AN INVESTIGATION INTO ATTITUDES TOWARDS WATER POLLUTION IN THE SHUSWAP LAKE AREA OF BRITISH COLUMBIA.

BY

James Alistair McVey

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Name: James Alistair McVey

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Examining Committee:

Chairman: E.J. Hickin

T. O'Riordan
Senior Supervisor

M.E. Eliot Hurst

R.C. Brown

M.L. Barker

Date Approved: November - 23 1973

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ABSTRACT

During the summer of 1969 an apparent decline in water quality in Shuswap Lake became a hotly debated political issue in the Salmon Arm area of British Columbia. The purpose of this study was to investigate public awareness of the pollution problem. In particular, the goal was to isolate the social factors which influenced the level of awareness of individuals in the community and to determine the sensitivity of local decision makers to this awareness.

The following hypotheses were therefore proposed:

(1) that awareness of the problems of water quality will depend upon the socio-economic status of the individual, such that

  (a) awareness of the problems of water quality will increase with experience in water-oriented recreation activities and active involvement in community affairs, and

  (b) that a sense of political efficacy in coping with community problems will increase with experience in water-oriented recreation activities and active involvement in community affairs.

(2) that there was no demonstrable difference in the awareness of the public of both the Village and the District of Salmon Arm concerning problems of water quality.

To test these hypotheses, a questionnaire survey was conducted in the two communities during the period when the

debate was at its peak and there was widespread local concern for the future quality of the lake.

The results of the study show that awareness, knowledge and expressed concern for water quality problems are interrelated. In turn, these are linked to personal experiences in the use of water through recreational activities, involvement in community affairs, and a sense of political efficacy in coping with community problems. These bonds are all connected to socio-economic status, which seems to act as a surrogate for the more important variables of experience, community activity and political efficacy in influencing preferences for water quality improvement.

The results also suggest that the information channel(s) between the electors and their representatives is extremely weak, with local decision makers generally unaware of public opinion about local environmental issues, but giving the impression that their actions are conducted in the best interests of the communities they represent.

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THE RISE OF CONCERN OVER ENVIRONMENTAL QUALITY

The realization that the activities of an achievement-oriented society, while creating an eagerly sought-after affluence, have placed excessive quantitative demands upon our environment has in recent decades led to a concern for environmental quality.[1] Outdoor recreation, sport, and travel, made possible by this increasing affluence, have begun to make demands of our environment that, frequently conflicting with those of industry, require clean air and water and unspoilt scenery. Such intangible elements, being by definition less easy to define, have necessitated changes in traditional methods of resource management. As White suggests,[2] the scope of resource management has been steadily widening and must continue to do so in order that a greater proportion of society may share enjoyment of that which is beautiful in the natural environment.

From the earliest of times, men of enlightenment have been aware that some kind of close relationship exists

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[1] Jarrett, H., (ed.), Environmental Quality in a Growing Economy, John Hopkins Press, Baltimore, 1966, Introduction.

[2] White, G.F., Alternatives in Water Management, National Academy of Sciences, National Research Council, Washington, D.C., 1966, p. 6.

between man and nature and have never ceased to speculate upon the nature of that relationship.[3] It was not until the Nineteenth Century, however, when men of vision finally recognized the threat to our environment posed by the tremendous rate of development in science and technology, that the conservation concept truly developed.[4] Inspired by men such as Marsh,[5] many became aware of the need to balance the many different and conflicting demands upon the environment. In his now classic work, Marsh warned that further disturbing of the balance between man and nature would have extremely serious long-term effects upon human beings themselves.

The fundamental aims and ideals of the original conservation movement are still with us. In its present form, however, traditional North American values and goals have been evaluated in the light of the signs of environmental deterioration so obvious in the 1960's. The development of the science of ecology has focussed, partly through the activities of the mass media, public attention upon the concept of the Ecosystem, a system that stresses the complex biological interrelationships upon which all forms of life, including

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[3] See Glacken, C.J., Traces on the Rhodian Shore, Los Angeles, University of California Press, 1967.

[4] See Burton, I., & R.W. Kates (eds.), Readings in Resource Management and Conservation, Chicago, University of Chicago Press, 1965, pp. 155-226.

[5] See G.P. Marsh, Man and Nature, New York, Scribner's, 1864. Also, Glacken, C.J., "The origins of the Conservation Philosophy", in Journal of Soil and Water Conservation, Vol. XI, No. 2, 1956.

man himself, depend.[6] The views of the ecologists[7] have been widely published and it is perhaps due to their influence that much of the emphasis of the conservation movement has, to some extent, "shifted from anthropocentric thinking to a more humble, ecological concept in which man is but one organism in a mutually dependent system of organisms....".[8] The present generation of conservationists do not accept that the environment is freely available for all men to use, but that its use should be balanced against other non-economic needs. Such a philosophy, finding wide popularity in an age of widespread intellectual and aesthetic protest (against the Vietnam war, racism, the corporate elite, and other readily-accepted values of previous decades) does not hold that the economic development of the landscape is an ideal end in itself. Economic development and growth may

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[6] The ecosystem, a term first proposed by Tansley in 1935, is defined as comprising the interacting, living and non-living, elements in a particular habitat.

[7] For example see: Bates, M., Man in Nature, Englewood Cliffs, N.J. Prentice-Hall, 1964; The Forest and the Sea, New York, Random House, 1960;
Commoner, B., Science and Survival, New York, Viking Press, 1966; The Closing Circle, New York, Knopf, 1971;
Ehrlich, P.R., and A.H., Population, Resources, Environment, San Francisco, Freeman, 1970;
Watt, K.E.F., Ecology and Resource Management, New York, McGraw-Hill, 1968;
Lacey, M.J., "Man, Nature and the Ecological Perspective" in American Studies, Vol 8, 1970, pp. 1-3, 13-27.

[8] O'Riordan, T., "The Third American Conservation Movement: New Implications for Public Policy," in Journal of American Studies, Vol. 5, No. 2, 1971, pp. 161-162.

be a vital element in the national political decision-making process, but the "new" conservation philosophy is in direct conflict with the traditional economic interests of the capitalist system: The aesthetic values of a beautiful lake area may therefore be in conflict with economic interests who wish to exploit the tourist potential of the same area.

The present conservation movement, therefore, seeks a reorientation of the nation's goals and values. The most important of these goals have been viewed as being both "incompatible and hierarchical in priority",[9] as Figure 1 demonstrates. The attention given to the goals lower in the hierarchy depends upon the degree to which the more important goals are met; the new conservationists, the voices of whom are becoming increasingly vocal (aided, to a considerable extent, by the attentions of the media) wish to see environmental quality and ecological harmony in balance with, rather than supplanted by, economic growth and equal social opportunity as popularly accepted goals. Conservation could thus be viewed as a socio-political ethic,[10] a philosophy of resource management which seeks to balance

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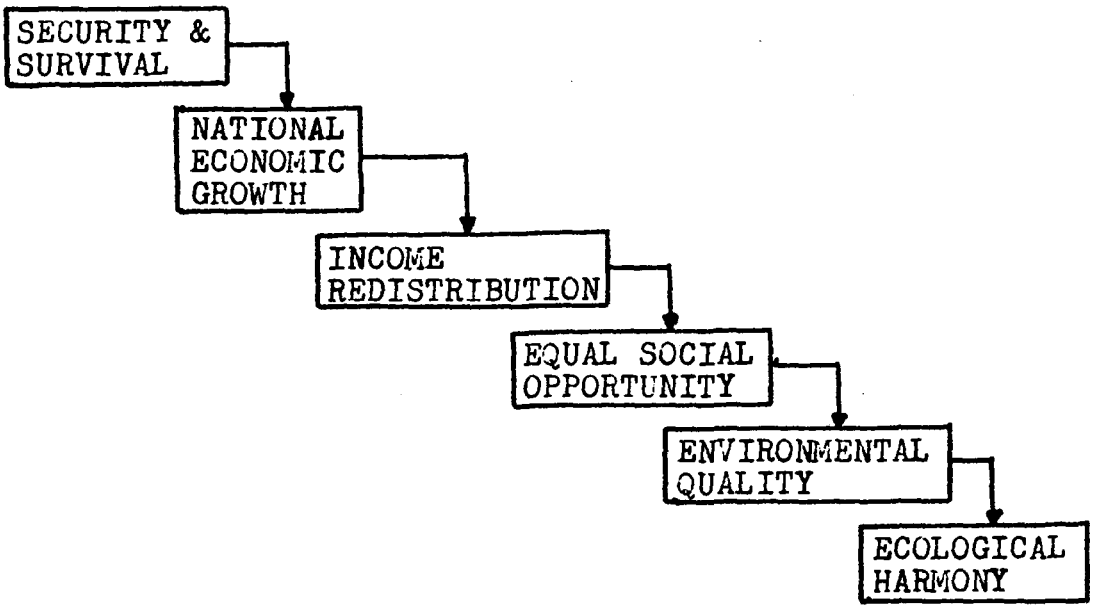
[9] For further details see O'Riordan, T., Ibid., p. 163. See also Rokeach, M., "The Role of Values in Public Opinion Research", in Public Opinion Quarterly, Vol. 32, 1968, pp. 347-359.

[10] See Fleischmann, P., "Conservation: The Biological Fallacy", in Landscape, Vol. 18, No. 2, 1969, pp. 23-26. Fleischmann maintains that conservation has no biological justification, nature being a dynamic system ever changing its checks, balances, and interrelationships. It is based, rather, upon human value systems.

Figure 1.

HIERARCHY OF TRADITIONAL NATIONAL GOALS
(after O'Riordan)



the preservation of the beautiful in, and the harmony of, nature against the popularly-perceived need for economic growth and development.

The recent upsurge of public interest in environmental quality would appear to be partly explained by a greater public concern over the signs of environmental deterioration. Public opinion polls conducted by geographers and other social scientists have recorded views about environmental issues.[11] Two major surveys of American polls have shown

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[11] For a review, see Saarimen, T.F., Environmental Perception, Washington, D.C., Association of American Geographers, Resource Paper No. 5, 1969; "Research Approaches and Questionaire Design", in Sewell, W.R.D. and I. Burton (eds.), Perceptions and Attitudes in Resources Management, Ottawa, Information Canada, 1971, pp. 13-26.

that, between 1965 and 1970, the issue of reducing pollution rose from ninth out of ten most serious problems facing the United States to second (behind the state of the economy), and that the number of those prepared to pay more of their income to clean up the environment increased by 20%.[12]

Such opinion polls, however, register only the expression of concern;[13] they do not necessarily demonstrate the extent of individual commitment to accept responsibility for bringing about improved environmental quality. It could thus be said that public opinion surveys do not adequately show the connection between verbal statements (expressed concern) and overt behaviour (concern that is translated into action).[14] Prior to the expression or demonstration of concern,

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[12] Munton, D., and L. Brady, American public opinion and environmental pollution, Columbus, Ohio, Ohio State University, 1970;
Erskine, H., "The polls: pollution and its costs", in Public Opinion Quarterly, Vol. 35, 1971, pp. 120-35.

[13] Within the context of this study, "concern" is defined as an anxious response on behalf of an object, idea, or state of affairs that one views as being important or significant. Concern therefore involves judgements and preferences made by the individual that are affected by both the internal value system of the individual and that of the society of which he or she is a member.

[14] The nature of the connection has been of interest to social scientists for over 30 years. Deutscher, however, notes that many sociologists have ignored the problem, many scientific conclusions in the social sciences continuing to be based upon verbal responses rather than upon overt behaviour. See Deutscher, I., "Words and Deeds: Social Science and Social Policy", in Social Problems, Vol. 13, No. 2, 1966, p. 236.

however, one must be aware of an object.[15] This cognitive process leads to belief patterns that contain within them understanding of linkages that may exist between the phenomena of which the individual is aware. For concern to be transformed from a verbal expression into action, knowledge of these linkages is necessary. One is more likely to desist from using detergents containing phosphates if one understands the linkages between the use of such detergents, untreated municipal effluent, and increased biological productivity in waters receiving the effluent. Heberlein, in conducting a field experiment concerning littering behaviour, discovered that those who were aware of the consequences of their actions were less likely to litter, behaving "according to moral norms rather than economic expedience."[16] It would appear, therefore, that an understanding of the level of awareness of the individual is important when testing the degree of concern over environmental quality issues.

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[15] "Awareness" has been defined as a state of being knowledgeable about "....something through alertness in observing or interpreting what one sees, hears, feels, etc.", Websters' New World Dictionary, (College Edition), Toronto, Nelson, Foster and Scott, 1966.

[16] See Heberlein, T.A., "The Land Ethic Realized: Some Social Psychological Explanations for Changing Environmental Attitudes", in Journal of Social Issues, Vol. 28, No. 4, 1972, p. 82.

ATTITUDES RELATING TO ENVIRONMENTAL QUALITY ISSUES

As Schiff has noted, the increased interest in environmental quality has been accompanied by a "flood of papers focusing on perception of and attitudes toward the environment."[17] The contributions of scholars working within the confines of a variety of disciplines, each with its own approaches and interests, have led to some confusion in defining "perception" and "attitude".[18] In addition, the term "opinion" is frequently used interchangeably with "attitude" when describing an individual's preference towards something.[19]

Although the relationship between "opinion" and "attitude" is indeed an intimate one, some distinctions between the two terms may be made. An opinion may be defined as a verbally-expressed belief or group of beliefs, not based upon positive knowledge but held to be true, valid, or probable.[20] An attitude, on the other hand, is not necessarily expressed verbally and may be regarded as an evaluative stance towards, or an organization of beliefs about,

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[17] Schiff, M.R., "The Definition of Perceptions and Attitudes", in Sewell, W.R.D., & I. Burton (eds.), op.cit., p. 7.

[18] See O'Riordan, T., Perspectives on Resource Management, London, Pion Ltd., 1971, p. 94.

[19] White, C.F., "Formation and Role of Public Attitudes", in Jarrett, H. (ed.), op.cit., p. 110.

[20] See Kiesler, C.A., B.E. Collins, & N. Miller, Attitude Change: A critical analysis of theoretical approaches, New York, John Wiley, 1969, p. 104.

an object or objects.[21] In other words, an opinion is a loosely-held set of beliefs while an attitude is a collection of beliefs and feelings which lead to a particular predisposition.

The confusion concerning the definitions of "perception" and "attitude" is increased by the fact that there may not appear to be much difference between the two. As Schiff suggests, "....attitudes affect perception, perception affects attitudes, and cognition plays a role in both of them."[22]

The concept of perception is basic to an understanding of man's interrelationships with his environment. Perception involves a conscious, cognitive interpretation of a stimulus or a set of stimuli: Each individual therefore views the physical and the cultural, the tangible and the intangible, components of the environment from the vantage-point of his, or her, own perspective, through a "filter" provided by culture, socio-psychological background, training, and experience.[23] An individual's actions primarily occur not within the "real", or phenomenal, environment but rather within the environment as perceived and, therefore, interpreted by

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[21] See Hollander, E. P., Principles and Methods of Social Psychology, New York, Oxford University Press, 1967, pp. 20 and 114-115.

