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**A THEORETICAL FRAMEWORK FOR SOCIAL IMPACT ANALYSIS
WITH SPECIAL REFERENCE TO POPULATION RELOCATION
AT THE MACTAQUAC DAM PROJECT ON THE SAINT JOHN RIVER**

Zhizhong Si

Submitted in partial fulfilment of the requirements for
the degree of Doctor of Philosophy in Interdisciplinary Studies

at

Dalhousie University
Halifax, Nova Scotia

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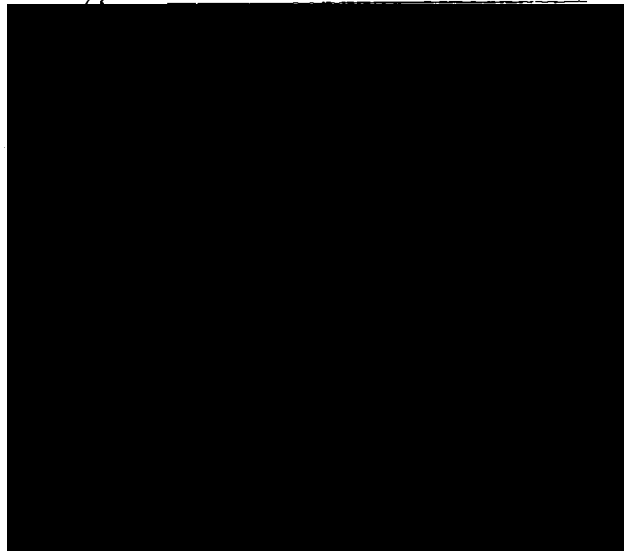
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by Zhizhong Si

in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

Dated 15 December 1992

External Examiner
Research Supervisor
Examining Committee



DALHOUSIE UNIVERSITY

Date: April 15, 1993

Author: Zhizhong Si

Title: A Theoretical Framework for Social Impact Analysis
with Special Reference to Population Relocation at
the Mactaquac Dam Project on the Saint John River

School: School for Resource and Environmental Studies

Degree: PhD Convocation: Spring Year: 1993

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Dedicated to my wife, Li, and my son, Xiao Hua.

Spare The Valley

Here are the homes of people,
Here are the graves of our dead,
Here we know peace and contentment,
For which our ancestors bled.

Here in this beautiful valley,
Our River flows to the sea,
The St. John, world famed and renowned,
Beloved of you and of me,
Shall we let Mactaquac Dam despoil us,
And desecrate graves that are dear?

Shall we let our hearthstones be ruined,
Our lives drenched in sorrow and fear?
Let us rise as one man with a purpose,
Rise up and proclaim each his right,
To hold fast his heritage holy,
Let us unite in the strength of our might.

The alternatives for power are plenty,
To our shores to the east and the west,
So leave us our farms and our good earth,
Where life can be lived at its best.
For here are the homes of the living,
Here are the graves of our dead,
Here we have peace and contentment,
With freedom from danger and dread.

Let us call on all forces of reason,
May our leaders get on the right track,
To guard the best interest of New Brunswick,
And to save us from dreaded MACTAQUAC.

George A. Davis
Relocatee from Mactaquac
The Daily Gleaner, July 4, 1964.

Preface

This thesis is the result of my doctoral studies in the Interdisciplinary PhD Programme at Dalhousie University. The programme is unique in that its requirements are shared by two or more departments within the University, thus offering students the opportunity to undertake studies that cannot be completed within the framework of a disciplinary programme.

The Supervisory Committee for the research was composed of seven members, representing five departments. They were Dr. Richard Apostle, Dr. Gordon Beanlands, Dr. Fay Cohen, Dr. Chris Field, Dr. Allister Sinclair, Dr. Richard Sutherland, and Dr. Don Waller. Dr. Beanlands, my principal supervisor, and Dr. Cohen, Chair of the Committee, are from the School for Resource and Environmental Studies. Dr. Apostle comes from the Department of Sociology and Social Anthropology; Dr. Field and Dr. Sutherland, Department of Mathematics, Statistics and Computing Science; Dr. Sinclair, Department of Economics; and Dr. Waller, Water Resources Centre, the Technical University of Nova Scotia.

During the course of the study, it became evident that a major benefit of having a large and interdisciplinary committee was the opportunity of exposure to, and interaction with, different perspectives the Supervisory Committee offered. The Committee members, by providing advice from different viewpoints, played an indispensable role in the development of the theoretical framework, which, being interdisciplinary in nature, draws upon various perspectives from a number of disciplines.

Notwithstanding, undertaking research of this nature has also proven to be a challenge. For instance, one immediate predicament in the writing of the thesis was the use of terminology. As we know, differing viewpoints exist in social and physical sciences concerning the definition of a "theory", "approach", or "framework". It is not unusual to have some disagreement among representations of various disciplines on the use of terminology.

In order to avoid confusion, it is preferable to adopt the terminology of either the social sciences or physical sciences. I elected to choose the former. The rationale is that the focus of this research, the subject matter of which deals with population relocation, should be "people" as they are affected by the process of being involuntarily removed from the original places of residence. It is with this understanding that the thesis should be read.

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Abstract

The social impact on relocatees associated with the construction of large dams has been described as the least satisfactory aspects of such projects. This study is concerned with changes in the well-being of relocatees, arising from environmental, economic, and socio-cultural effects of large dams. An interdisciplinary theoretical framework for social impact analysis is proposed which incorporates a number of concepts and propositions drawn from several relevant disciplines. Social impacts are defined in terms of changes in the quality of life (QOL) experienced by relocated individuals. It is assumed that the impact may arise from project-induced changes in economic, social and environmental settings and may be differentially distributed among sectors of society. It is contended that the most reliable information on social impacts comes from the individuals directly affected.

The framework is applied to the Mactaquac Dam Project on the Saint John River in New Brunswick which displaced over 1,100 residents between 1965 and 1968. The heads of 74 relocated households still in the area were interviewed using a semi-structured questionnaire. Background information and data on the regional economy, social structures and natural environment were collected and interpreted. The technique of discriminant analysis is used to determine the relative contribution to the overall QOL of various impact domains, such as family finance, housing, personal health, the elderly, children, community services, community relations, regional economy and the environment. Bivariate analysis is used to examine the differential impacts among segments of the relocatee population. Two case studies are also presented to illustrate the complexity and interactions of the factors involved.

The analysis shows that approximately equal numbers of respondents considered that their overall QOL has improved, remained the same or worsened as a result of the implementation of the project. Impacts on family finance, regional economy, personal health, community relations and housing were shown to be the most important contributors to the impact on overall QOL. Differential impacts were demonstrated between two segments of the relocatee population, farmers and householders, with the former articulating greater negative impacts in terms of family finance, community relations, personal health and overall QOL. These differential impacts may be related to the economic and social disruptions that accompany the loss of land as a means of production.

This proposed integrative approach to the study of social impacts associated with relocation emphasized the multi-dimensional nature of the stress on the relocatee populations. As demonstrated in the application of the framework to the Mactaquac Dam Project, the approach provides for the determination of the relative contributions from economic, social and environmental factors and incorporates the possibility that impacts may be differentially distributed. The findings will be of interest to those responsible for designing relocation programmes, including mitigation and compensation components.

Acknowledgement

While I bear sole responsibility for the information and conclusions of this study, I wish to gratefully acknowledge the efforts of many individuals who helped to make this thesis a reality. First of all, I wish to thank the respondents and local residents in the Mactaquac area, who not only opened their doors but also their hearts. They always greeted the presence of a curious student with friendliness and generosity and never seemed to be tired of answering the endless questions. My time in their homes and their villages constitutes the best possible learning experience, and some of the happiest moments of my life.

I would also like to thank members of my Advisory Committee for their invaluable advice and support. They are Dr. Richard Apostle (Sociology), Dr. Gordon Beanlands (Environmental Studies), Dr. Fay Cohen (Environmental Studies), Dr. C.A. Field (Mathematics, Statistics and Computing Science), Dr. Roy George (Economics), Dr. A.M. Sinclair (Economics), Dr. W.R.S. Sutherland (Mathematics, Statistics and Computing Science) and Dr. Don Waller (Water Resources Center, The Technical University of Nova Scotia).

I am deeply indebted to my thesis supervisor, Dr. Gordon Beanlands, for his inspiration, encouragement, advice and generous support throughout my four-year stay at the School for Resource and Environmental Studies. With extraordinary knowledge, expertise and patience, Dr. Beanlands guided me through each and every phase of this research- from the initial conception, implementation, to the finalization of this thesis. As an academic supervisor as well as a personal friend, he also offered his warmth and understanding, which helped me to overcome many difficulties and stresses.

Special thanks are due to Dr. Fay Cohen for her direction and support as Chair of the Advisory Committee. I also wish to thank Dr. Richard Apostle, member of the Advisory Committee, for his special advice and help in designing the questionnaire and in spending an enormous amount of time reviewing drafts of the thesis.

Many thanks are due to the New Brunswick Electric Power Commission for giving me the opportunity, and more importantly, for granting me absolute liberty, to use the Mactaquac Dam Project as the case study. Without its co-operation and support, this study would have

been a very difficult task. While many people in the Commission should be thanked, I would like particularly to mention Mr. Doug Hayward, Mr. Fred Meth, Mr. Al Lawrence and Mr. Charles Hickman. Special thanks are due to Mr. Fred Harriman who provided invaluable assistance as a contact person during the data collection process and later agreed to be an external reader of this thesis.

I also would like to thank a number of people who offered advice, encouragement and support in various phases of this research. They are Dr. Thayer Scudder, Professor of Sociology at the California Institute of Technology, Dr. Michael M. Cernea, Sociologist at the World Bank, Dr. Will C. van den Hoonaard, Professor of Sociology at the University of New Brunswick, Dr. Paul Brown, Professor of Public Administration at Dalhousie University, Dr. Leonard Kasdan, Professor of Sociology at Dalhousie University, Mr. Paul Smith, Lecturer of Sociology at Dalhousie University, Dr. Shen Ganqing, Senior Engineer at the Chinese Ministry of Water Resources, and Dr. Guan Boren, Professor of Environmental Science at Peking University. I also wish to thank Dr. Frank Quinn, Head of Social Impact Studies, Inland Waters Directorate, Environment Canada, for kindly reviewing early drafts of thesis chapters and providing very constructive comments while attending the 1991 Annual Meeting of the Canadian Geographers Association at Kingston.

Many friends and faculty and staff members at the School assisted me in one way or another. In particular, Ms. Judy Reade, our Librarian, deserves a note of thanks for her efficient and timely assistance in locating and acquiring research materials, and Mr. Gordon Chiu, China Project Officer at the School, for his timely help. I am also deeply indebted to Mr. Brian Beanlands, Bedford Institute of Oceanography, for successfully recovering my data from the failed hard drive of my personal computer when I was told by many professional computer experts that they could do nothing about it. I also benefited from discussions with Mr. Gary Stairs, Planning Officer at the New Brunswick Emergency Measures Organization. I wish to thank him for his inputs.

Last but certainly not least, I thank my wife Li for her love, support and patience. Li accompanied me throughout the entire period while I was doing the field work, and relieved me of many responsibilities while I was writing the thesis. Finally, I thank my son, Xiao Hua, who may have been neglected during the long days in the preparation of this thesis but certainly was not forgotten.

Chapter One. Introduction

1.1. The Controversy Over Large Dams

The past few decades have witnessed the construction of many large dams¹ around the world. According to the International Commission on Large Dams (ICOLD), over 350 dams are built each year, bringing the total number of large dams currently in service around the world to 17,000.² Many more are under construction or in the planning stage. Large dams are usually one of the major components of national or regional natural resource development plans. They are intended to achieve one or more objectives such as electricity generation, flood control, water supply, improved navigation, and recreation. However, in most instances, the production of electricity is the primary or even the sole objective of a dam project. This is particularly true in Canada, where 95% of large dam and diversion projects are primarily associated with hydroelectric development (Quinn 1990).

Traditionally, and even until recently, hydropower has been regarded by many as the cheapest, cleanest and least-polluting source of energy production and the best way to produce electricity (Deudney 1981; Bourassa 1985).³ This notion is now being challenged as more is learnt about the negative effects of large dams on the natural and social environments (Goldsmith and Hildyard 1984).

Since the late 1960s, there have been increasingly critical and comprehensive reviews of the ecological and social impacts of large dam

projects. Large dams are characterized as important agents of economic change that may also be ecologically and socially destructive (Farvar and Milton 1968). Drawing on the ecological and social effects of the Volta Dam in Ghana, Johnson (1971) argued that large dams may create far more problems than they solve. Sterling (1972) and Obeng (1977) also questioned the economic efficiency, safety, and ecological and social desirability of large dams. The most extensive and best documented case against large dams has been provided by Goldsmith and Hildyard (1984, 1986). In the first two volumes of this three-volume series, Goldsmith and Hildyard presented a host of evidence to show the enormous ecological and social costs that have been associated with large dams all over the world.

