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Beneficiary Pays Analysis of Water Recycling Projects

A report prepared for the State Water Resources Control Board

Economic Analysis Task Force for Water Recycling in California

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March 9, 2011

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TABLE OF CONTENTS

TABLES

FIGURES

LIST OF ACRONYMS

AJE	Alternative Justifiable Expenditure
BPA	Beneficiary Pays Analysis
BPP	Beneficiary Pays Principle
DWR	Department of Water Resources
SCRB	Separable-Costs Remaining-Benefits
SWB	State Water Resources Control Board

1.0 INTRODUCTION

"Beneficiary pays" is a phrase that brings many reactions. To everyone it implies an effort to allocate costs to beneficiaries of a project. Where a project's costs exceed its benefits, adherence to a beneficiary pays principle implies that economically unfeasible projects will fail due to insufficient funding. In this way, adherence to a beneficiary pays principle helps deprive unworthy projects of investment. However, where a project's benefits exceed its costs and there are several beneficiaries, the surplus of benefits over costs is implicitly allocated among beneficiaries depending on the particular process used to determine how much each beneficiaries pays. This implies that any implementation of a beneficiary pays principle will always be controversial as it will be seen as a way of killing projects which are desired by some (albeit desired less than their willingness to pay) or as a way of enforcing payments from some beneficiaries more than others. This controversy is inherent in allocating costs among project beneficiaries. The problem is made both easier and more difficult by the potential of government sponsors to subsidize projects, implying that complaining about cost might increase government support, and decrease payments from beneficiaries (Giglio and Wrightington, 1972). For these situations, it is usually efficient for the government agency to mandate one specific method for allocating costs among beneficiaries.

The purpose of this short report is to present an approach for allocating costs among multiple project beneficiaries. This report is not intended to be the basis for policy or to be used to evaluate how to allocate state or federal funds among projects. Rather, this report reviews this problem with respect to water recycling projects and suggests one of the most common and widely accepted methods of cost allocation among project beneficiaries.

1.1 Beneficiary Pays Principle

The Beneficiary Pays Principle (BPP) is based on the concept that those benefiting from a project should fund the project. The BPP operates on the demand side and is not a means to incentivize payment. Often, participants may try to reduce their accounted-for benefits to minimize their cost share.

This document presents a method to conduct Beneficiary Pays Analysis (BPA) for a project. We propose using the Separable-Cost Remaining-Benefits (SCRB) method to allocate costs of a project among beneficiaries. The SCRB method was chosen because it uses the benefits accrued to each user as the basis for allocating joint costs which results in an equitable distribution of costs among users. Historically, the SCRB method has been used by the State Water Board (SWB), Department of Water Resources (DWR), and US Bureau of Reclamation.

1.2 Background

Some legal context for BPA in California was outlined in proposed Senate Bill 113 (Machado April 2005). The proposed Senate Bill 13 did not become law, but its broad message was that costs should be paid by project beneficiaries. Related to how the State allocates funding, the bill stated that the State should fund projects with public benefits and should not provide funds for private benefits. Rather, non-State funds should be used for projects or the portion of projects which are considered to have private benefits. The proportion paid by government and non-government users should be based on their proportion of the overall benefit.

While the message from the Senate Bill was simple, there are three main challenges. First, identifying costs specific to each user and purpose; second, identifying benefits as public or private; and third, in determining how costs are allocated.

1.3 Application of BPP in Other Sectors

The BPP has been used to address financing for public goods. In economics, goods are considered public if they benefit more than one user and use is not, or cannot be, limited by payment (Yamauchi, 2000). A example of a public good are traffic signals. Motorists do not pay for traffic signals, but they benefit from them, and one motorist's use of the signals does not diminish the service for other potential users. It is often difficult to fund public goods projects because users do not realize their full opportunity cost, which leads to undervaluation. BPP attempts to reduce this gap. Examples of projects involving public goods that have used BPP include urban land use development, transportation, and health care.