[22] Schiff, M.R., Op.cit., p. 8.

[23] See Lowenthal, D., "Geography, Experience, and Imagination: Towards a Geographical Epistemology" in Annuals of the Association of American Geographers, Vol. 51, 1961, pp. 241-60.

him.[24] One is not dealing with conditions and events external to an individual, but with

> ".... some kind of psychological interaction between the individual's felt needs and stored knowledge on the one hand, and the signals or messages conveyed to him via his sensory organs, on the other."[25]

Furthermore, one has first to be aware of an object before it can be said that one has perceived the object. As a result, the term "perception" is more accurately used on those occasions when an actual stimulus, or set of stimuli, is present.[26]

An attitude, following the definition above, is a learned predisposition that may guide an individual's response to a certain stimulus or set of stimuli. Although there are many definitions of the term, it is generally agreed by many psychologists that an attitude has an affective and a cognitive component.[27] The former is an individual's affinity for, or aversion to, the object of the attitude.[28] Such feelings (likes and dislikes, for example) are influenced

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[24] Sonnenfeld, J., "Geography, Perception, and the Behavioral Environment", a paper presented at the Dallas A.A.A.S., December 1968, in a symposium on "The Use of Space by Animals and Man."

[25] Sprout, H. and M., The Ecological Perspective on Human Affairs, Princeton, N.J., Princeton University Press, 1965, p. 100.

[26] Schiff, M.R., Op.cit., p.8.

[27] Schiff, M.R., Loc.cit.

[28] Bem, D.J., Beliefs, Attitudes, and Human Affairs, Belmont, California, Brooks/Cole, 1970, p. 14.

by perception, social background and past behaviour patterns. They are also associated with the cognitive component which consists of the beliefs held by an individual, these latter being partly dependent upon the awareness level. These affects and cognition are therefore organized by the individual into a system that develops the predispostion which enables him to relate favourably or unfavourably to the object of the attitude.

The definitive boundaries between opinion and attitude, and perception and attitude would seem, therefore, to be most indistinct. Of greater importance, perhaps, is the need to better understand the link between the verbal expression of concern/opinions/attitudes and overt behaviour[29] In other words, in matters concerning environmental quality, what individuals think is not as important as what people will do.[30] Environmental attitudes would seem to be better measured by attendance at public meetings, where environmental issues are discussed, and membership in environmental interest groups than by the verbal expression of concern over related problems.

A series of studies have attempted to analyse attitudes

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[29] See Schiff, M.R., "Some considerations about attitude studies in resource mangement", Waterloo, Dept. of Geography, Waterloo-Lutheran University, 1971 (mimeo); also O'Riordan, T., "Some reflections on environmental attitudes and environmental behaviour", in Area, Vol. 5, No. 1, 1973, pp. 17-21.

[30] Schiff, M.R., Op.cit., p. 8. Schiff expresses the view that, while the traditional "attitudes" study still has its place in studies of environmental quality, environmental behaviour should be the major object of such studies.

towards environmental quality. Barker placed emphasis upon measurement of the social consequences of a deterioration in water quality and examination of the attitudes towards the use of water recreation facilities.[31] She found that differences in perception were important in accounting for variations in user behaviour associated with recreational opportunities. Previous experience was also an important factor, perception of pollution increasing with the number of visits to water. It was also discovered that individuals and groups would rationalize the local pollution situation by stating that more serious condtions existed elsewhere.

Frederickson and Magnas, in a random sample survey of the attitudes of residents of Syracuse, N.Y., towards water pollution as a local problem noted that people regarded water quality problems differently, on the basis of differing socio-economic characteristics.[32] They found that people of lower socio-economic status, who were predominantly black, poor, and ill-educated and who were likely to live nearer to the city centre, were not as concerned about water pollution as a public problem whereas the more affluent, better-educated, and usually white, suburbanites felt more directly

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[31] Barker, M.L., "The Perception of Water Quality as a Factor in Consumer Attitudes and Space Preferences in Outdoor Recreation", unpublished M.A. Thesis, Dept. of Geography, Unviersity of Toronto, 1968.

[32] Frederickson, H.G. & H. Magnas, "Comparing Attitudes toward Water Pollution in Syracuse", in Water Resources Research, Vol. 4, 1968, No. 5, pp. 877-889.

affected by water pollution and placed it higher in their set of policy preferences.[33]

In a study of attitudes towards air and water pollution in Victoria, B.C., Lycan and Sewell found that middle class residents tended to regard pollution as being a more serious problem than did residents of lower socio-economic status.[34] In addition, two more recent studies have also suggested that those individuals of higher socio-economic status (measured on the basis of income, occupation, and travel experience) consider environmental quality issues to rank high in a list of problems facing communities (law and order, jobs, housing, education, etc.).[35]

There would appear to be a relationship between socio-economic status and opinions and attitudes. Some social psychologists suggest that an individual's opinion and attitude are created and modified by social influences.[36] In

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[33] Frederickson, H.G., and H. Magnas, Ibid., p. 888.

[34] Lycan, D.R., and W.R.D. Sewell, "Water and air pollution as components of the urban environment of Victoria," in Geographical Perspectives, Vancouver, B.C. Tantalus Press, 1968, pp. 13-18.

[35] Tognacci, L.N., R.H. Wergel, M.F. Wideen, and D.A.T. Vernon, "Environmental Quality: how universal is public concern?", in Environment and Behaviour, Vol. 4, 1972, pp. 73-86.
Constantini, E. and K. Hanf, "Environmental concern and Lake Tahoe", in Environment and Behaviour, Vol. 4, 1972, pp. 209-242.

[36] Bem notes that "social influences range from explicit attempts of a salesman to modify single, isolated opinion to a society's ability to inculcate an entire nonconscious ideology into its citizens...." See Bem, D.J., Op.cit., p. 71.

particular, interpersonal influence is of more importance than mass media in modifying opinions and attitudes. The role of opinion leaders and the most active members in the community is thus vital to opinion and attitude formation.[37]

Little has been done, however, to test the importance of these findings with regard to environmental pollution. With this in mind, one of the objectives of this study was to examine to what extent socio-economic status and other related social factors influence the level of public awareness regarding local water quality problems and, in particular, the extent to which they affect the optimism that such political action as membership in an interest group and attendance at public meetings can exert influence in the local political forum towards controlling such problems.

ENVIRONMENTAL QUALITY AS A POLITICAL ISSUE

The political decision-making process in resource management has received a considerable amount of attention:[38]

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[37] See Katz, E., "The two-step flow of communication: An up-to-date report on a hypothesis", in Public Opinion Quarterly, Vol. 21, 1957, pp. 61-78.

[38] Beasley, R., "Decision-Making and Conservation: a rationalization", in Natural Resources Journal, Vol. 7, 1967, pp. 345-360.

Schiff, A.L., "Innovation and Administrative Decision-Making in the Conservation of resources", in Admin. Sciences Quarterly, Vol. 11, 1966, pp. 1-30.

Caldwell, C.K., "Environment: a new focus for public policy" in Public Admin. Review, Vol. 23, 1963, pp. 132-139.

Jarrett, H. (ed.), op.cit.

Herfindahl, O.C., and A.V. Kneese, Quality of the Environment, John Hopkins Press, Baltimore, 1965.

Despite the fact that "....decisions concerning resource utilization and allocation have a predominantly economic impact...."[39] the modern concept of resources permits a greater consideration of the intangible elements in our environment and would seem to encourage participation of the general public in the decision-making process.[40] The majority of the population, however, remains apathetic toward declining environmental quality until a crisis point is reached:[41] Individuals tend to maintain a remarkable optimism concerning potential environmental problems, regarding a potential hazard as something that will "never happen to them". Only when people are affected personally will they finally act. It would, therefore, appear that not all individuals are conscious of, nor concerned about, the need for environmental quality standards.[42] Yet, since air and water are freely available to all (they cannot be easily divided up like land), each member of a society has a moral obligation towards the maintenance of adequate quality stand-

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[39] Wengert, N., Natural Resources and the Political Struggle, New York, Random House, 1955, p. 2.

[40] See O'Riordan, T., Perspectives on Resource Management, London, Pion Ltd., 1971, pp. 15-21. Also White, G.F., Op.cit., pp. 105-127.

[41] Guthrie, D.A., "Environment and the Evolutionary View", in Journal of Environmental Education, 1971. Guthrie suggests that "most people" are not convinced that problems are as serious as scientists suggest.

[42] O'Riordan, T., "Community Attitudes towards Environmental Resources" in Procs. New Zealand Ecological Society, Vol. 18, 1971, p. 21.

ards in order that the rest of society may enjoy such resources in the same condition. As Hardin has suggested, in order that the "Commons" do not become polluted, or otherwise despoiled, the individual in society has a distinctly utilitarian, moral responsibility to subordinate his personal freedom of choice to the best interests of all, present and future.[43] The individual has, in addition, a public obligation to make his environmental quality preferences known to the elected representatives—the decision-makers.[44] In the case of major policy decisions that may affect his community, however, the individual resident rarely participates in the decision-making process, due either to aforementioned apathy, a lack of knowledge or expertise (in such areas as planning, municipal law, engineering, etc.,) or to society's reliance on professional advisors and a political elite. White[45] notes that a "large number" of environmental quality decisions are made by such groups. He further suggests that such experts are aware of three principal beliefs concerning

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[43] Hardin, G., "The Tragedy of the Commons" in Science, Vol. 162, 1968, pp. 1243-8.

[44] Wengert, N., "Resource development in the public interest", in Natural Resources Journal, Vol. 1, No. 2, 1960;
Englebert, E., "Political Parties and natural resources policies", in Natural Resources Journal, Vol. 2, No. 1, 1961.

[45] White, G.F., Ibid., p. 125. See also Craik, K.H., "The Environmental Dispositions of Environmental Decision-Makers", in Annals of the American Academy of Political and Social Science, 1970, pp. 876-94, and Sewell, W.R.D., "Environmental Perception and Attitudes of Engineers and Public Health Officials", in Environment and Behaviour, Vol. 3, 1971, pp. 23-59.

environmental mangement — those attitudes which they themselves hold, their opinions as to what others prefer, and their opinions as to what others should prefer. With the two latter alternatives especially in mind, without clearly-expressed public preferences, and without adequate means of accurately testing public opinion, it is hardly surprising that most environmental decisions have been left to professionals, individuals who tend to be limited both by their terms of reference, and by the specialized nature of their training.[46] Yet, with this narrow professional view an element of the environmental decision-making process, a lack of public input can be most serious, with the possibility of environmental preferences and values being imposed upon the public by such elite groups. Since the environment belongs to all and since the electorate is frequently called upon to pay for environmental projects (through bond issues, direct and indirect taxation, etc.), the decision-makers in a democratic society have a responsibility to be responsive to the opinions of those they represent.

Not all individuals are apathetic, however. In recent years, with the increase in public concern for environmental problems groups of articulate, outspoken citizens have become involved in the political process.[47] Since the individual

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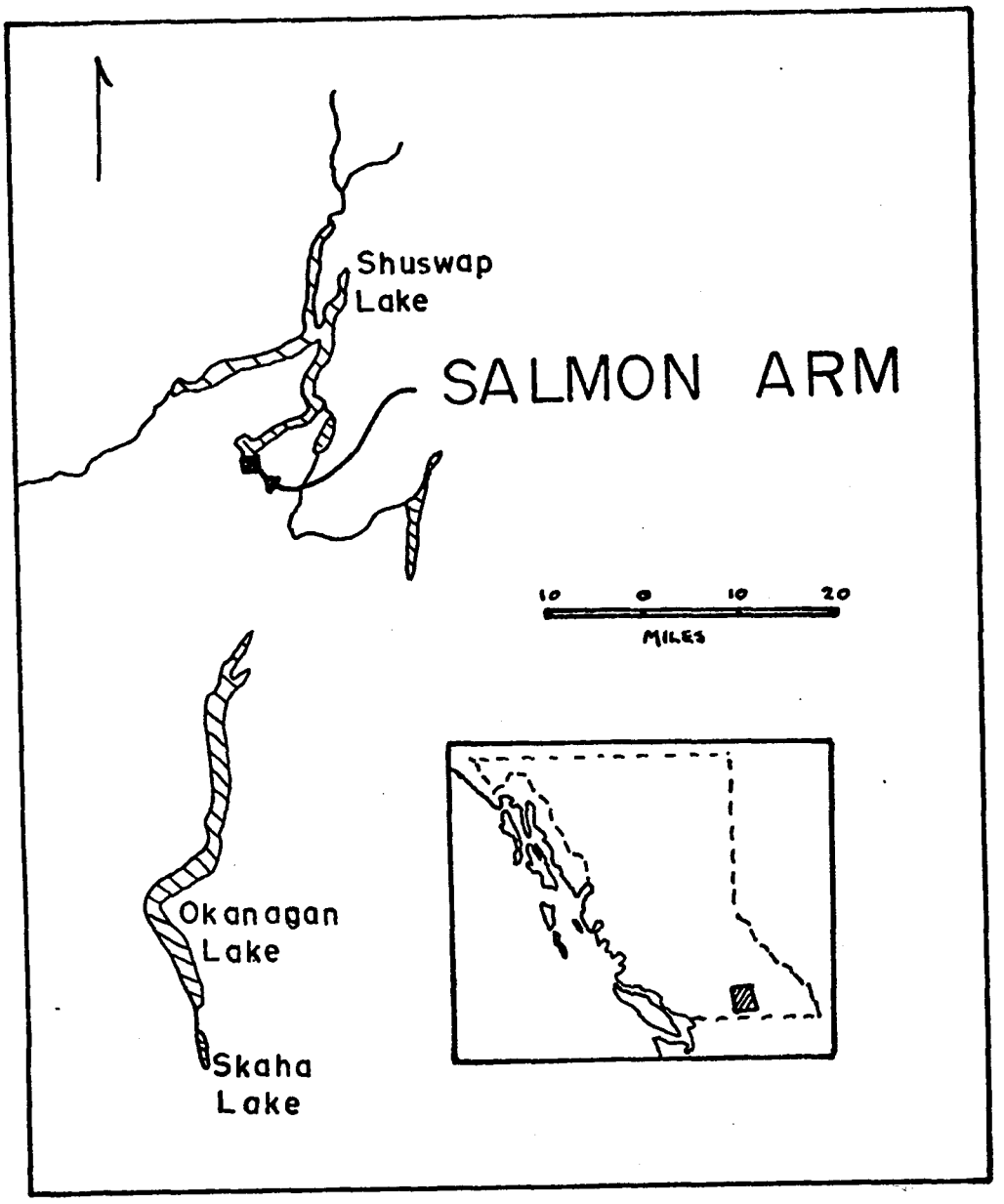
[46] White, G.F., Op.cit., p. 109.
In an earler study, Maas, A., Muddy Waters, Cambridge, Harvard University Press, 1951, pp. 1-16, comments on the role of specialist agencies.

