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THE APPLICATION OF BENEFIT-COST ANALYSIS TO PROPOSED LAND USE CHANGE: THE GUEMES ISLAND AND PORT SUSAN (KAYAK POINT) CONFLICTS

by

Peter Harrison

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Peter Harrison

WSG-TR-71-5
(see Le He. 2/10/72)

Mr. Peter Harrison is a research assistant financed by U. S. Department of Commerce, Sea Grant research project, "Socioeconomic, Institutional and Legal Considerations in the Management of Puget Sound," Grant No. 11-4825, directed by Professor James A. Crutchfield. This paper is a result of preliminary research and is not to be cited without the author's permission.

University of Washington
Seattle
May 1971

Table of Contents

1. Introduction

2. Benefit-Cost Analysis..... 3
   a. Regionalization..... 6
   b. Primary and Secondary Costs and Benefits..... 7
   c. Benefit-Cost Analysis and County Economic Development..... 8

3. The Case of Guemes Island..... 10
   a. Interest Groups..... 10
   b. Benefits and Costs..... 11
      i. County Authorities..... 11
      ii. North West Aluminum Co..... 12
      iii. Local Manufacturing Industry..... 13
      iv. Local Service Industry..... 13
      v. Local Landowners..... 14
      vi. Local Labor..... 15
      vii. Groups Concerned with Environmental Quality..... 15
   c. The Balance of Benefits and Costs..... 16

4. The Case of Port Susan..... 18
   a. Interest Groups..... 18
   b. The Balance of Benefits and Costs..... 18

5. Change of Areal Stance..... 20

6. Availability of Data..... 22

7. Conclusion..... 23

8. Footnotes..... 25

APPENDIX A. Data which would have been needed to perform a benefit-cost analysis..... 29

APPENDIX B. Data available on the Guemes Island (N.W. Aluminum) conflict..... 34

APPENDIX C. Data available on the Port Susan (Atlantic Richfield) conflict..... 36

1. Introduction

Industrialization of any form is seen by many county authorities as the goal of their respective administrations. The idea of an "expanded tax base" is forwarded by officials as the main rationale for attracting industry to new sites, and it is assumed that such activity will result in a net benefit to the community.[1]

As society grows more affluent and people become more concerned about the "environment" in which they intend to live, disagreement arises as to the desirability of industrial growth in certain areas. Assuming it can be proven that the tax burden on the individual will become relatively lighter as industry grows in a given area (and this is frequently very difficult to prove),[2] there are many areas where individuals would prefer a higher tax burden and no industry.

The land surrounding Puget Sound and the Gulf Islands is increasing in value because of the demand for property which has access to open water and which still retains a certain modicum of seclusion.[3] For a multitude of reasons, persons owning such property would prefer that industry locate elsewhere. The noise, atmospheric pollution, water contamination, and loss of visual amenity connected with major industry are seen as invaders of the tranquility which pervades Puget Sound and the Gulf Islands.

It is therefore understandable that when North West Aluminum Co., Inc., succeeded in acquiring a rezone of Guemes Island by Skagit County to allow the construction of an aluminum smelter on the Island,[4] public indignation was rife. The County's final decision to rezone was contested in the State Supreme Court,[5] and eventually reversal of the decision was handed down. The Supreme Court decision[6] was based on the fact that right procedure had

not been followed in the county-zoning hearing sessions, and the rezone of Guemes Island to industrial use constituted a "spot zone."

The Guemes Island decision greatly affected a similar decision by the State Supreme Court in reference to the rezoning of over 600 acres in Port Susan Bay (Kayak Point) by Snohomish County.[7] Atlantic Richfield, who owned the land, had pressed for a rezone to construct an oil refinery, and following the usual public hearings the zoning ordinance was changed.[8] Contestants successfully appealed to the State Supreme Court[9] and the decision to rezone was reversed.[10] Conflict of interest on the part of county officials, together with the judgment that the rezone constituted "spot zoning," was the basis of the Supreme Court ruling.[11]

Details of the county hearings and of the State Supreme Court hearings on both cases can be found elsewhere in condensed form.[12] Conspicuous in the reports is the fact that the zoning decision eventually arrived at by way of the State Supreme Court was based not on any social or economic criteria, but rather on particular interrelationships between individuals involved and upon the legal definition of what constituted "spot zoning." The court system is indeed an excellent method whereby injured parties can claim redress; it is doubtful, however, whether the court system is an adequate medium for controlling industrialization or land use development.[13] In the conflicts relative to Guemes Island (Smith vs. Skagit)[14] and to Port Susan (Chrobuck vs. Snohomish County),[15] the representations to the State Supreme Court were based on the individual parties involved. In reality, however, the incidence of costs and benefits accruing from such industrial development, or from the decision not to develop, is more widespread than court procedure suggests.

The decision-making process involved in the two conflicts can be viewed in many ways. This paper is an attempt to look at the decisions arrived at in the two cases in terms of the costs and benefits relevant to the interest groups involved. The use of benefit-cost measures implies the existence of adequate data to study the impacts of the developments. Since such data rarely exist, and certainly do not exist in the case of Guemes Island and Port Susan, an attempt will be made to show how "going through the motions" of a benefit-cost analysis not only outlines and clarifies certain conceptual and practical problems involved but can also suggest the direction which policy should take.

Such "ex post" reasoning is obviously easier to construct than projective reasonings would be when the conflicts first arose. It is suggested, however, that similar "ex ante" reasoning on the part of many of the officials involved might have made the legal process shorter and less costly and might indeed have resulted in different eventual decisions. It is assumed as a matter of course that, in default of adequate regional planning and industrialization policies on a state and county level, the courts are still the necessary forum for many policy decisions. It is to be hoped that this situation can be rectified when common goals and adequate methods of analyzing the process of goal-seeking can be found.