In urban development, residents will feel the cost of construction of municipal infrastructure (i.e. roads and water mains) through their property purchase price and fees. This is a result of conditions put on the developer by municipalities, requiring that the developer construct or contribute to municipal infrastructure to get permits (Azizi, 2000). Common *user-pays* methods to fund transportation projects, in which users of a public good pay a charge for its function, include tolls, congestion charges, fuel taxes, and emissions taxes (OECD 2002). *Means-based* user fees, which are based on the ability of individuals to pay given their personal finances, have been used in health care to moderate government contributions to health care systems (Gargett, 2010). The common thread behind applying the BPP is to reduce use of government funds for public goods that can be at least partially self-financed.

1.4 Allocation Mechanisms

A variety of methods have been proposed for allocating costs of public projects among beneficiaries (Giglio and Wrightington, 1972). Several methods are summarized below.

1.4.1 Separable Cost Remaining Benefits (SCRB)

The Separable Cost – Remaining Benefits (SCRB) method is a commonly used approach used by State and Federal funding agencies in allocating project costs. The method is detailed in James and Lee (1971) and was first recommended to the US Inter-Agency Committee on Water Resources in 1950. In this method, the cost allocation is based on the economic benefits accrued for each purpose and user (USDOI 2001). The separable cost, which is the added cost for each participant, and proportion of benefits, is used to determine the proportion of joint costs allocated to each user. Detailed steps for the SCRB approach are described in Section 3.0 and in Figure 1.

1.4.2 Alternative Justifiable Expenditure (AJE)

The Alternative Justifiable Expenditure (AJE) approach is simplified version of the SCRB method. Rather than using the separable cost for each purpose, it only uses the alternative cost to construct a project which meets the same objective. The steps for the AJE method outlined below are described further in Ernst and Ernst (1979).

AJE begins with identifying the *total project cost*, as defined in the financial analysis, and the *benefits* for each purpose, as defined in the economic analysis. For each purpose, the *cost of an alternative* project resulting in the same benefit is also calculated. The lowest of the *benefits* and *cost of alternative*, is selected and used as the *justifiable cost*. The *justifiable cost* represents the minimum value each participant should contribute to the multi-purpose project. The *specific cost* for each purpose is then defined. This value represents the cost of each purpose in the multi-purpose project. By subtracting the sum of the *specific costs* from the *total project cost*, the *total joint cost* is defined. The *remaining justifiable cost* is then calculated as the difference between the *justifiable cost* and the *specific cost*. The sum of all the *remaining justifiable costs* represents the *total remaining justifiable cost*. The proportion of the *remaining justifiable cost* to the *total remaining justifiable costs* then represents the present distribution for joint costs. Therefore, by multiplying the *total joint cost* by the representative proportion of *remaining justifiable costs*, *joint costs* are distributed among project participants. The total contribution by each party is equal to the *specific cost* and their proportion of the *joint costs.*

1.4.3 Subsidies

A common approach to funding projects having State or Federal interests is to subsidize the total cost. Subsidies are used to encourage projects with larger net benefits that may not be encompassed within the individual purposes or user groups. For multipurpose projects, such as water recycling, non-governmental agencies may also subsidize other participants to participate in the project by paying a portion of their separable costs. The SWB has provided subsidies for water recycling through the Clean Water State Revolving Fund. Subsidies amounted up to 25% of construction costs to a maximum value of $5 million.

Subsidies acts as an incentive so that one party's interests are met even if another's could be met through a different project with lower costs. Providing the subsidy may keep more participants involved in the multipurpose project. The drawback of providing a subsidy is that, if applied broadly, users may not know the full opportunity cost of the project which may lead to inefficiencies (Kemper et al, 2003)

1.4.4 Cost sharing

Cost sharing is when overhead costs are distributed among users and all participants contribute (USDOI 2001). The distribution of costs is not based on the benefits received, but is sometimes a negotiated or mandated formula among agencies for many projects. Cost sharing is not the ideal cost allocation mechanism as it neglects the benefits from economies of scale from having joint-use facilities and is not suited to accept single-purpose project facilities that may get added later in the project (USDOI 2001).

1.4.5 Cost allocation based on physical (non-monetary) measures

Cost allocation can be based on non-monetary benefits such as physical benefits or costs caused by each participant. Under this methodology, a volumetric recycled water allocation may determine the cost allocation scheme. Those using 30% of the recycled water pay 30% of the cost. A disadvantage of this approach is that the economic benefit per unit of recycled water may differ across users, introducing a bias on efficient resource allocation.