[47] Wengert, N., Op.cit., pp. 9-10.

is himself not usually articulate enough, the formation of such interested pressure groups is a logical development of this increased concern. Members of local communities often form impromptu groups when they perceive their common interests to be threatened, in such instances as the flooding of property after dam construction, river diversion, or water pollution. The political effectiveness of these groups largely depends upon their ability to influence and inform public opinion so that the decision-makers become aware of the extent of local attitudes and preferences. Despite the encouraging trend of such public participation in the political process, an identifiable consensus of public opinion rarely exists.

It would seem, then, that the decision-making process in environmental management must have an understanding of the moods and preferences of the general public in order that communication between elected officials and the electorate, concerning the quality of the environment, become a reality. Only by improving the channels of communication will the decision-makers become aware of the standards of environmental quality demanded by individuals in society. If the general public is not aware of, or knowledgeable about, environmental problems such as water pollution, with the decision-makers uncertain as to the environmental attitudes and preferences of those they represent, little coordinated and clear planning will be done to maintain and, where necessary, improve environmental quality. A further objective of this study, therefore, was to seek to determine how much local decision-makers know concerning the



MAP 1. LOCATION OF STUDY AREA.

awareness levels of those they represent regarding water quality problems.

THE STUDY AREA

The area with which this study is concerned centres around the southern arm of Shuswap Lake in the Interior of British Columbia (see Map 1). The lake is located to the north of the Okanagan Valley and is drained by the Thompson River which joins the Fraser River at Lytton. Including Mara Lake and Little Shuswap Lake, Shuswap Lake covers an area of 84,000 acres and the water level fluctuates on average about 16.8' p.a., this being due to a normally heavy spring melt. The watershed covers approximately 6,060 square miles, contributing to an average annual outflow at Chase of 10,200 cubic feet per second.

The village of Salmon Arm (population 1,800) is situated on the Trans-Canada Highway, at the southern extremity of the Lake, being the primary nodal point for the region between Kamloops, to the west, and Revelstoke, to the east. Contiguous with the Village is Salmon Arm District Municipality (population 4,200), a predominantly rural region with a lower population density than that of the Village. At the time of this study during the summer of 1969, the two municipalities were separate and administered by two separate councils, neither community favouring amalgamation, despite the recomendation of a firm of planning consultants in a

1964 study.[48]

The Village itself has no major secondary industry beyond a few lumber mills, its principal economic activities being limited to the maintenance of essential regional and community services— schools, a hospital, a branch campus of a regional college— and the catering to the requirements of a substantial tourist industry.[49] In the District, secondary industry is limited to three lumber mills and one plywood plant, although a fuse plant and the chipboard factory were under construction in the summer of 1969. Despite little major industry and limited available agricultural land, the area is something of a growth point, due in part to its popularity as a pleasant place for retirement and in part to a flourishing tourist industry. During the summer months Shuswap Lake and its pleasant climate attract a large number of vacationers, many of whom come specifically to enjoy the facilities of campsites and private cabins situated along the lakeshore. Tourism and recreation is expected to contribute heavily to the economic future of the Shuswap Region, but this contribution will, to a considerable extent, depend upon the extent to which adequate standards of environ-

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[48] Rawson and Williams, Town Planning Consultants, Salmon Arm Amalgamation Study, Vancouver, B.C., 1964. Amalgamation of the two municipalities did, however, take place in June, 1970.

[49] Recreation and Tourism is worth $45 million per year for the Okanagan-Shuswap Region, of which $12 million is for accommodation alone. Economics and Statistics Branch, Regional Economic Study of the Okanagan-Shuswap Region, Victoria, B.C. Dept. of Industry, Trade, and Commerce, 1971, p. 121. The tertiary sector (including the tourist industry), accounts for 62% of employment in the region.

mental quality are maintained.[50]

In recent years, however, there has been some evidence of a decline in water quality along the settled lakeshore of Shuswap Lake, particularly around the wharf at Salmon Arm. Algae growth on the lake surface near the Village had come to the attention of those who, either because they lived close to the lake or because their livelihood depended upon tourism associated with the lake, felt directly affected by any decline in water quality.[51]

THE PROBLEM: EUTROPHICATION.

The principal reason for this water quality decline was the process of accelerated eutrophication, a process of increasing concern to interior communities in British Columbia. Eutrophication, usually associated with the growth on the water surface of large amounts of aquatic plant life, is a natural process of "aging" of a water body and is generally a result of nutrient enrichment. Although this change from "oligotrophic" (unproductive) state to an "eutrophic" (over-enriched) state may not be as steady or as inexorable as once was thought,[52] there seems little doubt

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[50] Economics and Statistics Branch, Ibid., pp. 130-131.

[51] Personal communication with fishermen and motel owners in the summer of 1969.

[52] Wagner, R.H., Environment and Man, New York, W.W. Norton, 1971, pp. 128.

that many water bodies experience natural increases in the quantities of plant and animal life, a process that slowly turns a lake into a waterlogged marsh or bog.

Nutrient enrichment leads to increased productivity of algae and other aquatic weeds during the growing season, thereby ensuring an extremely high biochemical oxygen demand (B.O.D.) at the end of this season when the many weeds die and begin to decompose. The higher the B.O.D., the lower the oxygen content, bringing about the death of many smaller organisms. As time passes, the characteristics of the water change— the water is turbid for much of the year, various species of algae float upon the surface in calm weather, often to be deposited by wind and wave action in malodorous heaps along the lakeshore, substantially reducing the aesthetic qualities of the beaches. The increase in the quantity of floating algae is not the only observable biological change that occurs because of eutrophication, but it is one of the most striking that affects the public in its contact with water bodies.[53]

Although this "aging process" is a natural one, one that will occur in the absence of man,[54] man's intervention

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[53] Edmonson, W.T., "Water Quality and Lake Eutrophication: The Lake Washington Case", in Campbell, T.H., and R.O. Sylvester (eds.), Water Resource Management and Public Policy, Seattle, University of Washington Press, 1968, pp. 139-178.

[54] Committee on Pollution, Waste Management and Control, Academy of Sciences, National Research Council, Washington, D.C., 1966, p. 42.

may bring about "accelerated", or "induced" eutrophication. This phenomenon is not, however, a recent one: The problem existed in Europe and Eastern North America in the Nineteenth Century, but scientists' warnings largely went unheeded. As early as the 1890's evidence of "cultural" (accelerated) eutrophication was noted in Lake Eurich,[55] an early reference to the impact of Man's actions upon natural processes.

Although the causes of accelerated eutophication are not universally agreed upon, many sources of nutrient enrichment have been identified.[56] The introduction of phosphorous and nitrogen compounds has been cited as promoting the growth of algae and other aquatic weeds, as have copper, carbon, boron, molybdenum, and silica.[57] Such additional nutrients partly reflect society's demand for products and materials that contain significant amounts of these compounds (for example, synthetic detergents,

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[55] Edmonson, W.T., Op.cit., p. 152.

[56] See International Symposium on Eutrophication, Eutrophication, Washington, D.C. National Academy of Sciences, 1969.
Vollenweider, R.A., Scientific Fundamentals of the Eutrophication of Lakes and Flowing Waters, with particular reference to nitrogen and phosphorous as factors Eutrophication, O.E.C.D., Technical Report, DAS/SCI/ 68.27, 1968;
Edmonson, W.T., Op.cit.

[57] Hasler, A.D., and W. Einsele, "Fertilization for measuring productivity of natural inland waters", in Trans. 13th. North American Wildlife Conference, 1948, pp. 527-554.
Pirson, A., "Functional Aspects of mineral nutrition of green plants", in American Review Plant Physiol., Vol 6, 1955, pp. 71-114.

polyphosphates, and other chemicals of industrial and commercial origin) and are introduced into water bodies via the discharge of domestic sewage, industrial wastes, and agricultural runoff.

Municipal sewage is the major source of phosphorous, up to 70% of the substance originating from domestic detergents and it has been estimated that household and industrial detergents are by far the greatest single source of total phosphorous input into the Great Lakes, the water quality of some of which has declined critically.[58] In addition, human wastes contain significant levels of nitrogen; when dumped into a water body, it greatly contributes to an accumulation of nutrients as well as creating a serious health hazard with the addition of biological contaminents (assorted bacteria and viruses).[59]

On the basis of the previously-mentioned nutrients, it is extremely difficult to distinguish between industrial and domestic wastes since many industrial plants discharge their wastes directly into municipal sewer systems. Rural domestic wastes, on the other hand, are usually absorbed

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[58] International Joint Commission, Canada and the U.S.A., Pollution of Lake Erie, Lake Ontario and the International Section of the St. Lawrence River, Ottawa, Information Canada, 1970, pp. 49-50.

[59] According to Edmonson, W.T., Op.cit., p. 143, the "fertilizing effect of sewage has been known and recognized for some time". He quotes Whipple, G.C., "Technical and Sanitary Problems", in Ward, H.B. and G.C. Whipple (eds.), Freshwater Biology, New York, Wiley, 1918.

into the environment via septic tanks, although it has been seen that much of this rural effluent filters into the groundwater, depending upon the type, depth and porosity of the soil. As agricultural practices have become more sophisticated, the variety and quantity of rural wastes that reach rivers and lakes via groundwater have reached critical proportions.[60]

The rate of accelerated eutrophication in Lakes Erie and Ontario has been the subject of considerable study.[61] Closer to the present study, the lakes of the Okanagan Valley, a popular tourist attraction, in British Columbia (see Map 1), have for some time displayed signs of accelerated eutrophication. The eutrophication of Lakes Skaha and Osoyoos is viewed as being critical,[62] while signs of advanced littoral eutrophication have been detected in Okanagan Lake. Comparisons of limnological studies carried out in the Okanagan Lakes in 1939 and 1970 emphasize the marked change in water quality in the intervening years.[63]

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[60] Committee on Pollution, Loc.cit.

[61] International Joint Commission, Op.cit., p. 21-22, 51-52.

[62] Alcock, F.R., and D.A. Clarke, Brief on Pollution in the South Okanagan to the B.C. Pollution Control Board, Sept. 1968.

[63] Clemens, W.A.D.S. Rawson, and J.L. McHugh, A Biological Survey of Okanagan Lake, B.C., Ottawa, Bulletin 61, Fisheries Research Board of Canada, 1939.

Okanagan Study Committee, Annual Report of the Study Committee of Canada— British Columbia Okanagan Basin Agreement, Penticton, B.C. 1971.

In the opinion of local experts, this accelerated eutrophication has been largely brought about by the introduction of human and industrial wastes, a practice that the South Okanagan Health Unit recommended by ceased.[64] Skaha Lake in particular, had for some time been suffering from severe algae blooms, "....resulting in a high illness rate in 1967 among residents who lived around the periphery of the Lake. Clinical symptoms of the illness at that time indicated toxic algae as the cause."[65] In the previous year, a Technical Committee of the Okanagan Watershed Pollution Control Council had reported upon a significant increase in biotic productivity in the Lakes, recommending not only the improvement of effluent standards for the entire valley, but also that tertiary treatment of all municipal effluent be mandatory.[66] Serious algae blooms on Skaha Lake in 1967-8 did, however, galvanize the local councils into action. The overloading of the Penticton sewage treatment plant, during the height of the summer tourist season, impressed the local decision-makers with the need to provide facilities that would maintain public health and, presumably, the

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[64] Alcock, F.R. and D.A. Clarke, Op.cit., p. 2.

[65] Useful is Alcock, F.R., The Threat of Eutrophication of Okanagan Lakes, Kelowna, B.C. South Okanagan Health Unit, 1968, p. 4.

[66] Technical Committee, Okanagan Watershed Pollution Control Council, Report, Kelowna, B.C., Sept. 1966.

health of the local tourist economy.[67] Penticton City Council therefore instructed its consultants to examine the feasibility of constructing tertiary treatment facilities, to provide a level of treatment that would ideally radically reduce the nutrient content of effluent entering the lake. The concern for local environmental quality thus became a political issue, with local decision-makers taking definite action to attempt to prevent further deterioration of the lake waters.[68]

POLLUTION CONTROL POLICY IN BRITISH COLUMBIA

The administrative responsibility for pollution control in British Columbia lies with the Provincial Government, the responsible authority being the Pollution Control Branch of the B.C. Water Resources Service, a division of the Department of Lands, Forests and Water Resources.[69] The Pollution Control Branch, prohibits the "....discharge (of) sewage or other waste materials on, in or under any land or into any land or into any waters without a permit from the Director (of the Pollution Control Branch)".[70] The Act also establish-

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[67] It was estimated, in 1969, by the Osoyoos Chamber of Commerce that tourist revenues in the Okanagan Valley had declined by approximately 30% (i.e. $7 million). The Vancouver Sun extensively covered the algae problem, August, 1967.

[68] The mayoralty contest in the 1967 municipal elections in Penticton revolved around the question of pollution control. The facilities have now been completed.

[69] See Lucas, A.R., "Water Pollution Control Law in B.C.", in U.B.C. Law Review, Vol. 4, 1969, pp. 56-86.

[70] R.S.B.C., 1967, c. 34.

ed a Pollution Control Board, one of whose responsibilities is the interpretation of water pollution according to its own criteria, the Board thus acting in an advisory capacity to the Government on pollution matters. Control of pollution is therefore entirely at the discretion of the Director of the Pollution Control Branch, who issues waste discharge permits according to his consideration of the minimum standards required.[71] In addition, The Pollution Control Act, as amended in 1970, requires that all new sewage collection system proposals be approved by the Minister of Lands, Forests, and Water Resources before a municipal by-law be presented to an electorate.

