A Review of Economic and Financial Issues for the North Coast Resource Partnership

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I. Water Resources and the North Coast's Economy

In this section, we describe the relationship between the water resources of the North Coast and the region's economy. This description provides a conceptual framework for anticipating the potential economic consequences of water-management policies and actions incorporated into the North Coast Integrated Regional Water Management Plan (NCIRWMP) and North Coast Resource Partnership (NCRP) planning processes. It also provides a framework for determining and explaining the economic merits of continuing with the planning process and implementing the projects and other actions it contains.

At the core of the framework lies recognition that the region's water resources are important to the regional economy primarily when, as part of an ecosystem, they produce goods and services that are desired by one or more households or firms. We briefly describe the different types of goods and services produced by the region's water-related ecosystems. We then describe the several major types of competing demands for water-related goods and services. We conclude by describing five different ways in which water-management decisions or actions could affect the region's economy.

A. Water-Related Goods and Services

From an economics perspective, water is important not in and of itself, but because it produces things that benefit people, imposes costs on them, or both.[1] Describing the economically important products derived from water is not a straightforward task, but one widely accepted approach combines economics with ecological concepts, as shown in Figure 1. Its central feature is the ecosystem's production of water-related *ecosystem goods and services*, which are important to people and, hence, have economic value. Their economic importance may arise when they are extracted, as when water is diverted from a stream to irrigate crops, or when they remain *in situ*, as when boaters use sections of a stream for recreation. The ecosystem produces these goods and services through processes, known as ecosystem functions, that derive from the ecosystem's structure. The left side of Figure 1 highlights the importance of human influences on the ecosystem. The right side shows that sometimes humans place values on an ecosystem's structure, e.g., the diversity of species, rather than on the goods and services it produces. To simplify things, however, we use the terms, goods and services, to represent all those water-related things with economic value.[2]

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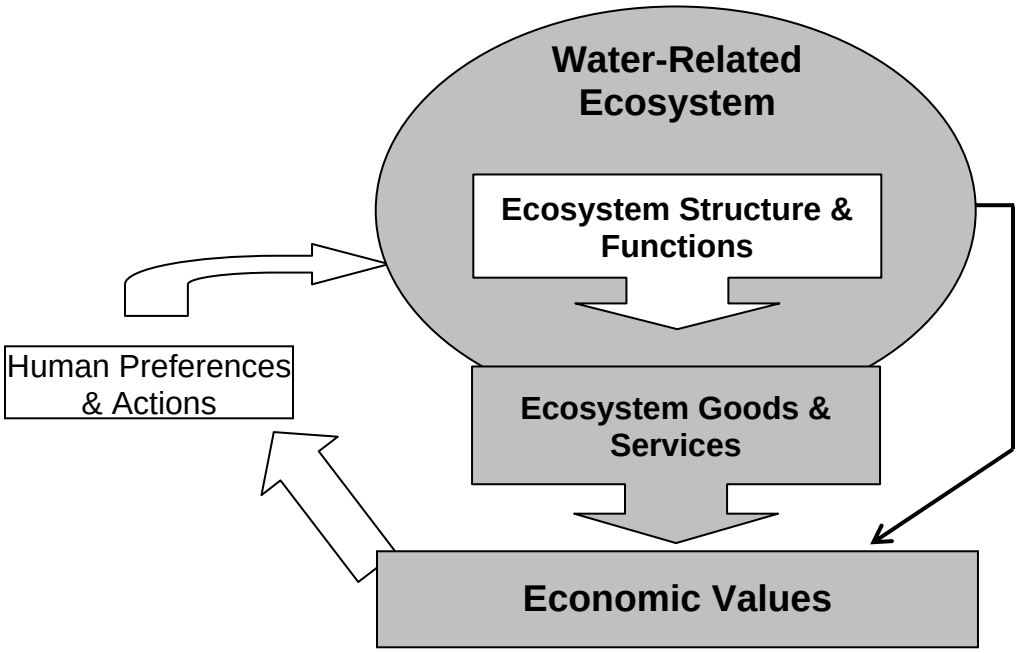
[1] Some believe water is important not only for what it does for humans, but for its place in the environment, apart from people. They suggest economics should consider those values, and there are good arguments for doing so. Here, however, we focus on the connections between water and people. We do so not just to keep our task from becoming intractable but also because water's contributions to human quality of life underlie many, if not most, human actions affecting the water. We take a broad view, though, of the ways in which water affects human standards of living and quality of life.

[2] We also use "goods and services" to include things, such as damaging floods, that are economically important in a negative rather than a positive sense.

Figure 1. Connections between the Ecosystem and Economic Values



Source: ECONorthwest, adapted from National Research Council, Committee on Assessing and Valuing the Services of Aquatic and Related Terrestrial Ecosystems. 2004. *Valuing Ecosystem Services: Toward Better Environmental Decision-Making*. National Academies Press.

The list of water-related goods and services is long and growing, as ecological scientists learn more about the inner workings of ecosystems and people find new ways to derive benefits from them. Table 1 illustrates the current list. Some of the goods and services in Table 1 will be unfamiliar to those who see water as having economic value only in terms of irrigation and other direct uses. Natural-resource and economic-development economists, however, now widely recognize the economic importance of the full slate of goods and services.[3]

[3] *See*, for example, National Research Council, Committee on Assessing and Valuing the Services of Aquatic and Related Terrestrial Ecosystems. 2004. *Valuing Ecosystem Resources: Toward Better Environmental Decision-Making*. National Academies Press.

Table 1. Summary of All Functions, Goods, and Services of the North Coast's Water-Related Ecosystems

Functions		Examples of Goods and Services Produced
1	Production and regulation of water	Natural and human-built features of an ecosystem capture precipitation; filter, retain, and store water; regulate levels and timing of runoff and stream flows; and influence drainage.
2	Formation & retention of soil	Wetlands and biota accumulate organic matter, and prevent erosion to help maintain productivity of soils.
3	Regulation of atmosphere & climate	Biota produce oxygen, and help maintain good air quality and a favorable climate for human habitation, health, and cultivation.
4	Regulation of disturbances	Wetlands and reservoirs reduce economic flood damage by storing flood waters, reducing flood height, and slowing a flood's velocity.
5	Regulation of nutrients and pollution	Wetlands and riparian vegetation improve water quality by trapping pollutants before they reach streams and aquifers; natural processes improve water quality by removing pollutants from streams.
6	Provision of habitat	Wetlands, riparian vegetation, streams, and reservoirs provide habitat for economically important fish and wildlife.
7	Food production	Biota convert solar energy into plants and animals edible by humans.
8	Production of raw materials	Streams and biota generate materials for construction, fuel, and fodder; streams possess energy convertible to electricity.
9	Pollination	Insects facilitate pollination of economically important wild plants and agricultural crops.
10	Biological control	Water-related birds and microorganisms control pests and diseases.
11	Production of genetic & medicinal resources	Genetic material in wild plants and animals provide potential basis for drugs and pharmaceuticals.
12	Production of ornamental resources	Products from water-related plants and animals provide materials for handicraft, jewelry, worship, decoration, and souvenirs.
13	Production of aesthetic resources	Wetlands, riparian vegetation, streams, and reservoirs provide basis for enjoyment of scenery from roads, housing, parks, trails, etc.
14	Production of recreational resources	Streams, reservoirs, riparian vegetation, fish, waterfowl, and other wildlife provide basis for outdoor sports, eco-tourism, etc.
15	Production of spiritual, historic, cultural, and artistic resources	Wetlands, riparian vegetation, streams, and reservoirs serve as basis for spiritual renewal, focus of folklore, symbols of group identity, motif for advertising, etc.
16	Production of scientific and educational resources	Wetlands, riparian vegetation, streams, and reservoirs provide inputs for research and focus for on-site education.

