelled this formal recognition of water being treated as a *need* rather than a right. The NGOs in disagreement later released a statement rejecting the World Water Forum report (Rothfeder, 2001). Whether or not the failure to prevent human suffering due to lack of access to safe water supplies violates a fundamental human right still remains a subject of controversy. Regardless of the debate, this new acknowledgment of human need only further supports the ideologies of privatization.

In addition to the shift away from distinguishing water as a human right, there is also a move away from identifying water as a collective good. The underlying feature of the traditional recognition of water as a collective good is the notion of social equity. Typically, the state has the responsibility to deliver water to all people regardless of the level or class of society to which they belong. Economist Ralph Turvey argues in his 1963 seminal paper entitled "On divergence between social cost and private cost" that the purpose of government intervention is not to provide economic efficiency. Instead, Turvey states, the government's critical role is to ensure equity. Customarily, government participation in water resource allocation has been one of justice; therefore, the underpinning principle of water policy has been based on social equity. More recently, however, there has been a change from assuming that users be charged

according to their ability to pay (Bakker, 2001). Rather, privatization efforts now support a principle based on the belief that users pay the costs they impose on the system (Ibid.).

Privatizing water systems is not new to hydrologic discourse. Gleick et al. (2002) recognize, however, that what is new today is the growing expansion of privatization efforts, as well as the growing public awareness of problems associated with these efforts. In fact, before 1990, almost all developing countries relied on public enterprises, but since 1990 private participation in the water sector has significantly accelerated. The World Bank Group (1999) notes that the number of private water projects between 1990 and 1997 has increased more than ten-fold. This accelerating trend toward privatization has also managed to gain significant leverage due to strong support on behalf of international development agencies, such as the World Bank and the International Monetary Fund (Allouche and Finger, 2001). As Finger and Allouche (2002) comment, “In short, the World Bank is today the actor driving the change in the global water sector. It is also the World Bank which decides with which partners the global water crisis will be solved in the future – i.e., mainly actors from the private sector” (p. 61). Previously, donor agencies recognized the custodian role of the state and focused on helping governments provide basic water services. More recently, however, donor agencies have clearly begun to shift their efforts toward looking at privatization as the new solution (Gleick et al., 2002). As its main principle, the new hydrologic discourse encourages economic equity, in which water prices are commensurate with the total costs to the system.

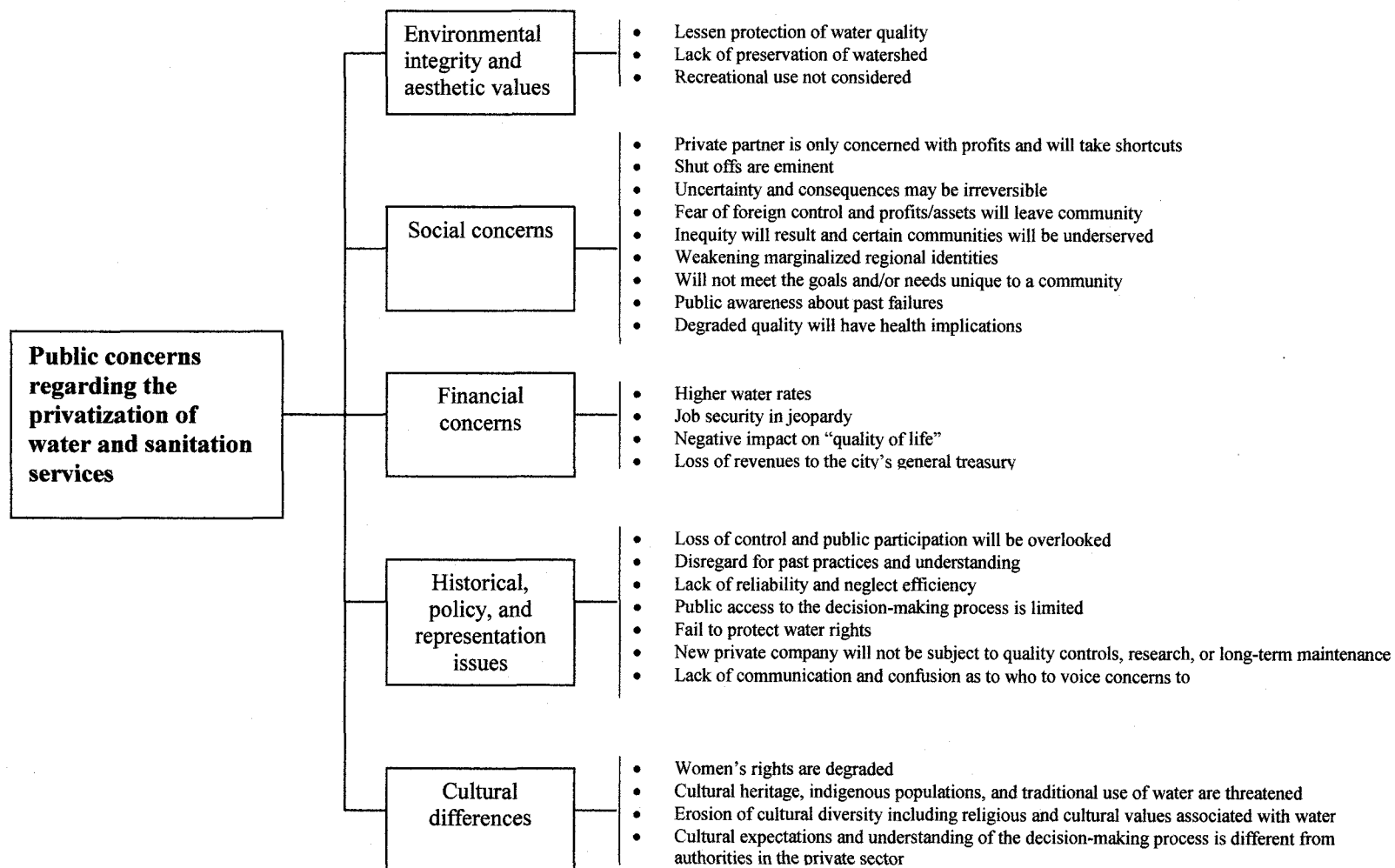
3.2 Concerns regarding water privatization

The new hydrologic discourse's recent incorporation of water privatization has had a direct impact on the communities being served. With the water supply now more readily recognized as an economic commodity, public concerns surrounding the issue have strengthened. More specifically, there is concern that privatization will lead to the erosion of public values concerning water use and management. Furthermore, communities may feel apprehension about relinquishing public control of water services to a corporate body. Often it is difficult to decipher what specific values and expectations the general public holds regarding water resources and its management. Therefore, an assessment of public *concerns* proves to be an effective tool in highlighting public standards. It is important to recognize public concerns as values that can then be addressed in the process of privatizing the water sector. Water policies for water management should expand their scope and extent to include all relevant values.

To identify and define clearly the various dimensions constituting public concerns regarding the privatization of water and sanitation services, the concerns may be articulated in a graphic form known as an objectives hierarchy or value tree (Keeney 1988), as shown in Figure 1. The hierarchy consists of five main dimensions: (1) environmental integrity and aesthetic values, (2) social concerns, (3) financial concerns, (4) historical, policy, and representation issues, and (5) cultural differences. Each of these categories is further defined and specified by the various facets shown subsidiary to it.

The first dimension – environmental integrity and aesthetic values – refers to the understanding that profit motives will allow for the private entity to compromise

Figure 1: Public concerns regarding the privatization of water and sanitation services*



* In order to clearly identify and define the various dimensions constituting public concerns regarding water privatization, the concerns are articulated in this graphic form known as an objectives hierarchy or value tree as described by Keeney (1988).

environmental standards. Undermining the value of the environment and freshwater supplies may, in turn, result in the deterioration of water quality and impede watershed preservation. The second dimension in the hierarchy expresses concerns related to social issues. More specifically, there is fear that the private sector may overlook social welfare measures, such as health implications, equity, and the particular humanitarian needs unique to a community. The third value dimension, financial concerns, expresses the notion that privatization will lead to rate increases, which will ultimately adversely affect residents' lifestyles. Furthermore, job losses are a very real concern not only for the employees, but also the consumers. If the private corporation needs to reduce costs in order to increase profits, an obvious and common response is labor force reduction, seen as layoffs. Reflected in the fourth value dimension is the concern that past practices will be disregarded. The corporate process may stifle historical, political, and representational concerns voiced by an individual community with unique needs. There is fear that there will be no public access to the decision-making process nor will the water management corporations facilitate open communication with each community. Additionally, there is the fear that efficiency will be neglected in the water management process. Finally, the fifth dimension expresses concerns regarding the erosion of cultural diversity, namely the disintegration of traditional water uses. Native cultures and related public interest groups will not receive special concern or consideration to carry on their customs and traditions relating to water.

3.3 Benefits of privatizing the water industry

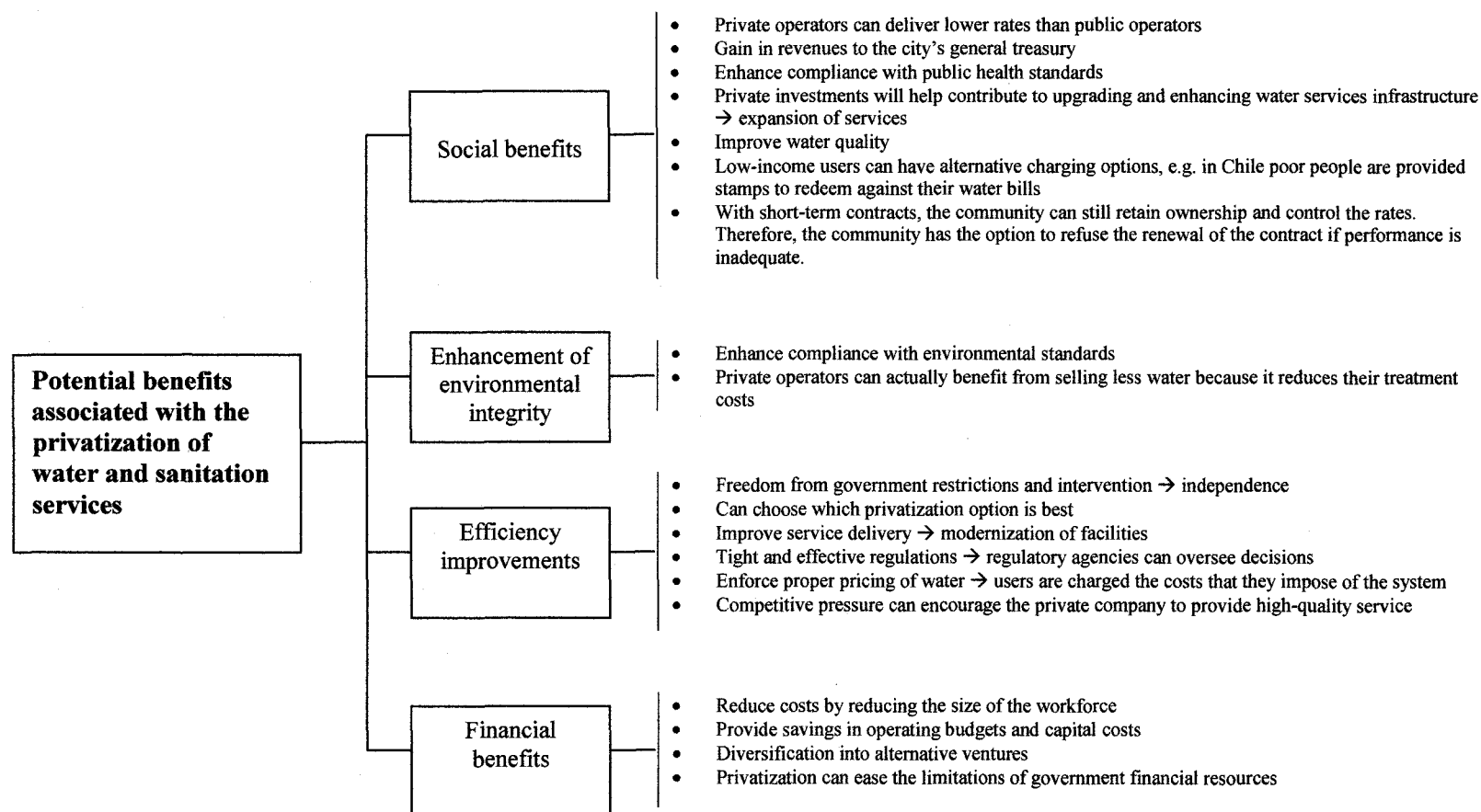
As the global population increases and financial and natural resources continue to decrease, governments are turning to privatization of previously public-owned entities in hopes of improving economic and structural efficiency. Economists, believing that water is generally under-priced, feel that water should be viewed as an economic good, subject to the power and control of the market and hence available to any economic agent, including multinational corporations. With privatization, economists argue that the economic incentives for both water suppliers and consumers to efficiently manage water resources will prove extremely effective. Currently, however, the majority of publicly controlled water services has not allowed for an evenly balanced system between supplier and producer. In the United States, for example, the most common form of water pricing has been the declining-block rate system, in which those using more water are charged a lower rate than those consuming less (Tietenberg, 2001, p. 170). However, it has been argued that this pricing system is not efficient because consumers are charged a higher marginal cost for low levels of water consumption, and a lower marginal cost for higher levels (Ibid., p. 171). This system actually encourages overconsumption and discourages water conservation. It is evident that there is little incentive for managers in public enterprises to institute a profit-maximizing rate system. On the other hand, in private enterprises “managers have an incentive to seek a high return for shareholders because their association with a successful firm increases their own values in the market for managers” (Spulber and Sabbaghi, 1998, p. 194). Since private firms have a greater incentive to utilize a profit-maximizing rate system, they are, therefore, more likely to develop such rate structures than public enterprises. With a profit-maximizing rate

structure implemented, the marginal benefits will reflect the marginal costs and consumers will be able to understand the true scarcity value of freshwater supplies.