2. Benefit-Cost Analysis

Benefit-cost analysis is a well-developed and well-used method of assessing priorities in investment decisions[16]--especially at the federal level.[17] The greatest use of benefit-cost analysis has been made in water resources management,[18] and indeed the application of the method to other

problems of resource allocation has been a transplant of the entire system of analysis.[19]

As a technique for evaluating investment decisions which would result in marginal changes to the national economy, benefit-cost analysis parallels the theory of investment in the private sector.[20] It extends the profitablity criterion contained therein by allowing benefits to accrue to individuals other than those who bear the related costs (i.e., the technique is especially applicable to public goods). The major difficulty with the method is that it is based on the classical model of perfect competition in equilibrium[21] and thus assumes that market prices reflect the opportunity cost of goods and services and are unaffected by the project under analysis. It is further assumed that conditions of full employement prevail, since the employment of previously unemployed resources (especially labor) would in fact have zero opportunity cost. Although the above assumptions place restrictions on the benefit-cost method, their non-fulfillment does not invalidate the method but suggests that measures of cost and benefit other than market prices should be used.

As with the theory of the firm on which it is based, benefit-cost analysis is a positive and not a normative model. Having compared the returns of different projects over time, the decision-maker can rank such projects on the basis of their "profitability." This is not to say, however, that any project is more "desirable": it merely suggests which of several projects would fulfill the goal of maximizing returns to investment. The attainment of other goals may require a different set of criteria and a model based on different assumptions. In cases where a given project would radically alter the national economy, there would be need for a general equilibrium model of a more comprehensive nature than benefit-cost analysis.[22]

On the national level many investment opportunities are open to federal agencies, specifically with regard to building of flood control schemes or hydroelectric systems.[23] To evaluate priorities in such a situation, benefit-cost analysis assesses all direct costs of construction (amortized over time), all direct benefits accruing to each project, and compares the net benefit, over time, of each project.[24] On the national level only those costs and benefits directly related to the project are considered, since the inclusion of indirect costs would result in double-counting. Assessment of regional impact, however, involves the delineation of all costs and benefits. It is assumed that at the national level the external effects of project construction will balance out throughout the economy. In a regional setting (e.g., Puget Sound), it is often the expected external effects which assume the greater importance.[25]

Much discussion has been directed towards the applicability of "benefit-cost ratios" to the analysis of urban development or transportation schemes,[26] and such discussion could be applied to the use of benefit-cost criteria in the case of the Guemes Island and Port Susan conflicts. Similarly, the very pertinent questions of how to amortize construction and development over time, which interest rates to use in "discounting" costs over time, and which level of prices to assume, etc.--have all received a great deal of attention. Two specific conceptual problems relate directly to the Guemes Island and Port Susan cases, however, and these can be treated in isolation from the problems mentioned above.

On the one hand, the question arises as to what is the most effective "accounting stance" or region to take for analysis, and on the other hand the complementary question is which indirect costs and benefits to include.

a. Regionalization. The problem of defining the surface area over which a particular study takes place is not of recent vintage.[27] Much time and effort has been expended on attempting definitions and delineations of "ideal regions."[28] When development and schemes are being analyzed on the national scale the idea or concept of "space" receives minor attention: the nation is considered to be a closed system.

When one studies the impact of industrial developments such as the proposed sites of North West Aluminum Co. and Atlantic Richfield Co. the problem of drawing a line around the "impact region" becomes more acute. The direct impact of such developments upon local people is patent. At the same time, however, an impact is exerted on the state and also on the nation in a completely different "economic space."[29] If Atlantic Richfield had constructed its refinery at Port Susan the nation would have benefited to the extent that Port Susan was a better location than somewhere else; the State of Washington would have benefited to the extent that the location could have been in another state; yet the County of Snohomish might have suffered a net cost or disbenefit. Thus, when computing the costs and benefits of a scheme, the area over which they are assessed is of critical importance. The only solution to the problem of calibrating such benefit-costs for a national industry in a small locality is to assume that from the point of view of the county the important benefits and costs accruing from such a development are those affecting groups within the county.

It is obvious that similar assumptions could be made at the state and national level. As one increases the size of the "accounting stance," however, the flexibility of possible locations increases. Both North West Aluminum and Atlantic Richfield eventually announced that they had decided not to

locate in the respective counties they had chosen (Skagit and Snohomish). Such a decision is obviously a total loss of potential benefits and costs to the respective counties from their point of view (accounting stance), whereas from the statewide point of view (accounting stance) the decisions made by the respective companies may result merely in their removal to some other part of the state.

Thus, in order to isolate interest groups and affected parties in the Guemes Island and Port Susan conflicts it is assumed initially that the stance to be taken is that of the county. The importance of North West Aluminum or Atlantic Richfield to the state and to the nation is considered secondary.

b. Primary and Secondary Costs and Benefits. Directives on the application of benefit-cost analysis to federal projects point out that as in national income accounting, the inclusion of indirect effects can result in double-counting. Since the search is for the net effect of any project, such inclusion is undesirable.[30] From the previous discussion on "accounting stances" it can be seen (by extrapolation) that the decision whether to include secondary and tertiary benefits and costs of a scheme depends entirely on the accounting stance taken. In the case of Skagit and Snohomish Counties, the importance of an industrial project is not only in the direct employment of labor or the payment of county and municipal taxes, but also in the employment and expenditure induced by the development. Such local multiplier effects are of extreme importance to local communities, especially where the initial impetus is exogenous. Indicative of this fact is the undoubted interest of local business and trade associations in attracting more industry.