Source: Adapted by ECONorthwest from De Groot, R., M. Wilson, and R. Boumans. 2002. "A Typology for the Classification, Description and Valuation of Ecosystem Functions, Goods and Services." *Ecological Economics* 41: 393-408; Kusler, J. 2003. *Assessing Functions and Values.* Institute for Wetland Science and Public Policy and the Association of Wetland Managers, Inc.; and Postel, S. and S. Carpenter. 1997. "Freshwater Ecosystem Services." in *Nature's Services: Societal Dependence on Natural Ecosystems*. Edited by G.C. Daily. Washington, D.C.: Island Press, pgs. 195-214.

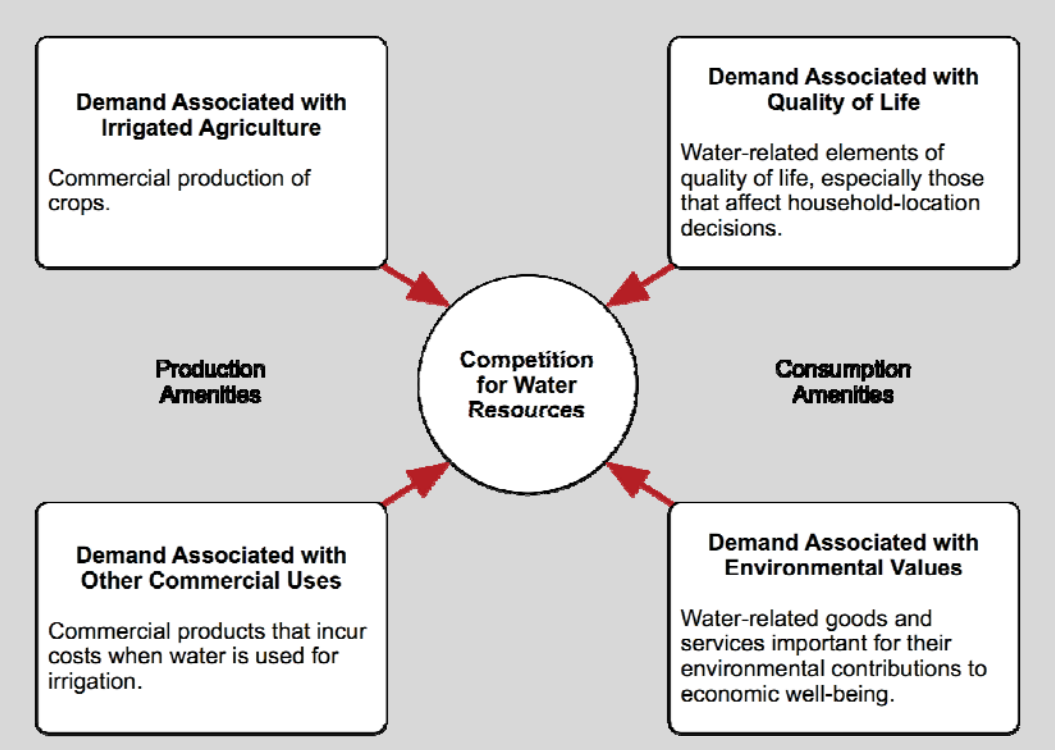
B. Competing Demands for Water Resources

In most times and places there is insufficient water to satisfy all the demands for all of the goods and services in Table 1. Hence, there is competition for the water and, when water is used to produce one set of goods and services, the demands for others go unmet. This competition is distinct from the system of water rights that allocates water to satisfy some demands and leaves others wanting. Because they both reflect and shape the economic importance of different water-related goods and services, the characteristics of this competition provide useful insights into the economic consequences of future decisions and actions regarding management of the North Coast's water resources.

One could categorize the competition in any of a number of ways, but we employ a taxonomy that distinguishes among four types of demand, as illustrated in Figure 2. Two of these are called demands for production amenities, i.e., those goods and services that are, or could be, inputs to processes that produce other goods and services. The other two are called demands for consumption amenities, i.e., those goods and services that directly enhance the well being of consumers. To facilitate the discussion, we assume that one of them—the demand for irrigation, shown in the upper left of Figure 2—prevails and then look at the consequences for the others.

Competition for Production Amenities. Demands for the North Coast's water-related

Figure 2. The Competing Demands for the North Coast's Water Resources



Source: ECONorthwest.

production amenities, represented on the left side of Figure 2, come from private and public enterprises, defined broadly to include private corporations, incorporated cities, and public agencies, as well as households that conduct commercial activities, such as ranching operations. We separate the demands for production amenities into two groups—irrigated agriculture and other commercial demands—to show that, sometimes, the positive consequences arising from irrigation (or any other commercial use of water resources) can be offset, more or less, by negative effects on other commercial sectors, which are represented in the bottom left of Figure 2. When an irrigator depletes stream flows and reduces fish habitat, for example, he may reduce the production by irrigators downstream who now have less water for their fields, or impose costs on fishing guides who now have fewer prime fishing spots for their customers.

Competition Directly from Consumers. On the left side of Figure 2, water-related goods and services are economically important because they are inputs in the production of other things (e.g. crops, hydroelectricity, etc.) that consumers want to have. On the right side, the connection to consumers is more direct. Here, consumers consider the North Coast's water resources economically important for how they directly contribute to their well-being. In economic parlance, these are known as consumption amenities.

Some water-related goods and services, such as recreational opportunities and scenic vistas, contribute directly to the well-being of people who have access to them. Their contribution to consumers' well-being makes them economically important in their own right, but they have additional economic importance when they also influence the location decisions of households and firms. We show the demands for consumption amenities that influence location decisions of households sensitive to spatial variation in the quality of life, in the upper right portion of Figure 2. In general, the nearer people live to amenities, the lower their cost of using them. Thus, consumers can increase their economic well-being by living in a place that offers recreational opportunities, pleasant scenery, wildlife viewing, and other amenities they consider important. Quality-of-life values can be powerful. Differences in quality of life explain about half the interstate variation in job growth,[4] and the quality of life available in the North Coast region is a major factor influencing why many households come to and stay in this area. Some residents undoubtedly could enjoy higher earnings living elsewhere, but choose not to do so because their overall economic welfare—the sum of their earnings plus quality of life—is higher here. Some aspects of this quality of life—the strength of communities, schools, and churches, for example—are not directly related to water, but others are: open space, way of life, and opportunities for fishing and hunting, to mention a few. All else equal, if the region's water-related consumption amenities improve, some people already here will tend to stay and additional people will tend to move in. Degradation of the amenities will have the reverse impacts.

The lower right portion of Figure 2 represents demands associated with economic values that do not necessarily entail a conscious, explicit use of water-related goods and

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[4] Partridge, M.D. and D.S. Rickman. 2003. "The Waxing and Waning of Regional Economies: the Chicken-Egg Question of Jobs Versus People." *Journal of Urban Economics* 53: 76-97.

services. We call these environmental values. There are two general categories: nonuse values and values of goods and services that generally go unrecognized. Nonuse values arise whenever people place a value on maintaining some aspect of the environment, even though they do not use it and have no intention to do so. Research has documented nonuse values for maintaining the existence of species threatened with extinction, for example, and for special natural areas, such as national parks. They also can materialize when people want to maintain a particular cultural or ecological characteristic of a resource, as when people want to maintain the existence of landscapes associated with traditional agriculture or native wilderness, for enjoyment by future generations.