Not only does water privatization tout economic efficiency, but it is also recognized for several other important benefits. Following the same logic as depicted in Figure 1 for the perceived disadvantages, Figure 2 articulates the values corresponding to the purported benefits of privatizing water and sanitation services. This hierarchy consists of four main value dimensions: (1) social benefits, (2) enhancement of environmental integrity, (3) efficiency improvements, and (4) financial benefits. More specific aspects are shown under each one.

The first dimension, social benefits, in Figure 2 details the benefits that the community being served by the private water sector may experience. For example, the community can benefit from modernization of water infrastructure as well as expansion of services. Furthermore, privatization does not necessarily imply a rate increase. In fact, water privatization may result in lower water rates than their public counterpart. The second element, enhancement of environmental integrity, expresses the view that privatization can indeed comply with environmental standards. It may be in the private operators' best interests to sell less water (and therefore conserve more) due to high treatment costs. The third value dimension, improved efficiency, outlines private companies' ability to more effectively and efficiently operate water systems than public systems. They are able to bypass many of the slow-moving and restrictive regulatory systems that the government imposes on public projects. Also, competition from rival companies will contribute to a high-quality and efficient water system. The fourth dimension, financial benefits, states that privatization of the water industry will lead to

Figure 2: Potential benefits associated with the privatization of water and sanitation services *



* In order to clearly identify and define the various purported benefits regarding water privatization, the benefits are articulated in this graphic form known as an objectives hierarchy or value tree as described by Keeney (1988).

overall economic improvements. Reductions in the workforce, alleviating these costs from the government's budget, and additional capital ventures by the water management companies, may lead to lower water costs, reduced taxes, and increasing stock prices.

3.4 Examination of specific cases

To assess clearly how the water privatization process has affected values, a critical analysis has been conducted for sites having already undergone the privatization of water and sanitation services. Furthermore, a clear examination of the purported benefits and drawbacks of water privatization for specific cases can contribute to understanding the diversity of outcomes of such efforts. The cases selected for this assessment are those of two countries that are predominantly privatized – the United Kingdom and Chile. Also, two cities located in nations that are *not* predominantly privatized – Buenos Aires (Argentina) and Atlanta (Georgia, United States) – have been selected for this analysis. Information synthesizing the commonalities and contrasting features for each site location is presented in Figure 3.

3.4.1 United Kingdom

In Europe, water privatization efforts have typically taken the form of public-private partnerships (e.g., France). The United Kingdom, however, has adopted full privatization, in which the management and ownership of the entire water supply and sewerage system, as well as the assets, are privatized. In November 1989, the then Prime Minister Margaret Thatcher announced that the UK's ten centralized Regional Water Authorities would each become private entities. The British situation has proven to be a

Figure 3: Summary of the commonalities and contrasting features for four water privatization case studies

	<u>United Kingdom</u>	<u>Chile</u>	<u>Buenos Aires, Argentina</u>	<u>Atlanta, United States</u>
Type of Privatization	Full	Concession Contracts	Concession Agreement	Concession Agreement
Date Implemented - Date Ended	1989 – Present	1998 – Present	1993 – 2002 (dispute ongoing)	1999 – 2003
Private Company's Name	10 regional private companies	Anglian Water, Thames Water	Aguas Argentinas	United Water
Previous System	In 1974 water services were centralized under 10 regional water authorities.	Centralized public service (SENDOS)	Obras Sanitarias de la Nación	City of Atlanta
Motivations for Privatizing	New infrastructure was needed. However, government unable to continue to subsidize users. Improving economic efficiency was central.	Goals of economic growth, employment, and the elimination of extreme poverty.	Modernize water delivery.	Wanted to expand its capacity and reach to its growing population. Government budgetary shortfalls prohibited improvements in delivery service and environmental compliance.
Regulatory Structure	The Water Acts of 1989 & 1991 set up separate economic (Office of Water Services), environmental (National Rivers Authority), and quality regulators (Drinking Water Inspectorate).	The state water rights agency (Dirección General de Aguas) still has some technical and administrative functions. In 1989, the Superintendency of Water and Sanitation Services was set up to regulate service quality and prices.	In the early phase no regulatory agency was in place. Eventually however, an independent regulatory agency (Ente Tripartito de Obras y Servicios Sanitarios) was set up.	City of Atlanta retained some regulatory role.
Benefits	<ul style="list-style-type: none"> ▪ Higher drinking quality ▪ Service delivery & efficiency have been satisfactory ▪ Lower environmental impact ▪ Government has responded to fix problems 	<ul style="list-style-type: none"> ▪ Near-universal water & sanitation coverage ▪ Low-income families can obtain stamps to redeem against their bills ▪ Water access by the poor has increased 	<ul style="list-style-type: none"> ▪ Modernized treatment plants ▪ Billings are now computerized ▪ Gains in the extension of water infrastructure ▪ Increased coverage 	<ul style="list-style-type: none"> ▪ City saved money ▪ Made significant repairs to fire hydrants ▪ Water quality did improve towards the end

Figure 3 continued: Summary of the commonalities and contrasting features for four water privatization case studies

	<u>United Kingdom</u>	<u>Chile</u>	<u>Buenos Aires, Argentina</u>	<u>Atlanta, United States</u>
Problems	<ul style="list-style-type: none"> ▪ Lack of expenditure directed towards resource development ▪ Discrepancies between those metered and non-metered ▪ Stock market performance has not been significant ▪ Growing social dissatisfaction ▪ Water debt is rising faster than any other debt for low-income families ▪ Proportion of income of lower income families spent on water has risen faster than that of higher income families ▪ Yorkshire Water suffered cutoffs during 1995-96 drought ▪ Downsizing ▪ Water prices have risen faster than inflation 	<ul style="list-style-type: none"> ▪ Price increase ▪ General opposition ▪ 1995-97 drought offered poor service and poor quality 	<ul style="list-style-type: none"> ▪ Prices increased ▪ No information provided to public and no public consultation ▪ Contract modifications were made approximately a dozen times ▪ Did not meet sewage treatment targets ▪ Labor force reduced ▪ Urban inequalities increased ▪ Regulator role was irrelevant 	<ul style="list-style-type: none"> ▪ Poor bill collection ▪ Low water pressure ▪ Insufficient maintenance ▪ "Boil Only" alerts

unique example of both successes and challenges. Almost 15 years later, the privatization of the United Kingdom's water industry continues to be an ongoing process affecting its domestic water users.

Prior to 1974, the UK's water services had predominantly focused on water quantity, reliability, and quality as it affected public health (Bakker, 2001). With the creation of the ten Regional Water Authorities in 1974, water services began to place more emphasis on the efficiency of their structural developments (Ibid.). Government cutbacks in the water industry during the late 1970s and early 1980s, however, prohibited the Regional Water Authorities from adequately maintaining a critically aging system. The government recognized the need to improve economic efficiency, whereby increased prices would pay for the development of a new water infrastructure. It was during this time that the government began to consider the idea of privatizing its water services. Although the first plans for privatization in 1986 were withdrawn, privatization was eventually completed in 1989 (Richardson et al., 1992).

To make privatization more attractive, the government cancelled all water industry debts. Furthermore, the government offered a "green dowry" totaling £6.4 billion in subsidies to ensure that water quality would successfully meet the European Union standards (Barraqué, 2003). With the introduction of water privatization, the British also created new independent regulatory agencies. Clifton et al. (2003) comment on the necessity for a regulatory structure, "In order to develop a market based on effective competition, it became necessary to establish new rules and adequate regulatory frameworks which would compensate for the loss of direct government control" (p. 50). Thus, the following three regulatory systems were established under the Water Acts of

1989 and 1991: (1) the Office of Water Services (OfWat) which oversees economic regulations, (2) the National Rivers Authority (NRA) which is responsible for all environmental regulation functions such as pollution control, land drainage, flood protection, and licensing of water withdrawals, and (3) the Drinking Water Inspectorate (DWI) whose main function is to monitor water quality compliance by all private companies (Neto, 1998). The separate economic, environmental, and quality regulators now provided some assurance that consumer interests and social equity would be considered.

Today the citizens of the United Kingdom have managed to see several positive changes in their water industry. Most notably, privatization has resulted in higher drinking water quality (Bakker, 2001). The service delivery as well as efficiency has also shown signs of improvement (The Economist, 19 July 2003). Additionally, water production now has a lower impact on the environment (Bakker, 2001). The sale of water to consumers on a full-cost recovery basis has indeed resulted in several beneficial improvements for its domestic users.

The British model, however, has not been without problems. In order to make the necessary water quality improvements, the private companies increased water charges. In fact, water and sewerage bills increased 67% between 1989-90 and 1994-95, and water prices overall have risen faster than inflation (Shiva, 2002). While water quality and environmental impact did improve, low-income families have suffered from this expense. It was found that low-income families spent 4% of their weekly budget on water, whereas the national average is just over 1% (Bakker, 2001). A survey conducted by Bakker (2001) found that 75% of those on income support have difficulty paying their water

bills. Furthermore, water debt is rising faster than any other component of debt for low-income families (Ibid.). It has been apparent that there is significant cost differential between low- and high-income consumers. Clearly, the resulting increased prices have greatly affected the most vulnerable in British society.

There have also been issues concerning differential in payment between metered and non-metered properties. In 1997 the new Labour government made metering voluntary; therefore, household metering in the United Kingdom remains limited. Resulting from the 1997 policy, a consumer with a low consumption rate and high property value may have a lower bill with a meter installed, whereas a large family with a low-property value would experience a higher bill with a meter. In the UK, water pricing discrepancies are a result of the assumption that residents on low-property values use less water than those living on high-property values. By 1996, however, OfWat responded to this differential in payments by requiring the companies to equalize the rates. OfWat mandated that water rates maintain a differential of no more than £30 (Bakker, 2001). The British model has not been without difficulty (e.g., pricing and equity), and the regulatory agencies have played, and continue to play, a crucial role in trying to maintain social equity.

The Yorkshire drought that began in the summer of 1995 and lasted until November 1996 plagued its customers with cutoffs, which ultimately also brought concerns regarding equity and fairness to the forefront (Bakker, 2000). Arguments surrounding reasons why the private water industry could not better handle the drought have focused on the underinvestment for water source development and protection as well as for infrastructure development and maintenance. In addition, it has been

observed that the Yorkshire drought was a result of “regulatory policies geared toward low-capital and high-revenue company investment programs aimed at minimizing price increases to consumers” (Bakker, 2000, p. 20). With this conflict between consumer interests and corporate profits, public criticism became centered on the debate between water as a public good or private commodity (Ibid.). The Yorkshire drought left many residents wondering if the reliability of water services had been sacrificed for private profits. The British conundrum evidently still exists today, as the UK water industry continues to search for a balance between public values and economic principles.

3.4.2 Chile

In Chile until 1981, water rights were assigned by the state, but in practice were dictated by tradition (Hachette and Lüders, 1993). It was in 1981, when Chile adopted the Water Code, that water rights entered into the market arena. More specifically, the 1981 Water Code strengthened private property rights, increased private autonomy in water use, and more strongly favored free markets in water rights (Bauer, 1997). With this change, water rights in Chile could be “freely bought, sold, mortgaged, and transferred like any other piece of real estate” (Ibid., p. 641). Hoping to modernize its water delivery system as well as achieve its goals of economic growth, increased employment rates, and elimination of extreme poverty, Chile’s government introduced separate laws in 1989 and 1990 that allowed the state to conduct entrepreneurial activities in the water sector (Bitran and Serra, 1998).

Not only had the government set up new principles for the water industry to follow, but also prior to privatization Chile developed a regulatory framework. For

example, in 1989 the government set up the Superintendency of Water and Sanitation Services to be responsible for monitoring service quality and setting prices (Bitran and Serra, 1998). A bill was also sent to Congress in 1995 allowing the public sector to retain veto power on certain issues (Ibid.). Furthermore, the state water rights industry, Dirección General de Aguas, has still maintained some technical and administrative functions, such as maintaining hydrologic data and inspecting large water works.

Once the Chilean government felt that the regulatory framework of the water sector had been strengthened, five out of the 13 regional companies were privatized by 1998. Although full privatization of assets had initially been proposed, it was later decided upon review to change to management concession contracts. Concessions for three out of the five companies were given to British water utilities – Anglian Water has one company and Thames Water has two companies – while French-Spanish investors won the remaining two companies.

Despite price increases, it has been observed that water access by the poor in Chile has increased faster than in any other developing nation (Bate, 2002). Currently, Chile has almost complete coverage of water supply and sanitation services. Furthermore, pricing has been efficient, where customers are charged the full cost of their water, “but gives poor people stamps to redeem against their bills” (The Economist, 19 July 2003, p. 13). The Chilean experience clearly highlights not only the need for a strong regulatory framework to be in place *before* privatization, but also the need to maintain a system that impedes the expansion of water poverty.

3.4.3 Atlanta, Georgia, United States

In 1999, United Water, a subsidiary of the French company Suez Lyonnaise des Eaux, made a twenty-year privatization deal with Atlanta, Georgia that would eventually collapse in January 2003. Similar to many other American cities faced with enormous costs to repair water infrastructure and lack of government financial resources, Atlanta hired United Water to manage its aging system and growing population. However, shortly after the deal was made, customers found themselves left with a service that was “poor, unresponsive and fraught with breakdowns, including an epidemic of water-main breaks and occasional ‘boil only’ alerts caused by brown water pouring from city taps” (Jehl, 2003). As customers, advocacy groups, and the mayor, Shirley Franklin, stood against the failure of the agreement made, United Water’s contract with Atlanta was ultimately terminated.