The full impact of any new industry, however, may not be felt entirely

by the county where the industry locates, since different industries have different propensities to import material inputs. It is thus conceivable that a capital-intensive stage of a production process may induce few spinoff benefits in the area of its location, since all inputs are imported from outside the area and all value-added in the process accrues to capital and not to labor. The extent to which the former is owned outside the locality likewise reduces the impact effect of the new industry. It can be concluded that the differential impact of industrial development in a locality depends not only on the nature and extent of that industry's linkages with other processing industry and with households, but also on the extent to which such linkages occur within the given locality.

From the point of view of a county, an educated attempt at industrialization would not focus on the absolute size of a proposed development, but rather on the linkage patterns it could be expected to form within the county and the potential multiplier-induced effects. It is conceivable that at the county level the maximization of direct benefits resulting from an industrial development may not necessarily be the same as the maximization of overall (i.e., primary and secondary) benefits. It is for this reason that both primary (direct) and secondary (indirect) costs and benefits are discussed in this paper.

c. Benefit-Cost Analysis and County Economic Development. The process of economic growth and change is still not clearly understood.[31] Moreover, it is difficult to isolate initial stimuli to growth on a national scale.[32] When the accounting stance is smaller, however (as at the county level), it is often relatively simple to isolate the cause of economic growth. The

Skagit or Snohomish County) can often be isolated as the "prime mover" in the process of growth.

The term growth, of course, is an emotive one; increased cost to societies and increased complexities in living are frequently mistaken for growth. Industrial and economic growth is the ideal of most county officials--to return to the "increased tax base" argument. The imposition of a new industry on an agricultural, rural, or recreational area (as in the Guemes Island and Port Susan cases) may result in economic growth and development[33] but in the process may cause costs and disbenefits which are not taken account of in the discussion of growth. External effects detrimental to other groups and to the environment[34] plus the consumption and degradation of traditionally "free goods" (air, water, etc.) are very conveniently forgotten.

It is suggested here that if account were to be made of all costs and disbenefits accruing to and caused by the company because of such development as Guemes Island or Port Susan, a more balanced view of the social effects of economic growth would be gained. Attempts to include secondary inputs and outputs of economic systems (especially intangibles related to environment) have been made recently.[35] Such inclusions, however, tend to ignore another forum where costs and benefits are utmost, almost decisive, in importance--the political decision-making process.

Previous analyses of the Guemes Island and Port Susan cases provide information which is difficult to relate to more rational concepts of local economic growth as noted above. The information tendered, however, does allow an analysis of the decision-making process of the interest groups involved in terms of (i) the benefits which would accrue to them if the particular industry had been allowed to develop, and (ii) the costs which would have

to be faced by each respective group if the development had been allowed.

3. The Case of Guemes Island

Not all the individuals involved in the case of Smith vs. Skagit County could possibly have had similar levels of knowledge or judgment concerning the development of North West Aluminum Company's smelter on Guemes Island. Nevertheless all parties involved had obviously weighed the effect which the development would have on each of them individually, and had formed an opinion based on this assessment. It could be said that each interest group assessed what "benefit" for themselves would accrue from the project, and balanced this against the "costs" involved. Obviously some groups stood to gain more than others, and some stood to lose. As already noted, the final decision was made upon the contentions of only two parties rather than of all the parties involved.

a. Interest Groups. Assuming that the county is taken as the accounting stance, it is possible from the minutes of the county hearings [36] and the law reports involved in the Supreme Court hearings [37] to isolate the following opinion groups or "players" in the decision process:

1. Skagit County
2. North West Aluminum Company
3. Local manufacturing industry
4. Local service industry
5. Local landowners affected by the proposed development
   (i) residing in Skagit county
   (ii) residing elsewhere (Seattle)
6. Local labor
7. Interest groups concerned with environmental quality.

Each of the above groups involves different combinations of people, but no two groups are mutually exclusive. It is possible, for example, for one person to belong to several interested parties, e.g. local labor, local landowner, and environmentalist. Each of the above groups, however, represents a particular "body of opinion" generated in relation to the specific question of the location of North West Aluminum's plant on Guemes Island.

Many of the costs perceived by the individuals and groups are not readily reduced to economic measurement (such as the "quality of the environment" or "visual amenity"), and groups of landowners will often make a stand against industrialization on the basis of nontangible considerations. Although such considerations cannot be analyzed in terms of dollars and cents, they are obviously important in the decision-making process and need to be noted in any discussion of relative costs and benefits of a project.

b. Costs and Benefits:

1. County authorities

a) Benefits: increased tax returns from industry and employees and induced returns; increased ferry service to mainland and Anacortes (provided by the State); reduction in unemployment; increased harbor dues.

b) Costs: schools; water; roads; sewers; lighting; police facilities; garbage disposal; other public services, especially libraries (which had planned expansion in the event of industrialization; cleaning up the debris of pollution, etc.

The potential increase in benefits inherent in a wider tax-base may have made the county favor industrialization. A more rigorous analysis of the added costs involved, however, might have reversed the opinion of Skagit County,

since it might actually have been worse off had North West Aluminum located on Guemes Island. The increased demand for public services by the labor involved might have outweighed their added contributions (in the case of Port Susan it may be noted that this imbalance would probably have been less, since the refinery, being more capital intensive, would not have increased demand to such an extent).

ii. North West Aluminum Company

a) Benefits: those which make the site better than elsewhere, such as land facilities (i.e. marginal locational advantage); deep water port facilities; accessibility to West Coast markets; cheap power from Bonneville scheme; labor supply from Anacortes; climate (?).

b) Costs: capital equipment and construction; transport facilities; taxes; wages; returns to other factors of production; pollution control equipment.

Given a net benefit over other sites, North West Aluminum most likely chose Guemes Island because of its distinct locational advantage. Had the net benefits not been positive, it is likely that the company would initially have tried to locate elsewhere.