It is well-known that large dams can create adverse effects of tremendous scope and magnitude on the natural environment (Geen 1974, 1975; Ruggles and Watt 1975; Baxter 1977; Goldman 1979; Baxter and Claude 1980; Canter 1983; White 1988; Delisle and Bouchard 1990). It is well-documented that large-scale water resource development projects may create significant changes in physical and chemical processes such as erosion (Goodland 1989), sedimentation (Canter 1983; Wu 1986), thermal regime (Lehmkuhl 1972), and water quality (Gras and Albignat 1985a, 1985b). The effects can involve all components of the local ecosystems in the areas surrounding the dam and reservoir, and may extend to the headwaters and to the estuary of the river system.

A review of 19 Canadian river diversion projects indicated pronounced morphological changes in most cases (Kellerhals, Church and

Davies 1979). Dominy (1973) observed that the construction of a series of dams on the Saint John River greatly reduced the dissolved oxygen concentrations in the headponds as a result of increased stagnation. Olofin (1988) also found that dams controlling over 90% of the flows in two large river basins in South Africa, the Kano and the Chalawa, created important environmental impacts on soil erosion and sediment yield, channel morphometry, discharge pattern and volume, vegetation cover, and water chemistry.

Through complex ecological processes, these physical and chemical changes may affect biological resources. One of the most frequently reported biological impacts concerns fish. Dams serve as physical obstructions to migratory fish species such as striped bass, shad and particularly salmon. Moreover, water becomes supersaturated with gases, especially nitrogen, when it passes through turbines or over spillways, carrying entrained air to a considerable depth. As such, fish in the water may develop the so-called "gas bubble disease" when the supersaturated gases are released from solution within fish bodies. The disease can sometimes cause serious injuries and death (Harvey 1975; Baxter and Claude 1980). It was estimated that 10% of the 1968 upriver salmon run at Mactaquac Dam was killed by the gas bubble disease (MacDonald and Hyatt 1973). It is reported that turbine-related mortalities can result in the death of 7% to 32% of salmon smolts at each dam (Ruff 1989).

Migratory fish species like salmon can tolerate only limited delays as their energy reserves are closely tied to the requirements

necessary for successful migration and spawning (Idler and Clemens 1959). A study indicated that a five-acre lake formed as a result of a small wooden dam on the Ellerside Brook in Prince Edward Island acted to delay migrating smolts, causing heavy mortalities (Saunders 1960). It was also found that the construction of dams on the Lower Nelson River in Manitoba has largely eliminated brook trout and sturgeon in the impoundments due to habitat alterations (Swanson 1990). Similar effects were also observed in the Churchill River Basin, Manitoba, where dam and diversion projects seriously affected many fish species, including whitefish, northern pike and walleye, as a consequence of physical and chemical changes (Bodaly, Hecky and Fudge 1984; Bodaly *et al.* 1984; Barnes and Bodaly 1990).

In the Columbia River system, hydropower development reduced runs of Chinook salmon by as much as 95% in low-flow years, as a result of turbine-related mortalities and losses associated with delayed passage through the reservoirs and altered spawning grounds (Raymond 1969, 1988). On the whole, salmon in the Columbia River system have declined to just 15% to 25% of their previous numbers, due to a number of factors such as logging, mining, agriculture, urban development, industrial pollution, and overfishing as well as hydropower development. Hydropower development, however, accounted for over two thirds of the total loss (Muckleston 1990).

Large dams were also found to contribute to forest decline by reducing downstream flows and/or by altering flow patterns. Dams are responsible, for example, for the collapse of riparian poplar forests in

western Canada (Rood and Mahoney 1990a, 1990b). The construction of dams usually submerges large areas of land- including forests and wetland- that serve as the primary source of food and refuge for wildlife (Heinzenknecht and Paterson 1978). The loss and disturbance of habitats, for example, as a consequence of flooding and associated ecological changes, are among the major causes for the reduction or extinction of wildlife species in many African floodplains (Liao, Bhargava and Das 1988).

Large dams can create serious negative impacts on humans as well. They may increase the risk of flooding.⁴ The large volume of water in the reservoir may also induce earthquakes (Budweg 1980). Large dams can also pose other safety hazards; tragic dam failures have been reported in, among many other countries, Brazil, France, India, Italy, Spain, Sudan, and the United States (USCOLD 1975; US Committee on Failures and Accidents to Large Dams 1975; Thomas 1976; Moffat 1979).⁵ The failure of the Machhu II in India in 1979, for example, flooded sixty-eight villages, affecting a total of 150,000 people and resulting in the deaths of an estimated 15,400.⁶

In tropical and sub-tropical regions, large dams can cause the proliferation of water-borne diseases such as schistosomiasis, malaria, trypanosomiasis and filariasis (WHO 1967; Lagler 1969; SCOPE Working Group on Man-Made Lakes 1972; Stanley and Alpers 1975; USAID 1975; Goldman 1979; Interim Mekong Committee 1982). Another effect on local residents is through the reduction in the availability of natural resources as a result of ecological changes. The Churchill-Nelson Project, for example,

was responsible for the collapse of the commercial whitefish fishery and the subsequent devastation of the economy of the community of South Indian Lake in Manitoba (Wagner 1984).

A large reservoir⁷ can cover as much as tens of thousands of square kilometres. Lake Nasser in Egypt and Lake Volta in Ghana, for example, have surface areas of approximately 5,276 and 7,482 square kilometres respectively (Fahim 1981; Chambers 1970). Consequently, large tracts of land with various uses are submerged. This inevitably leads to the relocation of local residents whose houses and land stand within the planned reservoir. The flooded areas are often the most productive and densely-populated riverine land so that large numbers of people are involved (Table 1-1-1). The relocation of 80,000 people from the Volta project in Ghana, which was constructed between 1962 and 1966, comprised over 1% of the population of Ghana at that time (Hart 1980). The proposed Three Gorges Dam in China may displace as many as 1.5 million people if it is built (Fearnside 1988).⁸ It was estimated that between 600,000 to 750,000 people would be relocated by 40 irrigation and hydropower projects approved for funding by the World Bank during the fiscal years for 1979-1985 in 27 countries (Cernea 1988a).

Relocation has been found to result in multi-dimensional stresses (including physiological, psychological and socio-cultural) upon the relocatees (Scudder 1975; Scudder and Colson 1984). It has been described as the "least satisfactory aspect" of large dams and "one of the cloudiest pages in the history of induced development change" (Scudder

Table 1-1-1. Population Relocation Associated with Selected Large Dam Projects Around the World (Rounded to Nearest Thousand)

Project/Country	Relocation	Reference
<i>COMPLETED</i>		
Danjiangkou/China	382,000	Wang and Peng (1982)
Sanmen Gorge/China	300,000	Wu (1986)
Aswan/Egypt	110,000	Farid (1975)
Pong/India ⁹	97,000	Parkash (1989)
Mangla/Pakistan	90,000	Gosling (1979a)
Tarbela/Pakistan	86,000	Gosling (1979a)
Kossou/Ivory Coast	85,000	Cernea & Le Moigne (1989)
Volta/Ghana	80,000	Kalitsi (1970)
Shuikou/China	63,000	Cernea (1988b)
Sobradinho/Brazil	60,000	Cernea & Le Moigne (1989)
Kariba/Zimbabwe	57,000	Scudder (1973)
<i>UNDER CONSTRUCTION OR PLANNED</i>		
Three Gorges/China	1,500,000	Fearnside (1988)
Narmada Valley/India ¹⁰	1,000,000	Jackman (1989)
Makurdi/Nigeria	401,000	Adekolu-John (1983)
Pa Mong/Thailand	400,000	Lightfoot (1981)
Upper Krishna/India ¹¹	288,000	Nayak (1989)
Ikom/Nigeria	101,000	Adekolu-John (1983)
Gandhi Sagar/India	100,000	Cernea & Le Moigne (1989)
Kalabagh/Pakistan	80,000	Cernea & Le Moigne (1989)
Subernarekha/India	64,000	Cernea (1988b)
Cirata/Indonesia	55,000	Cernea (1988a)
Karnali/Nepal	50,000	Cernea & Le Moigne (1989)

1973; Cernea 1988a, 1988b). The adverse social impacts of relocation have been among the major concerns of the critics and opponents of large dams (Alexis 1984; Goldsmith and Hildyard 1984, 1986; Drucker 1985; Kalpavriksh 1985; Lutzenberger 1985; Mohun and Sattaur 1987; Fearnside 1988; Hirsch 1987, 1988; Colchester 1989; Jackman 1989; Ryder 1990). In some instances, the final approval of a project may hinge mainly on relocation issues (Cernea 1988a). As the trend towards building larger and larger dams is increasing under the justification of wider societal benefits that more than compensate for local destruction (Hirsch 1988), it is expected that the controversies and confrontations over large dams will increase in the future.

1.2. Dam-Related Relocation: Lessons from Experience

Most dam projects have adopted a standard of "no worse off" as the goal for relocation (Gosling 1979a; Waterbury 1979; Goodland 1986; Graham 1986). That is, relocatees should not become economically, socially or psychologically worse off as a result of being forced to leave their homes. Specifically, their material and financial assets, on-going incomes, future economic prospects and living standards should not be reduced. In many cases, the relocatees are assumed by dam planners to be better off because of the relocation.

However, worldwide experience indicates that few, if any, of the world's relocation programs have lived up to the expectations of their planners. In almost all instances, the relocatees suffered severe financial,

material, social and cultural losses.

Extensive field studies on resettlement programmes in connection with many large dams in Asia and Africa showed "far more evidence of failure than success" (Gosling 1979a: p.10). At the Gezira Dam of Sudan, it was observed that the "quality of life (of the relocatees) has seriously declined" (Pollard 1986: p.177). In China, the general reaction of the relocatees from the Danjiangkou Dam was that "in the past the reservoir had caused much suffering".¹² At the Volta Dam, all relocatees thought that "his or her life in general was worse off after than before the time of resettlement" (Barrington 1973 as cited in Graham 1986: p.138). In summarizing the findings of a comprehensive review of 40 World Bank-financed water resources development projects in 27 countries which relocated 600,000 to 750,000 people, Cernea (1988b: p.1) concluded that the adverse consequences of relocation on affected communities and households were "profoundly" disruptive, painful and often tragic.

It has been widely acknowledged that relocatees may be impoverished as a result of inadequate compensation for the properties submerged by the reservoir. In the five major dam projects in Africa (the Aswan High, Kainji, Kariba, Kossou and Volta), the relocation budgets were under-estimated to such an extent that the actual relocation expenses were between three- and ten-times higher than the original estimates (SCOPE Working Group on Man-Made Lakes 1975). At an irrigation project in Andhra Pradesh, India, the amounts of compensation offered by the land acquisition agency to displaced residents had to be increased, by court order, by 200%-

400% on average, to attain the fair market value (Cernea 1988a). It is conceivable that the financial and social consequences to the relocatees may have been similarly beyond expectations.

In most developing countries, the relocatees are usually placed in planned settlements where they are provided with sub-standard housing and poor infrastructural facilities (Brokensha 1963; Wang and Peng 1982). Relocatees may also be redistributed among existing communities. When the carrying capacities of the receiving communities are overloaded, the economic prospects for the relocatees, as well as the host populations, become grim. In China's Danjiangkou Dam development, for instance, the population of a receiving community had expanded from 97 to 401 residents when the relocation was complete, while the land base remained constant (Wang and Peng 1982). Many of the Danjiangkou relocatees were still living in critically poor conditions 20 years following the move.

Relocation programmes in the past have also created many secondary environmental problems, such as deforestation, soil erosion and over-exploitation of natural resources. In Zambia, for example, the environment in the vicinity of the settlements occupied by the Kariba relocatees experienced serious gully erosion due to ecological stress related to overgrazing by goats and cattle (Magadza 1986).

Relocatees can also be affected by marked ecological changes accompanying the formation of a reservoir. The spread of water-borne diseases has been one main concern. At Kariba, for example, an outbreak of human sleeping sickness caused by the tsetse fly led to the deaths of 41

children within a three-month period. In the Lusitu area below the dam, dysentery killed over 153 of the approximately 6,000 relocatees in less than two years after the relocation (Scudder 1966a). For the first few years, the relocatees tried to flee from the new settlements for fear of the diseases and had to be kept there by force (Colson 1971). A decade and a half later, agricultural development in the areas surrounding Lake Kariba was still prohibited as a result of the tsetse fly (Magadza 1986).

The malaria epidemic of 1942 and 1943 in Upper Egypt, which caused 130,000 deaths, was attributed to the water resources development at low Aswan (Hunter, Rey and Scott 1982). The Volta development in Ghana induced a sharp increase in the rates of infection of water-borne schistosomiasis from below 5% before to 80% in the early years after the impoundment. The eyesight of over 100,000 people in the surrounding areas of Volta Lake was damaged as a consequence of the spread of the onchocerciasis disease. About 70,000 of the 100,000 victims became permanently blind (Mohun and Sattaur 1987). Increased incidence of schistosomiasis and malaria in reservoir areas has also been reported in many countries other than those in Africa, such as the United States (Elliot 1973; Hayes 1976; Kitron 1987), China (Chen *et al.* 1980), and Brazil (Budweg 1980).