Present Pollution Control Board policy requires at least primary sewage treatment for coastal communities and secondary treatment for all interior communities by 1975. It can be surmised that many communities will not be able to conform to this standard, for a low population density, small municipal tax bases, and a provincial economy largely founded upon dispersed primary economic activities have tended to hinder attempts to develop adequate sewage control systems, this especially being the case in the interior of the Province.[72]

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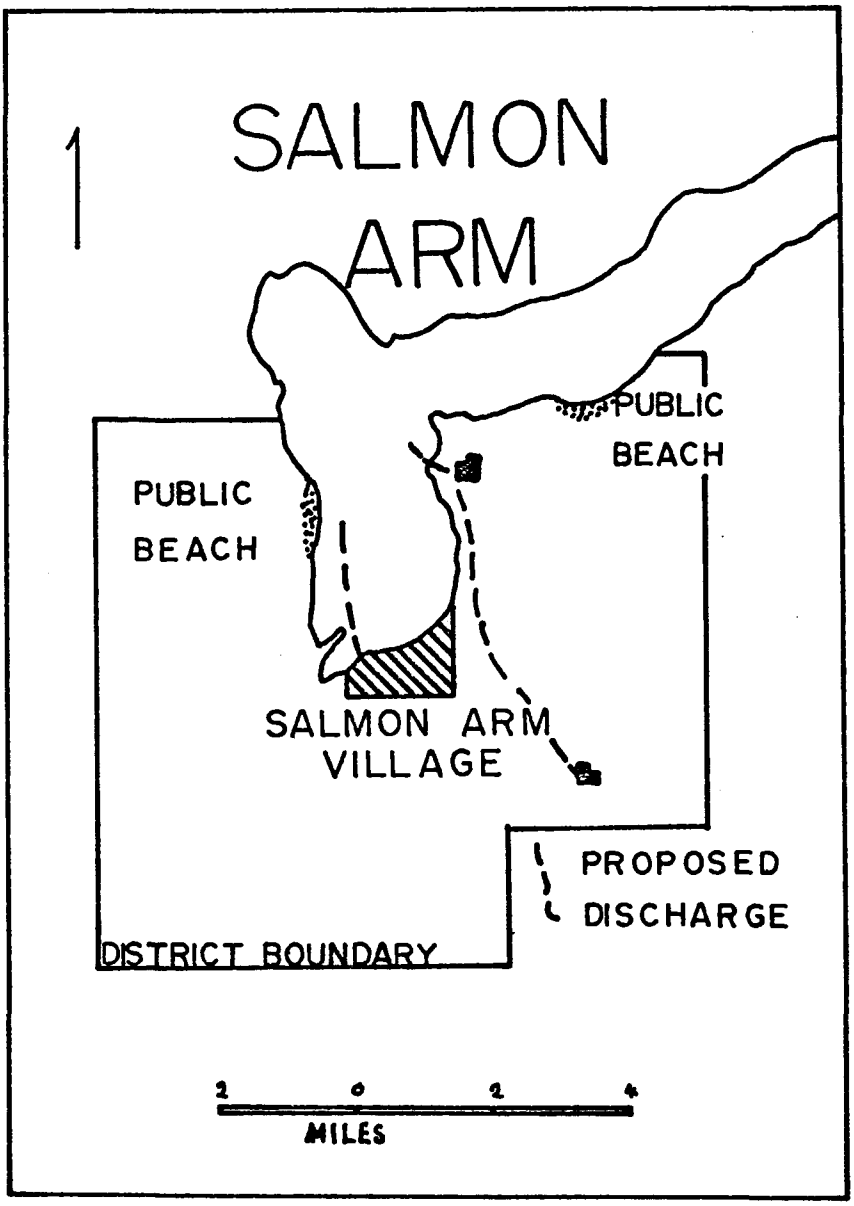
[71] Different water uses may be accorded different standards: e.g. health standards may differ from those required by the Recreation and Conservation Department for fish and wildlife purposes; B.C. Water Resources Service, Pollution Control in British Columbia, Victoria Department of Lands, Forests, and Water Resources, 1970, p. 10.

[72] The city of Prince George (pop. 32,000), one of the largest interior cities, discharges all municipal wastes directly into the Fraser River.



MAP 2. SALMON ARM:
VILLAGE AND DISTRICT.

MUNICIPAL FINANCING FOR ENVIRONMENTAL PROJECTS

Whether improved standards of environmental quality are demanded for aesthetic, health, or economic reasons, the ability of communities to pay for the standards they desire becomes an important factor in the environmental decision-making process. It is, therefore, useful to review the ability of communities to adequately finance environmental projects.

The ability of British Columbia Municipalities to provide for high standards of environmental quality largely depends upon a Provincial Government financing formula that, in effect, limits the proportion of locally generated tax revenue available for municipal improvements.[73] In the Province, local municipal taxes are mostly controlled by Provincial Government social welfare policy:[74] since, by 1967, health, education, and welfare services were together 46% of local taxes, only a maximum of 54% of revenue was available to larger municipalities for local improvements, such as the provision of sewage treatment facilities.[75] In smaller centres, such as the Salmon Arm communities, only 40% of local taxation is so available. Although further

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[73] O'Riordan, T., Op.cit., p. 30.

[74] Plunkett, T.J., The Municipal Picture in British Columbia: A Report to the Union of British Columbia Municipalities, Montreal, T.J. Plunkett and Associates, 1971.

[75] Plunkett, T.J., Ibid., p. 37.

financial sources are available for the construction of such projects,[76] the level of local taxation would necessarily have to be raised to meet capital costs not forgiven by external sources and, in particular, the annual operating costs of such facilities. Since the smaller municipalities derive the greater share of taxes from residential property, the need for such municipal projects is naturally viewed in largely tangible economic terms. The Plunkett Report suggests quite clearly that municipal improvement projects are not likely to be provided unless the individual taxpayer is willing, and able, to withstand the costs involved.[77]

THE SEWAGE TREATMENT AND WATER QUALITY ISSUE IN SALMON ARM

The Village of Salmon Arm, serviced by a partial system of sewers which collected septic tank effluent, has discharged untreated sewage into Shuswap Lake near the wharf for approximately 40 years. The District of Salmon Arm, on the other hand, being predominantly rural, employed septic tanks as a means of sewage disposal. The population of the District is expanding, and, since most of this increase is being housed in the area immediately adjacent to the Village, septic tank disposal has obvious disadvantages in terms of the ability of the soil to absorb much domestic effluent in urban settlements. In 1966, surface seepage from the tanks created a most unpleasant odour and residents began to

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[76] See Lucas, A.R., "Legal Techniques for Pollution Control: The Role of the Public", in U.B.C. Law Review, Vol. 6, 1971, pp. 167-191.

[77] Plunkett, T.J., Op.cit., p. 82.

express anxiety over the quality of drinking water.[78] The problem was considered serious enough for some residents to bring it to the attention of the District Council, especially after a North Okanagan Health Unit Study demonstrated that coliform counts in the local drainage water were high.[79] Seeking alternative means of effluent disposal, as a result of public protest, both Councils prepared various schemes which aroused much public debate in the two communities. Since the two councils could not agree upon joint use of the Village's sewer system, the District Council investigated the possibility of constructing its own sewage system, deciding to construct a system that entailed discharge of secondary-treated effluent into Shuswap Lake. This move aroused protest in 1967 by two local interest groups: the Shuswap Rural Ratepayers Association, the members of which felt directly threatened by any further lake discharge of effluent. Both of these groups protested by writing to the local newspaper,[80] but they later requested that the Pollution Control Board refuse the permit application. The

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[78] Salmon Arm Observer, June 16, 1966.

[79] See O'Riordan, T., Okanagan Water Decisions, Western Geographical Series No. 4, Department of Geography, University of Victoria, Victoria, B.C., 1972, p. 104. Apart from this report, the water quality situation in the Salmon Arm area did not attract the attention of the North Okanagan Health Unit during this period. Dr. M. Smart, head of the Unit, only considered the town of Armstrong to have exceeded (in 1968) the effluent discharge allowed under its Pollution Control Board Permit, Vancouver Sun, Sept. 10, 1968.

[80] Salmon Arm Observer, April 20, 27, May 4, 11, 1967.

The Pollution Control Board did not, in fact, hold an enquiry[81] but the wide publicity given to the case by the Salmon Arm Observer eventually persuaded the District Council to abandon its scheme in favour of land disposal of partially-treated effluent.

The events in the District of Salmon Arm provoked a similiar interest in the Village, the Council of which engaged a firm of consultants to advise upon construction of improved sewage disposal facilities. The Village Council upon the recommendations of the consultants, approved the construction of a secondary treatment plant, the effluent to then be discharged into Shuswap Lake via a 7000' disposal pipe. This proposal was vigorously protested by the two interest groups in the early part of 1968. To support, and as part of, their protest, the groups submitted the privately-sought advice of technical experts, making it clear that they preferred land disposal of municipal effluent.[82] The Village Council maintained its position, noting the fact that few members of the two interest goups actually resided in the Village and preferring to rely upon the guidance of

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[81] The Board may legally ignore citizen protest unless proof of actual injury and/or damage is substantiated.

[82] The advice came from two sources: Mr. L. Smith, a former public health inspector, and Mr. A. Marino, Director of the Division of Environmental Health, Placer County, California. Both opposed lake discharge of effluent, while generally supporting nutrient control by means of land discharge after treatment. Mr. Smith made an additional point of suggesting that minimum standards are not enough, that exceeding such standards through design was a better goal. It is interesting that local interest groups from a small community would seek such expert advice.

the Pollution Control Branch. For some months, the two councils remained in a position of stalemate, the Village preferring lake discharge and the District believing in land discharge: neither Council would seriously consider a joint scheme because it was assumed that the public would not be willing to pay the additional costs.[83]

While this debate continued in the Salmon Arm area, significant water quality problems were being experienced in the Okanagan Valley, to the south of Salmon Arm. The publicity surrounding the algae problem in the Okanagan caused the reopening of the debate in the Salmon Arm area. Since the District Council had decided upon land disposal of at least partially treated sewage, criticism mounted against the decision of the Village Council to proceed with its secondary treatment plant and lake discharge. The issue thus became political, since the Village Council strongly resented the "groundless complaints" and "destructive criticism" from "outside" groups. Despite the public debate[84] and the pressure exerted by local interest groups, there was no systematic attempt by either Council to canvas public opinion; nor was there an attempt to clearly state, in public, the relative merits, and costs to the taxpayer, of any of the schemes under consideration.

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[83] O'Riordan, T., "Public Opinion and Environmental Quality" in Environment and Behaviour, Vol. 3, 1971, pp. 197.

[84] The Salmon Arm Observer fully covered the issue, an important fact since it was distributed in both Salmon Arm Communities.

STATEMENT OF THE PROBLEM

The present study was therefore undertaken in the summer of 1969 when certain signs of a decline in water quality (accelerated eutrophication) became a hotly debated issue in the Salmon Arm area. There appeared to be a great deal of expressed concern over the quality of Shuswap Lake waters, particularly that the quality would decline further, in a manner similiar to that experienced in the Skaha Lake area to the south, if steps were not immediately taken to prevent it. The local decision-makers, who appeared to be under pressure from the activities of protest groups and the local newspaper to prevent further water quality decline, by improving local sewage treatment facilities, made little attempt to canvass public opinion regarding the issue, even while they were planning to provide such facilities.

It is, therefore, the purpose of this study to investigate the awareness by local residents of water pollution in the Shuswap Lake area. In particular, a prime concern of this study was to investigate social factors influencing the level of individual awareness. A further primary objective was to determine how much the local decision-makers knew concerning the awareness levels of the voting public regarding water pollution.

The following hypotheses were therefore selected:

(1) That awareness of the problems of water quality will depend upon the socio-economic status of the individual.

Associated with this hypothesis were two sub-hypotheses:

(1a) That awareness of the problems of water quality will increase with experience of water-oriented recreation activities and active involvement in community affairs.

(1b) That a sense of political efficacy in coping with community problems will increase with experience of water-oriented recreation activities and active involvement in community affairs.

(2) That there was no demonstrable difference in the awareness of the public of both the Village and the District of Salmon Arm concerning problems of water quality.

The first major hypothesis was chosen because analysis of the literature suggests that a relationship appears to exist between socio-economic status and concern for environmental quality problems.[85] Recent studies, however, have demonstrated the significance of experience as a factor in influencing user evaluation of water quality,[86] and the literature of social psychology notes the importance of interpersonal influence, especially the role of the active

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[85] See pp. 11-13 above.

[86] Barker, M.L., Op.cit.

opinion leader.[87] For these reasons, the two sub-hypotheses were selected.

The second major hypothesis was designed to test the extent to which the local decision-makers were aware of the extent of public awareness concerning local water quality problems. If the public in the Village and the District held similiar views, the decision of the two Councils to develop different methods of sewage treatment has to be questioned since such a result would suggest that the local decision-makers were not, in fact, quite clear as to the preferences of the public.

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[87] Bem, D.J., Op.cit.

CHAPTER II

SAMPLING AND ANALYSIS

In order to discover the awareness by local residents of water pollution in the Shuswap Lake area, a questionnaire survey was conducted during the summer months of 1969. Personal interviews were conducted with residents in both the Village and the District of Salmon Arm. In each case, a cross-section of the population was interviewed—urban dwellers, lakeside dwellers, and rural dwellers —by means of a structured questionnaire.

For the questionnaire survey, a systematic sample was taken, composed of every tenth person listed upon the most recent list of voters for both communities. This was done in order to reduce the personal bias of the two interviewers (the author and his wife); at the same time, the voters' list gave a sample regardless of geographical location or socio-economic status.[88] Only one person per household was interviewed. Every attempt was made to conduct the interview in the individual's home; when this was not possible, a copy of the questionnaire was left with instructions and later retrieved. In such cases, some information, in particular

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[88] See Cole, J.P., and C.A.M. King, Quantitative Geography, New York, John Wiley, 1968, p. 115.

that concerning socio-economic status, was frequently found to be missing.[89] When possible, such information was obtained at a later interview.

The personal interview approach was preferred to a postal survey as it was felt that the latter approach usually entails a very low rate of questionnaire return. In addition, it may often be advantageous to conduct a personal survey in order that accurate answers be stimulated by the presence of the interviewer. A significant bias can, in fact, be reduced by the interviewer conducting each interviewer in the same manner (style of dress, behaviour towards the individual being interviewed). If more than one interviewer is employed (as was the case with this study) close liason the interviewers is therefore important.

For the purposes of clarity and ease of organization, the questionnaire was divided into three distinct sections, each designed to elicit specific types of information. The aim of the first section was to extract data concerning the individual's contact with Shuswap Lake. Length of residence in the Salmon Arm area, reasons for residing in the area, and types and frequency of preferred recreational activities were all ascertained in order to place the subsequent responses in an appropriate context. The second, and largest, section, was designed to discover the extent to which those

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[89] The problem of missing data is dealt with below.

interviewed were aware of the phenomenon of water pollution, its importance relative to other pressing problems of public concern, and the seriousness of the phenomenon in British Columbia. In addition, this section sought to discover the residents' awareness of the causes of water pollution, the measures necessary to combat it, and the linkages between algae, eutrophication, and the discharge of municipal effluent. The final section was designed to collect the socio-economic data relevant to the study: education, age, income, occupation and place of residence within the Salmon Arm communities.