Atlanta’s agreement with United Water had been the largest water privatization deal in the United States’ history. It had aspired to serve as an example for future American cities also plagued by budgetary shortfalls and deteriorating water systems. Instead, however, the failure of the agreement resulted in many questions about the reality of public-private partnerships within the water sector. While water quality eventually did improve, Segal (2003) notes that there were four main areas that had received significant complaints: (1) insufficient maintenance, (2) poor bill collection, (3) tardy meter instillation, and (4) an improper letter of credit. The City of Atlanta gave United Water ninety days to fix these complaints, but in the end, both parties agreed that the privatization agreement was not in the interest of either party.

It eventually became apparent that the contract had not lived up to either side's expectations. For example, the city had estimated that United Water would have 100 broken water mains to deal with in a year; however, United Water ended up dealing with 280 broken mains (Powers and Rubin, 2003). Whether or not a poor contract was to blame for the failed public-private partnership in Atlanta, it has left doubt about the reality for both parties to form an agreement that can satisfy the needs and wants of the public, as well as achieve financial success for the private company.

3.4.4 Buenos Aires, Argentina

In August 1989, President Carlos Menem of Argentina issued a National Reform Law, which declared an economic crisis for the nation's public services. It was this new law that authorized the privatization of the water industry; and it was the wealthiest city in Latin America, Buenos Aires, that would become the subject of the largest private concession agreement in the world (Barlow and Clarke, 2002). By 1993, Buenos Aires began operations with its thirty-year contract with Aguas Argentinas, a subsidiary of the French company Suez Lyonnaise des Eaux. Despite a 1992 survey that found 82% of Argentines to favor privatization, it would be less than ten years later that the contract would dissolve (Tagliabue, 2002). With Suez blaming Argentina's financial crisis of 2002 for its shortcomings, the dispute between the City and the private company is ongoing.

The relationship with Buenos Aires and Suez was fraught with problems only a year into the agreement. Soon after privatization had been adopted the costs borne by the public had escalated by 26.9% (Barlow and Clarke, 2002). Furthermore, the lack of

developing more sewage treatment facilities resulted in uncollected wastewater draining into overflowing aquifers, thereby causing adverse environmental impacts (Loftus and McDonald, 2001). In addition to this environmental mismanagement, no regulatory agencies were even established in the early phase of privatization to address such issues. When the regulatory agency, *Ente Tripartito de Obras y Servicios*, was eventually put in place, there was suspicion regarding the agency accepting bribes from the private company (Loftus and McDonald, 2001). Moreover, community input was not considered or even solicited until the first public hearing was held seven years after the contract had been signed (Ibid.).

By 1999, however, coverage in Buenos Aires had increased from 70% to 82.4% (Barlow and Clarke, 2002). Despite this increase, water services have failed to cover the poorest population who continue to lack service. Loftus and McDonald (2001) comment, “Although there have been some impressive gains in the extension of water infrastructure, the majority of the concession’s negative impacts have been most deeply felt in the poorest sections of Buenos Aires” (p. 197). In fact, some private companies did not even put bids in for Buenos Aires because they believed that the informal settlements would be at “unacceptably high risks” (Hardoy and Schusterman, 2000, p. 63). While privatization of the water sector in Buenos Aires did extend services to 12% more of its residents, the city’s poorest residents did not benefit from this expansion in coverage.

3.4.5 Discussion

As stated previously, water privatization is not a new idea. In the United States, for example, the city of Indianapolis sold water rights to the Indianapolis Water Company in 1881, which has long been recognized as the largest U.S. city served by a private water company (National Research Council, 2002). A historical review of water privatization in the U.S. reveals that there are additional cases where privatization has indeed ‘succeeded.’ For example, Jersey City, New Jersey signed a five-year contract with United Water in May 1996, and has since seen many improvements. Similar to Atlanta, this was the largest public-private partnership of water services at the time. Water bills were computerized, and water rates were unaffected. Furthermore, within the first two years, the City had achieved more than \$23 million in savings, which in turn allowed for tax relief and infrastructure upgrades. Employees were given the opportunity to either work for United Water or transfer to another public sector job. If employees were eligible, then they could elect to take early retirement. Those who chose to work for United Water continued to be classified as public employees and, therefore, were able to retain their current wages, benefits, and retirement plan. Jersey City exemplifies a successful privatization effort of a city’s water services – both the consumer and the producer have thus far benefited from this move.

In general, confidence in water services is crucial. However, in each of the cases discussed above, distrust has stemmed from privatization’s failures. During some point of the water privatization process, significant public hesitation and opposition have occurred in each of the four sites. By the mid-1990s, for example, support for privatization in the United Kingdom began to decline. Clifton et al. (2003) observes,

“public opinion polls revealed the public perception was that there was a direct relationship between privatization and redundancies while, at the same time, there were huge increases in salaries and incentives to directors (so-called fat cats)” (p. 50). Moreover, the public felt that the promises of privatization had not been fulfilled, which only further exacerbated privatization’s unpopularity (Ibid.). In places where social dissatisfaction has grown or privatization efforts have failed, a general loss of confidence in the government’s ability to solve problems may also result. This lack of confidence in the government may prove to have negative implications for important future decisions made by the state.

Today, public water utilities are clearly faced with competing demands for water resources, yet they lack the financial resources for further development or maintenance. The utilities turning to privatization as the solution to remedy their financial woes ultimately anticipate and strive for self-sufficiency. However, it is important to recognize that there are still risks involved when entering the private market. The four case studies discussed above all show that privatization cannot be viewed as a panacea; potential problems can and *do* arise. For example, the private company may place too much weight on its shareholders’ wants, rather than on consumer needs or service (Meredith, 1992). Companies hoping to enter into a concession agreement may also underbid in order to win the contract. Like in the case of Atlanta, an agreement that is not realistic for the needs of either party may further exacerbate the problems of the water industry. Today, United Water is not re-vamping Atlanta’s aging water system. Instead the company is assisting Atlanta in the transition back to City management through a newly organized Bureau of Water in the Department of Watershed Management.

Not only has the assessment of the four case studies shown that water privatization is not a universal remedy, but also that it should not be exactly replicated from one location to the next. A particular community's situation needs to be examined carefully and thoroughly before any prescription is made. Therefore, the British model, for example, should not be directly applied in another place. Rather, the 'model' should be viewed as an example to be learned from, and privatization efforts should tailor their plans according to the uniqueness of that particular community.

The case studies also show that success requires a strong and efficient public regulator, and that the regulation needs to be effective. In Buenos Aires, for example, the presence of a strong regulator independent from political pressures introduced in the beginning of the privatization process may have alleviated many of the problems they experienced. Furthermore, public participation needs to exist throughout the entire process. Hardoy and Schusterman (2000) point out "the lack of capacity of private operators to work in a participatory way was identified as one of the factors contributing towards their failure to work with low-income groups" (p. 75). It is evident in the four case studies that community representation, whether it is before or after privatization has been introduced, is fundamental for a successful outcome to occur.

Chapter 4: INTRODUCTION TO CASE STUDY FOR OAHU, HAWAII

4.1 Introduction

Because the natural resources of an island are limited by its location, size, and isolation, islands offer a unique opportunity to examine the intensity of water depletion. The island of Oahu in the Hawaiian archipelago serves as a good example of an island community attempting to maintain a reasonable water balance for the future. Home to 80% of the state's 1.2 million people, Oahu provides a clear illustration of a finite water supply faced with increasing demands for water and land-use development. In fact, domestic consumption on the island of Oahu increased by 29% from 1977 to 1990 (Malla and Gopalakrishnan, 1997, p. 1). In addition, from 1985 to 1990 alone commercial and industrial water use in the state of Hawaii increased by 60% (Malla & Gopalakrishnan, 1999). Malla and Gopalakrishnan (1999) explain this significant increase over a mere five years to correlate to Hawaii's changing economy. They state, "Hawaii's gradual but sustained transformation from a plantation economy centred on irrigation-intensive sugar and pineapple cultivation to a sprawling urban economy is largely responsible for this increase in urban water demand" (Malla and Gopalakrishnan, 1999, p. 1). The recent developments that have shifted primary water use to urban areas, with a notable concentration also on the visitor industry including hotels and golf courses, has led to speculation about the current and future availability of freshwater supplies. By understanding the fundamental changes that have occurred on the island of Oahu, other Pacific Island communities might make wiser decisions regarding their hydrological concerns.

As freshwater supplies on Oahu continue to decrease and competing demands continue to rise, however, there is the issue of enhancing efficiency to meet these demands. Moncur (1994) comments, "As demand increases, water moves further and further beyond the status of a free good" (p. 154). This dilemma has opened new economic approaches to water management. In situations similar to Hawaii's, where water demand increases with decreasing supply, the privatization of the water management system is touted as an efficient and effective method for alleviating a community's water crisis. In fact, "Until recently, Hawaii's water allocation mechanisms could be seen evolving gradually toward the market end of the spectrum" (Moncur, 1994, p. 155). To add strength to the argument for privatization of Hawaii's water management system, there have been noted weaknesses to its current public management regime. As Gopalakrishnan et al. (2005) comment, "There is growing evidence of popular disenchantment with Hawaii's water institutions, which for all intents and purposes, have remained the product of a monumentally moribund system representing a long-vanished era" (p. 18). Doubts also have been raised regarding the State Water Code's efficiency and, "in terms of economic efficiency... flexibility probably is the code's most important weakness" (Moncur, 1994, p. 158). Furthermore, corporate politics have also influenced the Water Code, which is another reason why the Code needs "serious revamping" (Gopalakrishnan et al., 2005, p. 19). Improvements to infrastructure and efficiency within the current water management system occur slowly and often not at all as they get tied up in the bureaucratic system. It has been observed that, "One cannot feel certain about the directions in which Hawaii has moved recently, but it would seem that Hawaii provides a series of avenues not to be emulated" (Moncur, 1994, p. 165).

With demand projections estimating that Oahu will reach its sustainable yield limits for groundwater within the next 20 years, the central question facing the island today is if the current public water management practices can maintain an adequate supply for its residents of today and the future (Gopalakrishnan, 2005). Or similar to the locations discussed in section four (Buenos Aires, Atlanta, Chile, and the United Kingdom), does privatization offer the potential for improving the current situation? A brief history of water development and water rights on Oahu is further discussed in the following sections. The potential to privatize Oahu's water sector is explored in chapters six and seven.

4.2 Overview of water and development on Oahu, Hawaii

Early Hawaiian beliefs about Oahu's freshwater supply were based on Hawaiian deities as well as its representation in nature. More specifically, ancient Hawaiians believed that they were part of a "divine creation," in which nature, including freshwater, was perceived as one of the gods' gifts (Honolulu Board of Water Supply, 2003, p. 5). It was recognized that two main gods, Kāne and Kanaloa, were the creators of Hawaii's freshwater sources. Kāne, described as "impatient in nature," was responsible for producing the large rivers and streams, whereas the "easy-going" Kanaloa created freshwater springs and pools (Honolulu Board of Water Supply, 2003, p. 5). Further, "Hawaiians believed that the gods would always bless the earth with water as long as water was used with respect and water sources were cared for well" (Ibid., p. 5). Therefore, traditional Hawaiian practices encouraged all to conserve and adequately maintain their freshwater supplies. Early Hawaiians clearly valued water highly, and

even developed regulations in order to ensure that water in the *ahupua'a* was available to all. During the pre-contact period, *konohiki* were assigned by the king to serve as water masters. The Hawaiian tradition of water use is often associated with the prior appropriation doctrine, which holds that earlier users of a source have priority over later users – i.e., “first in time, first in right” (Koletty, 1983). However, because early Hawaiians recognized water as a gift from the gods, no one would claim its ownership (Wilcox, 1996). As Gopalakrishnan (2005) observes, “The ancient Hawaiian system of water rights was unique in that it acknowledged water as a public good, a natural bounty that belonged to the people, and accorded the rulers the role of custodians entrusted with the task of managing it effectively and equitably” (p. 4).

Drastic changes in water use and rights quickly occurred upon Western “discovery” of the Hawaiian Islands in 1778. Throughout the nineteenth century there was significant expansion of sugar cultivation, which ultimately conflicted with traditional Hawaiian water practices. The increase in demand for water associated with sugar cultivation resulted in the diversion of freshwater from traditional taro agriculture to sugar plantations. Furthermore, because the Hawaiian Kingdom did not have the financial resources for water development, development was done almost entirely by the private sector (Wilcox, 1996). In fact, Wilcox (1996) states, “private plantations and water companies built virtually every surface-water collection system on the four main islands” (p. 17). It was also during this time that traditional water rights were abolished (Honolulu Board of Water Supply, 2003). More specifically, the Great Māhele of 1848 introduced a series of laws that allowed a Western private property regime to enter into the Hawaiian system. It was at this point in time that non-Hawaiians were first permitted

to own land as well as water. The privatization of land allowed land to be allocated among the people, and water rights then went along with the land (Moncur, 1994). Sugar plantations, for example, were now able to acquire water rights. By the mid-1800s water had been transformed from a communal resource into a private entity.

Not only did agricultural production increase the demands for freshwater, but also an escalating population called for more water to be extracted. It was first recognized in 1859 that the government could take freshwater for the sole purpose of urban development (Wilcox, 1996). Concomitant with this was a tripling of Honolulu's population between 1879 and 1915 (Honolulu Board of Water Supply, 2003). By 1920, water development on Oahu had significantly increased, and "water rights were well defined and clearly transferable between uses, users, and locations" (Moncur, 1994, p. 155). In order to better develop and operate the water system for the City of Honolulu, in 1925 the Territory established the Honolulu Sewer and Water Commission. However, this Commission was plagued by continual shortages, in which local residents demanded a water system free from political control (Koletty, 1983). It was then in 1929 that operations were given to a newly created City agency, the Honolulu Board of Water Supply. By 1959, Oahu's suburban water system was completely turned over to the Honolulu Board of Water Supply. By the 1980s, the majority of water resources throughout the island of Oahu were connected to the public water supply system (Koletty, 1983). Currently, the Commission on Water Resources Management, established in 1978 under the State Water Code, regulates the amount of water the Board of Water Supply can withdraw. Today, the City and County of Honolulu, comprising the entire island of Oahu, is home to 80% of the state's population, with the Board of Water Supply thus

serving approximately 800,000 people making it one of the ten largest water utilities in the country (Honolulu Board of Water Supply, 2004).