Lifestyle modification has proven to be another painful experience to the relocatees. Such modification can originate from a number of factors, such as improper housing designs or labour migration. At Kariba, the new houses built by the Volta River Authority offered only one room for

the husband and all the wives, resulting in conflict with the traditional arrangements where the wives had separate rooms and the husband moved around from one room to another (Johnson 1971). At Danjiangkou, pens for household animals were built within the house so that the relocatees had to live with the animals (Wang and Peng 1982). The labour migration induced by the reduction of land forced the relocated Nubians from the Aswan High Dam into the cities, which caused family breakups (Fahim 1983b).

The social impacts of relocation have not only attracted the attention of the academic community, but also raised increasing resistance from the people who are to be directly affected, including the potential relocatees. India's massive water resources development scheme, the Narmada Valley Project, which consists of 3,000 dams that would eventually displace over one million people, drew protests from the local tribal groups who were or would be displaced (Kalpavriksh 1985). In Norway, the construction of a hydropower plant on the Alta River was once suspended as a result of strong opposition.¹⁹ Demonstrators all over the country set up a permanent camp at the dam site to prevent the construction from proceeding. The Lapps, the only ethnic minority in that country whose traditional economic activities would be harmed by the project, held a hunger strike in front of the Norwegian National Assembly.

Armed resistance was reported to the Chico Dam project in the Philippines (Drucker 1985). The Kalinga tribes who were to be affected by the dam, with the support of the guerrilla New People's Army, attacked dam crews and constabulary guards. The project was postponed due to the

violent confrontation. The bitter and indignant feelings can be clearly discerned in one of their protest posters:

"The dams are all we talk about these days. It is like talking continually of death of certain death. The President will have to put us all in prison if he wants to continue with the construction of the dams on the Chico, better still, he should bomb us out of existence. This would be much easier for him and for us. Because we are not going to allow the destruction of our homes and fields as long as the breath of life is in us." (Hirsch 1988: p.9).

The greatest concern is that the trend towards larger dams around the world is growing as construction technology advances. It is certain that future large dam projects will involve considerably large relocatee populations, such as those of the Three Gorges Dam in China and the Narmada Valley Project in India. Given the repeated failures of relocation programmes worldwide in the past, addressing the social and environmental impacts of large dams has become a matter of urgency.

1.3. Relocation in the Canadian Context

Canada is one of the few nations in the world that is endowed with great hydropower potential. It is not surprising that some of the world's largest hydropower projects are found in Canada, such as the Bennett, Mica and Revelstoke in British Columbia, the Gardiner in Saskatchewan, the Caniapiscau, Daniel Johnson and La Grande in Quebec, and the Churchill

Falls in Newfoundland (Mermel 1990).

The construction of large dams in Canada began as early as 1832, and has continued to date. By 1920, hydropower accounted for more than 97% of total electric production in Canada. During the period between 1950 and 1960, this percentage stayed at over 92% (Energy, Mines and Resources Canada 1991). Despite the rapid development of fuel and nuclear energy, electric energy from hydropower still accounted for 65% of Canada's total electric supply in 1972 (Efford 1975). By 1989, the figure stood at 60% (Energy, Mines and Resources Canada 1991). It is not surprising that as a major source of electricity, hydropower occupies a central position in Canada's energy policies (Lilley 1990).

The completion of the 19-meter-high Jones Falls Dam on the Rideau Canal in Ontario in 1832 marked the first large dam in Canada. But it was not until the advent of commercial hydropower that the development of large dams was accelerated. By 1970, the number of large dams in Canada increased to 423. From 1971 to 1983, an additional 190 large dams were added, bringing the total number of Canadian large dams to 613 (Table 1-3-1).

To date, most of Canada's major river systems have been dammed. They include, among others, the Columbia, the Peace, the Saskatchewan, the Churchill, the Nelson, the St. Lawrence, the Ottawa, the Maricouagan, the Saint John, and the Churchill (Labrador). In the meantime, a number of large dams are under construction, such as the Oldman Dam in Alberta and the Rafferty Dam in Saskatchewan. Construction of the

Table 1-3-1. Distribution of Large Dams in Canada (CANCOLD 1984)

Province	Number by 1984
Quebec	189
British Columbia	89
Ontario	79
Newfoundland	79
Alberta	38
Nova Scotia	35
Manitoba	34
New Brunswick	16
Yukon Territories	3
Northwest Territories	3
Prince Edward Island	0
Total	613

massive James Bay II, or the Great Whale Project, of Quebec is to begin in 1993.¹⁴ Many more large dams are in the planning stage. According to statistics, the total gross hydroelectric resource that could be developed in Canada is estimated at 188,191 MW, which is twice as much as the total hydroelectric generating capacity in operation and under construction by 1989. Of the total hydroelectric reserve, over 40%, or 43,143 MW, is considered to be likely for future development (Energy, Mines and Resources Canada 1991).¹⁵

The growing public awareness of the negative environmental

effects has fostered momentous controversies over the construction of dams. The James Bay Project, for example, has been the target of strong criticism ever since it was announced (Glooschenko 1972; Richardson 1972, 1975; Salisbury 1986; Berkes 1990). In an effort to draw attention to the effects of the James Bay II development, or the Great Whale Project, planned by Hydro Quebec on their traditional hunting grounds, Cree and Inuit hunters from a remote Northern Quebec settlement paddled a canoe in protest from Ottawa to New York in the spring of 1990.¹⁶ Controversies and confrontations over the project continue to grow as the scheduled starting date is fast approaching.¹⁷

As recently as March 13, 1990, a Supreme Court ruling ordered a suspension to the construction of the Oldman Dam, which was 70% completed, on the grounds of environmental concerns.¹⁸ The legal battle between the federal government and the government of Saskatchewan over the Rafferty-Alameda Dams project is another highly-publicized case.¹⁹ In British Columbia, a proposed Site-C Dam on the Peace River is claimed to be "the next environmental battleground".²⁰

The number of people actually relocated by large dams in Canada has been relatively small in comparison to dams of equivalent scale in other countries, simply because of Canada's low population density (Table 1-3-2). But, this does not mean that relocation has been a simple task. Nor does it imply that Canadian dams have had fewer and less serious impacts on the ecological and social environments.

Table 1-3-2. Number of Relocates from Selected Dam Projects in Canada

Project	Province	Number of Relocates	Reference
St. Lawrence	Ontario/Quebec	9,100	Mabee (1961) ²¹
Arrow	British Columbia	1,950	Wilson (1973)
La Grande	Quebec	1,200	Egre <i>et al.</i> (1990) ²²
Mactaquac	New Brunswick	1,115	Wark <i>et al.</i> (1969) ²³
Grand Rapids	Manitoba	180	Waldram (1980)

In fact, serious negative social impacts from dam-related relocation have been reported across Canada. In British Columbia, the Columbia River Project caused "suffering of people" as a consequence of the associated relocation (Wilson 1973: p.xiii). The sentiments over the loss of homes can be discerned from the statement of one of the relocatees (*Ibid*: p.20):

"We have built up our farm for ourselves and our children believing we would be allowed to go on living here, and I object strongly to having it all taken away from us. Most particularly I object to losing it for a scheme which has not yet been proved to be permanently beneficial to BC. Even if it could be shown to be profitable at the present time, it is a sad thing that love of money should be put before love of country. No amount of money would ever repay us for what we would lose- our home, our livelihood, and our whole way of life."

In Manitoba, the flooding and subsequent relocation of the Native community of Chemawawin, necessitated by the Grand Rapids Dam project, resulted in the demise of the hunting, trapping and fishing economy of the community and provoked numerous "maladaptive" social and economic problems, including decline in health standards, alcohol abuse, crime and vandalism (Landa 1969; Waldram 1980; Loney 1987). In reviewing the effects of hydroelectric developments in western Canada on Native communities, Waldram (1988) concluded that hydropower development projects "victimized" the natives by taking their land resources in a similar fashion to treaties making and scrip allocation in the past century.

In Ontario, the St. Lawrence Seaway Project created "suspicion", "bitterness", "despair", "dissent", "opposition" or even "outright hostility" (Richardson, Rooke and McNevin 1969). Cases of suicide and deep grievance were also reported (Mabee 1961). As another example, the Caribou Dam built by Ontario Hydro was blamed for destroying the livelihood of two Indian communities by ruining their commercial fishing grounds and flooding their farmland.²⁴

The creation of a series of reservoirs in connection with the La Grande Project (James Bay I) flooded up to 10% of the hunting grounds of three Cree villages in Northern Quebec, and necessitated the relocation of the community of Fort George, which was home to 1,200 Cree Indians (Egre and Senecal 1990). The relocation was strongly resisted by some members of the community. The long-term social impacts of the flooding and

relocation have yet to be determined. In the meantime, preparatory work for the Great Whale Project (James Bay II) is scheduled to start in late 1991. Construction of the main dam is planned to begin in 1993. Yet, an environmental review has yet to be conducted. Concerned with the destruction of their hunting grounds and way of life, Cree Indians have vowed to block the development.²⁵ The social impacts on the natives arising from project-induced environmental and social changes have become one of the crucial factors that may eventually determine the fate of the Great Whale Project.

1.4. Rationale and Objectives of Study

This research arose from a deep concern for the well-being of relocatees who were, or will be, affected by large dam projects. Despite extensive documentation on the scope and severity of the problems that relocation has created for the populations concerned, a lack of understanding and information on the part of those who make the decisions and formulate the plans is one of the most important obstacles to developing solutions to these problems. These decision-makers and planners remain ignorant of the environmental as well as social problems that their actions may create, or try to rationalize the problems by labelling them as "side-effects".

The underlying premise of this present study is that proper consideration of the environmental and social impacts in the early stages of

decision-making and planning of water resources development projects is the key to the prevention and mitigation of the negative impacts. In fact, this philosophy was the initial motivation for the National Environmental Policy Act (NEPA) of the United States, which went into effect in January of 1970. The passage of the NEPA mandated environmental impact statements (EISs) for any federal activities which could significantly affect the quality of human environment before decisions are made on whether and how the project should be constructed (Public Law 91- 190, Section 102). The Act has been interpreted to include cultural and social factors, and hence the legal procedures associated with NEPA rely on social impact studies (US Council on Environmental Quality 1973, 1978). Since NEPA, many other countries around the world have established environmental impact assessment procedures in an effort to cope with potential environmental and social consequences of development projects (Burton, Wilson and Munn 1983; Hollick 1986).

A similar motivation was behind the establishment of the federal Environmental Assessment and Review Process (EARP) in Canada (FEARO 1979; Government of Canada 1984). Under EARP, project proposals involving potentially significant impacts should be referred to the Minister of the Environment for public review by a panel to examine the environmental as well as directly-related socio-economic effects (Beanlands and Duinker 1983). Recent drafts of a new Canadian Environmental Assessment Act also include a requirement for the assessment of effects on "health and socio-economic conditions".²⁶

The experience in Canada indicates that in cases of major projects referred for public review, social issues are often critical and can exert an important influence on final decisions (Canadian Environmental Assessment Research Council 1985). The recent controversies over the Oldman and the Rafferty-Alameda projects have reflected this concern. Consideration of social issues has become one of the critical factors in determining the fate of proposed projects, rendering social impact assessment a matter of practical necessity for proponents and agencies responsible for impact assessment processes (Lang and Armour 1981).

It is in this context that this study was initiated. It was aimed to achieve three major objectives: (1) to develop a generic theoretical framework for social impact analysis; (2) to demonstrate the use of the framework using a practical case study; (3) to test some hypotheses, formulated under the guidance of the framework and taking into account the limitations of the case study, about the social impacts of population relocation.

1.5. Organization of the Thesis

This thesis is divided into seven chapters. Chapter One serves as an introduction to the general issues involved in dam-related relocation. In particular, it highlights the problems that large dams in the past have created in affecting the lives of relocatees. The rationale and objectives for this study are also presented. Since the case study used in this research

involves a Canadian dam, a special section is devoted to outlining relocation issues associated with large dams in Canada.

In the second chapter of this thesis, the literature on dam-related relocation and relevant fields is reviewed. The review is organized around major themes that previous authors have developed. Although there are a few dedicated researchers, dam-related relocation remains a relatively under-developed scientific field. Therefore, the review will be extended to other types of relocation such that connected with urban renewal, highways, and nursing homes for the elderly.

Chapter Three presents the analytical framework that has guided this study throughout the entire process, from the design of the research, the collection and processing of data, to the writing of this report. In presenting the framework, emphasis is placed on the major theoretical perspectives that are used in the analyses, as well as in the interpretation of the results.

The research design is explained in Chapter Four. It outlines the selection of the case study, design of the questionnaire, data collection and processing methods. Also presented in this chapter are the demographic features of the respondents. The limitations of the study are discussed in the final section.