Two hundred and twenty-eight persons were interviewed during a two-month period, 92 being residents of the Village and 136 of the District of Salmon Arm. This represents approximately 4% of the total population. It is difficult to test for the representativeness of the sample compared with the socio-economic characteristics of the total population as the relevant census information covers a far larger area than the two Salmon Arm municipalities.[90] By randomly drawing a sample from the voters' lists of the communities, it was hoped to produce a representative sample of the voting and tax-paying public.

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[90] Census of Canada, Ottawa, Queens' Printer, 1966.

TABLE 1. LOCATION OF THOSE INTERVIEWED

Location	No.	%
Village	92	40
District	136	60
	N= 228	

LIMITATIONS OF THE SURVEY

The first, and perhaps the most basic, limitation concerns the attempt to investigate the individual's awareness of water quality problems. It is realized that the choices contained in many of the questions could reflect the bias of the author: considerable care, however, was taken to ensure that the questions themselves did not suggest an immediate and convenient answer. The questions were so ordered in sequence as to elicit responses to general problems of water quality before leading to specific problems of water pollution in the area under study.[91]

A second limitation arose from the fact that the residents in the sample were interviewed in their homes, a situation removed from that in which water quality problems might have been present. The importance of the situation in which an interview takes place is recognized,[92] but the use

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[91] See Saarinen, T.F., "Research Approaches and Questionnaire Design", in Sewell, W.R.D., and I. Burton, Op.cit., p. 16.

[92] See Tartar, D.E., "Attitude: he Mental Myth", in American Sociologist, Vol 5, No. 3, 1970, p. 276. Tartar notes the success of Gallup polls in predicting actual voting behaviour in that they attempt to create voting booth situations.

of the respondents' homes was consistent with the choice of the voters' lists in selecting the sample.

The final important limitation concerns the problem of missing data. The obtaining of relevent socio-economic data may frequently encounter an obstacle in the reluctance of some individuals to divulge information about income, in particular, despite assurances that such information should remain confidential in studies of this type. In the case of the present study, 85 individuals refused to furnish the author with such information. While this was due, to some extent, to the reluctance of many individuals to disclose information that is viewed as private, the hesitation of the author in asking questions of this type undoubtedly contributed to the limited response. The problem of missing data was solved by discounting the responses of 33 individuals to all but the income variable, when 85 responses had to be discarded The sample was therefore reduced to 195 and 143 respectively.

CHAPTER III

RESULTS OF THE STUDY

GENERAL FINDINGS

Results from the survey demonstrated a general concern for the present and future quality of the southern Salmon Arm of Shuswap Lake. Although the majority of those interviewed felt that the Lake was not yet in a "polluted" state, 81% expressed the view that the quality of its waters would deteriorate in the future. From a list of problems such as education, air pollution, housing, parks, roads, health and police protection water pollution was, in fact, cited by 82% of the respondents as being the most important problem of public concern facing the two Salmon Arm communities. Understanding of the connection between municipal sewage, eutrophication, and water pollution was clearly expressed, 84% stating that sewage was the most important source of pollution affecting Shuswap Lake while 62% and 56% of the sample recognized algae and weeds/slime, respectively, as being the most significant indicators of water pollution on Shuswap Lake. These findings were tempered by a scanty knowledge concerning the technical details of local sewage treatment (20% did not know how the effluent was disposed of and 45% were not aware of the level of treatment); nevertheless, many were willing to offer an opinion on the

adequacy of sewage treatment. A majority of the sample regarded treatment of facilities in both the Village (80%) and the District (64%) as being "inadequate", the lower percentage (in the District) possibly reflecting the widespread use of septic tank disposal methods in the District.

It is suggested that information provided by the local newspaper, the Salmon Arm Observer, greatly contributed to the high level of awareness of local water quality problems and knowledge of some of the contributing factors. The newspaper is read by 80% of the local population: 64% of the respondents regarded the newspaper as the "most helpful" information source.

It is, therefore, not surprising that there was considerable and general concern over the Village Council's proposal for lake discharge of sewage, 74% of the sample expressing opposition (52% strongly) to the decision. The survey provided further evidence that the decision-makers were not, in fact, aware of public opinion concerning pollution control for, whereas the two Councils would not seriously consider amalgamation of the sewage treatment facilities of both the Village and the District, 75% of the residents of both communities (55% strongly) favoured joint action.

Despite the expressed concern for the water quality of Shuswap Lake and the definite opposition to lake discharge of sewage, the majority of the residents were sceptical of their ability to influence the decisions of the local Councils.

Few individuals had publicly made their opinion known, either by letter, attendance at public meetings, or by joining an action group. Only 46% felt that, by joining an action group, individual political activity would produce favourable results and even fewer residents viewed other forms of political expression as likely to influence the decision-making process. A considerable number, in fact, (30%) expressed the view that their concern, expressed or not, would have no influence on the local decision-makers. Concern, in other words, bore little relationship on the surface to personal political commitment but deeper investigation showed that those who were really committed to cleaning up the lake were likely to believe that they could influence local councils.

PARTICIPATION IN WATER ORIENTED RECREATION

The recreational activities in which the respondents and their families most frequently participated were of a type that require high standards of environmental quality and pollution abatement. Two-thirds of the respondents stated that they swam in Shuswap Lake more than once per week during the summer, and one-third fished and boated in the lake equally frequently. The figures found in Table 2 indicate the extent to which the lake plays an important part in determining the location and nature of the recreational pastimes of the Salmon Arm residents.

TABLE 2 RECREATION ACTIVITIES PURSUED BY THE RESIDENTS OF THE SHUSWAP LAKE AREA

	Frequently*		Seldom**		Never	
	No.	%	No.	%	No.	%
Swimming	120	61.5	32	16.4	43	22.1
Fishing	73	37.4	68	34.9	54	27.7
Boating	59	30.3	60	30.8	76	38.9
Water-Skiing	37	19.0	41	21.0	117	60.0

* Once or more per week
** Once or twice per month

N= 195

SOCIO-ECONOMIC CHARACTERISTICS OF THE SAMPLE

Judging from the results of the sample, many residents have lived in Salmon Arm for a considerable time, indicating fairly stable demographic conditions. Nearly two-thirds (65%) of the residents had been living in the Salmon Arm area for more than five years while 43% fo the sample had resided in the area for a period of more than ten years. Residents indicated that they appreciated the general attractiveness of the community, pleasant surroundings, retirement, and employment opportunities being the principal reasons for having chosen the area as a place of domicile.

The relative stability of the population base is also reflected in the age and occupation characteristics of the sample, 51% of the residents being 46 years of age and older and 22% classifying themselves as being retired.

TABLE 3 AGE OF THE SAMPLE

The Study Area Sample			B.C.		
	No.	%		No.	%
21 - 30	27	13.9	20 - 29	243,577	21.4
31 - 45	67	34.4	30 - 44	355,998	31.2
46 and over	101	51.7	Over 45	541,491	47.4
		N= 195		N= 1,141,066	

The 1966 Census figures for the British Columbia population demonstrate that the Salmon Arm area sample was somewhat older than the Provincial age breakdown suggests, despite slightly different class limits.

TABLE 4 OCCUPATION OF THE SAMPLE

	No.	%
Professional/Managerial	55	28.2
Service occupations (incl. tourism)[93]	23	11.8
Industry (forestry, mining)	37	19.0
Housewife	37	19.0
Retired	41	22.0
	N = 195	

The figure for the services seems to be low for an area so dependent upon the success of the tourist industry; the

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[93] The 1961 Statistics Canada figure for Service occupations = 39.2% for the Village of Salmon Arm.

Village of Salmon Arm, in addition, serves as a regional service centre. This could be due to certain individuals placing themselves in the Professional/Managerial category.

The remaining socio-economic indices of education and income demostrated that a sizeable proportion of the sample had achieved a Grade 12 education or less (76%) and received an annual family income of less than $9,000 (73%). As has already been pointed out, the usefulness of the income information is limited by the fact that 25% of the sample did not provide the required information.

TABLE 5 EDUCATION OF THE SAMPLE

	No.	%
Less than Grade 12	96	49.2
Grade 12	53	27.2
Vocational, College / non University	12	6.2
University or College	34	17.4
		N = 195

The Salmon Arm sample, therefore, tended to be older than the Provincial average, the "over 46" age group being greater in the study area, an indication perhaps of the announced popularity of the Shuswap Lake area as a place of retirement. This tendency was matched by a lower average income, an indication, it can be surmized, of the seasonal nature of many of the local economic activities (tourism, forestry) and of the lower incomes of retired individuals.

TABLE 6 INCOME OF THE SAMPLE[94]

	No.	%
$ 0 - 2,999	23	16.1
3,000 - 5,999	36	25.2
6,000 - 8,999	45	31.5
9,000 - 11,999	18	12.6
Over 12,000	21	17.4
		N = 143

SOCIO-ECONOMIC STATUS AND AWARENESS OF PROBLEMS OF WATER QUALITY

It will be recalled that the first hypothesis to be tested stated that . . . "awareness of the problems of water quality will depend upon the socio-economic status of the individual." Examination of the results of the survey revealed, however, that this hypothesis was not proven. There appeared to be no significant relationship between the socio-economic status of individuals (on the basis of age, education, occupation, and income) and the degree of awareness of the problems of water quality. Further analysis suggested that socio-economic status is only significant if it leads to activity patterns which result in increased knowledge, and

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[94] See Okanagan Study Committee, Okanagan-Shuswap Region Economic Study, 1971, Victoria, Dept. of Industrial Development, Trade and Commerce, p. 39. Note: For 1969, the average income for the Okanagan-Shuswap was $4,669, compared to that of the Province - $5,561.

and awareness of such problems. Increasing participation in water-based recreation activities and active interest in community affairs proved to be of greater significance in influencing the knowledge, awareness, and concern expressed by individuals with regard to water quality issues. Sub-hypothesis (1a) would appear to be valid.

THE RELATIONSHIP BETWEEN AWARENESS OF WATER QUALITY AND FREQUENCY OF CONTACT WITH WATER BODIES

The study revealed that a relationship existed between the respondents' involvement with water-oriented recreation activities and awareness of water quality problems. As Table 7 indicates, those respondents who enjoyed frequent contact with the water of Shuswap Lake demonstrated a greater concern for the quality of the lake, regarding water pollution as a "most important" problem facing their community, compared with the residents who did not go boating so frequently.

TABLE 7 IMPORTANCE OF WATER POLLUTION AS A COMMUNITY PROBLEM RELATED TO THE BOATING HABITS OF THE RESPONDENTS (See next page).

Active boaters and fishermen also tended to be more conscious of the water quality of Shuswap Lake, such individuals being more likely to express the view that there was an algae bloom problem on the lake (Tables 8 and 9) compared with those less active in such pursuits.

TABLE 7 IMPORTANCE OF WATER POLLUTION AS A COMMUNITY PROBLEM RELATED TO THE BOATING HABITS OF THE RESPONDENTS

	Boat Frequently		Seldom Boat		Never Boat		Total
	No.	%	No.	%	No.	%	
Most important problem	51	86.4	51	85.0	53	69.7	155
Less important problem	4	6.8	5	8.2	9	11.8	18
Least important problem	1	1.7	-	-	1	1.3	2
Don't know	3	5.1	4	6.8	13	17.2	20
Total	59		60		76		N = 195
							$r_S = 0.228$[95]

[95] Because the questionnaire employed questions that offered a choice of ranked answers (for example, "most important problem," "less important problem," "least important problem...."), a non-parametric technique that would measure the association between ranked variables was required. The Spearman rank correlation coefficient(r_S) was therefore employed in order to test the validity of the first hypothesis and sub-hypotheses.

With an N of 195, an r_s of 0.181 was significant at the 0.01 level.
With an N of 143, an r_s of 0.208 was significant at the 0.01 level.
Siegel, S., Non-Parametric Statistics for the Behavioural Sciences, New York, McGraw-Hill, 1956, pp. 202-213.

TABLE 8 AWARENESS OF ALGAE BLOOM PROBLEM ON SHUSWAP LAKE RELATED TO THE BOATING HABITS OF THE RESPONDENTS

	Boat Frequently		Seldom Boat		Never Boat		Total
	No.	%	No.	%	No.	%	
Yes	29	49.2	20	33.3	22	29.3	71
No	13	22.0	13	21.7	18	24.0	44
Don't Know	17	28.8	27	45.0	35	46.7	79
Total	59		60		75		N = 194
							τ_S = 0.195

TABLE 9 AWARENESS OF ALGAE BLOOM PROBLEM ON SHUSWAP LAKE RELATED TO THE FISHING HABITS OF THE RESPONDENTS

	Fish Frequently		Seldom Fish		Never Fish		Total
	No.	%	No.	%	No.	%	
Yes	41	56.2	18	26.5	12	22.2	71
No	12	16.4	18	26.5	14	26.0	44
Don't Know	20	27.4	32	47.0	27	51.8	80
Total	73		68		54		N = 195
							r_s = 0.298

There was no statistically significant relationship suggested between frequency of swimming and awareness of an algae bloom problem. This may be accounted for by the fact that algae blooms were only apparent around, and close to, the marina in the Village—a location where little swimming took place. Not surprisingly, there was a connection between income and the frequency of boating and fishing (Tables 10 and 11). A socio-economic variable such as income may be connected with an activity pattern but it would seem to be the particular activity, rather than income, that leads to an increase in experience that, in turn, is more directly related to awareness.

TABLE 10 ANNUAL FAMILY INCOME RELATED TO THE BOATING HABITS OF THE RESPONDENTS (See next page).

TABLE 11 ANNUAL FAMILY INCOME RELATED TO THE FISHING HABITS OF THE RESPONDENTS (See next page).

As has already been established, the majority of the sample regarded algae as the most important indicator of water pollution. When tested against frequency of contact with water-oriented recreation a relationship was revealed. In Tables 12 and 13, it can be seen that the active swimmers and boaters were more likely to understand the connection between eutrophication and water pollution than those who pursue such activities infrequently.