In an analysis such as the present one, any overt or even concealed concessions made to North West Aluminum by local authorities cannot be assessed. It is possible that an underestimation of taxes or lower than marginal cost pricing, e.g. for water, could result in a large positive transfer from the taxpayers in the area to North West Aluminum. The amount of such a possible "subsidy" could well outweigh site disadvantage which might otherwise have dissuaded an attempt at location on Guemes Island.

iii. Local manufacturing industry

Local industry, depending on its type, would not necessarily have felt an effect. Multiplier effects resulting in increased demand within the county might in fact be small if there were little connection or linkage within industry already located on Guemes Island or in Anacortes. Even lacking such direct connection, however, other manufacturing industry might favor the development simply to provide a "more stable base," to increase the incidence of "industry," or because of the possibility of tax reduction.

a) Benefits: possible increased demand for goods; better accessibility because of transport developments; reduced or stable taxes.

b) Costs: tax base may actually go up; land becomes scarcer, as does labor.

iv. Local service industry

Net benefits are often perceived to be higher than they turn out to be.

a) Benefits: increased turnover and, in the short run, increased profit rates and profit levels.

b) Costs: increased costs related to volume, together with the cost of providing facilities to cater for an increase in demand and a possible shift of tastes.

The service industry is characterized by unrestricted entry, and therefore factor receipts are highly changeable. Increased rates of profit would induce more entrepreneurs to enter the service industry until such pure profits were reduced entirely and only normal profits were experienced. Increased benefits would therefore be represented in the long run in rents according to land used

by the service industry.

At a certain "threshold" size of population it becomes feasible for chain stores and supermarkets to enter a locality where small owner-managed facilities have predominated. Since national chains (e.g. Safeway) typically follow a policy of charging a basic price for most goods plus the cost of transportation to a particular area, their prices are frequently lower than in non-corporate or non-chain stores. Because the resultant increase in population might attract chain stores to a locality, industrialization might thus be instrumental in reducing the turnover of locally-owned stores and even putting them out of business. Such a result is quite different from the benefits perceived as accruing from industrialization by members of the service center.

v. Local landowners

a) Benefits: increased value of land is typical of waterfront properties in the Puget Sound region, since a growing demand for land with access to the Sound is faced with a fixed supply. It is therefore difficult to pinpoint a given increase in land values as being due directly to rapid industrialization, as opposed to an increased demand for residential subdivisions or to increased rents described in (iv). For individual landowners actually employed in the new industry the net benefits in terms of income generated would be greater.

b) Costs: as far as the interest group of landowners is concerned, the "capital gains" described in a) may be offset by increased taxes and by a decline in areas of amenity--spoiled visual amenity, increased density of population, and a decline in

the selectiveness of the neighborhood.

vi. Local labor

a) Benefits: employment for the unemployed, increased salaries and wages to the group, and greater accessibility to the mainland.

b) Costs: a possible increase in taxes, loss of amenity, plus a chance of "pollution" and a decrease in the level of living.

Although most local labor might perceive the Guemes Island development as a net benefit, this would be true only to the extent that labor was not brought in or attracted from elsewhere. It is likely that management personnel would be brought from other installations by North West Aluminum; thus the only employment created for the available pool of labor would be at the lower level of semiskilled and unskilled office and production jobs. An additional consideration is that people attracted by the increase in employment might move in from adjoining areas in numbers greater than the available openings, thus creating the anomalous situation of increased unemployment stemming from local industrialization.

vii. Groups concerned with environmental quality

a) Benefits: are usually zero except for an occasional attempt at environmental control or preservation by the company in question that extends beyond the control of its own discharge.

b) Costs: pollution (decline in water quality) and rapid land development which contribute to lowered amenity values.

Such interest groups usually perceive industrialization as having a net cost, since the elements of the environment perform the functions of free goods in the production process and thus suffer the incidence of "external effects"

detrimental to their quality.

c. The Balance of Benefits and Costs. As was mentioned previously, the calibration of benefits and costs cannot always be done in terms of dollars and cents. The matrices used in the following analysis thus show the general direction of net cost (or benefit) incidence, i.e. whether a particular group experiences net benefit or net cost as a result of the zoning change. The groups are not considered to be of equal importance but merely represent the bodies of opinion involved in the decision process. In a similar way the net cost perceived or experienced by any one group cannot be balanced by the net benefit perceived or experienced by another (dissimilar) group. The analysis is therefore only a means of suggesting the difference between perceived costs and benefits and the actual costs and benefits which would probably have been experienced.

If perceived net costs of the Guemes Island case were as follows:

Figure 1. Direction of Perceived Net Costs and Benefits: Guemes Island Case

	Net Costs	Net Benefits
1. Skagit County		X
2. North West Aluminum		X
3. Local manufacturing industry		X
4. Local service industry		X
5. Local landowners affected by the development	X	
6. Local labor		X
7. Interest groups concerned with environmental quality	X	

then the direction of net benefits obviously suggests that the project should have taken place. Because of lack of information together with biases mentioned previously, some groups may perceive the benefits and costs incorrectly.

The positions taken by Skagit County, North West Aluminum, and environmental interest groups throughout the Supreme Court hearings are the basis

of the construction of Figure 1. The perceived costs of interest groups not directly involved in the Supreme Court proceedings are based on the results of a questionnaire survey administered by the Sea Grant research group at the University of Washington.[38] In the Guemes Island case it may be more realistic to show the direction of actual net benefits and costs as follows:

Figure 2. Direction of Actual Net Costs and Benefits: Guemes Island Case

	Net Costs	Net Benefits
1. Skagit County	X	
2. North West Aluminum		X
3. Local manufacturing industry		X
4. Local service industry	X	
5. Local landowners affected by the development		X
6. Local labor		X
7. Interest groups concerned with environmental quality	X	

i.e., the interest groups in the county would probably have experienced a much lower overall benefit than they forecast. This possibility exists because the costs facing the county as a result of providing extra infrastructural and service facilities would most likely have exceeded the increased tax returns.