The general setting of the case study of the Mactaquac Dam Project is presented in Chapter Five. The social and cultural background of the affected communities and the environmental conditions of the project area at the time of the relocation and at the present time are reviewed. The

chapter also contains discussions of the engineering aspects of the Mactaquac Dam Project and the various components of the associated land acquisition and relocation policies.

The research findings of this study are discussed in Chapter Six. As the most important part of the thesis, this chapter contains qualitative as well as statistical analyses of the questionnaire responses from the relocatees of the Mactaquac Project. The discussions are supplemented by the information collected from secondary sources, which include internal documents of the undertaking agency, and various articles published in the local and national media, as well as professional journals. The inclusion of two case analyses in the final sections of the chapter are intended to serve two purposes: to support the results of the statistical analyses in the preceding sections, and to further advance the theoretical concept of differential impacts proposed in the analytical framework in Chapter Three.

The general conclusions of this study and the implications of the research findings for the management of the social impacts of relocation are discussed in Chapter Seven. The thesis also has an appendix, which contains the introductory letter and questionnaire used in the interviews.

NOTES:

1. There are varying definitions of "large" dams. Brooks (1987), for example, contended that, to be called large, a dam has to be over 100 meters in height or involve a reservoir of a cubic kilometre in capacity. A large dam has been defined by the International Commission on Large Dams (ICOLD) as any dam above fifteen metres in height, measured from the lowest portion of the general foundation area to the crest. ICOLD has also defined a dam between ten and fifteen metres in height as large if it meets at least one of the following conditions: (a) the length of the crest is not less than 500 metres; (2) the capacity of the reservoir is not less than 1 million cubic metres; (3) the maximum flood discharge is not less than 2,000 cubic metres per second; (4) the dam has specially difficult foundation problems; or (5) the dam is of unusual design (Thomas 1976). The definition by ICOLD will be used in the discussions that follow.
2. This figure is based on ICOLD's World Register of Dams (1973, 1974, 1976, 1979) and McJunkin (1975) who estimated the total number by 1975 at 10,000-12,000. It should be pointed out that the ICOLD statistics are incomplete. Therefore, the actual figure may be close to, or greater than, the upper range of the estimate by McJunkin.
3. See also, "Look after your friends", Editorial Comment, *Water Power & Dam Construction*, April 1977, p.21.
4. "Large dams blamed for Brazilian flood", International News, *Water Power & Dam Construction*, April 1980, p.3.
5. See also, "India's worse dam disaster", International News, *Water Power & Dam Construction*, October 1979, p.3; "Spanish dam bursts in freak rainfall", International News, *Water Power & Dam Construction*, December 1982, p.7; "Tous dam failure hits Spain", International News, *Water Power & Dam Construction*, January 1983, p.5; "Sudanese earth dams collapse", World News, *Water Power & Dam Construction*, October 1986, p.2.
6. "India's worst dam disaster", International News, *Water Power & Dam Construction*, October 1979, p.3.
7. (1) There are several alternative names for a reservoir, which include man-made lake, headpond, and impoundment. They will be interchangeably used throughout the thesis. (2) Ackermann (1973) provided a definition of a

large man-made lake which should be over 10 metres in depth or have a surface area in excess of 100 square kilometres. From a flooding and relocation point of view surface area should be used to define a "large" reservoir. But the criterion of over 100 square kilometres set by Ackermann is based on ecological considerations and seems to exclude an excessively large number of dam projects. "Large" will be loosely used throughout the thesis.

8. Fearnside (1988) noted that the estimates of the numbers of people to be relocated by the proposed Three Gorges Dam varied, with the highest being 3 million. He believed that the figure of 1.5 million, which was given by the World Bank and agreed to by Chinese government agencies, was the most reliable.

9. A total of 16,100 families were relocated by the Pong Dam of India (Parkash 1989). Assuming six members in an average family, the total number of relocatees would be approximately 96,600.

10. As "one of the most grandiose schemes ever envisaged in human history", the Narmada Valley Project is composed of more than 3,000 major and minor dams and will take over 100 years to complete (Jackman 1989). The World Bank claimed that it would be "the largest river basin population resettlement to date" that would force one million people to leave their homes as a result of the flooding of more than 100,000 hectares of forest and agricultural land. Two of the dams, the Sardar Sarovar and the Narmada Sagar, were approved in 1988 by the Indian Government for construction (*Ibid*). The Sardar Sarovar alone will relocate a population of about 67,000 (Murthy 1989).

11. The Upper Krishna Project of India has been conceptualized as a long-term development program for irrigating three districts of Northern Karnataka, to be implemented in stages. The principal civil works in Stage I, currently under execution and scheduled for completion in 1996, involve the construction of two dams (for storage at Almatti and primarily for diversion at Narayanpur). The relocation figure of 288,000 in Stage I is calculated from Nayak (1989).

12. "Danjiangkou Resettlement Experience", Internal Report, Yangtze River Planning Office (YVPO), Wuhan, China, December 1986, p.3.

13. "Lapps halt hydro plant construction", International News, *Water Power & Dam Construction*, December 1979, p.9.

14. *The Globe and Mail*, "Hydro delay angers Bourassa", August 5, 1991, pp.1-2.
15. Hydroelectric potential is classified into gross potential, identified potential and planning potential. Gross potential is the total gross resource that could be developed if there were no technical, economic or environmental constraints, excluding sites already developed or under construction. Identified potential is the gross potential less sites that may not be developed for technical reasons. Planning potential is the identified potential less sites that may not be developed for environmental or economic reasons. Planning potential thus comprises all those sites that are considered to be likely candidates for future development. See, Energy, Mines and Resources Canada (1991).
16. *The Globe and Mail*, "Natives plan paddle protest against hydro development", February 19, 1990, p.1.
17. See, *The Globe and Mail*, *supra* note 14.
18. *The Globe and Mail*, "Assess impact of Alberta dam on environment, Ottawa ordered", March 14, 1990, p.1; "Oldman dam ruling stuns federal officials", March 15, 1990, p.A5.
19. *The Globe and Mail*, "Rafferty dam goes ahead", October 13 1990, p.1; "Ottawa takes hard line on Rafferty dam", and "The tangled history of 2 dam projects", October 16, 1990; "De Cotret to seek Rafferty injunction", October 19, 1990, p.1.
20. "The Peace River war", *The Alberta Report*, January 8, 1990, pp.24-25.
21. Including the relocatees from the State of New York, USA.
22. La Grande is part of the massive James Bay Project which will involve the construction of a series of large dams (Glooschenko 1972). The La Grand Project (James Bay I) necessitated the relocation of the entire Cree community of Fort George which had a population of about 1,200 (Egre and Senecal 1990). The total number of Natives to be relocated by the James Bay Project is unclear.
23. A.H. Wark, W.P. Steadman and D.C. Willet, "Design and construction of the Mactaquac hydro-electric development". Presented in Vancouver to the Engineering Institute of Canada Annual Meeting, September 1969.

24. Chief John Henry, "It is no longer possible to be an Indian", *Macleans*, Vol.84, No.6 (1971): pp.47-48.
25. *The Globe and Mail*, "Quebec Crees chase Hydro officials", June 26, 1991, p.1.
26. See, "Federal Environmental Assessment: New Directions", Information Package regarding the Canadian Environmental Assessment Act (Bill C-78), Federal Environmental Assessment Review Office, Ottawa, June 1990. This package contains (1) "The Canadian Environmental Assessment Act", The House of Commons of Canada; (2) "Federal Government unveils environmental assessment reform package", News Release, Minister of the Environment; (3) "Statement by the Honourable Robert de Cotret, Minister of the Environment, introducing the Canadian Environmental Assessment Act", June 18, 1990; and (4) thirteen fact sheets explaining the new Act. In the Act, an environmental effect is defined as "(a) any change that the project may cause in the environment, and (b) any change to the project that may be caused by the environment, whether any such change occurs within or outside Canada, and includes any effect of any such change on health and socio-economic conditions" (p.3).

Chapter Two. Literature Review

2.1. Introduction

Concern about the social effects of relocation from large dams began in the 1930s in the US. The earliest studies concerned discussions of land acquisition and relocation procedures in connection with early Tennessee Valley Authority (TVA) dam projects as well as adjustments for relocated families and affected communities (Satterfield 1937; Leonard 1942). Later on, research on dam-related relocation in the US concentrated largely on legal issues pertaining to land acquisition and relocation associated with TVA and US Corps of Engineers projects (McCarthy 1949; Goebel *et al.* 1970).

Sociologists in the US started to pay attention to relocation associated with US dams in the early 1970s. Most of the sociological studies were done by two groups of scientists. One was based at the Kentucky Water Resources Institute, with emphasis on projects built by TVA. Another was based at Ohio State University, with focus on projects built by US Corps of Engineers. The Kentucky group was mainly concerned with economic and social losses which families may suffer from relocation (See, for example, Burdge and Ludtke 1970a, 1970b; Donnermeyer, Korshing and Burdge 1974; Johnson and Burdge 1974; Korsching, Donnermeyer and Burdge 1980; Burdge 1985). The Ohio group, on the other hand, centred on alienation in communities affected by land acquisition and relocation (See,

for example, Napier 1972; Napier and Moody 1979; Napier, Bryant and McClaskie 1983; Napier, Goe and Carter 1985). Lawson (1982) undertook a separate inquiry into the effects upon the Sioux Indians of damming by the US Corps of Engineers in the Missouri River Basin.

In the late 1950s and throughout the 1960s, the African continent witnessed the construction of some of the world's largest dam projects, including the Volta in Ghana, the Kainji in Nigeria, the Kariba along the border of Rhodesia and Zambia (now Zimbabwe), the Kossou in the Ivory Coast and the Aswan High Dam in Egypt.¹ Due to the large scale of the developments and the population density in this region, these dams each resulted in the relocation of hundreds of thousands of local residents. American and European scientists, mostly sociologists and anthropologists, saw this as a "unique chance for research" on social change and human behaviour fostered by relocation (Scudder 1966b: p.22). Investigations covered a wide range of socio-economic and socio-cultural issues as well as administrative experiences (Brokensha 1963; Scudder 1965, 1966a, 1966b, 1968, 1969, 1971, 1972, 1973; Fernea and Kennedy 1966; Shaw 1967; Fahim 1968, 1973a, 1973b, 1981, 1983; Jenness 1969; SCOPE Working Group on Man-Made Lakes 1972; Chambers 1970; Colson 1971; Geiser 1973; Lumsden 1973, 1975; Palmer 1974; Scudder and Colson 1984). Research on recent dam projects in Africa included that by Futa (1983) and Derban (1985).

In Canada, early accounts of the social consequences of relocation associated with water resource development projects, particularly

the St. Lawrence Seaway Project and the Columbia/Peace Power Project, were scattered in books (See, for example, Mabee 1961; Richardson, Roobe and McNein 1969). One early substantial study was done by Landa (1969) who examined the structural changes in the economy of the native community of Easterville following its relocation as a result of the Grand Rapids Dam in Manitoba. This case was then re-studied by a number of sociologists for political and social changes in the community as a result of the relocation, including Matthiasson (1972), Waldram (1980, 1984, 1987, 1988) and Loney (1987). A study by Wilson (1973) on the social effects of relocation in the Columbia River Project in British Columbia represents another interesting contribution to the understanding of dam-related relocation in the Canadian context.

Research on dam-related relocation in other parts of the world has been relatively sparse. However, there were a number of studies that provided valuable empirical explorations. They included, among others, those by Gosling (1979b) on dams in Southeast Asia, Wang and Peng (1982) on the Danjiangkou Dam in China, Monosowski (1983) on the Tucurui Dam in Brazil, and Soemarwoto (1984) on the Saguling Dam in Indonesia. From an international perspective, Cernea (1988a, 1988b) examined some important policy issues concerning relocation in connection with development projects (including large dams) funded by the World Bank.

People may be involuntarily relocated due to many other reasons besides dam construction. They include highway construction, urban renewal, wars, political upheaval, natural disasters, or poor environmental

conditions. The social consequences arising from such types of relocation upon people concerned are often as serious as those of relocation associated with large dams. As such, they have also attracted considerable attention from the scientific community worldwide. Some of the earliest studies can be found in the US concerning the removal of people to relieve pressure on environmentally-marginal soils in the Mountain States (De Boer 1936, 1937; Anderson *et al.* 1937). Urban renewal and highway projects often require the relocation of many people, and therefore have drawn a considerable amount of research (See, for example, Duhl 1963; House 1970; Schorr 1975; Coates 1980; Clairmont and Magill 1987). Other studies on involuntary relocation were concerned with wars, political upheaval and planned social change (Dickman 1969; Lal 1969; Matthews 1976; Sutton 1977, 1978; Nann 1982; Jones and Richter 1982; Richling 1985; Steinglass, De-Nour and Shye 1985; Otten 1986; Shao 1986), mining (Lyew-Ayee 1981), natural disasters (Zaman 1989), as well as nature conservation in connection with establishment of parks (Turnbull 1972; Rao and Geisler 1990).

The following review will begin with a general discussion of dam-related relocation in the context of population movement. The sections that follow will concentrate on the effects of relocation on the well-being of relocatees. While the review is primarily concerned with large dams, it includes other types of projects that necessitate relocation.