4.3 Water rights and the allocation of Oahu's freshwater supply

Water rights in Hawaii pose a unique circumstance based on the fact that "Hawaii has had a system of water law different than any of the other forty-nine states" (Scheuer, 2002, p. 74). In the western United States, water law has been based on the prior appropriation doctrine; whereas the eastern United States developed a system based on the riparian doctrine. Riparianism, with origins stemming from the English Common Law, claims that stream flow by or through a property owner's land must be undiminished in quality and quantity. In Hawaii, however, neither doctrine was fully adopted. Scheuer (2002) observes, "Hawaii developed a system that was an amalgamation of some elements of prior appropriation, some of riparianism, and a significant measure of concern with Hawaiian tradition" (p. 74). Within this mix of water rights, appurtenant rights, in which the right is attached to land based on historic use, has priority over the others (Koletty, 1983). More specifically, water use based on the amount of water needed for the growth of taro in the acreage under cultivation before the Great Māhele of 1848 has taken precedence (Koletty, 1983). Indeed, Hawaii's fusion of traditional as well as Eastern and Western U.S. influences in regards to water management has evolved into a water system completely unique from the rest of the United States.

Due to Hawaii's incorporation of varying water rights, the court system has inevitably become involved in disputes over water. Long legal battles and judicial

rulings have come to define much of Hawaii's water rights and allocation. Prior to 1973, water rights were transferable and frequently traded. However, the State Supreme Court's ruling in 1973 of the water battle between two sugar plantations, known as the McBryde Decision, changed this understanding of water ownership. The legal dispute focused on a leaky tunnel that had been renovated by Olokele Sugar Company, which in turn resulted in reduced availability of water to the downstream McBryde Sugar Company. Also referred to as the Hanapēpē Decision, the State Supreme Court ruled that while both companies had appurtenant or riparian rights to use water, neither had a property right in it (Wilcox, 1996). Instead, the court ruled that water could not be transferred out of its originating watershed and that the state holds Hawaii's freshwater for the benefit of the people. This historic fight between the two sugar plantations and the State represented the first time in Hawaii that a decision over water ownership was not ruled in favor of private individuals. Gopalakrishnan (2005) comments that the McBryde ruling finally "settled the question by upholding the state's right in water allocation in Hawaii over private rights" (p. 7). In fact, Wilcox (1996) states that it was at this point the Supreme Court "was no longer dominated by justices with interests sympathetic to sugar" (p. 34). From the time of the McBryde Decision until present, water has been recognized as a public trust doctrine, in which the government is responsible for it for the people and decides its reasonable use.

Additional court cases have also strengthened and affirmed the McBryde Decision regarding water diversions. The 1976 case, Reppun versus Honolulu Board of Water Supply, was another significant water battle putting water ownership to the test. The cause of the battle was due to a 25-mile tunnel that diverted approximately 27 million

gallons per day (mgd) of Waiahole Ditch waters from the wet, windward-side of Oahu over to the drier, leeward-side of the island (Gopalakrishnan, 2005). Installed in 1916 by the Oahu Sugar Company, the diversion's sole purpose was to irrigate the Company's extensive sugar plantations. The diversion resulted directly in reducing the amounts of Waiahole water from windward-side taro fields as well as the amounts of water entering into Kaneohe Bay. Over the 80 years that water was being diverted, taro farmers' crops were being adversely affected and fish populations declined in Kaneohe Bay. Therefore, communities on the windward-side (e.g., small farmers, community associations, environmental groups, and Native Hawaiian Associations) decided to file suit. The Waiahole Ditch controversy only further strengthened in conflict when the Oahu Sugar Company closed its operations in 1995, thereby freeing up the 27 mgd of water being diverted. In order to further their urban development plans, large landowners and developers on the leeward-side wanted to maintain the Waiahole water diversion. However, "Reppun argued that their riparian and appurtenant rights were abridged and, moreover, that these were superior to the Board of Water Supply's right to take water for public consumption" (Wilcox, 1996, p. 37). A lengthy legal battle then ensued over how to specifically allocate the 27 mgd of Waiahole water.

The Hawaii Water Commission on Water Resource Management became responsible for deciding how to best reallocate the water, and in December 1997 they made the following allocation decision: 14.03 mgd of water was to be allocated to the leeward-side and 12.97 mgd was to be allocated to the windward-side (Gopalakrishnan, 2005, p. 12). In the end, the Board of Water Supply was required to reduce pumping to restore baseflow levels of windward-side streams. This decision to share the Waiahole

ditch waters clearly recognized the fact that the farmers had appurtenant rights; however, it is also important to note that the 12.97 mgd allocated was significantly lower than what windward-side communities had requested (Gopalakrishnan, 2005).

In the Reppun legal dispute, “the court did not even consider economic efficiency, though the diversion clearly met standard efficiency criteria” (Moncur, 1994, p. 161). Furthermore, Gopalakrishnan (2005) notes that in the 1997 decision several criteria, such as water rights issues, impact on sustainable water use, impact on water conservation, and impact on watershed, were absent from the Water Commission’s report on its reallocation decision. Soon after the 1997 decision, parties in favor of increasing the amount allocated to the windward-side challenged the Water Commission’s decision. In the Waiahole Water Case, “it was argued that the amount allotted for agricultural use by the leeward landowners was excessive and this could well have been the result of the Water Commission using an arbitrary water per acre need for diversified agriculture as the allocation basis” (Gopalakrishnan, 2005, p. 13). In the end, the State Supreme Court decided in 2000 that the Water Commission “had overly narrowly applied the Public Trust Doctrine,” and the Court advised the Water Commission “to take into account issues of intergenerational equity, ecological and environmental impacts, Native Hawaiian Water Rights, and other related concerns in its efforts to reapportion the Waiahole water” (Gopalakrishnan, 2005, p. 14). In order to equitably allocate water as a public good in the state of Hawaii, decisions regarding its rights and allocations are intricate, which clearly culminates into stakeholder conflicts.

4.4 Conclusion

This rapidly changing configuration of water demand has resulted in a number of conflicts in the allocation of water among its competing uses and users, largely because of the failure of Hawaii's water institutions responsible for the planning, allocation, and management of the state's water resources (Gopalakrishnan, 2005, p. 1).

As discussed in the previous sections, water rights in Hawaii are complex and difficult to define. Determination of water rights and ownership has widely varied and is undoubtedly indicative of Hawaii's distinct history and diverse population. Over Hawaii's history, competition for water has come to define how it is managed. No one equation can solve all of Hawaii's water conflicts, which ultimately makes water ownership very controversial as well as difficult to characterize. However, there is suggestion that Hawaii's water management regimes are to blame for their inability to effectively accommodate the state's changing pattern of water use. For example, Gopalakrishnan (2005) states, "We can thus conclude that a major revamping of Hawaii's water administration agencies is essential to enhance the effectiveness of water allocation, planning, and management in the state" (p. 12). Perhaps, then, one could argue that a new approach to water management in Hawaii, such as privatization, could improve the state's current inefficiencies. However, Hawaiian culture is deeply rooted in the concept of public ownership. Therefore, it is essential to vigorously analyze the concept of water privatization within the context of Hawaii in order to determine whether it could be a viable solution for Oahu.

Chapter 5: MEASURING VALUES AND INTANGIBLES

The moral is that we are sometimes led into developing blind expectations for that to which we are accustomed out of habit, and not necessarily because its truth is something written in granite. We believe that our own tempered understanding should produce closer results to experience than simply following tradition, which has possibly rutted our thinking, and induced us to forego change in search of better ways that give better answers (Saaty, 1990, p. 26).

5.1 Inclusion of intangibles in decision-making

Varis (1989) states that, “societies are becoming increasingly aware of the ever more complex, interrelated, political, technical, and socio-economic issues to be considered” in decisions concerning the natural world (p. 283). Increased community awareness of intricate problems notably underlies the management of our nation’s natural resources. Currently, natural resource management involves many aspects, which, in turn, define the complexity of decision-making for natural resources. The multiple objectives that are always part of the problem not only can conflict with one another, but their relative significance or importance is also difficult to measure. Clearly, measuring intangible attributes, such as environmental integrity and sensitivity to cultural practices, can pose a considerable challenge to making effective management decisions. Furthermore, enhanced community awareness increases the need to consider clearly and precisely the purported unquantifiable features in the management process. Herath (2004) states, “An inclusive process that reflects community interests and provides them with a key role in influencing planning and management decisions will have a greater chance of success” than a process that inadequately represents the views of the community (p. 263). The inclusion of aspects usually assumed unquantifiable can help to minimize conflict, which can ultimately define a project’s outcome. A holistic approach,

addressing tangible *and* intangible factors, is necessary for effective natural resource management.

5.2 Analytic Hierarchy Process

Developed by Thomas Saaty in the mid-1970s (Saaty, 1980), the Analytic Hierarchy Process (AHP) is a multi-objective decision-making procedure established to measure “both physical and social domains” (Saaty, 1987, p. 161). The AHP is a measurement and prioritization methodology that allows for the comparison of intangible elements and the quantification of their relative importance to or effects upon those elements. Such elements are of two types, alternatives (options) and criteria, the latter being the general term for any element relevant to a decision situation, including but not limited to goals, objectives, actors, time periods, scenarios, and spatial, social, or organizational units. Criteria often refer directly to subjective values, whether individual or collective, private or public. Saaty (2001) comments that the AHP is a good model for decision-making because it was developed “to accommodate our human nature rather than force us into a mode of thinking that may violate our better judgment” (p. 23). Furthermore, the AHP “is based on the principle that, to make decisions, experience and knowledge of people are at least as valuable as the data they use” (Vargas, 1990, p. 2). The Analytic Hierarchy Process thus provides a clear opportunity to assess the degree of people’s preference for intangible criteria.

In order to measure public preference for one criterion over another, the AHP forces the user to make comparisons of the relevant criteria once assembled in a hierarchic structure. More specifically, criteria belonging to the same “parent” (i.e.,

criteria that share the same branch in the hierarchy) are compared with respect to their particular impact on that parent. To express the criteria's importance, participants give verbal judgments, ranging from equal to extreme (e.g., equal, moderately more important, strongly more important, and extremely more important). Once the participants have expressed their intensity of preference, the judgments are assigned to corresponding numerical judgments using a 1-9 positive integer scale (see Table 1). The comparisons are then collected and the numerical judgments are put in a matrix. However, "Due to lack of precision in the human mind, the judgments may not be consistent and the priorities cannot be simply obtained from the original matrix," therefore, an infinite set of priorities for each activity is necessary for a more accurate priority (Saaty, 2001, p. 79). Hence, a positive reciprocal matrix's normalized maximum eigenvector is the best approximation to a criterion's "true" priority (Saaty, 1980). Because the priority measures now belong on a new ratio scale, the multiplication and division by other ratio-level numbers is permitted, which is necessary for the synthesis of the overall priorities. In order to obtain the overall priority for each alternative, one needs to multiply these priorities by each other as one moves up through the hierarchy and then sum up all terms pertaining to the same alternative. Ultimately, the information derived from the AHP can then serve as an additional tool in the decision-making process (Saaty, 1990).

Table 1: AHP pairwise comparison scale (Saaty, 2001)

Degree of importance	Definition
1	Both attributes are equally important
3	One attribute is moderately more important over the other
5	One attribute is strongly more important over the other
7	One attribute is very strongly more important over the other
9	One attribute is extremely more important over the other
2,4,6,8	Intermediate values between the above values

5.3 Advantages to using the AHP

Duke and Aull-Hyde (2002) state, “The primary reason for using the AHP is to improve the understanding of how respondents trade-off non-quantifiable attributes – attributes that may exhibit only subtle differences” (p. 134). Saaty and Gholamnezhad (1982) state that the advantages of Analytic Hierarchy Process over more traditional decision models are as follows:

- (1) “it incorporates data and judgment of experts into the model in a logical way,
- (2) it provides a scale for measuring intangibles and a method for establishing priorities,
- (3) it can deal with the interdependence of elements in a system,
- (4) it is flexible enough to allow revision in a short time, and, finally,
- (5) the process can be implemented easily without incurring large costs and using elaborate facilities and other resources” (p. 192).

This decision hierarchy allows for the successful measurement of intangible criteria to be analyzed in conjunction with tangible criteria.

Chapter 6: CASE STUDY FOR OAHU, HAWAII

6.1 Introduction to case study: Oahu, Hawaii

The difference between Western and Polynesian concepts of water was fundamental. Take, for example, the languages that drove the two cultures. While in English the word “water” means “a transparent, odorless, tasteless liquid, a compound of hydrogen and oxygen,” in Hawaiian the word “wai” has many meanings: water and blood and passion and life. Hawaiians were fully aware of the power and wealth bestowed on those who controlled *wai* (Wilcox, 1996, p. 24).

As discussed in chapter four, freshwater supplies on the island of Oahu pose a unique situation. Not only does its geographical location and geological composition of freshwater supplies help define its distinct limitations, but Oahu’s history and development have also significantly shaped how freshwater is managed. As Wilcox states in the quotation above, native Hawaiians had a unique cultural relationship with water. Do people on Oahu continue to regard water in such a way? What exactly do people value the most about water? The State of Hawaii continues to remain the actual owner of water, but private entities still have rights to use surplus water. How does this translate into how people believe water should be managed? As the trend of water privatization continues to increase, how would the people of Hawaii react if their own water supplies were transferred over to a private entity? The following chapters of this thesis will explore how various stakeholders on Oahu value freshwater.