2.0 PRELIMINARY STEPS

2.1 Baseline Conditions and Standard Assumptions

Prior to any analysis, baseline conditions and standard assumptions need to be set. The baseline describes the status in the area without the proposed water recycling project. A clear definition of the baseline helps describe the issues at hand and how the proposed recycling project may address these issues. In terms of the economic analysis of water recycling, the baseline condition consists of the fresh water and wastewater disposal alternatives without the proposed water recycling project. The baseline conditions aid in addressing how the current system would affect the multi-purpose project users and how the proposed project would therefore benefit them. Because of the implications, it is important that project participants agree on the baseline conditions established by an authority.

The standard assumptions used in economic and financial analysis calculations need to be agreed on or established authoritatively. These include the discount rate, inflation rate, interest rate, period of analysis, and whether rates used are real or nominal and subsequent costs are real or nominal.

2.2 Information from Economic and Financial Analyses

Information from the baseline conditions and previously undertaken financial and economic analysis are used to conduct a cost allocation. Information relevant to the cost allocation schemes are the specific benefits and costs incurred by each user and purpose. It is important to identify most benefits resulting from the project and to whom they accrue to in order to identify all of the potential financing sources (Mann, 2008). The summary information from the economic analysis describes the net benefits for each project user. It is this value which will be used in the SCRB method for allocating joint costs. Values needed from the financial analysis include the total project cost as calculated over the period of analysis, which includes both capital and operations and maintenance costs.

2.3 Characterization of Benefits: Public versus Private

Benefits can be categorized as public or private. Private benefits and costs are attributable to individual groups and can be recovered through fees. Potential private benefits entities in water recycling include: water suppliers, wastewater providers, recreationists, and adjacent property owners (i.e. adjacent to water bodies, green areas, or golf courses). Public benefits result from public goods which do not provide a revenue stream. For water recycling projects within California these could include reduced shortage costs within the entire state, or ecosystem and environmental benefits to the State (i.e. to the Delta). The occurrence of public benefits and non-reimbursable costs provides justification for public funding from either the State or Federal government sources (Mann, 2008)

3.0 COST ALLOCATION - SEPARABLE COST REMAINING BENEFITS

Separable-Cost Remaining-Benefits (SCRB) is the approach selected for cost allocation. This method was chosen as it results in an equitable distribution of costs since it is founded on the benefits accrued to each party. SCRB is a systematic benefits-based approach to distributing joint costs and can be modified with additions to a multipurpose project. The steps in SCRB can be broken down into two broad steps: separation of costs and allocation of costs. The process is represented in Figure 1.

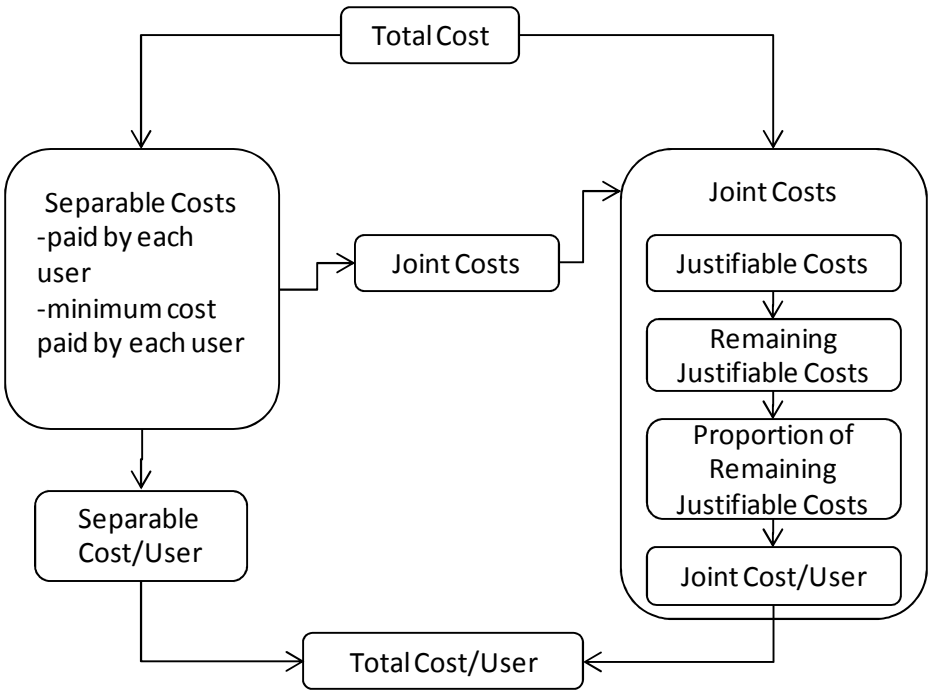

Figure 1 SCRB Process (adapted from USDOI 2008)