TABLE 10 ANNUAL FAMILY INCOME RELATED TO THE BOATING HABITS OF THE RESPONDENTS

	Boat Frequently		Seldom Boat		Never Boat		Total
	No.	%	No.	%	No.	%	
$ Over 12,000	14	31.1	4	7.8	3	6.4	21
9,000 - 11,999	4	8.9	8	15.7	6	12.8	18
6,000 - 8,999	12	26.7	21	41.2	12	25.5	45
3,000 - 5,999	13	28.9	12	23.5	11	23.4	36
0 - 2,999	2	4.4	6	11.8	15	31.9	23
Total	45		51		47		N = 143
							r_s = 0.257

TABLE 11 ANNUAL FAMILY INCOME RELATED TO THE FISHING HABITS OF THE RESPONDENTS

	Fish Frequently		Seldom Fish		Never Fish		Total
	No.	%	No.	%	No.	%	
$ Over 12,000	13	23.6	7	13.7	1	2.7	21
9,000 - 11,999	6	10.9	9	17.7	3	8.1	18
6,000 - 8,999	18	32.7	14	27.5	13	35.1	45
3,000 - 5,999	14	25.5	14	27.5	8	21.6	36
0 - 2,999	4	7.3	7	13.6	12	32.5	23
Total	55		51		37		N = 143
							r_S = 0.274

TABLE 12 ALGAE AS AN INDICATOR OF WATER POLLUTION RELATED TO THE SWIMMING HABITS OF THE RESPONDENTS

	Swim Frequently		Seldom Swim		Never Swim		Total
	No.	%	No.	%	No.	%	
Most important indicator	71	59.2	15	46.9	22	51.2	108
Less important indicator	30	25.0	7	21.9	7	16.3	44
Least important indicator	4	3.3	5	15.6	1	2.3	10
Don't know	15	12.5	5	15.6	13	30.2	33
Total	120		32		43		N = 195
							r_S = 0.219

TABLE 13 ALGAE AS AN INDICATOR OF WATER POLLUTION RELATED TO THE BOATING HABITS OF THE RESPONDENTS

	Boat Frequently		Seldom Boat		Never Boat		Total
	No.	%	No.	%	No.	%	
Most important indicator	33	55.9	32	53.3	43	56.6	108
Less important indicator	12	20.3	19	31.7	13	17.1	44
Least important indicator	3	5.1	4	6.7	3	4.0	10
Don't Know	11	18.7	5	8.3	17	18.3	33
Total	59		60		76		N = 195
							r_s = 0.211

THE RELATIONSHIP BETWEEN AWARENESS OF WATER QUALITY AND COMMUNITY ACTIVITY

Analysis of the data suggested, in addition, that increased contact with friends and community interest groups is likely to heighten an individual's awareness of problems of water quality. Sub-hypothesis (1a) would appear to be acceptable. In particular, a relationship was discovered between attendance at public meetings, where water quality was a topic of discussion, and belief that water pollution was the "most important" community problem (Table 14). Not

TABLE 14 IMPORTANCE OF WATER QUALITY AS A COMMUNITY PROBLEM RELATED TO ATTENDANCE AT PUBLIC MEETINGS

	Yes		No		Total
	No.	%	No.	%	
Most important problem	41	91.1	114	76.0	155
Less important problem	1	2.2	17	11.3	18
Least important problem	1	2.2	1	0.7	2
Don't know	2	4.5	18	12.0	20
Total	45		150		N = 195
					r_S = 0.185

surprisingly, the 21% of the sample who had actually attended public meetings in order to express their concern for environmental quality tended to assign greater importance to water pollution as a local problem than those individuals who did

not. Public meetings also appeared valuable as a forum for community interest and concern for there was a relationship between belief in the effectiveness of such meetings as an information source and the ranking of water pollution as a community problem (Table 15).

TABLE 15 IMPORTANCE OF WATER POLLUTION AS A COMMUNITY PROBLEM RELATED TO THE EFFECTIVENESS OF PUBLIC MEETINGS AS AN INFORMATION SOURCE (See next pg.)

The influence of social contacts and membership interest groups proved to be additional factors affecting an individual's assessment of local water quality standards. As Table 16 indicates, a relationship existed between active group membership and an awareness of an algae bloom problem on Shuswap Lake, while Table 17 demonstrates the important part played by social interaction in influencing awareness of water quality as a community concern. As the correlations were fairly weak, the results should only be taken as an <u>indication</u> of a relationship between the variables.

TABLE 16 BELIEF IN AN ALGAE BLOOM PROBLEM ON SHUSWAP LAKE RELATED TO MEMBERSHIP IN AN INTEREST GROUP

	Yes		No		Total
	No.	%	No.	%	
Yes	16	64.0	55	32.4	71
No	5	20.0	39	22.9	44
Don't Know	4	16.0	76	44.7	80
Total	25		170		N = 195
					r_s = 0.186

TABLE 15 IMPORTANCE OF WATER POLLUTION AS A COMMUNITY PROBLEM RELATED TO THE EFFECTIVENESS OF PUBLIC MEETINGS AS AN INFORMATION SOURCE

	Most Helpful		Less Helpful		Least Helpful		Don't Know		Total
	No.	%	No.	%	No.	%	No.	%	
Most important problem	28	87.5	36	87.8	49	83.1	42	66.7	155
Less important problem	1	3.1	4	9.8	7	11.9	6	9.5	18
Least important problem	1	3.1	-	-	1	1.7	-	-	2
Don't know	2	6.3	1	2.4	2	3.3	15	23.8	10
Total	32		41		59		63		N = 195
									r_s = 0.221

TABLE 16 BELIEF IN AN ALGAE BLOOM PROBLEM ON SHUSWAP LAKE RELATED TO MEMBERSHIP IN AN INTEREST GROUP

	Yes		No		Total
	No.	%	No.	%	
Yes	16	64.0	55	32.4	71
No	5	20.0	39	22.9	44
Don't know	4	16.0	76	44.7	80
Total	25		170		N = 195
					r_S = 0.186

TABLE 17 IMPORTANCE OF WATER POLLUTION AS A COMMUNITY PROBLEM RELATED TO THE EFFECTIVENESS OF FRIENDS AS AN INFORMATION SOURCE (See next page).

The results also produced some evidence that, as individuals become more actively involved in the affairs of a community (by joining interest groups, etc.), they tend to demonstrate a deeper and more accurate understanding of some of the factors that contribute to a decline in water quality. Thus, those individuals who had joined an interest group and who had attended public meetings were more likely to relate polluted conditions in Shuswap Lake to the presence of algae blooms (Tables 18 and 19) and to regard industry and septic tanks as the most important sources of this particular kind of water pollution. (Tables 20 and 21).

TABLE 18 ALGAE AS AN INDICATOR OF WATER POLLUTION RELATED TO THE EFFECTIVENESS OF PUBLIC MEETINGS AS AN INFORMATION SOURCE (See next page).

TABLE 19 ALGAE AS AN INDICATOR OF WATER POLLUTION RELATED TO ACTIVE MEMBERSHIP IN AN INTEREST GROUP (See next page).

TABLE 17 IMPORTANCE OF WATER POLLUTION AS A COMMUNITY PROBLEM RELATED TO THE EFFECTIVENESS OF FRIENDS AS AN INFORMATION SOURCE

	Most Helpful		Less Helpful		Least Helpful		Don't Know		Total
	No.	%	No.	%	No.	%	No.	%	
Most important problem	38	92.8	52	78.8	35	85.4	30	63.8	155
Less important problem	1	2.4	7	10.6	5	12.2	5	10.6	18
Least important problem	1	2.4	1	1.5	-	-	-	-	2
Don't Know	1	2.4	6	9.1	1	2.4	12	25.6	20
Total	41		66		41		47		N = 195
									r_s = 0.216

TABLE 18 ALGAE AS AN INDICATOR OF WATER POLLUTION RELATED TO THE EFFECTIVENESS OF PUBLIC MEETINGS AS AN INFORMATION SOURCE

	Most Helpful		Less Helpful		Least Helpful		Don't Know		Total
	No.	%	No.	%	No.	%	No.	%	
Most important indicator	26	81.2	31	75.6	31	52.5	32	50.8	120
Less important indicator	3	9.4	5	12.2	15	25.4	7	11.1	30
Least important indicator	-	-	-	-	8	13.6	5	7.9	13
Don't Know	3	9.4	5	12.2	5	8.5	19	30.2	32
Total	32		41		59		63		N = 195
									r_s = 0.265

TABLE 19 ALGAE AS AN INDICATOR OF WATER POLLUTION RELATED TO ACTIVE MEMBERSHIP IN AN INTEREST GROUP

	Yes		No		Total
	No.	%	No.	%	
Most important indicator	22	88.0	98	57.7	120
Less important indicator	3	12.0	27	15.9	30
Least important indicator	-	-	13	7.7	13
Don't Know	-	-	32	18.7	32
Total	25		170		N = 195
					r_S = 0.212

TABLE 20 IMPORTANCE OF INDUSTRY AS A SOURCE OF WATER POLLUTION RELATED TO THE EFFECTIVENESS OF PUBLIC MEETINGS AS AN INFORMATION SOURCE (See next page).

TABLE 21 IMPORTANCE OF SEPTIC TANKS AS A SOURCE OF WATER POLLUTION RELATED TO THE EFFECTIVENESS OF PUBLIC MEETINGS AS AN INFORMATION SOURCE (See next page).

THE RELATIONSHIP BETWEEN SOCIAL ACTIVITY AND OPINION OF THE POLITICAL EFFICACY OF INDIVIDUAL ACTION

The widespread lack of political action taken by respondents to combat local water pollution has previously been noted. The fact that so few individuals had attended public meetings (21%) or had joined an interest group (12%) is hardly surprising in view of the fact that a majority of the residents seriously doubted the effectiveness of such

TABLE 20 IMPORTANCE OF INDUSTRY AS A SOURCE OF WATER POLLUTION RELATED TO THE EFFECTIVENESS OF PUBLIC MEETINGS AS AN INFORMATION SOURCE

	Most Helpful		Less Helpful		Least Helpful		Don't Know		Total
	No.	%	No.	%	No.	%	No.	%	
Most important source	21	65.6	21	51.2	26	44.1	29	46.0	97
Less important source	8	25.0	17	41.5	27	45.8	12	19.1	64
Least important source	2	6.3	3	7.3	5	8.5	7	11.1	17
Don't Know	1	3.1	-	-	1	1.6	15	23.8	17
Total	32		41		59		63		N = 195
									$+_S$ = 0.201

TABLE 21 IMPORTANCE OF SEPTIC TANKS AS A SOURCE OF WATER POLLUTION RELATED TO THE EFFECTIVENESS OF PUBLIC MEETINGS AS AN INFORMATION SOURCE

	Most Helpful		Less Helpful		Least Helpful		Don't Know		Total
	No.	%	No.	%	No.	%	No.	%	
Most important source	19	59.4	13	31.7	20	34.0	23	36.5	75
Less important source	4	12.5	9	22.0	18	30.5	1	1.6	32
Least important source	3	9.4	2	4.9	5	8.5	2	3.2	12
Don't Know	6	18.7	17	41.4	16	27.0	37	58.7	76
Total	32		41		59		63		N = 195
									r_s = 0.193

political action influencing the local decision-makers. As might have been expected, analysis of the data revealed that those residents who had attended public meetings and had joined action groups placed greater faith in the possibility of such action having some influence in the local political forum (Tables 22 and 23). The stronger relationships may be noted.

TABLE 22 MEMBERSHIP IN AN ACTION GROUP RELATED TO BELIEF IN THE EFFICACY OF SUCH ACTIVITY

Membership	Efficacy				
	Yes		No		Total
	No.	%	No.	%	
Yes	16	18.0	9	8.5	25
No	73	82.0	97	91.5	170
Total	89		106		N = 195
					r_s = 0.390

TABLE 23 ATTENDANCE AT PUBLIC MEETINGS RELATED TO BELIEF IN THE EFFICACY OF SUCH ACTIVITY

Attendance	Efficacy				
	Yes		No		Total
	No.	%	No.	%	
Yes	29	37.2	16	13.7	45
No	49	62.8	101	86.3	150
Total	78		117		N = 195
					r_s = 0.362

There was, in addition, a relationship between active community involvement and acceptance of some feeling of personal responsibility for the maintenance of high standards of environmental quality. Those residents who had become members of action groups "disagreed" or "strongly disagreed" with the statement "To control pollution on Shuswap would be too expensive to be worthwhile." (See Table 24). Sub-hypothesis (1b) would, therefore, appear to be valid.

TABLE 24 MEMBERSHIP OF AN INTEREST GROUP RELATED TO AGREEMENT WITH THE STATEMENT "TO CONTROL POLLUTION ON SHUSWAP WOULD BE TOO EXPENSIVE TO BE WORTHWHILE."

	Yes		No		Total
	No.	%	No.	%	
Strongly disagree	18	72.0	91	53.5	109
Disagree	7	28.0	54	31.8	61
Neither agree nor disagree	-	-	20	11.8	20
Agree	-	-	2	1.2	2
Strongly Agree	-	-	3	1.7	3
Total	25		170		N = 195
					r_s = 0.208

There was an weak connection between frequent enjoyment of recreation activities and involvement in community affairs. The more active boaters and fishermen, in displaying concern for local environmental quality standards, tended to be more politically active (Tables 25 and 26).

TABLE 25 MEMBERSHIP IN AN INTEREST GROUP RELATED TO THE BOATING HABITS OF THE RESIDENTS

	Boat Frequently		Seldom Boat		Never Boat		Total
	No.	%	No.	%	No.	%	
Yes	16	27.1	5	8.3	4	5.3	25
No	43	72.9	55	91.7	72	94.7	170
Total	59		60		76		N = 195
							r_s = 0.186

TABLE 26 MEMBERSHIP IN AN INTEREST GROUP RELATED TO THE FISHING HABITS OF THE RESIDENTS

	Fish Frequently		Seldom Fish		Never Fish		Total
	No.	%	No.	%	No.	%	
Yes	18	24.7	7	10.3	-	-	25
No	55	75.3	61	89.7	54	100.0	170
Total	73		68		54		N = 195
							r_s = o.191

Furthermore, the study also revealed a relationship between recreational use of the Shuswap and acceptance in principle, of some responsibility for pollution abatement. It should be noted, in particular, that the greater the frequency of water-oriented recreation activity, the stronger the tendency to disagree with the statement in Tables 27 and 28.

TABLE 27 AGREEMENT WITH THE STATEMENT "TO CONTROL POLLUTION ON SHUSWAP WOULD BE TOO EXPENSIVE TO BE WORTHWHILE" RELATED TO THE BOATING HABITS OF THE RESIDENTS

	Boat Frequently		Seldom Boat		Never Boat		Total
	No.	%	No.	%	No.	%	
Strongly disagree	40	67.8	33	55.0	36	47.4	109
Disagree	15	25.4	20	33.3	26	34.2	61
Neither agree nor disagree	3	5.1	6	10.0	11	14.5	20
Agree	-	-	1	1.7	1	1.3	2
Strongly agree	1	1.7	-	-	2	2.6	3
Total	59		60		76		N = 195
							r_s = 0.182

TABLE 28 AGREEMENT WITH THE STATEMENT "TO CONTROL POLLUTION ON SHUSWAP WOULD BE TOO EXPENSIVE TO BE WORTHWHILE" RELATED TO THE FISHING HABITS OF THE RESIDENTS

	Fish Frequently		Seldom Fish		Never Fish		Total
	No.	%	No.	%	No.	%	
Strongly disagree	47	64.4	39	57.4	23	42.6	109
Disagree	22	30.1	23	33.8	16	29.6	61
Neither agree nor disagree	4	5.5	5	7.4	11	20.4	20
Agree	-	-	1	1.4	1	1.9	2
Strongly agree	-	-	-	-	3	5.5	3
Total	73		68		54		N = 195
							r_S = 0.218

It would appear that, despite some low-order relationships, awareness, knowledge, and expressed concern over water pollution in the Shuswap Lake are interrelated, and that this in turn is linked to personal experience of the lake through recreational use, social interaction in community affairs, and a sense of political efficacy in coping with community problems. These bonds are all connected to socio-economic status, but it seems that socio-economic status acts as little more than a surrogate for the more important variables of experience, community activity and political efficacy in influencing preferences for water quality improvement.