6.2 Selection of participants

The Analytic Hierarchy Process was originally developed with the purpose of allowing *one* decision-maker to choose among a selection of alternatives. However, the process was later extended to include group decision-making (Duke and Aull-Hyde, 2002; Saaty 1982). Because the AHP was developed with the intent of one user, and is

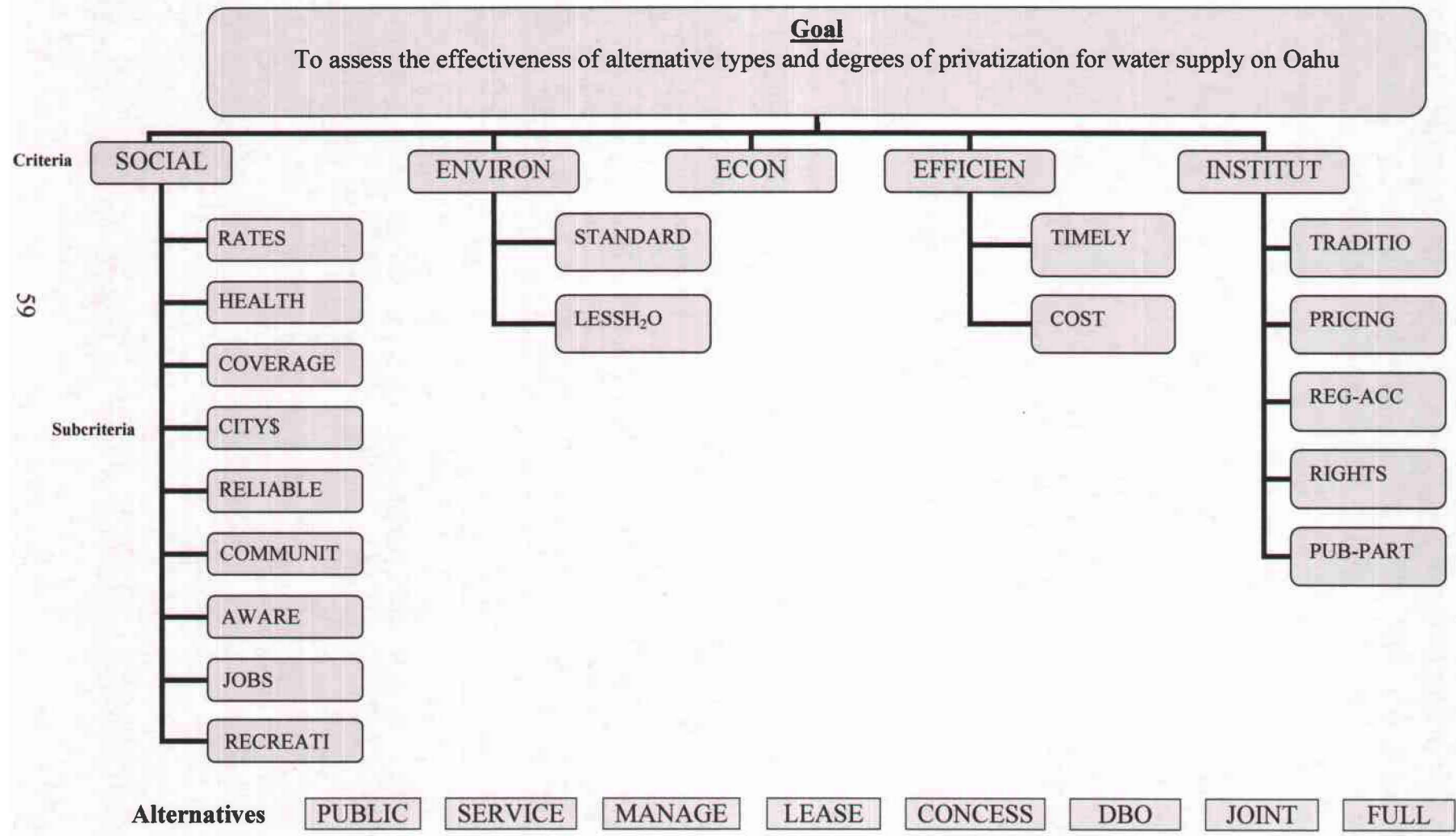
not statistically based, only one participant is needed to implement the AHP (Ibid.). Of course, the backgrounds and experiences of the participants will clearly affect the outcome of the AHP, since it is those individuals' values that one is attempting to measure (Willett and Sharda, 1991). Therefore, participant selection becomes based on eliciting views from stakeholders who are assumed to have different values.

In this study, the value hierarchy (Figure 4) was presented to what was assumed *a priori* to be a highly diverse group of ten stakeholders, in which their only obvious, relevant commonalities were their interest and concern for water issues in the state of Hawaii. Therefore, participants were selected based on their involvement or interests in Oahu's freshwater supply. In the analyses that follow, participants' names have been withheld, and respondents are identified only by their professional field or other relationship to water. The fields so represented are: concerned citizen, cultural resource specialist, environmental attorney, environmental economist, hydrogeologist, Native Hawaiian activist, planner, social scientist, water quality scientist, and water resource manager.

6.3 The use of the AHP for Oahu, Hawaii

The objectives used to construct the AHP hierarchy for this study were identified through an extensive literature review relating to the topic of water sector privatization. The benefits and concerns associated with water privatization, as summarized earlier in sections 3.2 and 3.3, were gathered from that review and are displayed in Figures 1 and 2. These findings were then used to develop the AHP hierarchy, which is shown in Figure 4. The first level of this hierarchy describes the overall goal: to assess the effectiveness of

Figure 4: AHP model hierarchy



alternative types and degrees of privatization for water supply on Oahu. The second level of the hierarchy lists the five main criteria to consider in the assessment: the relative *social, environmental, economic, efficiency, and institutional* (legal and administrative) effects to be expected from the implementation of the respective alternative. The third level of the hierarchy contains the subcriteria, which further describe the specific goals of the five main criteria. Definitions for the criteria and subcriteria can be found in Figure 5. The fourth level of the AHP hierarchy contains the alternatives.

Each of the participants was given a brief explanation of the hierarchy and the pairwise comparison process. Little additional information was provided because “minimal descriptive material allows the respondent to bring their own experience and perspective to the choice” (Duke and Aull-Hyde, 2002, p. 138). Participants were then given the option of going through the model on a laptop computer (using *Expert Choice*, a software package supporting the AHP) or in a paper survey format. Seven of the participants chose to have the model hierarchy presented on the laptop computer, whereas three chose to fill out the survey version.

The specific objective of this case study was to elicit and quantify the relative importance of the various water-privatization value dimensions according to the viewpoints of a variety of stakeholders, and to conduct an evaluation based on those views. Although the original intent was for the evaluations of the alternatives to be done directly by the stakeholders, the time allotted for the task proved too short, and the stakeholders were only able to prioritize the assessment criteria. Consequently, the evaluation of the alternatives has been conducted by the author using the stakeholders’ value priorities and is discussed later in the case study.

Figure 5: AHP criteria and subcriteria definitions

GOAL: To assess the values of various stakeholders regarding Oahu's freshwater supply.

- **SOCIAL:** Social considerations
 - **RATES:** water rates charged to the consumer
 - **HEALTH:** compliance with public health standards
 - **COVERAGE:** expansion of service (geographical, temporal, and by user group)
 - **CITYS:** cost to the municipality (City & County of Honolulu)
 - **RELIABLE:** the reliability of operation, maintenance, and repairs
 - **COMMUNIT:** consistency with the community's goals and needs
 - **AWARE:** public awareness about past failures
 - **JOBS:** job security
 - **RECREATI:** recreational use
- **ENVIRON:** Potential environmental considerations regarding water privatization
 - **STANDARD:** compliance with environmental standards
 - **LESSH2O:** water conservation
- **ECON:** Total cost, to whomsoever it may accrue
- **EFFICIEN:** Efficiency of the water-supply system
 - **TIMELY:** the timeliness of operation, maintenance, and repairs
 - **COST:** cost per unit of water delivered to the consumer
- **INSTITUT:** Potential legal, administrative, and institutional considerations regarding water privatization
 - **TRADITIO:** respect for historical and cultural practices
 - **PRICING:** "fairness" in pricing
 - **REG-ACC:** governmental regulation and accountability to the public
 - **RIGHTS:** protection of water rights
 - **PUB-PART:** public participation in the decision-making process

Participants made two types of pairwise comparisons: (1) pairwise comparisons of the general criteria, and (2) pairwise comparisons of the specific subcriteria under each general criterion. Upon completion of the comparisons conducted by those using the computer version, participants were shown their priorities as relative weights of the criteria and subcriteria in bar-graph form. At this point, the participants were asked if they felt as though the bar-graph and relative weights adequately reflected their values. They were then given the option to revise their comparisons if they felt otherwise. However, none of the participants chose this option.

6.4 The informants' value priorities

The overall individual rankings of the criteria and subcriteria by the ten participants are found in Table 2. Graphical depictions of these results are found in Figures 6, 7, 8, 9, and 10. One can conclude from this analysis that, *within this group of informants*, environmental considerations, with a mean priority of 0.363, are of greatest preference, followed by social concerns 0.193, institutional, legal, and administrative considerations 0.183, efficiency goals 0.135, and, lastly, economic considerations 0.126 (see Table 3). By focusing only on these mean priorities while ignoring individual variations, one can infer environmental aspects to outweigh sociopolitical concerns, which, in turn, outweigh efficiency and economic issues. In fact, on an individual scale, seven of the ten participants found environmental considerations to be of greatest preference. This pattern notwithstanding, the reader should *not* infer that a majority of people in Hawai'i are most concerned about the environmental implications of privatization. Because this is not a statistical study, one cannot make this claim.

Table 2: AHP results by individual

<i>Criteria</i>	<i>Subcriteria</i>	Concerned citizen	Cultural resource specialist	Environmental attorney	Environmental economist	Hydrogeologist
Social		0.316	0.369	0.176	0.079	0.155
	Rates	0.149	0.097	0.050	0.086	0.120
	Health	0.306	0.243	0.345	0.156	0.270
	Coverage	0.147	0.142	0.087	0.108	0.036
	City\$	0.093	0.044	0.080	0.099	0.120
	Reliable	0.155	0.104	0.183	0.163	0.191
	Communit	0.039	0.154	0.146	0.047	0.101
	Aware	0.051	0.121	0.063	0.044	0.061
	Jobs	0.035	0.023	0.019	0.241	0.040
	Recreati	0.025	0.073	0.028	0.055	0.061
Environ		0.196	0.385	0.444	0.075	0.316
	Standard	0.500	0.627	0.536	0.167	0.595
	LessH2O	0.500	0.373	0.464	0.833	0.405
Econ		0.201	0.041	0.085	0.263	0.166
Efficien		0.182	0.073	0.090	0.383	0.059
	Timely	0.519	0.381	0.596	0.750	0.351
	Cost	0.481	0.619	0.404	0.250	0.649
Institut		0.105	0.132	0.205	0.200	0.303
	Traditio	0.256	0.436	0.222	0.105	0.050
	Pricing	0.231	0.133	0.117	0.244	0.166
	Reg-acc	0.200	0.113	0.229	0.068	0.380
	Rights	0.131	0.215	0.244	0.530	0.057
	Pub-part	0.183	0.103	0.189	0.053	0.347

Table 2 continued: AHP results by individual

Criteria	Subcriteria	Native Hawaiian community leader	Planner	Social Scientist	Water quality scientist	Water resource manager
Social		0.161	0.260	0.030	0.195	0.192
	Rates	0.061	0.228	0.256	0.021	0.066
	Health	0.288	0.321	0.219	0.445	0.338
	Coverage	0.092	0.061	0.070	0.033	0.213
	City\$	0.061	0.025	0.059	0.036	0.048
	Reliable	0.196	0.228	0.121	0.094	0.140
	Communit	0.165	0.079	0.068	0.119	0.119
	Aware	0.032	0.032	0.140	0.028	0.031
	Jobs	0.067	0.057	0.036	0.016	0.018
	Recreati	0.097	0.041	0.030	0.208	0.026
Environ		0.260	0.526	0.556	0.566	0.301
	Standard	0.500	0.500	0.500	0.990	0.500
	LessH2O	0.500	0.500	0.500	0.010	0.500
Econ		0.063	0.120	0.227	0.059	0.035
Efficien		0.062	0.060	0.129	0.142	0.172
	Timely	0.200	0.167	0.589	0.818	0.250
	Cost	0.800	0.833	0.411	0.182	0.750
Institut		0.455	0.033	0.059	0.037	0.301
	Traditio	0.401	0.161	0.310	0.352	0.184
	Pricing	0.128	0.215	0.068	0.060	0.129
	Reg-acc	0.080	0.066	0.282	0.187	0.184
	Rights	0.345	0.176	0.072	0.373	0.374
	Pub-part	0.046	0.382	0.268	0.029	0.129