Environmental values also can be important when a water-related ecosystem provides valuable services that people generally consume without being aware of them. Some of these are part of the so-called web of life. Others, such as the ability of wetlands to purify water and mitigate flood damage, have a more direct link to the well-being of this region's residents. Some scientists and economists believe many services have great economic value, even though people generally are unaware of their importance.[5] Environmental values typically increase as people learn more about the environment, the services it provides, and environmental degradation.[6] Many people today, for example, consciously consider the economic values associated with the services produced by the global climate in ways that were unknown, even to scientists, just a few years ago.

The demands associated with the consumer amenities represented on the right side of Figure 2 typically are harder to measure, or even to observe, than the commercial demands shown on the left side of the diagram. This difficulty does not diminish their economic importance, however. Instead, it merely reflects the lack of tools for measuring them.

C. Types of Potential Economic Consequences from Water-Management Decisions and Actions

Figure 3 identifies five ways that decisions and actions regarding the management of the region's water resources might affect the North Coast's economy. The three core types of consequences reflect distinct concerns: the benefits and costs derived from water and related resources; the jobs, incomes, and related economic impacts generated by water; and issues regarding water-management finance. Associated with these three—individually and collectively—are risks and uncertainties, and the distribution of economic well-being that, themselves, can have economic importance. We briefly discuss each type of economic consequence and how it relates to water management.

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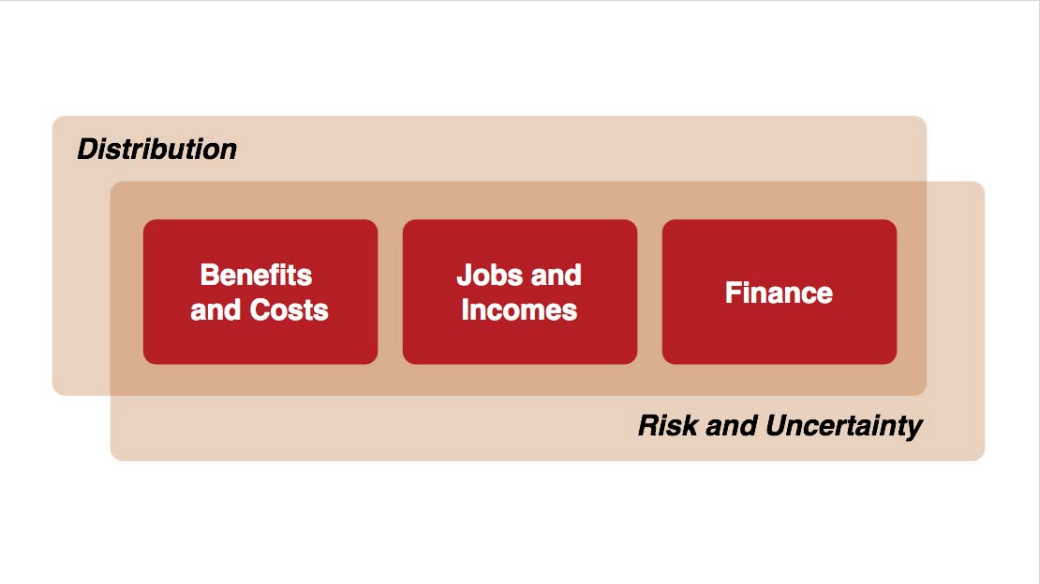
[5] Daily, G.C. 1997. *Nature's Services: Societal Dependence on Natural Ecosystem*. Washington, D.C.: Island Press.

[6] Blomquist, G.C. and J.C. Whitehead. 1998. "Resource Quality Information and Validity of Willingness to Pay in Contingent Valuation." *Resource and Energy Economics* 20 (2): 179-196.

Figure 3. Components of the Economy Potentially Affected by Water Management Policies, Programs, and Actions



Source: ECONorthwest

1. Benefits and Costs

Most people recognize that a water-management decision or action produces an economic benefit when it increases the monetary resources of a governmental agency, household, business, or other entity, and an economic cost when it leads to a decrease. Many times, however, non-monetary benefits and costs are more important. A water-management decision or action produces an economic benefit when it increases the economic value of a good or service. It can do this either by increasing the supply of the good or service available for society's use at a given price, or by reducing the cost of producing the good or service. Conversely, it produces an economic cost when it diminishes the supply at a given price or increases production costs.

Economists typically measure the economic value of a good or service in terms of what a person, group, or firm, which does not have it, is willing to give up to acquire it. It is not necessary to measure value in monetary terms, but doing so generally simplifies the measurement. If money is used as the units of measurement, then the value of a good or service is the amount the person, group, or firm is willing to pay for it. Sometimes, value is measured when a person, group, or firm already possesses a good or service, so that the value of the good or service equals the amount the person, group, or firm is willing to accept as compensation for relinquishing it.

When a good or service is traded in a fully-functioning, competitive market, the price at which it is traded provides a good representation of both what the seller requires as compensation to relinquish it and what the buyer is willing to pay to acquire it. Thus, the market price a farmer receives for an irrigated crop traded in a competitive market

probably provides a reasonable representation of the crop's value both to the farmer and to the overall economy. Most water-related goods and services are not traded in competitive markets, however, and there are no prices one can use to measure their economic value. The absence of a market price does not mean these goods and services have no value, only that they are not traded. When goods and services are not traded in markets, economists must use non-market techniques for measuring their value. Some of these techniques look at consumers' behavior to see what it reveals about the value they place on goods and services. To estimate the values recreationists place on distinct recreation sites, for example, economists have looked at how much visitors pay in travel costs to reach them, and concluded that households are willing to pay more to reach higher-quality sites. Other techniques ask people what they are willing to pay to retain, acquire, or protect a good or service. This technique is used, for example to determine the value people place on protecting habitat for endangered species.

There are some of studies and data specific to this region available for describing the value of water-related goods and services in the North Coast region. For the most part, though, valuation must rely on studies that are not specifically applicable to this region, because they offer useful insights into the general nature and magnitude of the value of various water-related goods and services.

Irrigation and other direct uses of water and related resources yield a net economic benefit when the value of the goods and services they produce exceed the value of those that were used in the production process. (We extend the focus on irrigation to facilitate the presentation, but the reasoning applies to other water uses.) When the converse is true, then they yield a net cost. Benefits and costs can accrue to different parties. For example, an irrigator realizes a net benefit, called a producer's surplus, when she sells a unit of a crop for a price higher than the cost she incurred to produce it. A consumer can realize a net benefit, called a consumer's surplus, when she buys a unit of a crop for less than she is willing to pay for it. A third party—an individual, household, business, or society as a whole—realizes a net cost or benefit, called a negative or positive externality, respectively, when the transaction between an irrigator and a consumer reduces or increases the value of goods and services available for its use.