The goal of separating the costs is to determine the joint costs to be shared among all participants. This is done by finding the separable cost for each user, which represents the minimum amount each user should pay if participating in the project. Specifically, the steps involved in separating costs are:

1. Determine the total project cost (this value is taken from the financial analysis)
2. Estimate the cost for the project with each user excluded. This is done by excluding each user from the project and determining the cost to complete the project without their interests.
3. Solve for the separable cost for each user. This is equal to the difference between the total project cost and the cost of the project with the specific user excluded.
4. Sum the separable costs.
5. Solve for the total joint costs to be shared among all participants. This is equal to the total project cost less the total separable cost.

The goal of cost allocation is to distribute the joint costs among participants given their level of benefit from the multipurpose project. The steps for allocating costs are:

6. Estimate benefits for each purpose (this is done as part of the economic analysis)
7. Estimate alternative costs for each user. This represents the cost for a single purpose project that results in the same benefit.
8. Solve for the justifiable cost. This is lesser of the two items above and represents the maximum allocated to a specific purpose.

9. Determine the remaining justifiable costs. This is difference between the justifiable cost and the separable costs and can only be calculated if the justifiable cost is greater than the separable cost. If the separable cost is greater, the participant should go at a single purpose project.
10. Determine the distribution of the remaining justifiable costs. This is the proportion of the remaining justifiable cost attributed to each user.
11. Allocate joint costs. Joint costs are allocated by multiplying the total joint costs by the percent distributions solved for in the previous step.

The total cost paid by each user is the sum of the separable cost (as solved for in step 3) and the allocated joint cost (as solved for in step 11).

3.1 Worked Examples

3.1.1 Example #1: Basic Distribution of Multi-Purpose Project Costs

A water recycling project has three participants: water supply agency A, water supply agency B, and wastewater agency C. The total multipurpose project will cost $13 million over 20 years. From the economic analysis, the benefits to each participant are: $131 million to agency A, $50 million to agency B, and $10 million to agency C. For each to pursue a single purpose project it would cost $30 million, $9 million and $15 million respectively. If the project proceeded without agency A it would cost $11 million; without agency B, $8 million; and without agency C, $8 million. The separable cost for each agency and the total of joint costs to distribute is presented in Table 1.

Using the total project cost of $13 million and the costs with each purpose excluded ($11 mil, $8mil, and $8mil), the *separable cost* is calculated. This is the difference between the total project cost and the cost with the purpose excluded. For agency A, this is equal to $2 mil ($13 mil – $11 mil). As mentioned previously, the separable cost represents the portion of costs that can be directly attributed to that user. The total of the separable costs is $12 million, leaving $1 million in joint costs to distribute among all participants. The *joint cost* is solved for by taking the difference of the total project cost and the total separable costs.

Table 1 Separation of Costs – Example #1

Total Multiple Purpose Project Cost	**$13,000,000**
Cost with Purpose Excluded	
Without Agency A Water Supply Purpose	**11,000,000**
Without Agency B Water Supply Purpose	**8,000,000**
Without Agency C Disposal Purpose	**8,000,000**
Separable Costs	
Agency A Water Supply ($13,000,000 less $11,000,000)	2,000,000
Agency B Water Supply ($13,000,000 less $8,000,000)	5,000,000
Agency C Disposal ($13,000,000 less $8,000,000)	5,000,000
Total Separable Costs	12,000,000
Joint Costs ($13,000,000 less $12,000,000)	1,000,000

Note: Grey shading indicates values pulled from the problem description. All other values are calculated within the table.