Figure 6: Overall AHP criteria ratings

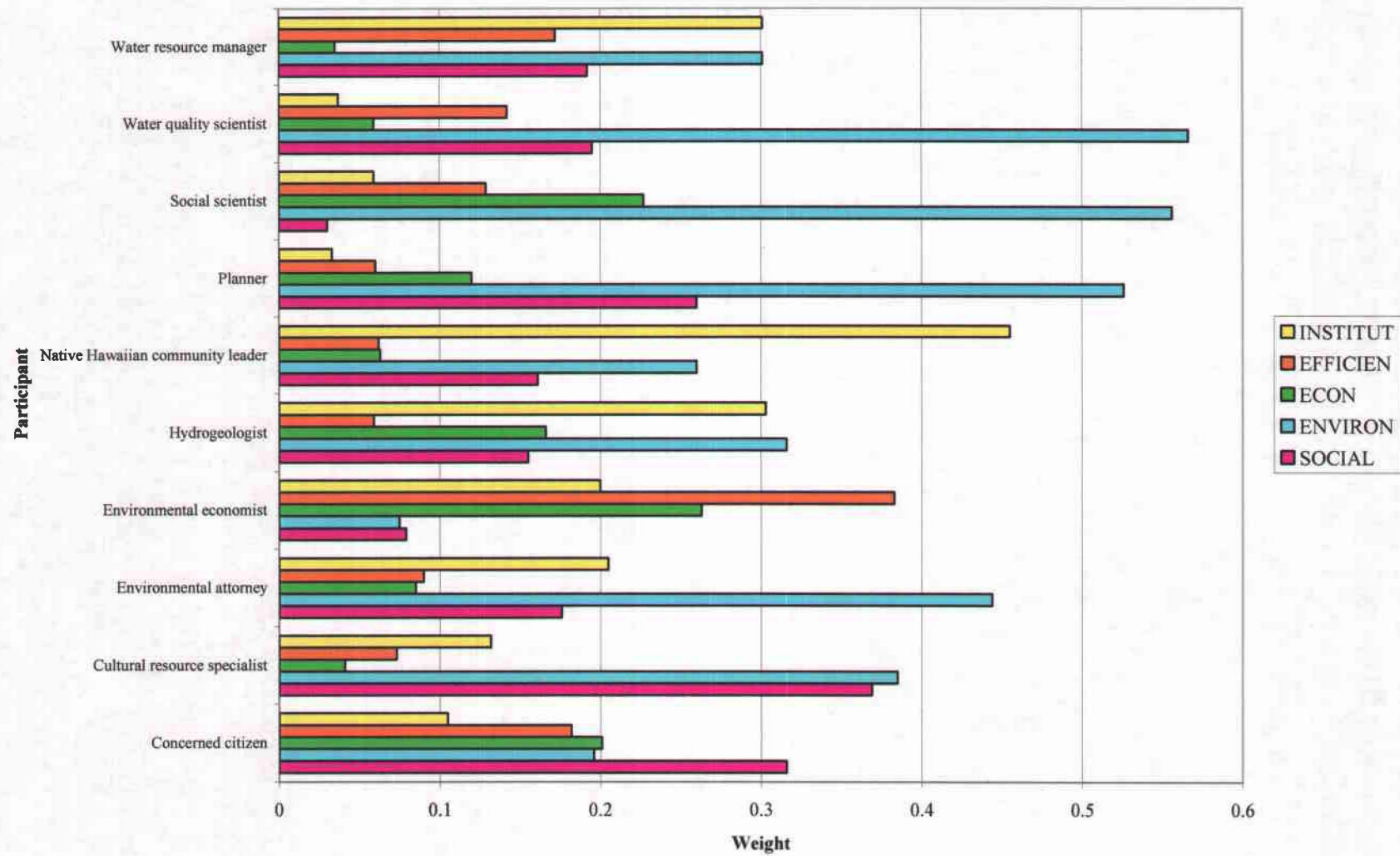


Figure 7: Overall AHP social ratings

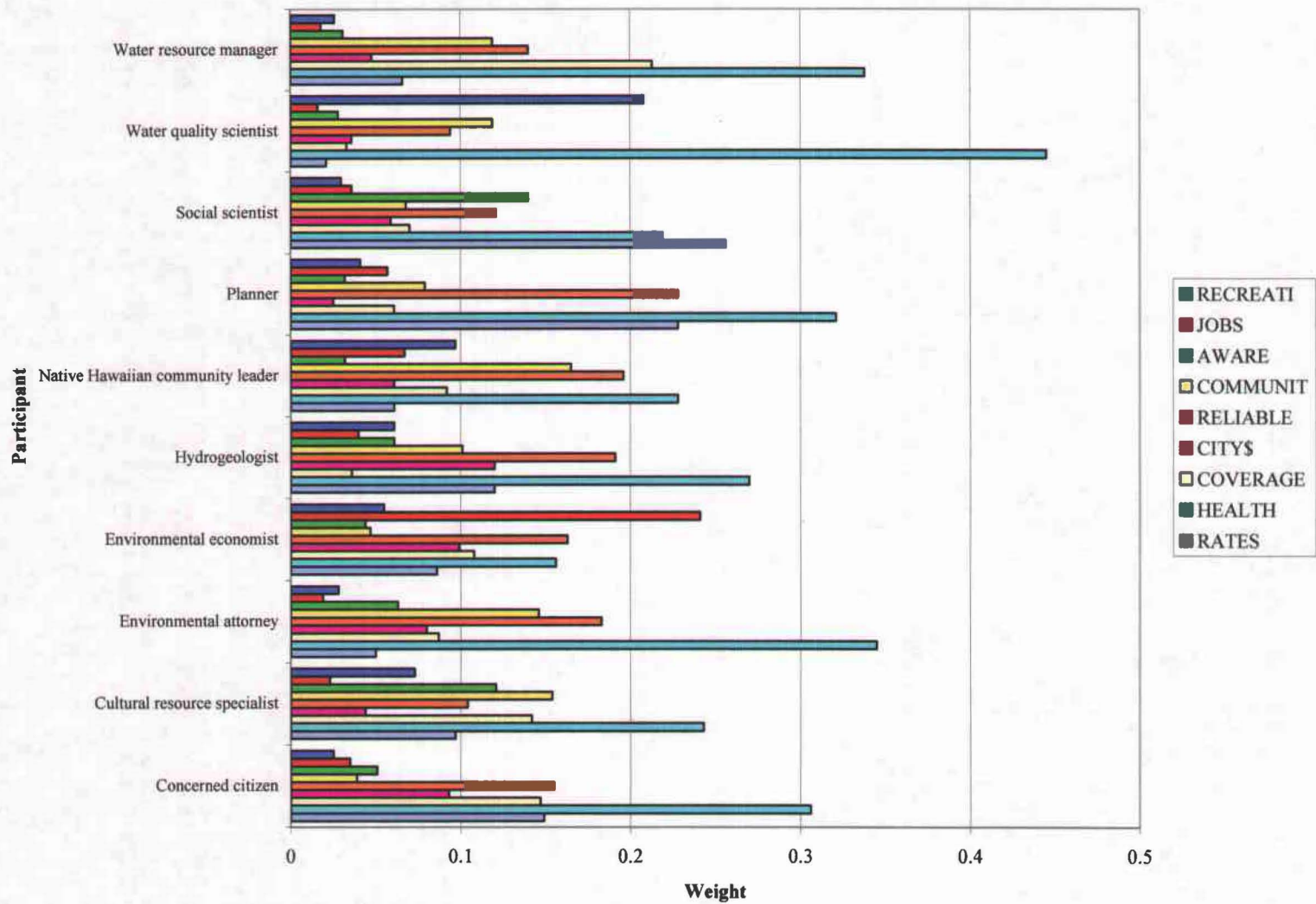


Figure 8: Overall AHP environmental ratings

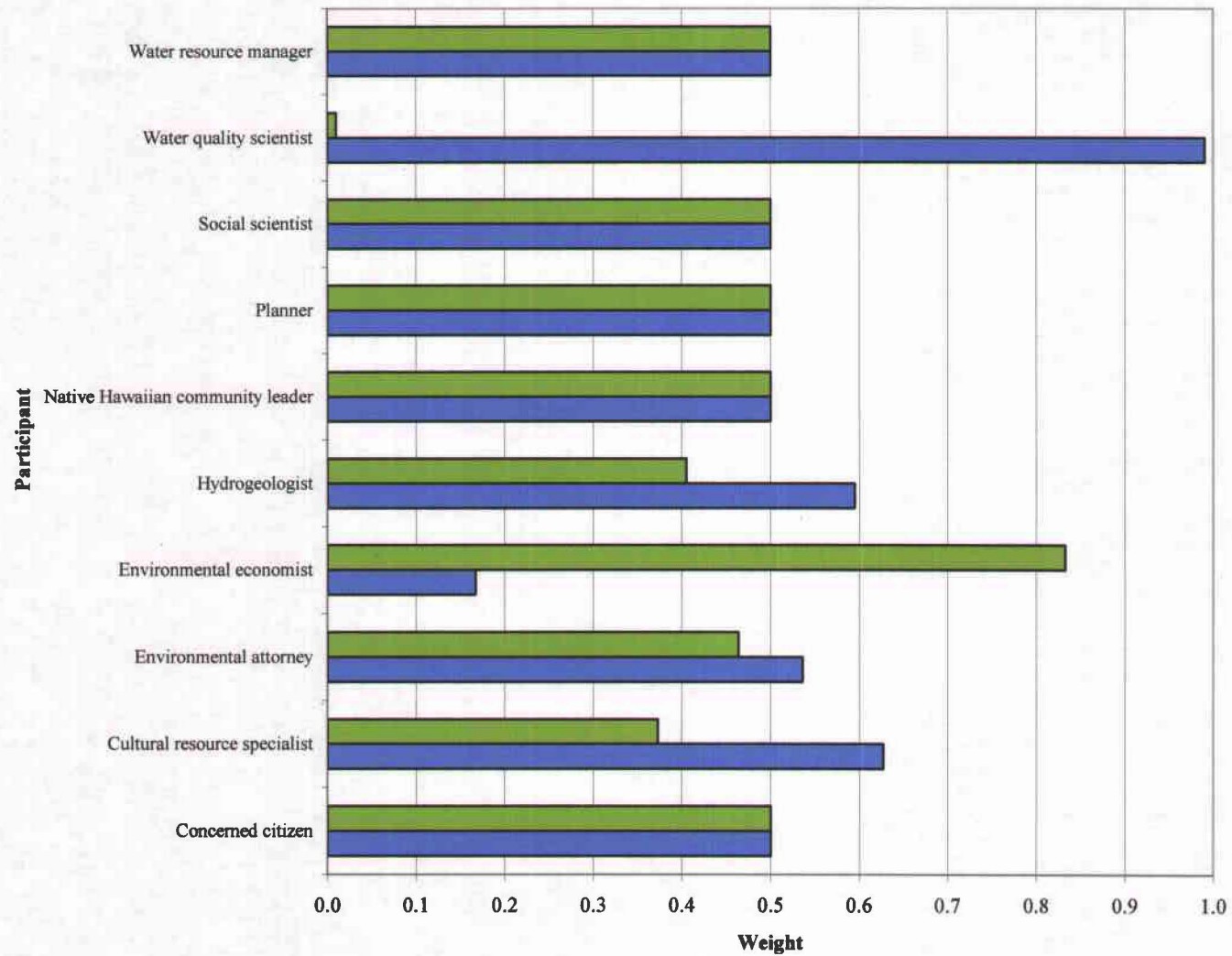


Figure 9: Overall AHP efficiency ratings

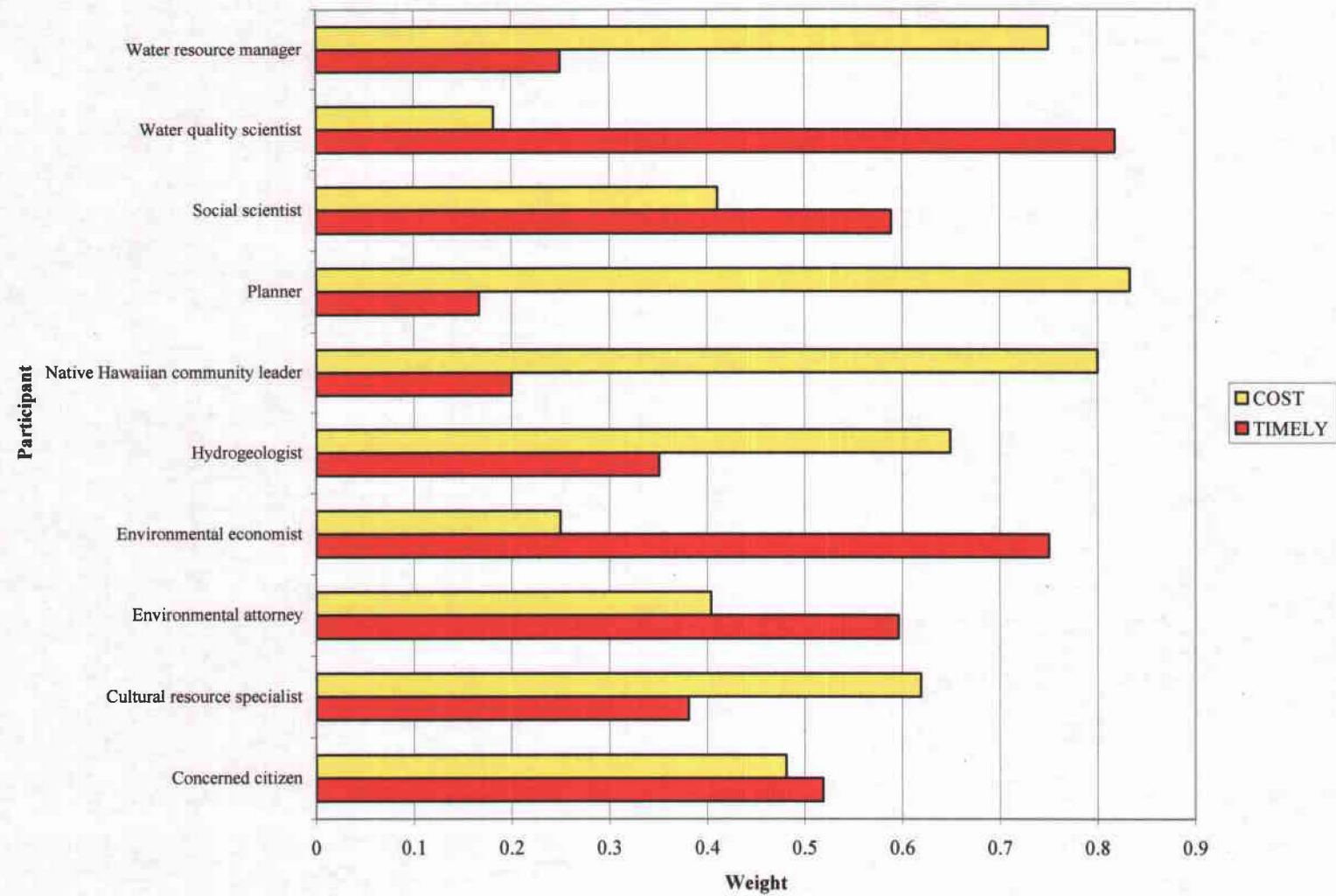


Figure 10: Overall AHP legal, administrative, and institutional ratings

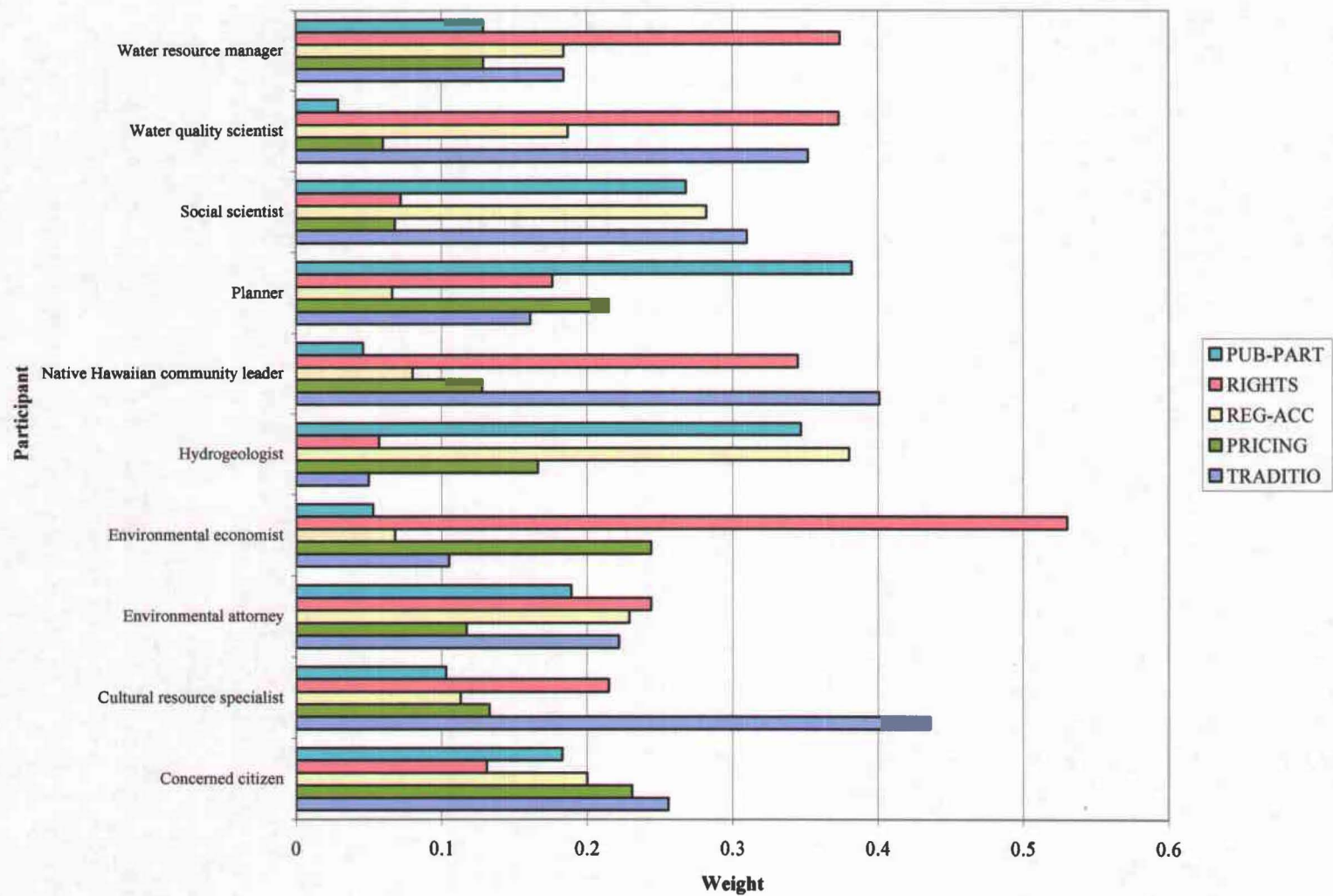


Table 3: Average AHP results

<i>Criteria</i>	<i>Subcriteria</i>	Criteria weight	Subcriteria weight
Social		0.193	
	Rates		0.113
	Health		0.293
	Coverage		0.099
	City\$		0.067
	Reliable		0.158
	Communit		0.104
	Aware		0.060
	Jobs		0.055
	Recreati		0.064
Environ		0.363	
	Standard		0.542
	LessH2O		0.459
Econ		0.126	
Efficien		0.135	
	Timely		0.462
	Cost		0.538
Institut		0.183	
	Traditio		0.248
	Pricing		0.149
	Reg-acc		0.179
	Rights		0.252
	Pub-part		0.173

Since there is the *existence* and *range* of priority variability among a group of informants, it is important to note in this and any study of a group's values, one should be aware of the issue of individual consistency. When weighing intangibles subjectively, human beings are all but guaranteed to exhibit inconsistencies. The array of multiattribute methods developed and used to measure values and other intangibles deal with such inconsistencies in one of two principal ways. One way is to ensure they do not occur, either by limiting the set of comparisons the informant must make and thus avoid the possibility of contradictory judgments, or by forcing reappraisals of problematic assessments until the inconsistencies disappear. The other way is to recognize inconsistency as a natural human trait and to allow it, but also to admit that too much inconsistency is undesirable and counter to good judgment and decision-making. The AHP adopts this second task, informing users of their degree of inconsistency and providing benchmarks against which to assess it, but not requiring them to alter judgments about which they feel strongly. Adherents of the AHP view this as a distinct merit. Ehie et al. (1990) state, "An additional advantage of AHP is that it provides a direct measure of inconsistency of judgment provided by each respondent by calculating an inconsistency index" (p. 189). The inconsistency index of each pairwise comparison matrix is given in Table 4. This index is the ratio between the cardinal (quantitative) intransitivity of the set of comparisons and that of an average set generated entirely at random. To reflect the principle of consistency as a norm for good judgment, Saaty (2001) advises one to reexamine one's judgments if their inconsistency ratio is greater than 10%. He and other practitioners agree, however, that if after reflection and

Table 4: Consistency ratios

<i>Participant</i>	Overall criteria	Social	<i>Criteria</i>		
			Environ	Efficien	Institut
Concerned citizen	0.43	0.12	0.0	0.0	0.10
Cultural resource specialist	0.08	0.23	0.0	0.0	0.11
Environmental attorney	0.15	0.13	0.0	0.0	0.01
Environmental economist	0.06	0.11	0.0	0.0	0.14
Hydrogeologist	0.06	0.23	0.0	0.0	0.08
Native Hawaiian community leader	0.08	0.06	0.0	0.0	0.05
Planner	0.22	0.14	0.0	0.0	0.15
Social scientist	0.26	0.28	0.0	0.0	0.01
Water quality scientist	0.16	0.28	0.0	0.0	0.33
Water resource manager	0.24	0.20	0.0	0.0	0.10

reassessment the inconsistency still exceeds that benchmark, the analyst should not force informants to alter their evaluations in order to strive for greater consistency.

In this study, inconsistency ratios were found to be relatively high. In fact, in each of the pairwise comparisons that involved more than two attributes, at least half of the inconsistency ratios were above Saaty's 10% recommendation. However, upon completion of the pairwise comparisons, each participant was shown their outcome, in which they all agreed that it reflected their values and preferences. Each participant was also asked if they would like to go through the pairwise process again, and each declined. One of the reasons contributing to the high inconsistency ratios may be due to the broad scope of the AHP model used, which is further discussed in section eight.

6.5 Results from the interviews

The conversations that occurred during the AHP interview helped to highlight the rationale behind the decisions made. While the AHP is a good tool at quantifying intangible attributes, the outcome depends greatly on how participants interpret and define the words in the model. This interpretation helps to understand where their values are coming from. For example, one participant states, "we can do something to change institutions, but it's much harder to change society, so I would say social considerations are very strong." In this case, it is not that institutional considerations are of less importance, but rather that institutional considerations are believed to be more flexible than social considerations, and therefore, are of less priority. The discussions that arose when working through the AHP model helped to understand better how the participants made tradeoffs.

As participants worked through the AHP model, not only were their values elicited, but also their thoughts on what the associated impacts would be regarding privatization options. For example, many stakeholders stressed the underlying principle that water traditionally has been a public good. It was also emphasized by one participant that it is everyone's obligation to preserve freshwater for future generations. The participant states, "[you] can't destroy a resource that has the basis for sustaining all of us; nobody has a private right to do that." There was the general feeling that if full privatization were to occur with the Board of Water Supply that it would not go over well with the general public. As another stakeholder expresses, "I think that there would be fear first, and uncertainty because they know what they have." Several participants suggested that the public would feel that water privatization would jeopardize the performance of the criteria. Through the dialogues that occurred, it became apparent that the stakeholders were concerned about the impacts the privatization alternatives would have on the objectives.