2.2. The Nature of Dam-Related Relocation

Human population movement refers to any movement of people from one place to another whether in the form of individuals, families, or entire communities. It is one of the fundamental processes in international, national and regional political entanglement and economic development, and social and cultural change. Generally speaking, the process of moving may be thought of as incorporating two decisions which involve location in space (Eichenbaum 1975). They include, first, the decision to move from the place of original residence, and second, the decision resulting in the selection of a new residence or destination. Each of these decisions can be further classified as totally voluntary (based purely on free will), totally involuntary (completely determined by outside forces), and intermediate (incorporating varying degrees of external influence).

Migration is often defined as voluntary changes of residence. Relocation, resettlement, displacement and dislocation, on the other hand, are often used in the literature to denote population movement imposed by outside forces. In such instances, they usually imply a forced, compulsory, or involuntary nature. Migration is sometimes modified, however, by adjectives such as "involuntary", "compulsory" or "forced", to describe residential changes independent of people's free will. Relocation as the result of development projects in general, and large dams in particular, involves no free will and thus is truly involuntary in nature. The local residents concerned are not allowed to decide when they should move from

the project area. It is often the case in developing countries that the decision on where to resettle is dictated by authorities.

The relocation of individuals, families and communities can occur for many reasons. Wars, religious or political persecution, and natural disasters are among the factors that force people to change their places of residence. People in these categories are usually called refugees. The construction of many types of development projects in modern history often requires the forced removal of local residents who are in the right-of-way. In these circumstances, people concerned are often called relocatees. Large dams are not the only type of development projects that involve large numbers of relocatees. Highways and urban renewal may sometimes necessitate the relocation of many local residents as well (Thursz 1966; House 1970).

Relocation necessitated as a result of development projects often distinguishes itself from voluntary migration by its massiveness and intensity. For example, it is common that as many as tens of thousands or even hundreds of thousands of local residents will have to be removed for a single dam project. In order to keep up with the schedules of other engineering components, the relocation programme often has to be completed in a time span of two to five years. Moreover, dam-related relocation is also characterized by its indiscriminate nature. That is, everyone in the reservoir area has to be evacuated, regardless of the individual's age, educational level, health status, financial situation, length of residence or many other socio-cultural factors.

In comparison to voluntary migration and involuntary change of residence as a consequence of wars and especially natural disasters, relocation associated with development projects in general, and large dams in particular, may solicit certain unique behavioural patterns on the part of the individuals involved (Kalitsi 1970). When the move originates from free will, for instance, the individual takes care to choose a place that best suits his or her convenience or interests. When the move stems from a natural disaster, the victims take the disruption philosophically and resettle through their own efforts, willingly making sacrifices to provide for themselves. However, in circumstances where it becomes necessary for people to move in order to make way for a development project such as a large dam, the relocatees usually expect that arrangements be made which would satisfy their socio-economic and socio-cultural needs, and which would ensure them a standard of living no worse off than before.

Are these expectations justified? Are there any provisions in the law that, on the one hand, give the state the right to expropriate private property, and on the other hand, require the state to properly compensate property owners? To answer these questions, it is necessary to examine the principle of eminent domain.

2.3. The Principle of Eminent Domain

The legal right of the state to take privately-owned property for public purposes has existed since the earliest of times. In different countries,

various terms are used to describe the right and its exercise. In the United Kingdom, for example, "compulsory taking" or "compulsory purchase" are commonly used. In the United States, the term "eminent domain" is used to describe the right and "condemnation" its exercise. In Canada, commonly-used terms include "expropriate" and "expropriation". The various terms embrace the same two concepts: (1) the right of the state to take private property for public use and benefit, and (2) the obligation to pay compensation to the owner (Boyd 1988).

In the United States, the power of eminent domain can be traced to English common law at the time of the American Revolution (Goebel *et al.* 1970). It was estimated that far-flung acquisition activities by a large number and variety of government agencies meant that approximately 200,000 family displacements occurred annually (Levin 1972). While the power of eminent domain grants government authorities such a right, it also requires that a property owner should receive "just compensation" (Tooby 1969). The concept of just compensation was based on the ethical principles of the law of eminent domain (Michelman 1967). Such ethical principles are rooted in the liberal philosophy that, as Hobhouse insisted, a social order does not rest "the essential indispensable condition of the happiness of one man (*sic*) on the unavoidable misery of another, the happiness of forty millions of men (*sic*) on the misery of one" (Michelman *ibid*:p.1166).

The acquisition of private property for a public purpose generally involves three interest groups: the property owner, the taxpaying public and

the responsible public agency (Kristjanson 1953). The property owner has an interest in what price will be given for the property taken. The public has an interest in paying no more or no less than fair and reasonable prices. The public agency is charged with the responsibility of paying a price which, on the one hand, is fair to the taxpaying public, and on the other hand, is satisfactory to the property owner, thus implementing the land acquisition programme in such a fashion that it does not create unnecessary dissatisfaction among the people affected.

The concept of just compensation in the United States has mostly been tested in the courts. In the search to prove a value for property taken, the courts initially adopted "fair market value" as a standard. "Fair market value" was further defined as "the price a willing buyer would pay a willing seller" in a free transaction. The courts have also argued that the owner of the property should be placed in as good a position pecuniarily as the owner would have been if the property had not been taken. Although these two interpretations were meant to be different ways of expressing the same idea, the courts have placed emphasis on the willing-buyer-willing-seller concept (Kristjanson 1953).

Although US federal agencies followed this somewhat rigid interpretation of the concept of just compensation when land could not be purchased and thus must be condemned or expropriated, there were variations in its definition used by these various agencies. For example, the Corps of Army Engineers, one of the largest dam-building organizations in the US, was guided by the willing-buyer-willing-seller concept (Kristjanson

1953). However, the Tennessee Valley Authority (TVA) maintained that if displaced property owners were to receive just compensation, they should be able to re-establish elsewhere and be at least as well off after the property was taken as they were before (McCarthy 1949).

Grounded on the willing-buyer-willing-seller concept, the emphasis of the land acquisition policy of the Army Corps of Engineers was placed on "minimizing the cost to the government" by initially offering less than previously ascertained appraisal valuations, instead of fully compensating landowners for their losses. As a result, the entire negotiating process was conducted in an adversarial atmosphere, and created widespread distrust of the agency and consternation on the part of the landowners. At the Cave Run Reservoir Project, only 6% of the 96 landowners accepted the initial offer, while 22% preferred to go through a litigation, as compared with a litigation rate of 10% on national average for projects of a similar nature. In addition to the high likelihood of under-compensation, the land acquisition procedure of the Army Corps of Engineers was also plagued by a lack of consultation with the landowners, rather ironically, in the "negotiation" process. Many were not informed as to when their property would be viewed; many were not invited to accompany the appraiser. In the meantime, only the lump sum, not the detailed breakdown, was revealed to the landowner. The owner's other recourse was to refuse the offer and allow the property to be condemned (Goebel *et al.* 1970).

In contrast, the TVA's land acquisition policy was guided by the

principle of "no worse off" (McCarthy 1949; Kristjanson 1953). That is, the affected individual landowners should be at least well off after the implementation of the project as they were before. In order to attain this objective, TVA adopted a number of unique strategies: fair appraisal, equal treatment, no price trading and public consultation. Compensation offers were based on highly organized research and investigation to ensure that all property owners were treated on a fair and equal basis. Once an offer was made, no change was granted unless the Authority was convinced that some error was made in the appraisal. All landowners were notified by a letter explaining the purpose of the project and the necessity for acquiring their land. It was followed by a second letter notifying the landowner that the field appraisal would visit the farm on a specified date. The landowner was invited to accompany the appraiser in inspecting the property and to participate in discussion of the method of valuation.² TVA, in co-operation with the Agricultural Extension Services of the state colleges and universities in the Tennessee Valley, also provided special assistance to displaced families, such as in locating available farms for sale. In retrospect, TVA succeeded in making condemnation the rare exception. Only about 3% of the landowners refused to convey voluntarily and resorted to litigation (McCarthy 1949). Interviews with landowners displaced by TVA reservoirs showed that most of them were satisfied with the appraisal procedures. In general, they believed that prices paid for their land were adequate to permit them to buy comparable property (Kristjanson 1953).³

In Canada, provisions in early public works and railway

legislation formed the basis of the first federal expropriation statute- the Dominion Expropriation Act, R.S.C. 1886, c.39. With minor amendments over the years, this legislation ultimately became the Expropriation Act, R.S.C. 1952, c.106, which remained in force, without any amendment, until the Expropriation Act 1970, c.41. received the Royal Assent on June 11, 1970 and was proclaimed in force on July 7, 1970 (Todd 1970).

Previous expropriation legislation in Canada was highly inadequate in many aspects. It had, by 1960, reached such a condition of confusion that the President of the Exchequer Court (the predecessor of the Federal Court), Mr. Justice Thorson, felt compelled to denounce the state of the law in *Grayson v. The Queen* [1956-60] Ex. C.R. 331, 336:

"I have frequently called attention to these provisions of the law and stated that Canada has the most arbitrary system of expropriation of land in the whole of the civilized world. I am not aware of any other country in the civilized world that exercises its right of eminent domain in the arbitrary manner that Canada does. And, unfortunately, the example set by Canada has infected several of the Canadian provinces in which a similar system of expropriation has been adopted". (Cited in Todd 1970: p.iv).

These remarks supplied as important impetus for reform and promoted a series of parliamentary activities in the years that followed, leading to the promulgation of the Expropriation Act of 1970. The new act, still in effect today, differs from preceding legislation in that it: (1) provides a rigorously defined process by which expropriation must take place; (2) explicitly states what heads of compensation may be claimed; and (3) dictates, in most

instances, how compensation is to be calculated. It has also served, thereafter, as a basis for similar legislation reforms in many provincial jurisdictions (Coates and Waque 1986).

A review of the land acquisition policies adopted by Canadian provincial hydro-electric corporations in the 1950s through the 1970s indicates that these policies had more commonalities than differences.⁴ For instance, they all included a provision of a bonus above the market value as an allowance for disturbance and inconvenience to the property owner. The disturbance bonus was usually set at 10% or 15% of the appraised market value. They all forbade price trading. Most, if not all, of the corporations made effort to construct new communities for the displaced, and physically moved houses as desired by their owners. Finally, some included concurrent regional development programmes into water resources development in an attempt to counteract the adverse effects of the loss of natural resources to flooding and subsequent relocation upon local communities. It is interesting to note that all these practices bore strong resemblance to those of the TVA.⁵

In developing countries, dam-related relocation policies in the past differed greatly, in spite of the fact that the goal of "no worse off", modelled after that of the TVA, had been universally endorsed. Relocation operations have often suffered from more severe problems (Cernea 1988). Dam planners often tend to inflate the financial benefits and deflate the environmental and social costs to obtain a favourable benefit-cost ratio. This, in turn, helps to secure financing from the central government and/or

international funding organizations. The number of people to be resettled is chronically under-estimated. Compensation is usually highly arbitrary and considerably below the fair market value. Property owners often have little or no access to the court. In most instances, little or no public consultation is carried out.

Most developing countries have favoured the approach of government-sponsored resettlement of dam relocatees. New settlements are constructed; new houses are built; land is cleared; and sometimes modern farming machinery is provided. However, the new settlements may later turn out to lack basic services; new houses to be sub-standard and not in line with the relocatees' lifestyle; land to be marginal and not capable of even supporting basic subsistence; and modern farming equipment to be deserted due to the lack of extension services. Although there is often a regional development programme affiliated with each dam project, such programmes are, more often than not, ill-fated.

2.4. Organizational and Political Issues

What has made the TVA unique is the fact that it is a highly autonomous, federal agency with authority to approve its own projects. Its mandate is not solely power generation. Rather, it is charged with complete responsibility for carrying out a programme of regional development in the Tennessee Valley, including, besides power generation, navigation, flood control, reforestation, and particularly economic development. The generated

electric power is used in rural electrification and expanding or establishing local industries within the region, instead of being exported. The success or failure of the TVA's relocation policy is subject to different interpretations. Some generally approved it. Others were critical. Nevertheless, it is safe to say that had there not been the incorporation of the concept of regional development in the TVA's power programmes, the negative effects of population relocation would have been much greater.

The importance of incorporating a regional development programme into each dam project has also been recognized by planners of large dams elsewhere. Dam planners are well aware of the economic and social hardship facing people who live in areas to be flooded. The flooding usually forces hundreds or thousands of square kilometres of prime land and associated natural resources out of the local economic system, depriving local residents, particularly farmers, of basic means of production and employment opportunities. Flooding also submerges burial grounds and familiar surroundings which are of cultural and sentimental value to the local residents, and interrupts social networks by dislocating neighbours, relatives and friends. It is even more painful and traumatic for those who are uprooted from their cultural and social networks. Thus, regional development, in combination with just compensation, is intended, on the one hand, to ease the economic hardship confronting local residents, and on the other hand, to compensate for the intangible social and cultural losses.