The allocation of costs begins with benefits to each user as defined in the economic analysis and the cost of an alternative project for each user which results in the same benefits. These are written as the first two lines in Table 2. For each purpose, the lesser of these two values represents the *justifiable cost*. The justifiable cost is compared to the separable cost calculated in Table 1. If the justifiable cost is greater than the separable cost, it is favorable for the user to participate in the multi-purpose project. The difference between the justifiable cost and separable cost is then calculated to determine the *remaining justifiable cost*. For Agency A, this equals $28 mil ($30 mil - $2 mil). These costs are then converted into proportions by dividing the remaining justifiable cost for each user by the sum of remaining justifiable costs. For example, for Agency A, the remaining justifiable cost is equal to 75.7% ($28 million/$37 million). Using these proportions, the joint costs are allocated. Continuing with agency A, the amount of the joint costs paid is equal to 75.7% of the total joint cost of $1 mil, which is $756,757. The total paid by each user is finally calculated as the sum of their allocated joint costs and their separable cost. These sum to the total project cost of $13 mil. To determine the proportion of the total project cost by each user, the total paid by each user is divided by the total project cost. For agency A, this is equal to $2,756,757/$13,000,000 = 21.2%.

Table 2 Allocation of Costs – Example #1

	Agency A Water Supply	Agency B Water Supply	Agency C Wastewater	Total
Benefits (Present Worth)	**$131,000,000**	**$50,000,000**	**$10,000,000**	**191,000,000**
Alternative Cost (Least Cost Alternative)	**30,000,000**	**9,000,000**	**15,000,000**	54,000,000
Justifiable Cost (lesser of benefits and alternative cost -- *must be greater than or equal to Separable Costs*)	30,000,000	9,000,000	10,000,000	49,000,000
Separable Costs	2,000,000	5,000,000	5,000,000	12,000,000
Remaining Justifiable Cost	28,000,000	4,000,000	5,000,000	37,000,000
Percent (distribution of remaining justifiable costs)	75.7%	10.8%	13.5%	100.0%
Allocated Joint Costs	756,757	108,108	135,135	1,000,000
Total Allocated Costs (separable costs plus allocated joint costs)	2,756,757	5,108,108	5,135,135	13,000,000
Percent of Total Costs	21.2%	39.3%	39.5%	100.0%

Note: Grey shading indicates values pulled from the problem description. All other values are calculated within the table.

Using the SCRB approach, the total cost of $13 million is therefore divided into payments of $2.8 million from A, $5.1 million from B, and $5.1 million from C.

3.1.2 Example #2: Using SCRB with Indirect Beneficiaries

A recycled water project is being undertaken by two water districts in southern California. The facility will supply 10 TAF/yr for $25 million. Both districts receive water from an independent water wholesaler which receives water supplies via the Delta. District A is an irrigation district, uses 16 TAF/yr and intends on replacing 8 TAF/yr with recycled water. District B represents a city with an annual consumption of 20 TAF/yr and B intends on replacing 2 TAF/yr of water used for landscape irrigation

with recycled water. With District A excluded from the project, the cost would be $18 million; with District B excluded, the cost would be $12 million. The difference between these values and the total project cost results in separable costs of $7 mil and $13 mil. For the water wholesaler, the recycled water facility will allow them to reduce their deliveries (a savings of $150/acre-ft from reduced pumping costs) and increased outflows from the Delta. It is assumed water devoted to the public benefits of habitat conservation has a value of $50/acre-ft and is accrued to the wholesaler. This results in benefits for the wholesaler in the amount of $2 million per year. In this example, the $2 million in benefits for the water wholesaler represents the separable cost for the water wholesaler and is inputted directly into the table as opposed to being solved for through the exclusion costs (note the gray shading in the table below). The joint costs, found by subtracting the total separable costs of $22 mil from the total project cost of $25 mil, are equal to $3 mil.

Table 3 Separation of Costs – Example #2

Total Multiple Purpose Project Cost	**$25,000,000**
Cost with Purpose Excluded	
Without District A (Irrigation)	**18,000,000**
Without District B (City)	**12,000,000**
Without Water Wholesaler	
Separable Costs	
District A ("Total Multiple Purchase Cost" less "Cost with Purpose Excluded")	7,000,000
District B ("Total Multiple Purchase Cost" less "Cost with Purpose Excluded")	13,000,000
Water Wholesaler ("Total Multiple Purchase Cost" less "Cost with Purpose Excluded")	**2,000,000**
Total Separable Costs	22,000,000
Joint Costs (Total Multiple Purchase Cost less Total Separable Costs)	3,000,000

Note: Grey shading indicates values pulled from the problem description. All other values are calculated within the table.