Table 2. Illustration of Potential Externalities of Irrigated Agriculture

Potential Positive Externalities	Potential Negative Externalities
Commercial Demands • Increased municipal-industrial water supplies • Irrigation-related business opportunities • Groundwater recharge from infiltration of irrigation water	**Commercial Demands** • Depletion of water available for other commercial uses • Off-farm costs to cope with irrigation-related erosion and sediment • Off-farm costs to remove irrigation-related nutrients and pollutants from water supplies
Quality-of-Life Demands • Contributions to recreation: o Reservoirs and canals o Hunting birds and wildlife supported by reservoirs and irrigated fields • Contributions to communities: o Agricultural contributions to rural economies o Traditional agricultural life style • Maintenance of agricultural open space and scenic vistas	**Quality-of-Life Demands** • Decreased recreational opportunities: o Instream boating and fishing o Watching wildlife dependent on natural streamflows • Detriments for communities: o Reductions in water quality o Loss of stream-related contributions to rural and urban economies • Loss of stream-related open space and scenic vistas
Environmental-Value Demands • Wetlands resulting from leakage of irrigation water • Dam-related flood control • Improved habitat for species associated with reservoirs, canals, and irrigated fields • Maintenance of agricultural lifestyles and landscapes that are valuable to those residents of the region who are not irrigators	**Environmental-Value Demands** • Loss of wetlands associated with dewatered streams • Reduction in ability of natural floodplains to control floods • Loss of habitat for species associated with instream flows and related riparian, areas and wetlands • Degradation of water quality from irrigation-related soil erosion and runoff • Threats of extinction for some species dependent on water and land diverted to irrigated agriculture • Ecosystem fragmentation and loss of biodiversity • Loss of natural streams and landscapes that are valuable to North Coast residents, whether they interact with them or not

Source: ECONorthwest.

Externalities are almost always important components of the benefits and costs of water-management decisions and actions. Table 2 illustrates some of these externalities, using irrigated agriculture as the focus of the illustration. The entries in the table identify some of the ways in which irrigation affects the three types of competing demands: other commercial demands, quality-of-life demands, and environmental-value demands (see the discussion, above, in conjunction with Figure 2). The list demonstrates that irrigation can have both positive and negative externalities, which often are similar to one another. For example, some irrigation systems might make water available for nearby municipal-industrial water users, provide agricultural open

space and scenic vistas enjoyed by neighbors, create reservoir-related recreational opportunities, and, through leakage from canals, create wetlands. At the same time, irrigation systems deplete the amount of water available for other commercial uses, reduce the amount of water to support stream-related open space and scenic vistas, and diminish stream-related wetlands.

Most of the externalities are familiar, at least in concept, but some warrant further explanation. Two positive externalities stand out. One that many residents of and visitors to the North Coast region consider quite valuable materializes when irrigated fields provide open space and improve the quality of life for nearby residents. In addition, some residents and visitors realize a benefit when irrigation maintains traditional agricultural lifestyles and landscapes they consider to have value, even though they do not live this lifestyle or manage lands to sustain this landscape.

More of the potential negative externalities require clarification. When an irrigator (or other user) uses water, it may impose costs on other potential commercial users—other farmers and enterprises in other sectors—able to generate higher net earnings from the water. Other enterprises also may incur costs, similar to a tax, when an irrigated field delivers sediment, nutrients, and other pollutants to water bodies. The sediment can clog ditches and stream beds, diminishing their ability to handle high water flows and increasing the risk of flooding. Nutrients and other pollutants can require costly removal before the water is appropriate for municipal-industrial uses. Although many people recognize the flood-control benefits of dams built to collect water in the spring for irrigation use in the summer, such a dam may also reduce the ability of downstream soils and vegetation to mitigate flooding, thereby creating a risk for downstream property owners. Irrigation can have negative impacts on habitat for some species while it has positive impacts for others. The negative impacts become especially important, however, when the population of an affected species declines to the point where it faces significant threat of extinction. Californians and other Americans repeatedly express a desire to prevent extinctions, almost without regard for the economic consequences, and, hence, when an irrigation system has a negative impact on such a species, the economic value of the externality can be huge.

In general, irrigators' costs to produce an additional unit of a crop increase as quantity increases, and, conversely, the amount consumers are willing to pay for an additional unit of a crop decreases as quantity increases. When large quantities of an irrigated crop are produced and sold under competitive market conditions, producers increase production and consumers increase their purchases until the point where the amount consumers are willing to pay for an additional unit of the crop equals the producers' cost. This balance point determines the market price. When the market clears at this price, most units of the crop being sold cost irrigators less than the market price to produce and they realize a net benefit, called producer's surplus. At the same time, most consumers would have been willing to pay more than the market price for the units of the crop they purchased and, hence, they realize a net benefit, called consumer's surplus. Parallel reasoning applies to other commercial uses of water and related resources.

2. Impacts on Jobs and Income

Following standard practice, we use the term, *economic impacts*, to refer to the changes in jobs, income, and related variables, such as property values, that result from a water-management decision or action. Economic impacts are not the same as benefits and costs. It is possible, for example, for irrigation to produce a large benefit, i.e., a big increase in the supply of a valuable good or service, yet have little impact on jobs and income, and *vice versa*. Economic impacts generally reflect expenditures; if more money should flow through the economy, all else equal, the economy should experience an increase in the number of jobs and/or in the level of incomes. Many of the goods and services affected by irrigation and other direct uses of water, however, are valued in ways that do not involve monetary expenditures.

Irrigation and other uses of water usually have both positive and negative economic impacts, arising from the competing demands for water illustrated in Figure 2. Increasing the supply of water for irrigation, for example, might increase jobs and income in agriculture and farm-related sectors, but if it reduces instream flows, it might also decrease jobs and income associated with commercial enterprises that sell services to anglers and boaters. It might increase the value of residential properties with an attractive view of irrigated fields, but decrease the value of those that now look onto a dewatered stream. Irrigation might increase farmers' incomes so they are willing to pay additional taxes to support public services, but the availability of some services might be diminished if local and state agencies must dedicate resources to cope with the negative impacts of water withdrawals on fish and other aquatic species.

Initial expenditures, jobs, and incomes resulting from uses of water can have a ripple, or multiplier impact in the economy, so that the overall impact is larger. When a farmer earns $1 from irrigated crops, for example, he will spend some of this amount to purchase goods and services from outside the local area, but will spend the remainder in local businesses, creating income for the business owners and their workers. The owners and workers who receive income from these local expenditures will, in turn, spend some outside and some locally, and this process will repeat itself until, after several iterations, none of the farmer's initial income remains in the local economy. The overall income will be greater than the farmer's initial income resulting from the production of irrigated crops, and the ratio of the overall income to the farmer's initial income is a measure of the multiplier effect. Research shows that the multiplier effect is limited in most settings, so that the ratio is often smaller than 1.5, and rarely more than 2.0.

Two major factors limit the multiplier. One is the broad regional, national, and even international integration of today's economy, which increases the percentage of income that households and firms use to purchase goods and services from outside the local economy. The other is the competition for water, illustrated in Figure 2, which means that an increase in jobs and income associated with the production of irrigated crops often is offset by a decrease in other sectors of the economy. This latter factor is reinforced when the economy is operating at its full capacity, so that irrigated agriculture can attract capital investment, workers, and supplies only by drawing them away from other enterprises.

The importance of offsetting impacts is diminished when irrigation and other water-related activities attract expenditures from outside sources that otherwise would not take place. Such an occurrence materializes perhaps most visibly when state or federal funds, which come primarily from taxpayers outside the North Coast region, are available to support activities here, and failure to spend the funds in this region would result in their being spent elsewhere.