Such intentions are not only good but necessary. However, whether or not the undertaking agency can deliver them is subject to many

factors. One of the most important determinants is the organizational structure of the agency in relation to other governmental entities. In Canada, provincial hydro-electric power corporations, unlike the TVA, are charged solely with the function of producing and distributing electricity within the provinces. They are mainly profit-driven. The initiation and implementation of regional development programmes are often at the mercy of provincial government budgets and many political entanglements. For instance, the proposed regional development programme to be associated with the Peace River Project in British Columbia had to be discontinued when the provincial government shrank its budget to fight over-spending (Wilson 1973).

The situation in developing countries is similar. The only difference is that the expectations for such regional development programmes are higher and the outcomes poorer. A typical example is the Volta Project in Ghana. The Volta resettlement scheme was seen as an exercise in positive economic development on a regional basis, designed to transform the traditional rural communities and the lives of local residents. A retrospective evaluation of the agricultural development component of the scheme, however, concluded that "most of the agricultural plans were inadequate and unrealistic and the limited staff available at the time was neither sufficiently qualified nor experienced for the work, particularly in regard to agricultural economics, marketing, co-operatives, farm management, etc..." (Wilbrandt *et al.* 1967; Cited in Lumsden 1973: p.121). Eventually, the agricultural development programme through the new system of intensive, mechanised farming had failed even to provide enough food to

feed the people and, in many settlements, to generate adequate sources of income to keep them there (Lawson 1968; Graham 1986). In summarizing the African experience with river basin development, Scudder (1989) pointed to the fundamental incompatibility between the pursuit of multi-objective development goals, and the nature of river basin authorities as centralized, hierarchical organizations, which makes it very difficult for them to delegate responsibilities to other organizations. A major result is that river basin authorities are more effective in building dams than implementing development programmes.

There is no easy explanation for the disappointing outcomes of resettlement schemes affiliated with large dam projects worldwide. In addition to the organizational perspectives previously discussed, there is another interesting line of inquiry which is centred around the political economy in a national or international context. According to this perspective, large dams are conceived and built to produce electricity to be transmitted to urban centres for use by the rich and powerful. People, who happen to be in the right-of-the-way of such projects and who are usually politically and economically marginal, are forced to give up their livelihood, their homes, and their communities. They also have to bear the consequences of ecological, economic and social destruction. Relocation, often considered a by-product of large dams, is deemed to have a ripple effect adverse to the interests of the impacted groups. In many countries, even resettlement schemes themselves are often designed to produce cash crops for the international food market in the industrialized nations or for domestic food

markets in urban centres instead of meeting the subsistence needs of local residents. All these, according to Palmer (1974) in his analysis of African resettlement schemes, are closely linked to what he termed international neo-imperialism.

In Canada, the construction of large dams is seen as one of the processes by which internal imperialist expansion impinges on native societies (Zlotkin and Colborne 1977). From Ontario, Quebec, Manitoba to British Columbia, large tracts of native land were submerged under reservoirs and the impounded waters are poisoned by mercury pollution. The native economy of harvesting, trapping and fishing was devastated along with the way of life, creating widespread welfare dependency and many social problems (Landa 1969; Zlotkin and Colborne 1977; Loney 1987). The electric power from the James Bay Project is exported to industries in southern Quebec and the United States, and electric power from the Churchill Falls complex in Labrador to the United States and eventually to produce enriched uranium for France. The development of natural resources, including hydropower, therefore, is for the benefit of the imperialist interests rather than for the advancement of the native people who live there. This imperialist ideology is clearly to create a dependent hinterland whose wealth could be exported to the metropolitan centres (Zlotkin and Colborne 1977).

The imperialist paradigm may seem extreme and biased. Nevertheless, it is very difficult to refute, given the fact that too many large dams to date have begot impoverished and disgruntled local populations.

2.5. The Social Consequences of Relocation

Lessons from past experience has shown that relocatees are most likely to sustain certain losses. Goebel *et al.* (1970) classified the possible losses as a result of relocation into economic and non-economic losses. The major source of economic losses is the market value approach commonly used in compensating property owners. In most instances, it failed to help to achieve "just compensation" manifested in the "no worse off" objective, even in a strictly economic sense. In studying the market value approach to compensating property owners who were forced to leave their homes as the result of urban renewal projects in the United States, Tooby (1969) discovered that the economic losses of relocation may entail three major components: (1) losses associated with moving; (2) relocation costs incident to finding a new dwelling and establishing residence; and (3) housing replacement costs, in terms of rent, purchase price, or mortgage payments. To make things worse, authorities in charge of compensation and relocation may not give property owners a fair market value. In some instances, the extent of under-compensation in terms of the ratio of the fair market value and the actual offer may run as high as 400% such as in Andhra Pradesh, India (Cernea 1988). At the Cave Run Project built by the US Army Corps of Engineers, the extent of under-compensation was revealed by the fact that in some cases, jury awards exceeded the appraisals by as much as 100%, 120% or even 140%. With low offered prices and high purchase prices, plus the market transaction costs involved

and the costs of moving, the relocatees are often left with large financial losses. On the average, the cost of a new property in the Cave Run area was \$20,555, while the average price paid by the Corps was only \$15,224. That is to say that an average relocatee household suffered a net economic loss of \$5,331 (35% of the original property value), excluding market transaction costs and the costs of moving (Goebel *et al.* 1970).

Relocation may not only cause short-term economic hardship to relocatees during or immediately after the relocation. It has been reported that it may also result in sustained economic consequences. Wang and Peng (1982), for example, found that effects on financial and housing conditions were still highly discernible among a large proportion of the relocatees at the Danjiangkou Dam in China 20 years after the relocation. The economic consequences of two other Chinese dam projects, Bailianhe and Qingshitan, which were also built in early 1960s, exhibited a similar pattern (Wang 1982; Kang 1986). Under-compensation was not the only cause of the decline in the economic well-being of the relocatees in these Chinese cases. The reduction of land resources in the project areas as the result of flooding by the reservoirs may have played a larger role in the outcomes.⁶

In Canada, severe economic consequences were also observed in the native community of Easterville which was relocated for the Grand Rapids Dam Project on the Saskatchewan River in Manitoba. Landa (1969) and Loney (1987) attributed the income declines of the relocatees to the reduction of the resource base which resulted from the flooding. The

diverse sources of income for the local residents from hunting, fishing and forestry activities were reduced to merely fishing. This single economic pursuit proved unable to support the majority of the residents of Easterville (Landa 1969). The destruction of the resource base created widespread welfare dependency (Loney 1987).

Non-economic losses of relocation range from the disruption of community relations at the community level to psychological and physiological illness at the individual level. The effects of relocation at the community level have been the subject of inquiry for many scholars, particularly sociologists and anthropologists. Scudder and Colson, for example, first developed a theoretical model of community response to relocation stress, which is often referred to as the Scudder/Colson model (Werner 1985; Partridge 1989). It is probably the most well-developed framework in the field of relocation studies.

The Scudder/Colson model was built on the basis of their empirical studies of several major dam projects in Africa, especially the Kariba Dam which relocated about 40,000 people in 199 villages of the Gwembe Tonga (Colson 1971). Scudder and Colson (1984) argued that the socio-cultural system concerned would respond to forced relocation in predictable ways because the extremely stressful nature of relocation would restrict the range of coping responses available to the majority during the period immediately following the relocation. The socio-cultural system, when placed under the stress of relocation, would draw inward and behave as if it were a closed one. Relocates would assume a conservative stance, and

cling to familiar behavioral patterns (cultural involution) as a major coping mechanism, by transferring old skills, by moving the shortest distance possible, and by attempting to relocate with kin, neighbours and co-ethnics (Scudder 1973).

Cultural involution is seen as the result of the severity of stress upon the socio-cultural system involved. The stress of relocation is multi-dimensional, consisting of three major components: physiological, psychological and socio-cultural. In addition to increased mortality and morbidity, these interrelated stresses can produce negative consequences on the family, kinship relationships, local leadership, and religious activities (Colson 1971).

Similar socio-culturally destructive effects observed by Scudder and Colson were also reported in the case of the relocation of a native community, Easterville, in Manitoba (Landa 1969; Waldram 1980, 1987, 1988; Loney 1987). The relocation of Easterville was necessitated by the construction of the Grand Rapids Dam project. It was found that the relocatees developed many maladaptive characteristics, including a decline in health standards, widespread alcohol abuse, the breakdown of family cohesion, increases in crime and vandalism, and welfare dependency (Landa 1969; Loney 1987).

However, a series of studies in the United States conducted by Napier and his colleagues generated conflicting findings (Napier 1972; Napier and Moody 1979; Napier, Bryant and McClaskie 1983; Napier, Goe and Carter 1985). They examined the effects of the relocation and land

acquisition for a dam project (built by the US Corps of Engineers) on the social relationships within affected and control communities in central Ohio, including community alienation, community identification and community integration. The authors concluded that the introduction of reservoir projects into rural communities, including relocation as an exogenously imposed social change, would not result in the destruction or deterioration of social relationships within those communities, either in the short-term or in the long run.

The inconsistencies between these studies raise a number of questions regarding the socio-cultural effects of relocation on local communities. Scudder believed that the stressful nature of relocation is independent of political and cultural systems. Napier, however, concluded that local communities were effectively resilient and adaptive to the social changes induced by exogenous agents. Therefore, how could the same stressor of relocation produce totally different consequences? Why is relocation socio-culturally stressful to some communities and not so to others?

Negative effects of relocation on the personal health of relocatees have been reported in many relocation programmes. Generally speaking, the health effects of relocation can be divided into two interrelated categories: psychological and physiological. In studying the relocation associated with an urban renewal in Boston's West End, the American psychologist Fried (1963) first discovered that relocation could produce a "grieving for a lost home" syndrome among the relocatees. Such a syndrome

could lead to many psychological consequences, including trauma, guilt, and depression. Similar effects were also observed in the Aswan High Dam project, where the Nubian relocatees suffered from exhaustion, disorientation, dis-illusionment and discontent (Fernea and Kennedy 1966; Snoad 1979). The results of a survey conducted by Werner (1985) also showed that relocatees from a dam project in Brazil displayed social stress and a host of psychological symptoms immediately following the relocation. Scudder and Colson (1984) emphasized the psychological stress upon relocatees arising from uncertainty over the future and from the need to adjust to the altered physical and social environments. They observed sharp increases in mortality and morbidity among the relocatee population at the Kariba Dam, as a result of physiological and psychological stresses.

One major deficiency in the field of dam-related relocation studies has been a lack of convincing evidence for many of the negative health effects. Most recently, Partridge (1989) pointed out that Scudder and Colson did not have quantitative data to prove that relocation could result in higher than normal rates of mortality. Epidemiologists who studied African dam projects concluded that the increased mortality rates were directly related to the outbreak of water-borne diseases such as schistosomiasis and malaria (Stanley and Alpers 1975). These diseases were caused by ecological alterations in the environment and changed patterns of water use by the local populations. It is unclear what role the stress of relocation, as defined by Scudder and Colson, had played in the increased mortality rates. In the meantime, researchers of stress and stressful life events have found

that stress may produce a wide variety of psychological and physiological consequences. The psychological effects of stress include such symptoms as nervousness, tension, anxiety, depression, speech defaults, sleep disturbance, diminished interest in significant activities, negative affect and interpersonal behaviour, alienation, and deficits in task performance (Wicker 1979; Evans and Cohen 1987).

There are two physiological models of stress, one centring on the pituitary-adrenocortical axis and another on the sympathetic nervous system (Evans and Cohen 1987). In the former model, it is maintained that an individual under the influence of a severe and prolonged stressor passes through the stages of alarm, reaction, resistance and exhaustion, which may result in such physiological consequences as the breakdown of bodily functions and even death (Selye 1956, 1975). The latter model builds a direct linkage between cardiovascular diseases and chronically increased levels of circulating catecholamines (Stepoe 1981; Krantz and Manuck 1984).

Most of these effects, especially the overt behavioural and physiological disorders, have rarely been reported in the literature on dam-related relocation. This is partly due to the lack of long-term perspectives. Most of the previous studies on the effects of relocation were conducted during or immediately (from a few weeks to a few years) after relocation, but not long enough to observe long-term socio-cultural and health consequences.

The lack of long-term perspectives on the effects of relocation

has also hindered theoretical developments with regard to adjustment or adaptation and their effects on relocatees. For example, Scudder and Colson (1984) contended that the incorporation of relocatees into new communities would take three to five years. Does this mean that relocatees can adjust physiologically, psychologically and socio-culturally to the stress when the stage of incorporation is over? Scudder and Colson (1984) acknowledged that this hypothesis has not been tested by practical cases. Thus, the long-term health effects of relocation still await to be investigated.