The conversations also showed how some of the stakeholders compared the different privatizing options on an 'accountability' criterion, whereas other stakeholders disagreed on that. For example, there was the general sentiment that de-politicizing water management would be good, but there remained the question as to how a private company actually would be responsible for allocating Oahu's freshwater supplies. Additionally, another participant states, "it looks like the approach to provide water would be to allow water to everyone so they don't die, and then having maybe a scale related to ability to pay. Now if one has a principle like this, then it doesn't matter what is established – it doesn't matter if it's public or private." It was clear in most interviews

that participants perceived private parties to not be as accountable to the public the same way as government parties are accountable. All in all, the stakeholders' comments while going through the AHP highlighted the fact that participants would like to have the purported efficiency benefits of privatization, but they would also like their societal objectives to be adequately met.

Throughout the AHP process participants speculated on the performance of different privatization options on the concerns most important to them. For example, they appeared worried that privatization would jeopardize certain social concerns, such as having an appropriate pay scale. Overall, the interviews showed that how well the objectives are met will depend not only on the priorities one assigns them, but also on one's assessment of each scheme's impacts on each of those objectives.

6.6 Evaluating privatization alternatives: Six scenarios

Having used the Analytic Hierarchy Process to help each of the ten stakeholders prioritize the concerns culled from the literature, we are still left with the question as to which water privatization option would be best for the island of Oahu based on those priorities. The participants' priorities have addressed the issue of *desirability*, or *relative importance*, of the criteria; however, the effects of the alternatives on the objectives and criteria have not been assessed. The question remains as to how the privatization options are going to perform on them. To distinguish *performance* from *desirability*, six different scenarios, which include three different "desirability scenarios" coupled with two different "effects scenarios," are carried out within the AHP analysis. The three "desirability scenarios" are:

1. A “consensus” view, as represented by the mean AHP priorities (Table 3)
2. An extreme environmental position: Because the water quality scientist had the highest rating of 0.566 for the environmental concerns amongst all other participants, the water quality scientist’s ratings will be used for the extreme environmental position (Table 2). Furthermore, in this case the social considerations were found to be second in priority with a rating of 0.195.
3. An extreme economic position: Because the environmental economist had the highest rating of 0.263 for economic concerns amongst all other participants, the environmental economist’s rating will be used for the extreme economic position (Table 2). In comparison to the water quality scientist’s ratings, the environmental economist found environmental concerns to be of least priority with a rating of 0.075 preceded by social considerations at 0.079.

It is important to point out that I have defined the desirability scenarios based on the conclusion from the participant AHP analysis that values among stakeholders often can differ. On the other hand, the two “effects scenarios” are based on the outcomes of different schemes of documented cases. The United Kingdom and Buenos Aires, Argentina represent one example of a documented case where water privatization has resulted in different outcomes. Both locations were in need of modernizing water delivery, however, environmental impacts associated with the changes made differed. The U.K. reported a reduction in adverse environmental impacts, whereas Buenos Aires, unable to meet their sewage treatment targets, experienced significant adverse

environmental impacts. In another example, Chile was able to successfully increase water access by the poor, while the urban inequalities of accessibility in Buenos Aires increased. Additionally, in the documented cases of Atlanta, Georgia and the United Kingdom, residents of Atlanta experienced “boil only” alerts, whereas the U.K. reported higher drinking quality of their freshwater. These conflicting outcomes clearly show how and why people can form different perspectives on the issue of water privatization. It is apparent why an individual may feel that privatization is only concerned about making profits when water quality has been jeopardized. On the other hand, one can also argue that privatization is responsive to public concerns since water quality has improved in some cases. Therefore, the two “effects scenarios” are defined as follows:

1. The private sector is only interested in the “bottom line,” i.e., making money
2. The private sector is responsive to the market, which itself is an expression of the public’s values.

Ultimately, the six scenarios used to evaluate the privatization alternatives are plausible futures, not necessarily probable ones.