It can be seen from these comments that eventually a decision regarding zoning still has to be made. Benefit-cost analysis is only a method for analyzing a situation and does not necessarily suggest which course of action should be taken. In the case of Guemes Island, if the county had found that it was going to suffer a net disbenefit, it is most likely that the zoning ordinance would not have been changed in the first place and that a lot of time, effort, and expense involved in the court proceedings would have been avoided. Even if Figures 1 and 2 could be calibrated in terms of dollars,

it would be necessary to assume that a dollar means the same to everyone involved in the respective conflict before cross comparison of costs and benefits could be made. Given the need for this assumption, it is doubtful whether aggregate benefit-cost comparisons completely reflect group opinion, since some groups will lose and some will gain no matter which decision is reached.

4. The Case of Port Susan

The major difference between the Port Susan conflict and that on Guemes Island is that the refinery proposed by Atlantic Richfield would provide fewer jobs by far than would North West Aluminum's plant. It is probable, therefore, that both perceived net benefits and costs and actual net benefits and costs will be quite different from those in the Guemes Island case.

a. Interest Groups. The Port Susan case also differs in that several occupational interest groups were involved in the debate--local farmers, local fishermen, and residents of the nearby Indian Reservation. The parties involved thus become:

1. Snohomish County
2. Atlantic Richfield Oil Co.
3. Local manufacturing industry
4. Local service industry
5. Local landowners affected by the development
   (i) residing in Snohomish County
   (ii) residing elsewhere
6. Local labor
7. Local occupational groups
8. Interest groups concerned with environmental quality

b. The Balance of Benefits and Costs. Since increased labor force would be lower than in the Guemes Island case and since existing facilities (e.g., for water supply) on the mainland would suffice the refinery, the increased cost to the county might possibly be much less than the tax returns

from the refinery. Because very little added and induced income would flow to local industry, those involved in local industrial management, together with those employed, might see the refinery and its associated smoke, oil spills, etc., as a net disbenefit. Local landowners, shopkeepers (service industries), and the environmental interest groups would seem to have views similar to those involved in the Guemes Island dispute.

Local occupational groups such as farmers and fishermen were categorically opposed to the refinery since they felt that the use of fresh water in the refining process and the possible contamination of sea water because of oil spills would detract from their respective businesses.

Figure 3. Direction of Perceived Net Costs and Benefits: Port Susan Case

	Net Costs	Net Benefits
1. Snohomish County		X
2. Atlantic Richfield		X
3. Local manufacturing industry	X	
4. Local service industry		X
5. Local landowners affected by the development	X	
6. Local labor	X	
7. Local occupational groups	X	
8. Interest groups concerned with environmental quality	X	

If the actual net costs and benefits as opposed to those perceived by the interest groups were shown the pattern would be:

Figure 4. Direction of Actual Net Costs and Benefits: Port Susan Case

	Net Costs	Net Benefits
1. Snohomish County		X
2. Atlantic Richfield		X
3. Local manufacturing industry	X	
4. Local service industry	X	
5. Local landowners affected by the development		X
6. Local labor	X	
7. Local occupational groups	X	
8. Interest groups concerned with environmental quality	X	

The balance in terms of net benefits is thus lower in the Guemes Island case. The major differences between Fig. 4 and Fig. 2 occur because the lower employment requirements of the oil refinery would result in a much lower need for infrastructure and service provision. The county would thus probably experience a net gain from increased tax revenues. Local labor would benefit little from the refinery development since construction workers and, eventually, production workers, would be hired from elsewhere.

As in the case of Guemes Island, perceived net benefits and/or costs tend to be at variance with the direction which actual net benefits and/or costs would probably take. The aluminum smelter on Guemes Island would have produced greater benefits to interest groups in Skagit County than the oil refinery at Kayak Point would have produced for similar groups in Snohomish County. This comparison, however, is not intended to show that the aluminum smelter should have been located on Guemes Island. It is rather an attempt to show the quite different nature of the two location decisions--yet both were based on identical legal criteria.

5. Change of Areal Stance

The discussion in this paper has digressed from the general approach to benefit-cost analysis by considering the incidence of costs and benefits on different interest groups at the county level. It was argued that an adequate assessment of the impact on the counties of the zoning proposals at issue would have required consideration of the secondary (i.e. indirect or induced) costs and benefits accruing within the respective counties. This suggestion is slightly at variance with previous studies, but arises out of the nature of the problem being dealt with and the relatively small area of the stance used.

If the accounting stance were enlarged (e.g.,to the size of the state) then the benefit-cost analysis would differ slightly from the approach taken here. First, the interest groups would be different in size and in kind, especially in the government sector and the household sector: statewide benefit is not necessarily the same as county benefit. Secondly, the "take us or we'll go elsewhere" attitude of certain industries would be lessened by the availability of different sites within the larger area. Atlantic Richfield, for example, eventually built its refinery at Cherry Point (Bellingham Bay) and thus the final effect for the state may be little different (in toto) from the possible effect of the Kayak Point location. At the county level, of course, such alternative locations outside the county constitute an "all or nothing" choice for the county. Even though Atlantic Richfield eventually located quite near to Snohomish County, the spinoff effects will probably be small for Snohomish County compared with the benefits had the location been several miles south, at Kayak Point.

Analysis at the state level would suggest that in terms of maximizing net benefit the only variables of crucial importance would be those which vary between sites within the state. The analysis of secondary costs and benefits (spinoff or multiplier effects) thus constitutes a third major difference brought about by a change in accounting stance. At the state level one could argue that the multiplier effects of a given development are important only in the case of a net expansion of product imports, i.e., in the cases of industries where the propensity to import is greater than 1.0 or where the marginal rate of import substitution exceeds the marginal growth rate of output in the industry.