Information from the economic analysis found the benefit to District A and B to be $50 mil and $100 mil respectively. The recycling facility would also represent a benefit of $70 mil to the regional water wholesaler (i.e. from reduced pumping costs, environmental benefits, and benefits from improved system reliability). The alternative cost to achieve the same benefit to each user would be $13 mil, $28 mil, and $3 mil respectively. For each purpose, the lesser of these two values represents the *justifiable cost*. The difference between the justifiable cost and separable cost is then calculated to determine the *remaining justifiable cost*. These costs are converted into proportions by dividing the remaining justifiable cost for each user by the sum of remaining justifiable costs. For example, for District A, the remaining justifiable cost is equal to 27.3% ($6 million/$22 million). Using these proportions, the joint costs are allocated. Continuing with District A, the amount of the joint costs paid is equal to 27.3% of the total joint cost of $3 mil, which is $818,182. The total paid by each user is finally calculated as the sum of their allocated joint costs and their separable cost. These sum to the total project cost of $25 mil. To determine the proportion of the total project cost by each user, the total paid by each user is divided by the total project cost. For agency A, this is equal to $7,818,182/$25,000,000 = 31.3%.

Table 4 Allocation of Costs – Example #2

	District A Irrigation	District B City	Wholesaler	Total
Benefits (Present Worth)	**$50,000,000**	**$100,000,000**	**$70,000,000**	**220,000,000**
Alternative Cost (Least Cost Alternative)	**13,000,000**	**28,000,000**	**3,000,000**	44,000,000
Justifiable Cost (lesser of benefits and alternative cost -- *must be greater than or equal to Separable Costs*)	13,000,000	28,000,000	3,000,000	44,000,000
Separable Costs	7,000,000	13,000,000	2,000,000	22,000,000
Remaining Justifiable Cost	6,000,000	15,000,000	1,000,000	22,000,000
Percent (distribution of remaining benefits)	27.3%	68.2%	4.5%	100.0%
Allocated Joint Costs	818,182	2,045,455	136,364	3,000,000
Total Allocated Costs (separable costs plus allocated joint costs)	7,818,182	15,045,455	2,136,364	25,000,000
Percent of Total Costs	31.3%	60.2%	8.5%	100.0%

Note: Grey shading indicates values pulled from the problem description. All other values are calculated within the table.

In this example, although not a direct user of reclaimed water, the water wholesaler benefits from its use. The SCRB method is valuable as it is able to identify how much the wholesaler should contribute based on its benefits. Without using SCRB, the wholesaler may provide a subsidy which is irrespective of the value of the facility to them.

4.0 APPLICATION ISSUES

Employing Beneficiary Pays Analysis to allocate project costs is not a cut and dry process. It is a challenge to employ because those who benefit more will pay more; therefore, participants have an economic incentive to report lower benefits so that they disburse fewer funds. This results in information asymmetries while estimating project benefits and costs, especially for those which are difficult to quantify. Further complexity arises when considering operations and maintenance (O&M) costs, including non-monetized costs and characterizing costs and benefits as public or private.

Typical funding programs are based on capital expenditures and do not provide funds for ongoing O&M costs. The benefits resulting from a project are dependent on the project being functional. Providing compensation for O&M represents a potential future issue to address.

Non-monetized costs and benefits are often controversial and hard to incorporate in an economic analysis. Exclusion of non-monetized benefits may undervalue the benefit to each participant and may lead to disputes over how much each user should contribute. It is possible to combine non-monetized values with monetized ones using trade-off analysis in a project's economic analysis. In trade-off analysis, monetized as well as non-monetized benefits and costs are ranked using user-defined weights. The monetized and

non-monetized items are then normalized, making all values unit-less. The normalized values are then multiplied by the weights to give a final value for each. The normalized and weighted values are used to rank alternatives. The trade-off analysis will aid in selecting alternatives in the economic analysis. This could serve as a basis on how to account for non-monetized benefits in the distribution of costs.