6.6.1 Results and discussion of the six scenarios

As discussed in the previous section, the best privatization scheme for Oahu is dependent on the effects a scheme has on the value dimensions as well as the desirability of those particular effects. Therefore, it was decided that the six assessment scenarios used to decide which privatization option would best fit for Oahu would be defined as combinations of impact and desirability scenarios. The classification of the six scenarios

can be found in Table 5. The final priorities and ranking of the alternative schemes for the six scenarios can be found in Table 6, and a graphical depiction of these results can be found in Figure 11.

In the three scenarios (AVEPRO, ECONPRO, and SCIPRO) that took the stance that privatization was mainly concerned about increasing their profit margins, it was found that the greater the involvement of the public sector, the greater the priority of that alternative. Likewise, the less involved the private sector, the greater the priority of that alternative. On the other hand, in the three scenarios (AVEVAL, ECONVAL, and SCIVAL) that recognized privatization to be responsive to public values, it was found that the greater the involvement of the private sector, the greater the priority of that alternative. That is, the less involved the government is with managing freshwater, the higher the priority ranking it received. All in all, the results showed that the ideological stance is indicative of which privatization option best fits for Oahu.

Experts may disagree on the effects of a scenario because they are focused on different past experiences, such as privatization's improvement of water quality in one case or the degradation of it in another case. However, if experts are aware of the same cases, yet focus on them differently, then it is clear that they have different ideological stances. It is these differing stances that then point to the origin of those differences. The "effects scenarios" used in this analysis encompass two opposed ideologies, which are purely value differences. Because there is no such thing as an expert in values, one cannot be quick to critique these ideological persuasions. In the outcome of the six scenarios, the difference in values led to different appraisals of the alternatives. Clearly, the outcomes of the "desirability scenarios" are perceived to be achieved when coupled

Table 5: Classification of the six scenarios

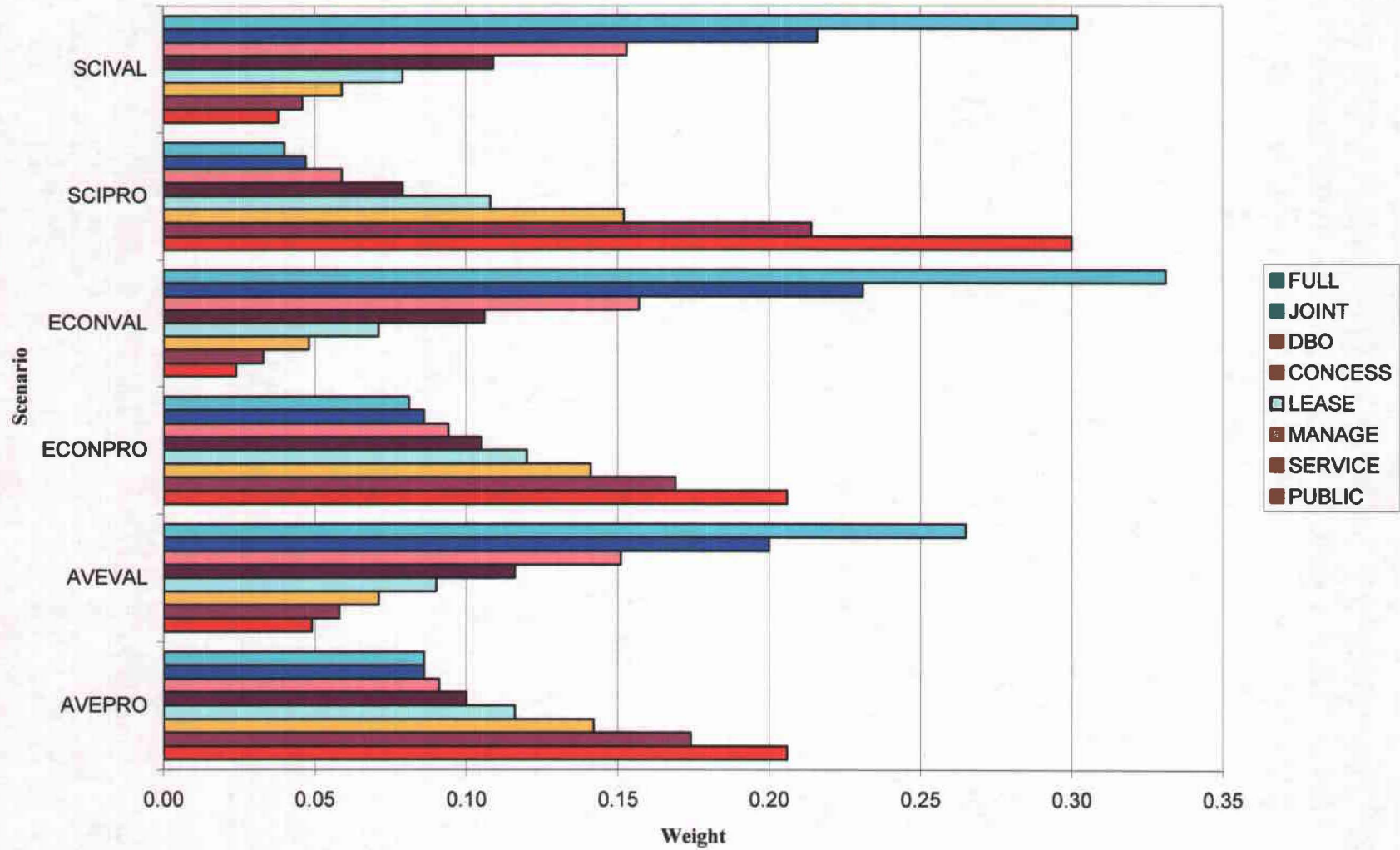
	<i>Privatization is only concerned about profits</i>	<i>Privatization is responsive to public values</i>
<i>Mean AHP ratings</i>	AVEPRO	AVEVAL
<i>Environmental economist's AHP ratings</i>	ECONPRO	ECONVAL
<i>Water quality scientist's AHP ratings</i>	SCIPRO	SCIVAL

Table 6: Results of the six scenarios*

<i>Alternative</i>	AVEPRO	AVEVAL	<i>Scenario</i> ECONPRO	ECONVAL	SCIPRO	SCIVAL
PUBLIC	■	0.049	■	0.024	■	0.038
SERVICE	0.174	0.058	0.169	0.033	0.214	0.046
MANAGE	0.142	0.071	0.141	0.048	0.152	0.059
LEASE	0.116	0.090	0.120	0.071	0.108	0.079
CONCESS	0.100	0.116	0.105	0.106	0.079	0.109
DBO	0.091	0.151	0.094	0.157	0.059	0.153
JOINT	0.086	0.200	0.086	0.231	0.047	0.216
FULL	0.086	0.265	0.081	0.331	0.040	0.302

*Shaded ratings indicate the highest priority for that particular scenario.

Figure 11: Results of the six scenarios



with a participant's ideological stance. For example, if the environmental economist believes that economic considerations should play a significant role in deciding what management changes ought to be made, *and* he or she possesses the ideological belief that privatization is responsive to public values, then full privatization efforts offer the potential to successfully achieve meeting the economic considerations. However, if the environmental economist feels that privatization is solely concerned about increasing their profits, then full privatization would be the least favored option in achieving the goal of successfully meeting the economic considerations.

The analysis of the six scenarios shows that selecting expert opinions cannot be an exclusive process since all sides of the issue needs to be analyzed clearly. Expert opinions may be in agreement on the desirability of a specific criterion, but conflict as to which alternative best satisfies that criterion. Throughout the research for this thesis, it was found in the literature that there are a significant number of opinions focused on improving water management practices. However, there lacked true prescriptions as to specifically how water management should make improvements. Clearly, any prescriptions made need to take a case-by-case basis, since all perspectives are up for a healthy and vigorous debate. In the end, effective water management practices must at a *minimum* include the priorities highlighted, and extensively address all options being considered. In the case for Oahu, changes made in managing freshwater supplies ought to include all of the perspectives and priorities discussed. However, it should also be recognized that these perspectives and priorities *do not* include or represent all opinions of Oahu residents.

Chapter 7: CONCLUSIONS

7.1 Case study conclusion

Because of the factors that contribute to the complexity of a problem, such as uncertainty, conflicting objectives, and intangible attributes, it is necessary to have a holistic approach to clearly analyze the problem. With the management of water resources, for example, there are many competing factors – environmental, social, financial, political, etc. – that provide a very complex context for decision-making. Therefore, the Analytic Hierarchy Process provides a helpful methodology to handle such management challenges. Because freshwater is a shared resource, it is inherently public by its nature, which further contributes to the complexity of decisions regarding its management. In the case study conducted in this thesis, the Analytic Hierarchy Process served as a useful tool at highlighting public values associated with freshwater and its management.

Despite the problems that did arise with the AHP, this methodology did help to decrease the complexity of the problem by providing a rational framework in which to compare values. However, while the AHP did pose a systematic way at looking at the problem, it is important to point out that the conversations had with the participants during the process also provided valuable information. As one participant clearly states, “it’s useful to go through this only as an exercise to think about the problem. And after you have juxtaposed all the hypotheticals, its not that that’s the answer...it’s a good training exercise.” The outcome of the AHP does not provide *the* answer. Instead, it is an effective tool with which the decision maker’s preferences can be incorporated in designing the management plan by ascribing appropriate weights.

In the case study for Oahu, the AHP showed what values need to be considered if Oahu were to privatize its water supply. While these values need to be included in the process, they are not the only values that need to be considered. The case study, by means of objectives hierarchies and the AHP, showed that values can be included in an assessment when considering privatization options. Values also can be included through stakeholder consultation. However, because this study is not statistically representative, the outcome for Oahu will depend on the scenario one selects. Therefore, the set of values and expert opinion that one adopts, as seen in the “effects scenarios,” will contribute to the final decision. The case study provides a useful template in which to work from for further studies regarding how Oahu residents value freshwater and its management.

7.2 Concerns and problems with the model

Saaty (1987) states, “a general rule is that the hierarchy should be complex enough to capture the situation, but small and nimble enough to be sensitive to changes” (p. 163). Although this was the intent of the hierarchy developed, a major pitfall was that it was not developed by the participants themselves. Because the hierarchy was not developed based on the original ideas of the participants, they had no sense of ownership in the model. This detachment from the AHP model further contributed to the participants’ recognition of the overlapping nature of criteria and subcriteria. Additionally, this broad and overlapping nature may have caused participants to have difficulty in expressing their true feelings. For example, one participant commented that “it’s hard to answer in such generalities,” whereas another participant stated that

efficiency considerations will at some point affect the social considerations. Another participant also mentioned that water rights are included in the traditional considerations, and historical and cultural considerations can be antithetical. Despite the participants' understanding of the choices to be made, many participants expressed difficulty in trading off the criteria and subcriteria. Although minor in this case study, another problem that arose was the duration of the AHP. Several participants commented on the AHP's tedious and tiring nature. All in all, the problems that arose in the case study for Oahu could potentially be reduced or eliminated if participants had contributed to the model's development.

Another potential source of problems that could have significantly affected the outcome of the AHP was *how* the judgments were elicited. Each participant went through the entire hierarchy, in which some of the participants chose to do their assessment with me working the computer model, whereas other participants selected the paper version of the model. The participants working with me on the computer may have felt an increased pressure to complete the assessment in one sitting. This, in turn, could have led to the issue of "good" facilitation. Clearly the skills of the facilitator are an important factor contributing to a participant's final assessment, which can eventually affect the final outcome of the AHP ratings.

7.3 General conclusions

Currently, hydrologic discourse includes an apparent emphasis on the role of the private sector. Despite the widely held belief that water is a common good and should therefore be freely available, "the fact remains that the provision of high quality water, in

inexhaustible quantities, the treatment and disposal of sewage waste, and the upkeep of the infrastructure to supply these services are not cheap” (Meredith, 1992, p. 78). As governments continue to be faced with budgetary shortcomings, today’s trend towards private sector participation will continue to accelerate. Although there has been a significant expansion of privatization, the real achievements as well as objectives of privatizing the water industry are still widely debated.

Ultimately, the question remains as to whether or not privatizing the water sector erodes public values. Is water privatization a socially responsive solution? Clearly the case studies analyzed in this paper have not been without complications. Whether or not privatization causes more problems than before, it is undoubtedly apparent that in some situations, e.g., Buenos Aires’s increase in urban inequalities and the U.K.’s rapid price increase, compromises were made on behalf of the public’s well being. It is also evident in some cases that complications were not fully alleviated, rather just transferred into another problematic form. For example, Buenos Aires traded off not meeting sewage treatment targets thereby polluting water bodies for gains in the extension of water infrastructure. The case study literature showed that on some values privatization was able to out-perform government water services, whereas in other cases privatization was unable to meet certain criteria. Because there seems to be a relative balance of the pros and cons associated with water privatization, it seems that privatization does indeed erode some public values while simultaneously enhancing others.

All in all, water privatization has yet to prove that it has aided in alleviating the world water crisis. While there may exist some immediate benefits to changing management regimes, the long-term sustainability of privatizing the water industry still

remains a question of doubt. Thus far however, this paradigm shift has forced water resource managers to critically examine and prioritize what they most want to accomplish. Water privatization does not have to mean that water resource managers are faced with questions such as “do I want to achieve overall higher water quality at the expense of higher disconnection rates? Or do I think that the community is willing to accept the possibility of increased water poverty levels over lower environmental impacts?” Instead, this new paradigm needs to include a better approach to handling private sector participation. By using such methods as described in this thesis, water managers can better define and assess their values, which can then be included in the process of changing management regimes. Ultimately, water privatization does not need to be an issue of compromise. For example, the case study for Oahu showed that a new model incorporating privatization’s operating efficiencies and profit-generation along with Hawaii’s traditional cultural values could be a viable and beneficial solution. Not only can new approaches to handling the issue of private sector participation better represent community values, but they can also have a lasting effect on maintaining valuable freshwater supplies.

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