From the above discussion it can be deduced that the differences between

analysis at the state level and the county level also apply between these levels and the national level. Because of the problems of double-counting, secondary benefits are not considered as of importance when the accounting stance is the nation. The comparison of costs and benefits thus becomes the comparison of net revenues at various sites, and the major variations in cost are those arising from different locations, different scales of production, and different external effects experienced at different possible sites.

The methodology outlined in this paper is thus derived from the nature of the problems being analyzed (resource conflict within a county) and the accounting stances used (counties). Application of such a methodology to the state or the nation would thus be inadvisable for the reasons suggested above. Changed accounting stances involve differing interest groups, and such changes imply different types of costs and benefits.

6. Availability of Data

The discussion so far has centered on a conceptual and intuitive approach to the application of benefit-cost analysis with reference only to data available from Supreme Court reports and questionnaire replies. Although persons interviewed in the process of collecting information on these two conflicts felt that sufficient cost data (i.e., dollar costs) were furnished by all parties,[38] it is doubtful if their judgment is correct. The small amount of data published either in official pronouncements or in daily newpapers is shown in Appendix A. The paucity of the data prevents effective ex post analysis of the situation.

The impact of any industrial development in a region is admittedly a

complex problem for analysis. In the case of Washington State, however, the 1963 (and now the 1967) interindustry Input-Output table provides a useful basis for industrial impact analysis. The direct and indirect impact of the Guemes Island and Kayak Point proposals has been traced, using the inverse (Leontief) matrix of the 1963 direct requirements matrix. The resulting values were then weighted on the basis of county population proportions.[39] Such a method assumes constant production functions and factor inputs at both the state and the county levels, and because of the problems thereby generated a detailed discussion of the use of the Input-Output tables is not presented here. The suggestion can be made, however, that knowledge of the industrial linkage pattern at the county level, as discussed previously, would have aided in analyzing the situation. An Input-Output type of analysis for the counties concerned could have been constructed in such a way that the local effects of development and the resulting feedback from industry elsewhere in the state could have been isolated.

If done in a way similar to the state Input-Output analysis, such a county analysis would be instructive not only in making impact studies feasible but also in shedding light on the problems of industry disaggregation in the state I/O tables and on the assumptions of stability of input proportions at different areal levels.

7. Conclusion

Although suggestions have been made as to how the conflicts at Guemes Island and Kayak Point could be analyzed conceptually, and an attempt at a methodology has been forwarded, one can only note in conclusion that in terms of concrete and meaningful numbers which would relate costs to benefits in the issues under consideration there is, in fact, very little available. The

production of such "numbers" would not be beyond the capabilities of some county planning departments, but it is doubtful if the legal decisions handed down in the conflicts analyzed would have been altered if such numbers had been available.

FOOTNOTES

1. W. Z. Hirsch, The Economics of State and Local Government (New York, New York: McGraw Hill Company, 1970), p. 256.

2. H. M. Groves & J. Riew, "The Impact of Industrialization on Local Taxes: A Simple Model," National Tax Journal, XVI (1963), pp. 137-145.

   L. K. Loewenstein, "The Impact of New Industry on the Fiscal Revenues and Expenditures of Suburban Communities," National Tax Journal, XVI (1963), pp. 113-136.

3. For a discussion of this problem, see the previous reports of the Sea Grant Group, especially J. A. Crutchfield, et al. Socioeconomic, Institutional and Legal Considerations in the Management of Puget Sound. Report to the Federal Water Pollution Control Administration, University of Washington, August 15, 1969.

4. For a discussion of the details of the zoning hearings, see the study report, "Case Study No. 1, Guemes Island," (Mimeograph; University of Washington, 1969.)

5. Ibid., p. 5.

6. Superior Court of Washington State (for Skagit County). Court's Memorandum Opinion No. 29267, April 17, 1969.

7. See the study report, "Case Study No. 2, Port Susan," (Mimeograph; University of Washington, 1969).

8. Ibid., p. 15.

9. Superior Court of Washington State (for Snohomish County). Findings and Opinion of the Court No. 94557, May 6, 1969.

10. Ibid.

11. Ibid., pp. 6, 7.

12. See footnotes 4 and 7, and also J. M. Conrad, "An Economic Analysis of the Guemes Island and Port Susan Conflicts." (A report of the Sea Grant Group; mimeograph; University of Washington, 1969.)

13. The case could be made at this point for some form of rational industrial and regional policy rather than ad hoc decisions based only on legal precedent.

14. See footnotes 4, 5, 6.

15. See footnotes 7, 8, 9.

16. A. R. Prest and R. Turvey, "Cost-Benefit Analysis: A Survey," Economic Journal (1965), pp. 683-735.

A. Maas, "Benefit-Cost Analysis: Its Relevance to Public Investment Decisions," in Water Research, ed. A. V. Kneese and S. C. Smith (Baltimore, Md., 1966).

17. J. L. Knetsch, et al. Federal Natural Resources Development: Basic Issues in Benefit and Cost Measurement (Natural Resources Center, George Washington University, 1969.)

18. A. V. Kneese and K. C. Knobe, "The Role of Economic Evaluation in Planning for Water Resources Development," Natural Resources Journal, II (1962), pp. 445-482.

J. Margolis, "The Economic Evaluation of Federal Water Resources Development," American Economic Review, XLIX (1959), pp. 96-111.

P. H. McGauhey and H. Ehrlich, Economic Evaluation of Water: A Search for Criteria (Bulletin No. 14, College of Engineering & School of Public Health, University of California, Berkeley, July, 1960.)