3. Finance

Economic analyses sometimes assume that, if a water-management decision or action would, in the fullness of time, generate a net economic benefit, it would be implemented, and if it would yield a net cost, then it would not. In reality, though, decisions and actions often are driven more by the availability and timing of funding. Projects capable of producing net benefits can be left undone because funding is not available. Those that run out of funding can run aground, even if they promise eventually to yield dollar inflows exceeding the outflows. Sometimes, the availability of funding can stimulate the implementation of a project that promises to be a net loser, with costs exceeding benefits.

None of this is to say that financial concerns are the only things that matter, however, when assessing the feasibility of a proposed water-management decision or action. As we explain above, the non-monetary benefits and costs of water-management decisions and actions generally are large relative to, and often outweigh the overall financial effects. But there can be no doubt that adequate financing will be a necessary, if not always sufficient, condition for implementing the NCIRWMP. Accordingly, to have a complete assessment of the economic feasibility of a proposed water-management decision or action, decision-makers should look not just at the overall, expected (monetary and non-monetary) costs and benefits but also at the availability of financial resources to started and the timing of financial flows to see if the efforts can be sustained.

In Section II, below, we discuss funding options potentially available for water management in the North Coast region.

4. Risk and Uncertainty

Economists use the term, risk, to represent the expectation that a harmful outcome will materialize in the future. Risk incorporates both the probability of the harmful outcome and the extent of the harm, if it should materialize. Risk is economically important because, all else equal, households, firms, and communities generally prefer to face less risk rather than more, and are willing to incur costs to avoid risk. Similarly, society generally prefers to lower uncertainty about the future and, in particular, uncertainty about the degree of risk.

Water-management decisions and actions can have important economic consequences if they alter the levels of risk and uncertainty regarding water-related benefits and costs, impacts on jobs and income, or finance.

Hence, we recommend that NCIRWMP initiate research, and publicize its results, regarding the relationship between the region's water-management decisions and actions and economically important risks and uncertainties. Past efforts have generally failed to consider risks and uncertainties in a comprehensive, technically sound manner.

Consideration of risks and uncertainties often misses the mark. A typical approach entails defining several scenarios of the future, picking one, and looking to see what must be done to avoid the problems it entails. Developing a plan to address these problems is then deemed sufficient to overcome risk and uncertainty. This approach can lead to serious misjudgments, however, because it fails to consider the full range of risks and uncertainties, and considers only those associated with a particular scenario, which may or may not materialize. It is akin to financial institutions that considered only a limited set of scenarios about the risks and uncertainties associated with sub-prime mortgages and overlooked risks and uncertainties that lay outside the scenarios. The potential implications for the North Coast of taking this approach may be analogous to those that have materialized in the financial markets.

A more credible approach would engage all entities having responsibility for major elements of the region's ecosystem and economy, to initiate a full assessment of important risks and uncertainties, including those that would materialize if multiple factors should all go wrong at once. A full assessment of important risks and uncertainties would, for example, consider risks and uncertainties associated with current trends in the ability of the region's ecosystems to satisfy future demands for different goods and services, as well as factors that might influence this ability: population and economic growth; changes in climate, the ecosystem's response to climate changes, and changes in social structures, such as regulations related to endangered species.

5. Distribution

A description of the economic costs, benefits, impacts, and finance of water-management decisions and actions is not complete unless it addresses the distribution of effects among different groups. Any decision or action will produce winners and losers. Whether one is a winner or a loser may, of course, affect one's assessment of the decision or action. Sometimes, though, the distribution has broader consequences. A decision that imposes costs on an already disadvantaged group, for example, might be widely seen in a negative light, not just by those in that group but by others as well. Past experience indicates that these distributional concerns may be important:

- The gross and net benefits and impacts accruing to tribal members.
- Offsetting consequences among different groups, with a decision or action benefiting one group at the expense of another.
- Benefits accruing primarily to households with high levels, and costs accruing to households with low levels of wealth and income.
- Differential consequences for rural and urban residents, with one group incurring costs to subsidize the other.

- Benefits accruing primarily to non-residents, such as corporate stockholders living elsewhere, and costs accruing to residents of the North Coast region.

II. Alternative Financing Mechanisms

If it is to be as successful, or even more successful in the future as it has been in the past, the NCRP must embody a financial structure able to support the administrative activities that support the plan, and provide funding for projects and other actions called for in the plan. This financial structure should be both achievable in the short term and sustainable over the long term. Toward these ends, it should aim to produce recognizable net economic benefits and/or net gains in jobs and income, and to distribute the financial impacts as well as the overall economic effects in a manner that most will consider to be equitable.

In this section, we provide a foundation for future efforts to identify, evaluate and select suitable financial options.[7] In particular, we provide a general overview of the sources of revenue that communities and regions rely on to accomplish goals similar to those expressed in the NCIRWMP, describe potential sources of additional revenue, and lay out a brief set of criteria for evaluating financial options. We make this presentation with broad perspective of the potential possibilities, with little regard for current legislative or regulatory restrictions, anticipating that, if an option is particularly attractive, but currently not available, the region's residents might be able to take appropriate steps to make it available in the future.

A. Sources of Revenue: An Overview

Experience with integrated, regional water management planning, and similar efforts, suggests that funding concerns likely will arise with respect to the activities listed in Table 3. Funding for the activities can come from these sources:

- Federal government.
- State government.
- Local government.
- Private households, landowners, and businesses.
- Non-governmental organizations.

1. Federal Government Funding

Federal agencies typically provide funding for the activities shown in Table 3 through seven mechanisms:

- Obtain funds from appropriations and fees.
- Implement programs that affect the status of water and related resources, and the social and economic well-being of communities linked to the resources.

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[7] Much of this presentation reflects general principles and current understanding of financial options for the management of water and related natural resources. It also draws on a recent investigation of financial and economic issues associated with efforts to restore the health of the ecosystem and promote sustainable improvements in the economy of Washington's Puget Sound basin.

Table 3. Summary of Major Activities that May Require Financial Support

• Enforce existing laws
• Plan and coordinate effectively
• Monitor the plan's effectiveness and adjust it appropriately
• Protect ecosystem functions from degradation
  o Protect habitats, especially of at-risk species
  o Prevent contamination of water bodies by nutrients, pathogens, toxins, and heat
  o Prevent alteration of the hydrograph
• Restore degraded ecosystem functions
  o Restore habitats
  o Conserve and restore populations of at-risk species
  o Reduce flows of contaminants
  o Clean-up contaminated sites
  o Move flows toward natural hydrograph
• Improve social and economic conditions, especially in disadvantaged communities
• Conduct scientific research to address high-priority issues and problems
• Engage the public—as well as targeted groups, such as landowners—to develop a broad understanding of issues priorities, and activities

Source: ECONorthwest.

- Manage federally owned properties, such as national parks, national forests, and buildings. Operate a diverse fleet of automobiles and vessels.
- Enforce compliance with federal laws and treaties regarding to water and related resources.
- Implement policies, programs, and projects to accomplish water-related objectives, such as those established by the Clean Water Act and the Endangered Species Act.
- Provide technical assistance to federal, state, local, private, and non-governmental resource managers.
- Provide financial resources to state agencies, local agencies, universities, and others for water-management and related activities.

2. State Government Funding

State agencies provide funding for the activities shown in Table 3 through these mechanisms, which are generally parallel to federal funding sources:

- Obtain funds from appropriations and fees.

- Implement programs that affect the status of water and related resources, and the social and economic well-being of communities linked to the resources.
- Manage state-owned properties, such state forests and parks, roads, buildings, and universities. Operate a diverse fleet of automobiles and vessels.
- Enforce of compliance with state and federal laws regarding water and related resources.
- Implement policies, programs, and projects to accomplish water-related objectives, such as watershed restoration, established by state and federal legislation.
- Provide technical assistance to state, local, private, and non-governmental resource managers.
- Provide financial resources to state agencies, local agencies, universities, and others for water-management and related activities.