To demonstrate how trade-off analysis works consider the following example. A proposed recycling project will result reduced demand from natural water sources and will therefore increase natural stream flows. Less disturbed stream flows will improve the quality aquatic and riparian habitats and is anticipated to improve the biodiversity in the stream. Each alternative will preserve a different area with varying diversities. The benefits from diversity cannot be quantified monetarily; however, it can be quantified using the number of native species populations that are improved. The contribution of diversity to the monetized net benefits is presented below in Table 5.

In the example, the monetized net benefits are given a weight of 0.8 while the benefits from increased stream biodiversity are given a weight of 0.2. For both the monetized and non-monetized parameters, values are normalized using the highest actual value. For net benefits, values are normalized by dividing by a value of 1000, and for biodiversity, values are normalized by dividing by 12. The normalized value is then multiplied by the weighting factor to give the normalized and weighted value for monetized and non-monetized benefits for each alternative. The sum of these represents the *weighted product* for each alternative and is used to rank and select the best alternative. In the example, the best alternative is option C.

Table 5 Trade-Off Analysis

	Net Benefits ($)	**Biodiversity (# species)**	**Weighted Product**	**Ranking**
Weighting Factor	0.8	0.2	1.0	
Alternative				
A				
Actual Value	500	6		
Normalized Value	0.50 (=500/1000)	0.50 (=6/12)		
Normalized and Weighted	0.40 (=0.5*0.8)	0.10 (=0.50*0.2)	0.50 (=0.40 + 0.10)	3
B				
Actual Value	800	12		
Normalized Value	0.80	1.00		
Normalized and Weighted	0.64	0.20	0.84	2
C				
Actual Value	1000	8		
Normalized Value	1.00	0.67		
Normalized and Weighted	0.80	0.13	0.93	1

Another challenge is identifying benefits as public or private. Public benefits do not generate a revenue stream which is later redistributed to society. Likewise, some private benefits may not generate a revenue stream and participants may be reluctant to include them as part of their benefits. In addition, there could be disputes over what is considered private versus public. Thus there is an incentive for funding applicants to identify more benefits as public rather than private to increase government funding received and minimize their own financial contribution.

Another issue related to public benefits is the extent to which they apply. Part of this is captured in the accounting stance established in the economic analysis. If a statewide stance is used, it is appropriate to include statewide benefits. If a local level is used however, wider state effects should not be included. The other avenue related to extent is the actual measurable benefit. For example, currently, agencies receiving water from the Delta, who are promoting water recycling projects, may claim a beneficial reduction in water withdrawals from the Delta. However, studies have shown that the impact on Delta outflows of increased recycling may be minimal. Therefore, agencies claiming Delta environmental benefits as a justification for public finding should demonstrate how their proposed recycling projects would result in greater Delta outflows, either by showing their effect on future plans for diversions of Delta inflows, requests for Delta export deliveries under the State Water Project (SWP) or the Central Valley Project (CVP) contracts, or direct Delta exports.

5.0 CONCLUSIONS

The Beneficiary Pays Principle is an important consideration in designing and applying cost allocation schemes of a project among beneficiaries. Its application helps reduce the gap in funding between government agencies and other funding sources and ultimate project beneficiaries. By minimizing government contributions to projects, more funding is available for projects which are not self-financing or which have greater public benefits (Misczynski, 2009). If a water recycling project is economically justified but not locally financially feasible, the state may lever funding to render the project financially feasible.

A simpler alternative to the BPP is to provide a standard subsidy, either an absolute value or percent contribution to projects which benefit society. This approach requires less computational effort but can result in large amounts of money going towards projects with small public benefits. Affordable projects not requiring significant amounts of funding may be candidates for this less costly cost allocation approach. The Separable Cost Remaining Benefit approach requires more information, including identification of users and quantification of benefits for each user group. However, the SCRB method may result in a more economically efficient and equitable allocation of limited resources.

Currently, agencies receiving water from the Delta who are promoting water recycling projects may claim a beneficial reduction in water withdrawals from the Delta. Because studies have shown that the impact on Delta outflows of increased recycling may be minimal, agencies claiming Delta environmental benefits as a justification for public finding should demonstrate how their proposed recycling projects would result in greater Delta outflows, either by showing their effect on future plans for (1) diversions of Delta inflows, (2) requests for Delta export deliveries under SWP or CVP contracts, or (3) direct Delta exports.

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