ANALYSIS OF THE AWARENESS OF THE RESIDENTS OF THE VILLAGE AND THE DISTRICT OF SALMON ARM CONCERNING WATER QUALITY

Hypothesis (2) stated that . . . "there was no demonstrable difference in the awareness of the public of both the Village and the District of Salmon Arm concerning problems of water quality." Examination of the data produced by the survey did not prove any significant difference in the opinions of the residents of both the Village and the District regarding the degree of concern and appropriate action for sewage treatment. In other words, the samples for the two communities appeared to have been drawn for the same population regarding their opinions on these matters. The two communities viewed the importance of water pollution as a problem in British Columbia generally, and the Salmon Arm area, in particular, with a similiar distribution of concern (Tables 29, 30, and 31).

TABLE 29 OPINION CONCERNING THE SERIOUSNESS OF WATER POLLUTION IN B.C.

	No.	%
Serious	133	68.2
Important, but not serious	55	28.2
Nothing to be concerned about	7	3.6
Total	195	

$\chi^2 = 2.938$ $p = 0.229$

TABLE 30 OPINION CONCERNING SHUSWAP LAKE WATER QUALITY

	No.	%
Very dirty	12	6.2
Fairly dirty	40	20.5
Fairly clean	112	57.4
Very clean	18	9.2
Don't know	13	6.7
Total	195	

$\chi^2 = 10.664$ $p = 0.031$

TABLE 31 OPINION CONCERNING FUTURE SHUSWAP LAKE WATER QUALITY

	No.	%
Better	5	2.6
Worse	168	86.2
Remains the same	10	5.0
Don't know	12	6.2
Total	195	

$\chi^2 = 0.280$ $p = 0.963$

There was no significant difference in the level of understanding of the connection between industrial and septic tank effluent and a decline in water quality. Equally, there was no significant difference in the knowledge that industry and septic tanks were "most important" sources of water pollution in the Salmon Arm area.

TABLE 32 THE IMPORTANCE OF INDUSTRY AS A SOURCE OF WATER POLLUTION IN THE SHUSWAP LAKE AREA

	No.	%
Most important source	97	49.8
Less important source	64	32.8
Least important source	17	8.7
Don't know	17	8.7
Total	195	
$\chi^2 = 4.550$ $p = 0.207$		

TABLE 33 THE IMPORTANCE OF SEPTIC TANKS AS A SOURCE OF WATER POLLUTION IN THE SHUSWAP LAKE AREA

	No.	%
Most important source	75	38.5
Less important source	32	16.4
Least important source	12	6.2
Don't know	76	38.9
Total	195	
$\chi^2 = 1.299$ $p = 0.733$		

Of more interest was the finding that the community populations did not differ in their views as to the worth-

whileness of water quality improvement. As Table 34 indicates, the respondents of both communities tended to disagree with the statement "To control pollution in Shuswap would be too expensive to be worthwhile," the public of both the Village and the District apparently demonstrating a willingness to accept some responsibility for community programs to improve water quality on the Shuswap.

TABLE 34 AGREEMENT WITH THE STATEMENT "TO CONTROL POLLUTION ON SHUSWAP WOULD BE TOO EXPENSIVE TO BE WORTHWHILE"

	No.	%
Agree[96]	5	2.6
Neither agree nor disagree	20	10.3
Disagree	61	31.3
Strongly disagree	109	55.8
Total	195	

$\chi^2 = 9.412 \quad p = 0.024$

Residents of the two communities held similiar views on the value of political activity. Results showed that both sample populations felt that their councils tended not to be responsive to public opinion and generally that political involvement would not influence the decisions of the two councils regarding the improvement of water quality on the Shuswap (Tables 35 and 36). Furthermore, both communities showed little variation in their optimism concerning the political efficacy of such involvement. (Tables 37 and 38).

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[96] The "Strongly Agree" cell was collapsed into the "Agree" cell since the former held less than 5.

TABLE 35 MEMBERSHIP IN AN INTEREST GROUP

	No.	%
Yes	25	12.8
No	170	87.2
Total	195	
$\chi^2 = 1.154$ p = 0.567		

TABLE 36 ATTENDANCE AT PUBLIC MEETINGS

	No.	%
Yes	45	23.1
No	150	76.9
Total	19	
$\chi^2 = 1.684$ p = 0.565		

TABLE 37 BELIEF IN THE EFFICACY OF INTEREST GROUP MEMBERSHIP

	No.	%
Yes	84	43.1
No	111	56.9
Total	195	
$\chi^2 = 2.688$ p = 0.260		

TABLE 38 BELIEF IN THE EFFICACY OF ATTENDING PUBLIC MEETINGS

	No.	%
Yes	75	38.5
No	120	61.5

	No.	%
Total	195	
$x^2 = 3.952$ p = 0.137		

As a further indication of the extent to which the two councils seemed to be unaware of public opinion, despite the fact that they had fought for two years to develop two separate sewage treatment schemes, there was no difference among the two sample populations in the strong feeling that both the Village and the District should amalgamate their sewage treatment facilities.

TABLE 39 OPINIONS CONCERNING THE POSSIBILITY OF UNITING THE SEWAGE TREATMENT FACILITIES OF THE VILLAGE AND THE DISTRICT

	No.	%
Strongly in favour	115	59.0
In favour	38	19.5
Neither for nor against	26	13.3
Against[97]	16	8.2
Total	195	
$x^2 = 2.627$ p = 0.545		

It would appear, therefore, that there were no significant differences in the awareness of the residents of the two communities regarding water quality problems in the Shuswap Lake area. The Second Hypothesis would, therefore,

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[97] The "Against" and "Strongly Against" cells were collapsed owing the latter containing less than 5.

appear to be valid. With no significant difference in public opinion, especially with regard to the possibility of uniting the sewage treatment facilities of the Village and the District, the decision by both Councils to pursue separate proposals has to be questioned.

CHAPTER IV

CONCLUSIONS

The study was designed to investigate the awareness by local residents of water pollution in the Shuswap Lake area of British Columbia. Results from the public opinion survey suggested that the general level of expressed concern over existing and potential water quality deterioration in the lake was high. Despite this apparent high level of concern, few of the residents had expressed their feelings, over the problems of water quality, in the form of community involvement and political action. Furthermore, a sizeable majority showed a marked degree of pessimism towards the political efficacy of such action. The results also suggested that there had been little contact between the local decision-maker and the public of the two Salmon Arm communities: There were no significant differences in the awareness of the Village and the District residents regarding water quality problems and appropriate action for sewage treatment.

SOCIO-ECONOMIC STATUS AND AWARENESS OF PROBLEMS OF WATER QUALITY

The first hypothesis suggested that awareness of the problems of water quality will depend upon the socio-

economic status of the individual. Analysis of the data produced by the public opinion survey did not demonstrate any significant relationship between income, age, education, occupation and awareness of the problems of water quality. The first major hypothesis is, therefore, rejected. Instead, it provides support for one of the conclusions in a previous study,[98] where the relationships between occupation, education, ethnic origin, sex, and opinions concerning water quality were weak. In a study of the attitudes of resource managers and those members of the general public, who pursued water-oriented recreation activities, towards pollution of the beaches in southern Ontario, Barker found that personal experience appeared to influence user evaluations of the water quality.

It would appear that socio-economic characteristics may be somewhat influential in affecting the degree of awareness of water quality problems for, in part, they lead to patterns of recreational and community activity that may, in turn, contribute to greater awareness of, and concern for, environmental quality.[99] Despite a missing data problem with the income variable, such seemed to be the case when a relationship was found to exist between annual family

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[98] Barker, M.L., Op.cit.

[99] See McEvoy, J., "The American concern with environmen", in Burch, W.R., N.H Cheek, and L. Taylor (eds.), Social Behaviour: Natural Resources, and the Environment, New York, Harper and Row, 1972, pp. 214-236. McEvoy suggests that life styles may be more important than any single variable in understanding public concern for the environment.

income and frequency of boating and fishing activities. The missing data and the weak correlations (r_s = 0.257 and 0.274 respectively) make such suggestions tentative.

EXPERIENCE WITH WATER BODIES

Results from the survey indicate that frequent participation in water-oriented recreation activities, such as boating and fishing, would seem to contribute to awareness. Support was thus provided for sub-hypothesis (1a). Since such activities require high quality standards, the most active participants are most likely to detect any deterioration in the quality of popular water bodies. Although, at the time the survey was conducted, the Lake generally was not really polluted to any degree, in terms of algae blooms, the results point to a fear among the most active users of the lake that the quality of its waters might continue to decline.

Not only did such individuals demonstrate greater knowledge of the surface conditions of parts of Shuswap Lake (noting, in this case, the presence of algae and weeds), but the most active swimmers and boaters demonstrated a readiness to identify algae as a "most important" indicator of water pollution.

SOCIAL INTERACTION IN THE COMMUNITY

The study showed a relationship between active involvement in community affairs and high levels of awareness

and knowledge, providing additional support for sub-hypothesis (1a). Individuals who had attended public meetings and who had joined action groups displayed a greater awareness of water quality problems, considering water pollution to be the "most important" problem facing their community. They were also more likely to understand the linkage between eutrophication and water pollution. These findings suggest that social organization through informal acquaintances and through membership of community groups is more influential in determining awareness levels than some surrogate such as socio-economic characteristics when analyzing the nature of attitudes towards environmental matters.[100]

Interpersonal and intergroup contact is thus an important factor in contributing to awareness of environmental

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[100] Bem, D.J., Loc.cit.; The study of the influence of groups upon reinforcing and hindering opinion is well covered by Katz, E., & P.F. Lazarsfeld, Personal Influence: The Part played by people in the Flow of Mass Communications, Glencoe, The Free Press, 1955;

See also De Fleur, M.C., Theories of Mass Communication, New York, McKay, 1970, pp. 124-129. De Fleur quotes a 1940 study of the U.S. Presidential election of that year, when it became apparent that "informal social relationships" played a significant role in modifying the opinions of an individual: Lazarsfeld, P.B. Berelson, and H. Gaudet, The People's Choice, New York, Duell, Sloan, and Pearce, 1944;

Milbrath, L.W., Political Participation: How and why do people get involved in Politics?, Chicago, Rand McNally, 1965.

Cohen, A.R., Attitude Change and Social Influence, New York, Basic Books, 1964; Marchland, C.P. and A.C. Coleman, "Group influence and agriculture innovations", in American Journal of Sociology, Vol. 61, 1956.

quality. Such information flows via groups of active opinion leaders, complement the role of mass media in bringing such problems to the attention of the average citizen. Great stress has previously been placed on the importance of mass media in disseminating information about environmental issues,[101] yet the media tends to play a limited role in determining viewpoints about matters over which the individual has little knowledge at interest.[102] It is also suggested that many individuals do not follow complex issues closely;[103] The role of the group is therefore important in leading opinion.

THE EFFICACY OF INDIVIDUAL POLITICAL ACTION

Concern expressed is not necessarily transmitted into

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[101] Auliciems, A., and I. Burton, "Air Pollution in Toronto", in Sewell, W.R.D., and I. Burton, Op.cit., p. 80.

[102] See Simon, R.J., "Public Attitudes towards Population and Pollution", in Public Opinion Quarterly, Vol. XXXV, No. 1, 1971, pp. 93-99. Simon notes a high level of concern when asked about specific pollution problems, but not much concern in the absence of specific issues.
See also, Klapper, J.T., "The Social effects of mass communications", in Schramm, W. (ed.), The Science of Human Communication, New York, Basic Books, 1963. The area of public opinion formation is considerable. For a concise overview, see Lane, R.E., and D. Sears, Public Opinion, Englgwood Cliffs, N.J., Prentice-Hall, 1964.

[103] Erikson, R.S., and N.R. Luttberg, American Public Opinion: its origins, content, and impact, New York, Wiley, 1973, p. 26.

action.[104] The results of the study indicated that those individuals most actively involved in community affairs and in water-oriented recreation activities seemed more likely to be optimistic that such political action as interest group membership and attendance at public meetings would exert influence upon the deliberations of local council members than those not as active. Sub-hypothesis (1b) would appear to be acceptable. Furthermore, such optimism is frequently accompanied by a sense of responsibility for the maintenance of environmental quality; those most optimistic that their community involvement would produce effective results in the political forum also appeared to be more prepared to pay for such quality. As Heberlein suggests,[105] those who feel a sense of responsibility for reducing environmental deterioration act according to moral, rather than economic norms. Active community involvement, recreation activity, and a personal commitment to the ethical aspects of environmental quality are thus, to a considerable extent, interrelated and more likely to influence the individual's knowledge and awareness of water quality problems than socio-economic characterisitics. The sub-hypotheses would seem, therefore, to

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[104] Deutscher, I., "Words and deeds: Social Science and social policy", in Social Problems, Vol. 13, 1966, pp. 235-254;
O'Riordan, T., "Some reflections on environmental attitudes and environmental behaviour," Op.cit.
Schiff, M.R., Op.cit.

[105] Heberlein, T.A., Op.cit.

be valid.

The results of the study would seem, in addition, to suggest the important role of certain key variables in a study of this type. The extent of an individual's awareness of the problems of water quality is testable by the ranking of water quality issues against a range of other issues that frequently face communities (such as education, roads, parks, crime, etc.). The knowledge levels of individuals can be tested by a series of questions designed to discover whether the individual knows of the linkages between water pollution, eutrophication, municipal sewage and nutrient-enrichment. Concern over environmental issues is only weakly tested by verbal statement: a sense of concern that accompanies a commitment to such issues is better tested by an examination of the individual's behaviour concerning environmental quality matters.[106]

PUBLIC OPINION IN THE TWO SALMON ARM COMMUNITIES

The second hypothesis suggested that there would be no demonstratable difference in the awareness of the public of both the Village and the District concerning local water quality. There was no significant difference between the residents of both communities regarding the degree of

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[106] So suggested Myra Schiff. See Schiff, M.R., "Some considerations about attitude studies in resource management," Op.cit.

awareness of water quality and the action considered necessary to provide adequate sewage treatment. The two communities seemed to be united in their concern for the future water quality of the lake and the steps taken to maintain it. The second hypothesis would, therefore, seem to be valid.