3. Local Government Funding

Local agencies provide funding for the activities shown in Table 3 through mechanisms that are similar to federal and state funding sources:

- Obtain funds from appropriations and fees.
- Implement programs that affect the status of water and related resources, and the social and economic well-being of communities linked to the resources.
- Manage locally-owned properties, such parks, roads, buildings, and marinas. Operate a diverse fleet of automobiles and vessels.
- Enforce compliance with local, state, and federal laws and treaties regarding water and related resources.
- Implement policies, programs, and projects to accomplish water-related objectives, such as watershed restoration, established by local, state, and federal legislation.
- Provide technical assistance to local, private, and non-governmental resource managers.
- Provide financial resources to local agencies and others for water-management and related activities.

4. Private Funding

Households, landowners, and businesses provide funding for the activities shown in Table 3 through mechanisms that are separate from or interact with those of the public sector:

- Obtain funds from household and corporate budgets.
- Make investments and on-going expenditures to promote the well-being of families and the profitability of businesses.

- Manage privately-owned properties, such as residential, commercial, and industrial buildings and sites, roads, and marinas. Operate a diverse fleet of automobiles and vessels.
- Implement policies, programs, and projects to accomplish water-related objectives, such as watershed restoration, sometimes in conjunction with the efforts of public agencies.
- Provide technical assistance to private, public, and non-governmental resource managers.
- Provide financial resources to local, regional, and national entities for water-management and related activities.

5. Non-Governmental Organization Funding

Non-governmental organizations (NGOs) can provide funding for the activities shown in Table 3 through a somewhat different set of mechanisms:

- Obtain funds from donations, fees for services provided, grants, or earnings on capital assets.
- Make investments and on-going expenditures to accomplish each NGO's objectives.
- Manage properties, such parks, roads, and buildings. Operate a diverse fleet of automobiles and vessels.
- Implement policies, programs, and projects to accomplish water-related objectives, such as watershed restoration, sometimes in conjunction with efforts of local, state, federal, or private actions.
- Provide technical assistance to public, private, and non-governmental resource managers.
- Provide financial resources to others for water-management and related activities.

B. Potential Sources of Additional Revenue

Additional revenue for future revision and implementation of the NCIRWMP might be available from several sources. Some of these, such as expanded appropriations for on-going public programs, are familiar. Others are not. We focus our discussion on identifying and describing new sources of funding that are currently receiving attention from managers of water resources in California and/or elsewhere. Some in the North Coast region may already be aware of some of these, but others may not.

We separate the potential new sources of revenue into three categories: (1) innovations associated with on-going financial programs; (2) innovative incentives to induce voluntary action consistent with the goals of the NCIRWMP; and (3) innovative markets and other mechanisms to facilitate payments for the provision of ecosystem services.

Raising additional revenue might serve two important purposes. The mechanism used to raise the revenue might send price signals to households, businesses, and others, discouraging them from activities that are harmful to the region's water resources. In addition, the revenue can be used for activities aimed at offsetting adverse impact on water resources that occur anyway, or for reversing the legacy of past impacts on these resources.

1. Potential Innovations in On-Going Financial Programs

Local governments in the region might be able to generate additional revenue for their own water-management activities by developing innovative taxes or fees. We list some of them below. In doing so we are not claiming that each one is feasible or that it could be implemented right away, absent legislative changes, or without threat of reversal through public initiative. Instead, our objective is to identify new, potential sources of revenue that might, under appropriate circumstances, be available in the future.

Taxes or Fees Associated with Specific Ecosystem Functions or Services. A local government might raise revenue and discourage activities having an undesired impact on a specific ecosystem service or function by regulating them and requiring payment of a fee or tax before allowing them to occur. This approach already is familiar: many counties regulate and require payment of a fee before allowing the placement of riprap along streams, or the installation of a septic system, for example. It might be expanded to include other ecosystem services or functions. The following paragraphs provide additional examples.

Fees Associated with the Use of Water Resources. A local government might be able to raise revenue through taxes or fees aimed at offsetting the costs imposed on the ecosystem and, hence, on society, by activities that directly use water resources. The additional fees would provide price signals, to induce individuals, households, businesses, and public agencies to curtail their adverse impacts on water resources. Here are some examples:

- **Water tax or fee.** An increase in water rates might provide revenue to cover the costs of activities required to offset the environmental impacts of water withdrawals. Revenue also might be generated by imposing a tax or fee on appliances and equipment that fail to meet standards for water-use efficiency.
- **Wastewater fee.** An increase in fees for wastewater services might be used to cover more than just the costs of building, maintaining, and operating the wastewater system. Additional fees might, for example, be used to mitigate the impact of wastewater discharges on fish habitat.
- **Septic tank fee.** A county or other appropriate government might impose a fee on septic tanks that are not installed and maintained in accordance with appropriate standards, to offset the impacts of potential negative impacts on water quality.
- **Boating fee.** This fee might be used to offset the expected ecosystem harm from motor boats associated with the impacts of boat wakes on stream

margins, propellers on stream bottoms, or gasoline/oil emissions on stream water quality.

Taxes or Fees Associated with Land-Use. A local government might be able to raise revenue for activities that would offset the negative impacts of different types of land uses on the flow and quality of water resources. Local governments across the U.S. have given considerable attention to several alternatives, which may, to some extent, be substitutes for one another:

- **Stormwater tax or fee.** This type of tax or fee would aim at producing revenues for activities to offset the adverse impacts of some land uses on stormwater runoff. The fee would be lower for land uses that meet low-impact standards.
- **Impervious-surface tax or fee.** This tax or fee would have similar purposes as the one above, but it would focus not on stormwater, *per se*, but on the impervious surfaces that alter the flow of stormwater.
- **Low-density development fee.** This fee would have a broader perspective, and could aim to raise revenue for activities aimed at offsetting not just impacts on stormwater but also other adverse impacts from some land uses.
- **Development fee.** This fee would have an even broader perspective, recognizing that even high-density development can have adverse impacts on water resources, and aim to raise revenue for activities intended to offset them.

Taxes or Fees Associated with Pollutants. A local government might be able to raise revenue by imposing a tax or fee on the purchase or use of substances that can have a harmful effect on water resources. Here are some common examples:

- **Transportation-related tax.** An additional tax on gasoline, oil and other fluids, brakes, or tires could provide revenue for activities to help offset the adverse impacts that occur when spilled liquids, brake dust, tire parts, and other vehicle-related materials wash into water bodies.
- **Other taxes or fees.** A local government might raise revenue by imposing a tax on products or activities that are associated with harmful impacts on water resources. A tax might be imposed on the purchase of fertilizers, pesticides, hazardous materials. A fee might be imposed on non-recyclable materials put into the solid-waste stream. A permit and a fee payment might be required for activities that generate sediment or have other harmful impacts on water quality.

2. Incentives to Induce Voluntary Action

Some communities, NGOs, and business groups have been successful in inducing households and businesses to increase voluntarily the amount of money they spend directly or make available for others to spend on enhancing the ability of water-related ecosystems to provide goods and services, and to produce benefits for nearby communities. Some of these approaches might be appropriate and feasible in the North Coast region.

Environmental Services. Some entities raise revenue by selling a commitment to perform activities beneficial to the environment and local communities.