There are also conflicting findings on the effects of involuntary relocation on the elderly. Many researchers contended that the elderly would be more vulnerable to relocation stress and thus more likely to develop health problems (Scudder and Colson 1984). In a study of highway relocation, poorer personal and social adjustment was observed for the relocated than the non-relocated elderly (Kasteler, Gray and Carruth 1968). This finding indicated that involuntary relocation was a stressful experience for the elderly, who generally had well-established ties with the previous residence and who, by the process of aging, may be resistant to change. However, a study of a Brazilian dam project demonstrated that "older people showed less social stress than do younger" (Werner 1985: p.164). Early research on the relocation of institutionalized elderly showed higher mortality rates than those who did not relocate or were relocated involuntarily (Aldrich and Mendkoff 1963; Miller and Lieberman 1965; Lawton and Yaffe 1970). Some recent studies have also generated conflicting findings (Heller 1982).

Finally, the effects of involuntary relocation in general, and dam-

related relocation in particular, on the physiological and psychological development of children deserve further investigation. There are a few examples where favourable adjustments for relocated children in new classroom settings were reported (see, for example, Young and Cooper 1944; Kantor 1965). However, Heller (1982) argued that children had few coping resources available and little voice in relocation decisions. This seems to suggest that children are more likely to be negatively affected by relocation. By and large, the effects of relocation on children need further attention.

2.6. A Critical Summary

Relocation as a result of large dams and other types of development projects has long been recognized as producing multi-dimensional effects upon the social systems concerned. It has attracted the attention of various scholars from different disciplines. Sociologists, anthropologists, psychologists, and legal scholars have probed various dimensions of relocation. Yet, one of the major deficiencies in the field of relocation studies lies in the fact that most of the previous studies are confined to specific disciplinary boundaries. The understanding of relocation and its effects on the relocatees is very fragmented. There is an obvious lack of interdisciplinary approaches that can provide a fuller understanding of the social and environmental changes brought about by relocation which may have a bearing on the well-being of relocatees.

Recently, de Wet (1988) criticized existing theoretical analyses of relocation for concentrating mostly on the element of stress, involved in the process of relocation, and for seeking to explain relocatee behaviour as a response to the stresses confronting them. The Scudder and Colson model, as de Wet pointed out, tended to operate at a high level of generality which limited its ability to account for different types of responses to relocation in different contexts, particularly after communities had entered the stage of potential development.

Alternatively, de Wet (1988) argued that relocation involves changes or modifications of the physical and social environment in which people live and to which they have to adapt. The range and extent of environmental modifications that relocatees experience seems to hold part of the key to a fuller understanding of the stress which they undergo and of their behavioural responses. Thus, environmentally-based approaches to relocation studies will be of great value in analysing the stress of relocation and the various pathways through which the social effects are manifested.

The field of relocation studies has also been characterized by a lack of long-term perspectives. Personal accounts indicate that the effects could still be seen 30 years after the relocation occurred (Partridge 1989). Yet, most relocation scholars have been pre-occupied with the short-term effects arising during and immediately after the relocation. Very few, if any, extended their inquiries to a period longer than five to ten years. Does relocation create chronic stress that may last ten or twenty years? How do relocatees cope economically, socially and psychologically with the long-term

stress? What are the long-term consequences? These questions have rarely been addressed.⁷

Finally, little work has been carried out on the differential effects of relocation on different segments of the relocatee population. In concentrating on community relocation and majority responses, the Scudder and Colson model, for example, has paid insufficient attention to differential responses to the stress of relocation (Scudder and Colson 1984; de Wet 1988; Partridge 1989). Partridge (1989) particularly pointed to the need for gender-based or generationally-based effects of relocation.

NOTES:

1. These five dams are often referred to as "the major African dams". See, for example, SCOPE Working Group on Man-Made Lakes (1972).
2. By today's standard, the degree of public consultation in TVA land acquisition programmes as exemplified in the above procedure is extremely limited. Nevertheless, the negotiation process of with land owners was relatively open in comparison to the practices of other federal and state government agencies.
3. For a critic of TVA's land acquisition policy associated with the Norris Dam, see, McDonald and Muldowny (1982).
4. See, for example, Mabee (1961) for an examination of Ontario Hydro's land acquisition policies in connection with the St. Lawrence Seaway Project, and Wilson (1973) on the Columbia River Project carried out by B.C. Hydro.
5. In fact, officials of some Canadian hydro-electric corporations (for example, the Hydro-Electric Power Commission of Ontario and the New Brunswick Electric Power Commission) visited the TVA to learn its land acquisition policies and experience.
6. In fact, the flooding at Danjiangkou drastically decreased the land-population ratio in the areas surrounding the reservoir to the extent that the population in one village expanded from 97 before to 401 after the relocation (while the land base remained constant) (Wang and Peng 1982).
7. In commenting on this study, Dr. Thayer Scudder, a renowned expert on relocation, stated, "As to relevance, there is a very great need to research what has happened to people 10-30 years after removal". (Letter to the author dated January 29, 1990).

Chapter Three. The Theoretical Framework

3.1. Introduction

This chapter contains nine sections. This first section serves as a general introduction to the organization of the chapter. Section 3.2 examines the historical and legal contexts of social impact assessment.

For the sake of clarity, the theoretical framework is presented in Section 3.3 in the form of a number of principal propositions. The list of propositions is not intended to be exhaustive. Other propositions will therefore be brought about as the discussion proceeds.

The six sections that immediately follow provide a detailed elaboration of the various theoretical and methodological issues concerning the propositions presented in Section 3.2. The main features of the theoretical framework are highlighted in the final section.

3.2. Social Impacts and Social Impact Assessment: An Overview

Interest in the study of "social impacts", broadly interpreted as "social consequences" or "social effects", originates in many traditional disciplines. In sociology, for example, it can be traced back to the concerns of Toennies and Durkheim with the social consequences of the Industrial Revolution (Freudenburg 1986b). Anthropological interest dates back to the earliest ethnographic descriptions of subsistence activities of human

populations (Moran 1986). The focus of geography on "man-environment relations" (*sic*) is also relevant to the impact of environmental changes on human society, although the prime interest is on the effects of human activities on the physical and biological environment (Berry and Johnson 1986).

It was, however, not until the passage of the National Environmental Policy Act (NEPA) of 1969 in the United States that social impact assessment (SIA), as we know it today, began to gain momentum. Under NEPA, federal agencies are required to prepare, before decisions are made, environmental impact statements (EISs) for any of their actions that may significantly affect the quality of the human environment. The US Council on Environmental Quality (CEQ), the agency charged with overseeing the implementation of NEPA, further defined the effects on human environment more comprehensively to encompass social, health, historical, economic, and aesthetic as well as ecological considerations (US Council on Environmental Quality 1978). It is in this context that social impact assessment has gradually developed into an expanding field of scientific inquiry.

There have been many definitions of SIA. Finsterbusch (1975, 1981a) and Wolf (1977) defined SIA as a decision-making tool to be used in the planning stage to determine and mitigate the full range of social effects of alternative courses of actions (projects, programmes and policies). This definition embraces two components. First, by stressing SIA as a decision-making instrument, it reflects the original intention of the legal

requirement in NEPA for the consideration of social consequences of government actions before final decisions are made. Secondly, SIAs are concerned with "social effects".

For the past twenty years or so, much of the literature on social impact assessment has been devoted to developing procedural frameworks, evaluating various methodologies, and exploring theoretical orientations. Nevertheless, recent reviews of experiences in the United States and Canada indicated that many theoretical and methodological issues in SIA are far from resolved (See, for example, Livesay, Boyer and Harding 1984; Finsterbusch 1985; Freudenburg 1986a, 1986b; Krawetz and MacDonald 1986). Theoretical and methodological problems have been among the many factors that serve to undermine the very objective of SIA, namely to improve the effectiveness of decision-making exercises.

3.3. A Proposed Theoretical Framework

There is no consensus on the definition of "theoretical framework". The definition used in this study draws upon a number of sources. One is a reference text by Chinoy and Hewitt (1975), which described "theory" as a body of logically related propositions that assert determinate relations among the phenomena being studied. It was also suggested by some that a (theoretical) framework is composed of a cluster of interrelated propositions which serve to guide the research (Falk and Kim 1980; Pelto and Pelto 1975).

In this context, a series of propositions has been developed in this study as the core of the theoretical framework, to delineate the processes by which social impacts are created. The framework is intended to provide guidance on where and how to set research priorities and to identify the critical variables to be incorporated into the analysis. It also gives a theoretical context for the interpretation of the findings. A brief discussion of each of the propositions is provided below; detailed elaboration can be found in the proceeding sections.

Proposition 1 *Social impacts can be defined as the effects of a development project on the quality of life (QOL) experienced or perceived by the affected individuals.*

Considerable difference of opinion exists among social impact researchers in regard to the meaning of "social impacts". Existing definitions fall into two general categories. The first category, which is closely associated with the sociological perspective of functionalism, is mainly concerned with macro-level social structural variables, including, among other things, demography, public services, revenues and taxation, and regional and/or national economy. The second category, the origin of which can be traced to the theoretical perspective of interactionism, deals with the effects upon the people concerned- their physical and psychological health, tradition, lifestyle, attitudes, beliefs, values, institutions, and interpersonal relationships; or, in short, their well-being (D'Amore 1978; Dietz 1987;

Albrecht and Thompson 1988).

Although the two schools of thinking are often viewed as rivals, in this study they are incorporated into the definition of social impact. In this proposition, social impacts are considered to include effects upon the full range of quality of life (QOL) domains relating to social structural variables, as well as the socio-cultural and socio-psychological aspects. Furthermore, social impacts are considered to include the "experience" or "perceptions" of the affected people.

Proposition 2 *Social impacts can be regarded as the behavioral responses of the impacted subjects to changes, arising from the development project, in the social as well as the ecological environments in which they live.*

Social impact assessment first emerged as a subordinate topic in the broad field of environmental impact assessment. Yet, it has begun to gain recognition as dealing with a separate subject matter. While environmental impact assessors focus their attention on the effects upon the biophysical environment, social impact assessors are interested in the social changes these biophysical effects may generate.

This distinction is critical, for determining the "significance" of an environmental impact, as a central task of environmental impact assessment, always requires a point of reference, i.e., significant for whom? (Beanlands and Duinker 1984). In this sense, an environmental impact is always socially

defined (Lang and Armour 1981). A close examination of the research findings in both fields reveals that a drastic interruption or modification of the interactive pathways between human beings and the biophysical environment can trigger human behavioral adjustments. Such adjustments, or processes of coping, may prove harmful to the communities and individuals concerned, and therefore should be considered part of social impact.

Proposition 3 *The social system affected by the development can be regarded as being composed of a number of subsystems at different organizational levels, such as individuals, families, communities, and the region. Social impact indicators can be identified around these organizational levels.*

The identification of social impact indicators has proven to be difficult. One of the major problems is the lack of a generally accepted reference framework (Andrew, Hardin and Madsen 1981). It is proposed in this study that the application of a systems approach to social systems analysis will help in the development of such a framework.

In terms of the systems theory, a social system can be divided into a series of subsystems based on organizational levels. Examples of the subsystems include, in an ascending order, individuals, families, communities, and the region. The approach requires the identification of social impact indicators at each of these organizational levels.

Proposition 4 *Structural and non-structural aspects of the social system should be seen as complementary quality of life domains, and should be combined into a social impact analysis.*

Traditionally, social impact analysis has relied heavily on the theoretical perspective of functionalism. One result is that many existing models do not reflect the real concerns most likely to engender social conflicts among the affected parties. There is growing evidence that socio-cultural aspects (e.g., the interference with the way of life, and disruption of families and communities), rather than socio-structural aspects (e.g., services and facilities), are often the main issues of concern to local residents (Krawetz and MacDonald 1986). This is contrary to the basic assumptions underlying most social impact studies.

The fundamental deficiency of the functionalist perspective is that it does not capture the real meanings of the structural variables to individuals in complex social settings. One way of rectifying this situation is to broaden the scope of inquiry in terms of both the methodologies for measuring or inferring social impacts and the theoretical perspectives for interpreting social impact research findings. One of the most pressing research needs is to test existing propositions, and to formulate new ones, so as to bring both structural and non-structural variables into a single frame of social impact analysis.

Proposition 5 *The pattern of distribution of social costs and benefits*

among different segments of the social system in any particular impact situation is an appropriate subject for social impact analysis.

Another fundamental deficiency of the functionalist perspective is related to its concentration on regional and national variables at the higher levels of social organization. Consequently, it often results in analysis of impacts on the social systems in which development takes place, undifferentiated by social groups (Shields 1975; Meidinger and Schnaiberg 1980). It obscures the social reality that the introduction of a development project creates social changes that commonly benefit some and disadvantage others.

It is obvious that the pattern of the distribution of social costs and benefits in any particular impact situation is an appropriate subject for assessment. Social impact assessments focused on differential impacts will generate knowledge more relevant to policies and decisions by responsible government agencies.

Proposition 6 *A study of the differential impacts among the various social units can be accomplished by profiling the categorical and functional social groups residing in the impact area.*

Methodologically, focusing social impact analysis on differential impacts requires an understanding of the social systems concerned, particularly the various social units involved. This can be achieved by

profiling the social categorical and functional groups in light of age, gender, education, race, religion, occupation, income or social status (Flynn 1985).