If there was no significant difference in public opinion in the two communities, why had the two Councils for so long preferred separate proposals for the treatment of sewage in their respective areas? The study would appear to point towards a considerable information gap between the public and their elected representatives. The decision-makers do not appear to have been aware of the opinions of the public concerning water quality in Shuswap Lake:[107] Although they saw themselves as acting in the public's interest, they (the Aldermen of both Village and District) had never attempted to formally discover the actual feelings of the public.[108] Furthermore, the public was not fully informed of the facts concerning the various sewage proposals.

Several reasons may be suggested to partially account for this poor information flow between public and decision-maker. Firstly, the very nature of small-town politics is an important factor in that the majority of decision-makers are, in fact, "volunteer citizen-politicians."[109] These

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[107] See Frederickson, H.G. & H. Magnas, Op.cit., p. 877.

[108] O'Riordan, T., Okanagan Water Decisions, Op.cit., P. 82.

[109] Prewitt, K., The Recruitment of Political Leaders, New York, Bobbs Merrill, 1970.

individuals rarely have any political experience, they do not belong to any political party with a backlog of experience to help them; they take part in local government out of a feeling of obligation to the community rather than for financial gain (such positions providing only nominal salaries).[110] It is hardly surprising, therefore, that this "volunteer" is rarely responsive to public opinion, especially since he quite frequently believes that the electorate is aware of the issues before their local decision-making body.[111]

Secondly, the average member of an electorate does not, in fact, monitor the views of his community leaders.[112] Despite the apparent high level of concern expressed by the residents of the two Salmon Arm communities, the majority were sceptical of the political efficacy of any action they might employ to bring this opinion to the attention of their Council members. There being no consensus of opinion as a result, little coordinated action had been taken to inform the decision-makers of the opinions of the electorate. The public would thus seem to have been partly to blame for the poor channel of communciation between the electors and the elected. Pressure upon the local councils

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[110] Erikson, R.S. and N.R. Luttberg, Op.cit., p. 254, suggest that usually the wealthy and best-educated tend towards such forms of community leadership.

[111] Erikson, R.S. & N.R. Luttberg, Ibid., 1973, p. 281.

[112] Ibid., p. 266.

came about almost entirely from small, active, and determined groups who were concerned enough about water quality to take some positive political action. The two major interest groups were, however, not formed of Salmon Arm Village residents: There was, therefore, a conflict of interest, the Village Council viewing the groups as meddling in other people's affairs, while the District Council appeared to be more receptive to such public opinion.

An additional problem[113] facing the two Councils was the borrowing of sufficient money to finance such capital projects as advanced sewage treatment facilities. Since only 33% of the total tax revenue is available for local improvements,[114] a considerable burden has to be borne by local taxpayers. If the land disposal scheme were to be adopted, a 40-50% tax increase per benefitting household would be necessary. Without some consensus of public opinion, considerable courage would be needed for a council to create the need for a significant increase in property taxes.

Finally, the local differences between the Village and the District Councils may have been partly responsible for different approaches to solving the sewage problem. As has

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[113] For details see O'Riordan, T., Op.cit., pp. 77-79.

[114] See pp. 29-30. It is quite possible that the financial issue was more responsible for the two Councils taking separate action to solve the pollution problem than a lack of awareness concerning the extent of public opinion. A further study however (O'Riordan, T., Op.cit.,) suggests that the local decision-makers were not aware of the extent of public opinion.

been suggested,[115] far greater interest was shown in District Council elections than in those held in the Village, composition of the latter body tending to be more static than the former. The more rapidly changing membership of the District Council was more likely to encourage Alderman to be more responsive to public opinion. Furthermore, a certain jealousy between the two bodies did not encourage the pursuit of similiar, or joint, policies,[116] tending to lead to a polarization of views that emphasizes the lack of awareness concerning the opinions of the local electorate. This situation was not helped by the tendency of the average citizen in any community to be apathetic towards environmental problems until they have reached a crisis point. Since the water quality of Shuswap Lake was generally high, the level of expressed concern for related problems reflected the fear of the most aware and active residents that the future quality of the lake could be in doubt.

The lack of consensus in public opinion may also have been reflected in the fact that the communities contained very few leaders of any influence: the Aldermen were well-meaning volunteers who did not possess the necessary technical expertise to easily judge the best methods of sewage treatment. The result was that, faced with a lack of clearly-

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[115] O'Riordan, T., Op.cit., p. 81.

[116] O'Riordan, T., Ibid., p. 81-82.

expressed public opinion, the conflicting advice of different firms of consultants (each Council had hired the services of a different firm), and certain institutional constraints (tax structure, no clear guidance from the Pollution Control Board), the two Councils were placed in a difficult situation where a certain procrastination was perhaps inevitable.

In summary, then, the study appears to show that socio-economic status may act only as a surrogate for factors that directly influence the attitudes of a community towards local environmental quality issues. Frequency of contact with water-bodies through recreation activities and the amount of involvement in community affairs are suggested as variables most likely to influence an individual's environmental awareness. Secondly, the apparent concern for environmental issues does not seem to be as widespread as traditional questionnaire survey results tend to suggest. Rigorous analysis of actual behaviour is more likely to demonstrate that the only most active members of a community show concern to the extent that they are willing to commit themselves to efforts that may combat environmental deterioration. Finally, the information channels between the electors and their representatives would seem to be extremely weak, with local elected officials demonstrating an almost total lack of awareness of public opinion concerning local environmental issues while, at the same time, maintaining the impression that they continued to act in the best interests

of the communities they represent.

FURTHER RESEARCH NEEDS

This study has demonstrated the need for further work to be conducted in an effort to better understand the relationships between environmental attitudes and opinions and the social activity patterns of individuals in our society. The difference between expressed concern and actual behaviour that results from such concern has been studied.[117] Better methods are required to measure the extent to which an individual feels committed to some issue about whcih he expresses concern. The study of an individual's overt behaviour has been suggested.[118]

The formation of attitudes and opinions is, therefore, a crucial area of research. The influence of mass media and group structure, in particular, has been a fruitful research area for some time. Such research must continue in order that we may better understand the processes by which individuals become informed about issues concerning environmental quality.

The apparently poor information flow between the public and the decision-makers points to a need, not only for "improved" communication between these two groups, but for

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[117] O'Riordan, T., "Some reflections on environmental attitudes and envrionmental behaviour", Op.cit.; Deutscher, I., Op.cit.

[118] See Schiff, M.R., Op.cit.

an understanding of the manner in which information is gathered by individuals and groups (whether interest groups or village councils) before decisions are made. The hostility between a decision-maker and an interest group may, for example, cause the former to reject the opinions of the l tter. Only if such exchange is made easier by the removal of the apparent feeling of "conflict" between elector and elected, especially in smaller cities and towns, are we likely to see an improvement in the flow of information between the two groups—an improvement that may bring the public and the decision-maker into closer agreement concerning the managing of a public resource so that a quality can be maintained that is compatible with the many needs and values of society.

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APPENDIX

Residential Interview Survey

1. How long have you lived here?
   - less than 5 years
   - 5-10 years
   - more than 10 years

2. If less than 10 years, what area are you from?
   - urban
   - suburban
   - small town (less than 5000)
   - rural
   - other (please state)

3. How far is this area from Shuswap?
   - less than 50 miles
   - interior B.C.
   - rest of B.C.
   - rest of Canada
   - U.S.A.
   - other (please state)

4. Please rank the two major reasons for moving to Salmon Arm.
   - retirement
   - small town amenities
   - lower cost of living
   - lower taxes
   - employment opportunities
   - pleasant surroundings
   - other (please state)

2. Water pollution means different things to different people. Please check the appropriate box to indicate the importance of each of the factors listed below in helping you to identify water pollution in general.

	most important	less important	least important
smell			
taste			
odour			
oil			
floating debris			
weeds, slime			
froth			
murkiness			
algae			
beach warning signs			

3. Which of the following do you think is most affected by water pollution? Which do you think is least affected by water pollution? Please rank in order of importance.
   a.)scenic beauty
   b.)public health
   c.)touris-
   lakeside recreation

4. How would you rate water pollution as a problem in B.C.? Do you think it is -
   serious
   important but not serious
   nothing to be concerned about

If serious, where do you consider water pollution to be most serious in B.C.?

5. If you had that chance all over again would you still come here to live?

   yes
   no

6. Do you own a summer cottage on the lake?

   yes
   no

   If yes, have you ever rented this out during the summer?

   yes
   no

7. Please indicate on the chart below how often you and your family participate in various recreation activities in the Shuswap area.

	Frequently	seldom	Never
swimming			
boating			
water skiing			
sailing			
canoeing			
fishing			
underwater diving			
camping			
hiking			
tennis			
golf			
bird watching			
hunting			
other (please specify)			

5. With regard to Shuswap Lake, how would you rate the general quality of the water?

very dirty
fairly dirty
fairly clean
very clean
don't know

6. Have you ever been warned against swimming in polluted water?

yes
no

If yes, where and when?

7. As far as you know have you ever suffered any ill effects swimming here?

no
upset stomach
skin irritation
infection of eye
infection of ear
other (please state)

8. Has the condition of Shuswap Lake changed at all in the time that you have known it?

better
same
worse
don't know

9. What do you feel might happen to the condition of Shuswap Lake in the future? Will it get -

better
worse
remain the same
don't know

8. Are there any of these you would like to do more of?
   Yes
   No
   Don't know
   If yes, which and why?

9. Are there any of these you did in the past but don't do now?
   Yes
   No
   Don't know
   If yes, which and why?

10. Are there any you don't do now but would like to do?
   Yes
   No
   Don't know
   If yes, which and why?

Part B

1. There are many problems of public concern facing most communities today. Of these listed below, which do you consider most important, somewhat less important, and least important with respect to your particular community. Please check one box per line.

	most important	less important	least important
adequate water supply			
adequate sewage disposal			
police protection			
education			
water pollution			
air pollution			
housing			
parks and recreation			
public health			
roads			

10. The following is a list of possible sources of pollution affecting Shuswap Lake. Please check one box per line to indicate which you think are most important, less important and least important in creating pollution on Shuswap Lake.

	most important	less important	least important
industry			
lakeside cottages septic tanks			
sewage from towns and villages			
agricultural drainage			
storm runoff in rivers			
other			

11. To answer the last question you must have got some information from various sources. Please indicate which sources you found to be most helpful.

    radio
    television
    newspaper (please state)
    public meetings
    friends, relations, acquaintances
    North Okanagan Health Unit
    personal experience

12. There are various ways in which pollution can be controlled, one is by providing adequate sewage treatment facilities. What about the sewage treatment facilities in Salmon Arm Village? Do you think they are -

    adequate
    inadequate
    don't know

If inadequate, in what way do you think they are inadequate?

13. What about the sewage treatment facilities in Salmon Arm Municipality? Do you think they are -

adequate
inadequate
don't know

If inadequate, in what way do you think they are inadequate?

14. Imagine that a lakeside Municipal Council decided to increase the discharge of secondary treated sewage into Shuswap Lake, how would you feel about this decision?

strongly agree
agree
disagree
strongly disagree
indifferent

15. Do you think that there is a problem of algae bloom on Shuswap Lake?

yes
no
don't know

16. What do you think are the conditions that give rise to algae blooms in lakes generally?

17. The councils of both the Municipality and Village of Salmon Arm have both expressed concern about pollution in Shuswap.
Do you think the Village, <u>and</u> the municipality, are:

	village	municipality
doing enough		
not doing enough		
not doing enough, but doing a good job generally in view of other local concerns		
it is not entirely their responsiblity		

18. If it's not entirely their responsiblity, whose responsibility is it to enforce pollution control and how much do you think should they be made responsible?

	very much	somewhat	not much
Federal Government			
Provincial Government			
Pollution Control Board			
North Okanagan Health Unit			
Local industry			
Regional district			

19. Do you think any of these bodies are doing much to assist in this problem in Shuswap. Please make one check per line.

	very much	somewhat	not much
Federal Government			
B.C. Pollution Control Board			
North Okanagan Health Unit			
local industry			
Regional district			

20. Pollution is a problem that doesn't affect me at all.
strongly agree
agree
don't know
disagree
strongly disagree

21. To control pollution on Shuswap would be too expensive to be worthwhile.
strongly agree
agree
don't know
disagree
strongly disagree

22. Suppose we could control pollution on Shuswap Lake. How much do you think you would be willing to pay for such control in terms of an addition to your local taxes per month?

$ 0 0-1 1-3 3-5 5-7 7-9 9-11
11-13 13-15 15-20 over 20

23. Who else do you think should pay?

	Yes	No
industry		
Federal Government		
cottage dwellers		
Provincial Government		
others		

24. Have you ever expressed your feelings about pollution in Shuswap in any of the following ways?

	Yes	No
letters to local council		
letter to M.L.A.		
letter to M.P.		
joined an action group		
written to local paper		
phoned into local radio program		
attended public meetings		

25. Do you feel that by expressing your feelings about pollution in this way that you will get favourable action?

	Yes	No
writing to local council		
writing to M.L.A.		
writing to M.P.		
joining an action group		
writing to local paper		
phoning into local radio station		
attending public meetings		

26. Do you know of any community groups who are concerned about pollution and are pressing for remedial action?

Yes
No

If yes, which ones?

27. Are you a member of any of these groups?

Yes
No

If yes, which ones?

28. I feel that my concern has very little effect in influencing the amount of pollution in Shuswap Lake, and that such interest that I have doesn't do any good. Do you -

strongly agree
agree
disagree
strongly disagree
don't know

29. What do you think of the proposal by Salmon arm Municipality to unite the sewage treatment facilities of both the Village and the Municipality into one plant?

strongly in favour
agree
don't know
disagree
strongly against

Part c SOCIO-ECONOMIC DATA

1. Salmon Arm -

Village lakeside
Village non-lakeside
Municipality lakeside
Municipality non-lakeside
other (please state)

2. Personal information:

(a) Age:

21-30
31-45
46 and over

(b) Sex:

Male
Female

(c) Education:

less than grade 12
grade 12
vocational college/non-university
university or college

(d) Occupation:

professional
managerial
white collar
1. clerical
2. sales
3. services
industrial employee
fishing, lumbering, mining, etc.
tourist industry
student
housewife
retired
unemployed

(e) Income for the household:

0-2,999
3,000-5,999
6,000-8,999
9,000-11,999
over 12,000