- **Green development.** Some developers have recognized that many households and businesses desire to locate in—and are willing to pay extra for—a community, neighborhood, or structure that has less of an adverse environmental impact than conventional developments. Some local governments are responding to this demand, by retrofitting the streets in some neighborhoods—and charging adjacent homeowners—to reduce stormwater runoff, for example.
- **Greenhouse gases.** Some NGOs, businesses, and Indian tribes in the U.S. sell commitments to sequester carbon, invest in projects that generate electricity from renewable energy sources, or otherwise reduce the atmospheric concentration of carbon dioxide and other greenhouse gases. In exchange, purchasers of the commitments sometimes receive a certificate, bumper sticker, or other product that they can use to validate and demonstrate their actions.
- **Hazardous-waste disposal.** Some solid-waste utilities have implemented programs that make it easy to collect and dispose of hazardous substances that people and businesses otherwise would retain, creating risk for families, workers, communities, and the environment. Sometimes these programs collect voluntary donations.

Dedicated Payments. These programs dedicate a portion of revenue from the sale of goods or services to be used for the activities illustrated in Table 3. Some programs leave the price of the good or service charged purchasers unchanged, but, instead, lower the seller's net revenues. Others allow purchasers to pay a surcharge voluntarily. Here are some examples:

- **Percent of revenues.** Some businesses (e.g., Ben & Jerry's, Working Assets) dedicate a portion of their gross or net revenues for environmental protection and enhancement, or for social and economic programs in disadvantaged communities.
- **Utility rates.** Some electric utilities have created programs that allow households and businesses to pay extra and use the additional revenue to encourage investments in energy efficiency and the development of generators powered by renewable resources.
- **Credit cards**. Airlines, gasoline companies, universities, and many other entities have long created credit cards linked to their identity and dedicated a portion of the revenue from them to particular causes. Some businesses in the outdoor-recreation industry dedicate a portion of credit-card revenue to repair environmental damage, for example, enhance parks, or develop new recreational opportunities.

Voluntary Corporate Environmental Investments. Many corporations have opted to go beyond what is required of them by governmental regulations and invested in reducing their impact on water resources and other aspects of the natural environment.

- **Certified products.** Some consumers prefer to purchase goods and services that have been certified as meeting environmental standards established by an independent body. Producers have responded by investing in technologies and practices to meet the certification standards.
- **Cost savings.** Many businesses have found that they can reduce costs and raise net revenues by making investments that curtail their use of energy, water, and hazardous substances.
- **Strategic corporate and community leadership.** Some corporations recognize a strategic advantage, relative to their competitors, by providing leadership in the development and implementation of cooperative efforts to protect and enhance the natural environment.
- **Expedited regulatory processes.** Some businesses go beyond regulatory requirements to reduce their environmental impacts anticipating that, by doing so, they will enhance their ability to satisfy regulatory requirements in the future. The U.S. Environmental Protection Agency promotes this behavior through its Performance Track Program. State and local regulators might stimulate additional spending on protecting water resources in the North Coast region by developing similar programs associated with residential, commercial, or industrial developments and activities.

3. Innovative Markets and Other Mechanisms

Economists favor markets because they offer robust opportunities and incentives for increasing the value derived from a good or service. Many economists and resource managers across the country have been investigating opportunities to develop markets, or market-like mechanisms, applicable to the management of water and related resources. These efforts stem from observations that markets powerfully influence the management of these resources, but often alter ecosystems so that they provide those goods and services that are traded in markets, to the detriment of those that are not, even though the latter may have greater economic importance. Arresting and reversing these outcomes, it is argued, requires harnessing market forces so they marshal financial resources to support the production of a broader set of ecosystem services.

Much of the effort, here and elsewhere, to develop new markets has focused on transactions involving the transfer of water from one location or use to another. Other attempts to develop markets or similar mechanisms involve water quality, wetlands and habitat, specific ecosystem services, and development rights.

Water markets. Water markets entail voluntary transactions that transfer the right to control water from one entity to another. A transaction can alter the use of water (from irrigation to municipal use, for example), or the timing and location of an on-going use (from irrigating one field and crop to another, for example). A water market, *per se*, comprises sellers and buyers who engage in transactions as well as the institutions and processes that facilitate, approve, and validate the transactions. In most cases, a market-based transaction results in immediate change in the goods and services derived from water, as the seller relinquishes control and the buyer assumes control.

Sometimes, however, a transaction results in the control of a unit of water being lodged in a water bank, where it resides and remains idle, until it expires or is withdrawn.

A temporary transfer occurs when a water-right holder retains the water right but leases the related water for use by another. A permanent transfer occurs when the water-right holder sells the water right to another. Leases can have different lengths. Some exist for only part of a season, while others last an entire season, an entire year, or multiple years. A split-season lease, for example, might materialize when a farmer that typically produces two hay cuttings per year agrees to cut only once and then leases water for instream use to support fish populations during the late summer. A lease may last several years but come to life only when pre-specified conditions exist. A farmer growing an annual crop, for example, might enter into a multiple-year lease with a farmer growing perennial crops, but effect the transfer only during years when water supplies are forecasted to be low. During such a year, the seller would not plant the annual crop, transfer the water to the buyer to sustain the perennial crops, and use the compensation received from the buyer to offset the forgone revenues from the annual crops.

Water markets are most robust when they exhibit characteristics typical of other well-functioning markets. Potential sellers must have solid, verifiable property rights in the water to be leased or sold, which usually requires full adjudication of all rights in a basin. Buyers and sellers must be able to find one another easily, develop a reliable assessment of the value of the water available for lease or purchase, and execute transactions quickly. Third parties must have an opportunity to evaluate, in a timely manner, how each proposed transfer might affect them. The costs parties incur to execute a transaction must be reasonable. Once a transaction is completed, each party must have confidence that others will comply with all its terms.

Market-based, voluntary transfers of water should increase the economic well-being of both the sellers and the buyers because a transaction would occur only if both parties expected it to be beneficial. Much of the concern over water transfers arises from third parties who fear the transfers will cause them economic harm. A downstream farmer, for example, may fear that a transfer would increase the upstream consumptive use of water, leaving less water in the stream to meet downstream demands, or farm-supply businesses may fear that water transfers away from one type of agriculture to another will reduce the demands for their products. Nearby communities may fear that, once transfers are allowed from one farmer to another, they eventually will be allowed to shift water away from agricultural use altogether, with the water perhaps leaving the area entirely. An incremental transfer of water from one farmer to another growing similar crops might have little effect on the overall surrounding economy. The economy might experience a discernible shake-up, however, from a transfer that significantly increased the supply of high-value, scarce goods and services while having a minor impact on the supply of abundant goods and services.

Several factors impede growth in the number and extent of market-based water transfers. One major factor is lack of experience. Transfers have not occurred in enough volume or for a long enough time for there to be widespread awareness, among both potential sellers and potential buyers, of the mechanics and economic opportunities

associated with transfers. This lack of awareness is made more acute because there exists no permanent, familiar set of institutions to facilitate transfers and, thereby, build familiarity and trust. Additional barriers to water markets stem from the nature of water rights. Typically, the validity of one's water right is not confirmed until the state has fully adjudicated all water rights in a basin. Where the adjudication process has not been completed, it creates uncertainty about the validity of any market-based transaction transferring a water right. This uncertainty diminishes the willingness of potential buyers to pay for a right that might later prove to be invalid.