Western Agricultural Economic Research Council, Committee of the Economics of Water Resources Development. Water Resources & Economic Development of the West. Report No. 3: Benefit Cost Analysis and Report No. 10: Direct and Indirect Benefits (Salt Lake City, 1963.)

19. C. D. Foster and M. E. Beesley, "Estimating the Social Benefit from Constructing an Underground Railway in London," Journal of the Royal Statistical Society, Series A (1963), p. 46.

20. See R. C. Lind, "Benefit-Cost Analysis: A Criterion for Social Investment," pp. 44-64 in T. H. Campbell and R. O. Sylvester (eds.), Water Resources Management and Public Policy (Seattle, Washington: University of Washington Press, 1968.)

21. Ibid., pp. 51, 60.

22. Ibid., p. 59.

23. J. K. Busby, "Toward a Sound Evaluation of Government Water Resource Projects," Edison Electric Institute Bulletin (New York, 1961), pp. 119-122.

24. A. Wildavsky, "Private Markets and Public Arenas," American Behavioral Scientist (1965), pp. 33-38.

Idem, "The Political Economy of Efficiency: Cost-Benefit Analysis; Systems Analysis; and Program Budgeting," Public Administration Review (1966), pp. 292-310.

A. D. Scott and W. R. D. Sewell, "The Use of Benefit-Cost Analysis by Canadian Federal Government Agencies" (Mimeographed; Ottawa, 1962.)

25. R. N. McKean, "Costs and Benefits from Different Viewpoints," pp. 147-162 in Public Expenditure Decisions in the Urban Community, H. G. Miller, ed. (Resources for the Future: Washington D.C., 1962.)

26. N. Lichfield, "Cost-Benefit Analysis in City Planning," Journal of the American Institute of Planners, XXVI (1960), p. 273.

Idem, "Cost-Benefit Analysis in Urban Redevelopment: A Case Study--Suranley," Papers and Proceedings of the Regional Science Association, XVIII (1965), p. 129.

Idem, Cost-Benefit Analysis in Town Planning: A Case Study of Cambridge (England, Cambridge & Ely County Council, 1966.)

S. D. Messner, A Benefit-Cost Analysis of Urban Redevelopment (Indiana Business Report #43; Bloomington, Ind., 1966.)

27. W. Isard, "Regional Science, the Concept of the Region, and Regional Structure," Papers and Proceedings of the Regional Science Association (1956), pp. 13-27.

J. V. Krutilla, "Water Resources Development: The Regional Incidence of Costs and Gains," Papers and Proceedings of the Regional Science Association (1958), p. 273.

28. For a discussion of "ideal regions," see: D. Grigg, "Regions, Models, and Classes," in R. J. Chorley and P. Haggett, eds., Models in Geography (London, Methuen, 1967.)

29. The concept of "economic space" as used here differs from the Euclidean concept of "geographic space" and is more comparable with Perroux's multidimensional abstractions. See: F. Perroux, "Economic Space: Theory and Applications," Quarterly Journal of Economics, LXIV (1950), p. 90.

30. See A. D. Scott and W. R. D. Sewell, footnote 24.

31. F. J. B. Stilwell, "Regional Growth and Structural Adaptation," Urban Studies, VI (1969), pp. 162-178.

32. M. D. Thomas, "Regional Economic Growth: Some Conceptual Aspects," Land Economics, XLV (1969), pp. 43-51.

K. E. Boulding, "Toward a General Theory of Growth," Canadian Journal of Economics and Political Science, XIX (1953), pp. 326-340.

33. D. North, "Location Theory and Regional Economic Growth," Journal of Political Economy, LXIII (1965), p. 243 ff. And reply by C. M. Tiebout in Vol. LXIV (1966), pp. 160 ff.

34. N. Lichfield, Spatial Externalities in Public Expenditures: A Case Study (London, OUP, 1965.)

35. For attempts to include environmental considerations in analysis of regional economic development see:

J. H. Cumberland, "A Regional Interindustry Model for Analysis of Development Objectives," Papers of the Regional Science Association, XVII (1966), pp. 65-95, especially p. 82 ff.

W. Isard, et al. "On the Linkage of Socio-Economic and Ecologic Systems," Papers of the Regional Science Association, XXI (1968), pp. 79-99.

36. See footnotes 7 and 7.

37. See footnotes 6 and 9.

38. See questionnaires administered to individuals involved in the hearings by members of the Sea Grant Study Group.

39. Although the calculation of direct and indirect impact was performed, the results are not presented here since it is felt that the simplifying assumptions made in applying the input-output matrices at the county level make the resulting figures of dubious validity.

APPENDIX A — DATA WHICH WOULD HAVE BEEN NEEDED IN ORDER TO PERFORM A BENEFIT-COST ANALYSIS

1. Benefit-Cost Accounting of the Firm

In the case of Atlantic Richfield Co. and North West Aluminum Co. their prospective sites discussed in this paper were in each case one of several. For each company to maximize its benefits from location in the Puget Sound region, it is therefore necessary for each to assess the NET benefits and disbenefits attendant upon location at each particular site. In reality, the accounting of such comparative costs would revolve around those factors and inputs which varied with the location rather than upon all costs involved in the production process. It would further be necessary to assume a given level of production, since the scale of activities would possibly alter the relative cost ratios involved.

The following table shows those components of cost which would need to be known in order to make a more rational choice of location. It is not necessary, however, that each component be important at each and every location. The summation of benefits (+) and disbenefits (-) would show which of the several locations maximized returns to the expenditure of location.