Properly designed, water markets might stimulate increases in income and investment in the North Coast region. Experience across the West shows that water markets often induce farmers using water to grow low-value crops to sell (or lease) water to an NGO seeking to use the water to increase instream flows and improve fish habitat. With such transactions, the farmer can end up with higher income. Fish populations available for ceremonial and other purposes can increase, and incomes can rise in the recreational and commercial fishing industries.

Water-Quality Markets. Some communities in the West are developing markets involving water quality. The most notable example is a wastewater utility near Portland, Oregon. It discharges wastewater to a river that experiences water temperatures violating standards and, hence, faces regulatory requirements to chill its discharges so they do not contribute to the violations. Rather than incurring costs exceeding $50 million to chill the discharges, however, the utility is paying owners of riverbank properties to plant and maintain streamside forests that will shade and help cool water in the river. Volunteers often participate in planting and maintaining trees, especially on public lands. With the transactions, the utility lowers its costs to satisfy regulatory requirements, landowners realize higher income from their property, members of the community become more aware of and committed to improving the quality of water in their river, and habitat conditions for fish and other species in the river are improving. Other communities are examining similar initiatives involving emissions of heat, nitrogen, and phosphorus to streams.

Wetlands and Habitat. Several federal and state agencies require the adverse impacts on wetlands and habitat arising from development projects to be offset by improvements in the nearby vicinity. These requirements have led to the creation of market mechanisms that enable the developer to purchase offsets from a public, private, or NGO entity that is managing lands to provide wetlands and habitat.

Payments for Ecosystem Services. Figure 1 and Table 1 illustrate the ways in which water and related resources provide a multitude of valuable goods and services. In some instances one group, such as owners of land near a river, incur costs to provide clean water, fish habitat, and other services, the benefits of which are realized by others, such as downstream communities, and recreationists. Absent economic incentives for the landowners to continue providing these services, they allow the supply to diminish. In recent years, many groups have worked to develop market-like mechanisms aimed at reversing the trend, by facilitating payments to landowners for the provision of specific ecosystem services.

Payments for ecosystem services (PES) can take many forms. One of the most common examples is USDA's Conservation Reserve Program (CRP), in which the federal government pays farmers to take land out of production and plant vegetation providing soil, water, and habitat benefits. Some communities—New York city is the most prominent example—pay landowners to avoid land uses and resource-management activities that would degrade the quality of water produced in the watershed providing municipal water supplies. Individuals pay landowners who provide high-quality opportunities for hunting, fishing, and other recreational activities. There is widespread anticipation that soon there will be market mechanisms facilitating payments for actions that sequester carbon dioxide or other greenhouse gases.

These and similar programs are most effective when they provide incentives that influence behavior, which usually means they must provide a landowner with sufficient revenue and/or reduce the risk sufficiently to offset the loss of expected earnings from the land as well as the costs of effecting the transaction. Although specific payments for ecosystem services often appear capable of producing net benefits for individuals and communities, these benefits do not always materialize. Implementation of payments for ecosystem services often is impeded by barriers, such as these:

- **High administrative costs.** Valuing, verifying, monitoring and tracking activities that generate ecosystem services can require management systems and personnel. Some programs include fees on transactions to support these activities, but others require outside revenue support.
- **No demonstration transactions or pilot projects.** New types of transactions can have increased uncertainty regarding costs and benefits. Examples of transactions or service-generating activities might be necessary for others to feel confident with the investments needed.
- **Regulations that do not allow PES.** Regulated entities under legislation, such as the Clean Water Act or the Endangered Species Act, might have obligations that could be more effectively met with PES. Permits or state-level rules might need to be modified to allow use of PES, however.
- **Funding constraints.** Even though certain ecosystem services, such as instream habitat provision, might be valuable to communities, funding or mechanisms for coordinating funding might not exist.
- **Thin markets.** While both buyers and sellers might realize benefits from PES, they might not be aware of opportunities to buy or sell ecosystem services. They also might not have ways to find each other.
- **Increased uncertainty and risk.** Buyers and sellers might perceive greater uncertainty and associated risk with PES than existing regulatory compliance or service opportunities.
- **Future liability.** Some landowners might worry that, if they provide ecosystem services on a voluntary basis, they subsequently may be required to provide them through government regulation.

Markets for Development Rights. Sometimes, when a community wants to ensure that a piece of land will provide a particular set of ecosystem services that would be

diminished or destroyed if the land were developed, the community must purchase the land to prevent the development. In some settings, however, communities, NGOs, and others have accomplished their objectives by purchasing not the land but the rights to develop it. This is what occurs when an agency, NGO, or other entity pays a landowner in exchange for placing a conservation easement on the land, restricting future development. Policies that facilitate conservation easements in the North Coast might be successful in attracting funds to the region from federal or state agencies, or from NGOs that would see the advantage of investing their funds here rather than in other regions.

Similar objectives can be accomplished when a community with regulatory authority of land use participates in a transaction that transfers development rights from one parcel to another. A community might, for example, discourage development that would have a particularly adverse impact on a watershed by allowing the landowner to transfer development rights to a parcel outside the watershed. Such transfers also might yield revenues for the regulatory agency, if it charges fees for reviewing and approving transfer requests.

C. Issues to Be Considered when Evaluating Financial Options

The discussion above demonstrates that there are many options available for acquiring and spending money, and for influencing the expenditures of others, to promote accomplishment of the goals and objectives of the NCRP. Financial decisions are always difficult, however, and there are many issues that political leaders and others likely will consider when weighing and selecting among the financial options available for supporting the NCRP. We highlight some of them here, expressed as questions that must be answered.

What Is the Problem Being Addressed? This question must be answered clearly and thoroughly, early in the process of evaluating financing alternatives. Doing so, may require looking beyond the immediate financial problems to see how they are linked to ecological, economic, legal, administrative, political, and inter-personal issues.

How Does the Funding Structure Relate to the NCRP's Priorities? To provide sustainable financial support for the NCRP, a financial structure must parallel the plan's priorities, both now and in the future. That is, it must focus on providing funding for high-priority actions rather than for low-priority actions, and it must have the ability to evolve as the priorities shift over time.

How Does the Funding Structure Relate to the Priorities of Others? Especially important is the extent to which the structure supports the priorities of those (state and federal agencies, donors to NGOs, key landowners, taxpayers) who will be asked to provide significant funding.

Is the Funding Structure Transparent? Is It Fair? Does It Have Accountability? To secure broad public support, interested parties and the public (and auditors) must clearly see that funds being raised for a purpose are being spent on that purpose. In most cases,

the public applies two principles when evaluating the fairness of financial decisions: those who pollute (impose costs on others) should pay the costs of preventing the pollution (stopping the costs); and those who pay for an action should be the same as those who will benefit from it.

Is the Funding Structure Feasible? In particular, does each source of funding comply with legal requirements, and can it withstand efforts of critics to undo it?

Is the Funding Structure Stable but Flexible? The NCRP addresses multiple problems, has multiple priorities, and engages multiple agencies, groups, communities, and individuals. Amid this milieu, the structure likely will provide stable, but flexible funding to the extent that it draws on multiple sources of funds.

What is the Net Amount of Funding Supporting the NCIRWMP and NCRP? Decisions that merely place new titles on existing sources of funding likely will be seen and criticized as a rearrangement of the deck chairs, rather than a net increase in funding. Decisions that direct some funding to accomplishing an objective but leave in place funding that undermines the effort will be seen and criticized as having little or no net effect. The same is true for funding of actions that would contradict current legal and regulatory requirements.