Table A.1 Benefit-Cost Account of the Firm

	Location		
	X	Y	Z
1. Land Cost of acquisition Preparation of site Landscaping, etc.[1]			
2. Labor wages and salaries[2] Fringe benefits (facilities)			
3. Capital equipment Plant (incl. wharfage) Materials for repairs			
4. Raw materials Costs of inputs[3,4] Transportation costs			
5. Taxes Federal government[5] State and county			
6. Legislation[6] Zoning ordinances Pollution and effluent control			
TOTAL BENEFIT			

1 Related to zoning ordinances (section 6).
2 May differ because of non-unionization.
3 May be the same as looking at total input costs if latter are c.i.f.
4 Will reflect economies of scale, agglommeration, and locale, therefore these are not specified.
5 Includes possible government industrial incentives.
6 Costs which are NOT included in 1 - 5.

2. Cost-Benefit Accounting of the Individual

The individual is not faced with the necessity of choosing between sites, but rather with the choice of the industry's coming into his region or going elsewhere. Because of this, the following table (A.2) refers also to local industry (manufacturing and service) and to interest-groups--insofar as they are made up of the individuals of the region.

The necessary accounting differs from that in Table A.1. in that the figures would be absolute rather than net--they would not reflect the choice of alternative location.

3. Cost-Benefit Accounting of Government Bodies (County, State, Federal)

The benefits accruing to the county, etc., are in the form of increased direct taxes and indirect taxes (i.e., induced by the location of the industry). Their costs are those of providing extra facilities, etc. Table A.3 therefore includes absolute values of different costs and benefits rather than net values as in Table A.1.

As Table A.3 shows, there may in fact be a choice between sites within the county. Comparison of total benefits to the county would indicate which site would be preferable as far as the county is concerned.

Table A.2 Benefit-Cost Account of the Individual

1. Income From employment[1] From property	
2. Land values of property	
3. Taxes State County	
4. Amenity[2] Pollution Views Crowding	
TOTAL BENEFIT	

1 This includes income from direct employment in new facilities as well as income induced because of multiplier effects in the local economy.

2 This category is the least susceptible to evaluation in monetary terms.

Table A.3 Benefit-Cost Account of Government Bodies

	Location X	Location Y
1. Income Taxes[1] Revenues from services		
2. Increased expenditures Schools Roads Sewers Water Police Lighting Garbage Libraries		
3. Social Expenditure Welfare payments (state) Effluent control		
TOTAL BENEFIT		

[1] Directly from the company concerned together with induced taxes from employees introduced into the region.

APPENDIX B DATA AVAILABLE ON THE GUEMES ISLAND (N.W. ALUMINUM) CONFLICT (Subject to Review)

As Jon M. Conrad pointed out in the paper, Economic Analysis of the Guemes Island and Port Susan Conflicts, the data available are not sufficient to allow a benefit-cost analysis to be done on the conflicts. The two sections of this appendix show (i) where data, if any, are to be found and (ii) the data available.

1. Sources of Data

a. Jon M. Conrad, Economic Analysis of the Guemes Island and Port Susan Conflicts.

A digested form of the following sources:

b. M. G. Poole & Assoc., Regional Planning in Skagit County. Submitted to Skagit County Planning Commission, May, 1963.

c. M. G. Poole & Assoc., Comprehensive Zoning Plan. Submitted to Skagit County Planning Commission, February, 1955.

d. Seattle Post Intelligencer, July 26, 1966, pp. 1-3.

e. Seattle Post Intelligencer, September 28, 1966.

f. North West Aluminum, Inc., Application and Petition for Reclassification of Zoning District. Issued to Skagit County, 9/14/66.

2. The data available are as follows:

1.	Direct employment by the aluminum plant	900
2.	First-round payments to (1)	$6,109,200
3.	Construction employment (average for two years)	500
4.	First-round payments to (3) (two years)	$6,700,000
5.	Generated employment in other industries based on generation ratio of 1.7	1,800
	based on generation ratio of 1:4.4 in aluminum-using industries	13,500
6.	Taxes paid to state and county by N.W. Aluminum (property assessment)	$1,300,000
7.	Land required--inclusive of production and "buffer zone"	750 acres
8.	Annual production of the plant	140,000 tons
9.	Cost of power from Bonneville Power Authority (for 20 years)	$70,000,000

The only source available for the costs, etc., to households comprises the questionnaires issued to concerned parties by the Sea Grant research group, other than the direction of the perceived net costs and benefits discussed in this paper. No possible assessment of the impact of net costs, etc., can be made from these transcripts. The importance of the project to households concerned can therefore only be assessed from sections (1 - 4) above.

APPENDIX C

DATA AVAILABLE ON THE PORT SUSAN (ATLANTIC RICHFIELD) CONFLICT (Subject to Review)

1. Sources of Data

a. Jon M. Conrad, Economic Analysis of the Guemes Island and Port Susan Conflicts.

b. Larry Smith & Company, Inc., Atlantic Richfield Refinery Site, Snohomish County, Washington, 1967.

c. Snohomish County Planning Department, Comprehensive Plan for Standard, October 22, 1956. Sixth update, 1964. Adopted 1965.

d. Snohomish County Planning Department, Stanwood Area Comprehensive Plan Review, November 24, 1967.

2. The data available are as follows:

1.	Direct employment by the oil refinery	400
	Employment derived from local labor sources	200
2.	First-round payments to (1)	$2,715,200
3.	Construction employment (average for two years)	1,000
4.	First-round payments to (3) (two years)	$6,788,000
5.	Taxes paid to state and county by Atlantic Richfield (based on property assessment)	$1,000,000
6.	Land required--inclusive of production and "buffer zone"	2,400 acres
7.	Annual production of the plant	100,000 barrels
8.	Cost of plant used specifically in the control of pollution[1]	$2,619,000

[1] This value may be considered as an approximate cost of controlling excessive emission of noxious fumes and liquids and therefore as a direct cost of preserving the "environment."