Proposition 7 *The intent of social impact analysis can be better served by soliciting social impact information directly from the impacted subjects.*

If social impact analysis is primarily concerned with determining changes in the quality of life of the affected population, it is apparent that a new set of measures are needed to capture the essence of social impact-measures that go directly to the experience of the local residents involved. Thus, it is proposed that reliable social impact information should be solicited directly from the impacted subjects (Burdge 1977; Lewis 1980).

3.4. Towards a New Definition of Social Impacts

Existing interpretations of what constitute "social impacts" vary considerably among authors of social impact studies. The US experience indicates that for many researchers, the phrase seems to mean the impact of people on service agencies, rather than the impact of technologies on humans and social systems (Freudenburg and Keating 1982). In many social impact studies, "social" is "hyphenated" to "socio-economic"; considerations are limited to economic manpower needs and availability of services to compensate for increased employment (Lewis 1980). Even when social impacts are seen as impacts on humans, significant variations in

interpretation still exist.

Generally, existing definitions of social impacts fall into two categories. The first category mainly involves macro-level social structure variables. A typical example is the definition offered by Leistritz and Murdock (1981). According to these authors, socio-economic impacts, which include "social" as well as "economic", are "indicators of change in economic, demographic, public service, fiscal, and social dimensions" as "the phenomenon of rapid change in established economic, demographic, and social structures" caused by large-scale development projects.¹

This definition identifies more with the functionalist perspective,² which has dominated many approaches and particularly earlier social impact studies. According to Disanto *et al.* (1981), the functionalist dominance is due to a number of reasons. First, the clientele of social impact assessments usually have a background in biology, engineering, business or economics, whose systems approaches are related to functionalism. Secondly, socio-economic variables are easier to quantify than socio-cultural ones. Thirdly, most social impact researchers are sociologists who were trained when the functionalist perspective was the prevailing theory.

The over-reliance on the functionalist perspective, or the lack of theoretical or conceptual bases, has resulted in many deficiencies in the field of social impact studies (Dietz 1987). The usefulness of many existing SIA models is limited because the variables used in these models do not reflect the concerns of the affected parties that are most likely to engender social conflicts. There is increasing evidence to support this argument.

The RARE II impact assessment for potential wilderness areas in the Upper Peninsula of Michigan is a case in point (Manring, West and Bidol 1990). It was predicted in the environmental impact statement for the Sturgeon River Wilderness Study Area that the major impact on local communities would be the loss of timber-related jobs. An assessment of the local reactions to the proposed wilderness area revealed that the real concerns of the surrounding communities centred on the intrusion of external forces into their own lifestyles and recreational use of the area, and a generalized objection to external interferences with the use of "their" resources.

Another example is the case of a study on the social impacts of a landfill site in the Regional Municipality of Peel in Ontario (Armour 1988). The main issues of concern to residents were related to potential impacts on community cohesion and community character, disruption of families and interference with their way of life, and possible hardships that could be faced by those who were to be displaced. Contrary to the common assumptions of most social impact studies, impacts on services and facilities were concerns of least priority. A recent review of Canadian experience with social impact monitoring also revealed that when social impacts were addressed, socio-economic impacts were usually stressed over socio-cultural and socio-psychological effects, despite the fact that the latter were, more often than not, the main concerns of potentially affected residents (Krawetz and MacDonald 1986).

The results from these studies call into question the theoretical

bases on which many social impact studies are designed and implemented. Particularly, the commonly-used functionalist perspective addresses poorly, if at all, the real social consequences and concerns of the affected parties. The issue is relevant not only to those who are affected, but also to industrial proponents who initiate most development proposals, as well as government agencies alike who are responsible for overseeing the implementation of social impact assessment legislation.

There are a number of alternative definitions of social impacts which emphasize socio-cultural and socio-psychological effects. D'Amore (1978), for example, defined social impacts as the effects upon people, their physical and psychological health, well-being and welfare, their traditions, lifestyles, institutions, and interpersonal relationships. The definition offered by Dietz (1987) included aspects of community concern. Albrecht and Thompson (1988) maintained that socio-psychological variables, including attitudes, beliefs, values, and opinions, should occupy a central place in social impact assessment methodologies.

In this present study, social impacts are defined as the effects of a development project on the quality of life experienced or perceived by the affected individuals as a result of project-induced social, economic and environmental changes. There are a number of essential elements in this definition. First, the concept of quality of life is viewed to encompass socio-cultural and socio-psychological as well as socio-economic dimensions. Therefore, the definition offers an opportunity to examine a full range of quality of life effects. Second, social impacts are experienced or perceived

by the individuals concerned. The definition thus also provides an opportunity to inquire into differential impacts on different social groups. Third, it also stresses the linkage of social impacts with environmental impacts by defining the former as arising not only from social changes but also from environmental changes.

3.5. Social in Relation to Environmental Impacts

In spite of the fact that social impact assessment first emerged as a subordinate topic in environmental impact assessment, there is a growing difference between the subject matters of these two fields. The dominant concerns of social impact assessors are effects upon the "social environment", whereas environmental impact assessors focus their attention on effects upon the "natural environment". While development projects often impact directly on the social environment, most, if not all, environmental changes have social implications as well. To determine the significance of an environmental impact requires a point of reference. The answer to the question, "Significant to whom?", has eluded many environmental impact assessors (See, for example, Ames 1978; Cooper and Zedler 1980; Beanlands and Duinker 1984).

A 20% reduction in the population of a fish species in a particular stream, for example, may be considered insignificant to the general public at the national level, or to people in distant places. It may, however, be significant enough to destroy the livelihood of the communities

whose primary source of income derives from the commercial fishing industry. In arriving at impact conclusions, it is always necessary to state explicitly the context within which significance has been defined. It is more important that social impacts should be assessed using the impacted subjects as the frame of reference.

In reality, it has proven difficult to distinguish environmental and social impact in rural areas where livelihood and lifestyles are closely tied to the natural environment, and in urban areas where problems of air and water pollution are often intertwined with complex social issues. Those who are impacted do not experience "the human environment" in separate social and environmental categories (Lang and Armour 1981). In this sense, an environmental impact is always socially defined, and is thus a social impact as well.

There is a need, therefore, for new approaches which allow for a systematic investigation of the social consequences of environmental changes. While single disciplinary approaches are useful in understanding social and environmental interactions, an interdisciplinary approach is most appropriate to achieve a fuller understanding of the human and environmental interactions in the social impacting process. The interdisciplinary framework, as this study attempts to develop, is built on the theoretical constructs and methodological approaches in a number of most relevant disciplines such as human ecology, environmental psychology, human geography and environmental sociology. It is beyond the scope of this thesis to provide a detailed discussion of each of these disciplines.

Although they are divergent in definition and focus, they share a common base that they all stress human behavioral and environmental linkages.³ A careful examination of the research findings in these interrelated fields may reveal that a drastic interruption of the interactive pathways between human beings and the environment may trigger human behavioral adjustments which may be harmful to the individuals and communities concerned.

Thus, social impacts, at least some of them, can be regarded as human responses to environmental changes arising from a particular development project. The affected individuals evaluate the environmental changes, and adopt coping strategies based on their access to coping resources. The process of coping and the outcome of the coping process both have bearings on the socio-psychological and socio-cultural well-being of the individuals. The socio-psychological and socio-cultural effects can be expected to be more severe in circumstances when coping mechanisms fail. Again, differences among the individuals and communities concerned in their evaluation of the changes and in their access to coping resources serve to explain the differential outcomes.

To understand how social systems respond to environmental changes requires a full understanding of how social systems interact with the environment (Figure 3-5-1). The environment, as envisaged here, has at least two interrelated sets of utilities (functions or values) to the individuals under consideration. They include instrumental and expressive values. The instrumental values of the environment provide its inhabitants with important means of production, specifically land and related natural resources.

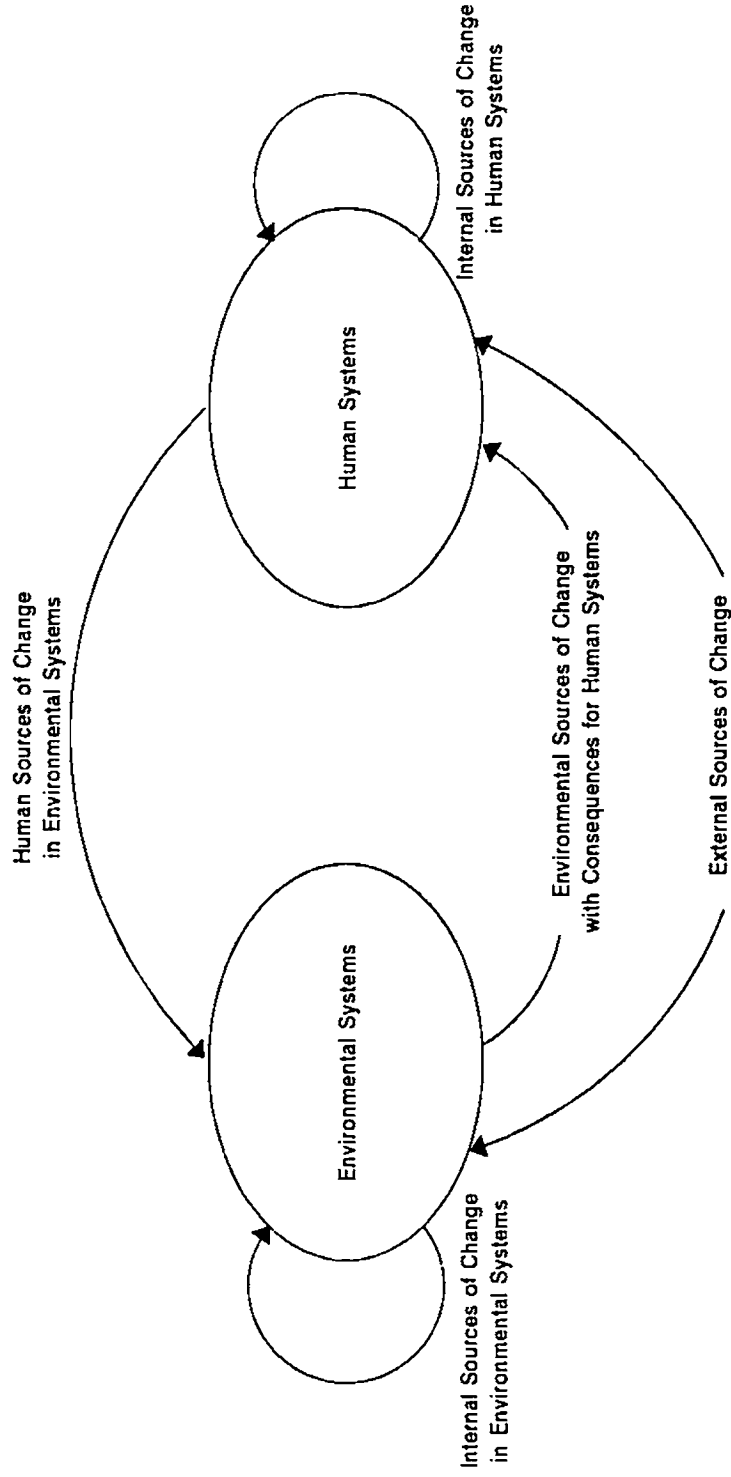


Figure 3-5-1. Interactions between Human and Environmental Systems (Adapted from Clark 1989)

These resources enable the inhabitants to maintain and improve their material standard of living.

Rolston (1981, 1988) used the phrase "life support value" and "ecological value" to denote the instrumental functions which natural systems play in sustaining human lives. A reduction in the availability of these productive resources will have social repercussions. The flooding associated with the Danjiangkou Dam Project in China, for instance, reduced the land holdings of the local residents surrounding the reservoir by as much as 75%. Many of the local residents remained impoverished even 20 years after the flooding.⁴ The financial hardship suffered by the native fishermen who lived around South Indian Lake in Northern Manitoba was also related to the collapse of the commercial whitefish industry which was attributed, in turn, to environmental modifications in connection with the Churchill-Nelson development (Wagner 1984).

The expressive value of the environment is manifested in what the American environmental psychologist Seamon (1984) calls "the emotional experience of the environment". In this context, the concept includes the human-made environment (for instance, housing), as well as the natural environment such as landscape. The American geographer Tuan (1974) used "topophilia" to convey this affective bond of the humankind with the environment. Similar terms used in the literature include "sense of place", "at-homeness", "spatial identity", "place-identity" and "rootedness" (See, for example, Fried 1963; Fried and Gleicher 1970; Schorr 1970; Relph 1976; Proshansky, Fabian and Kaminoff 1983; Seamon 1979; Tuan 1980).

Exploration of the expressive values of the environment has led to the gradual recognition that people are emotionally linked with the environment and have a profound sense of attachment to a place (Seamon 1979, 1982). Peace, security, insiderness, sacredness and "home" are all domains of the emotional experience of the environment. These features of the environmental experience can be fostered through such varied contexts as physical contact, patriotism, aesthetic appreciation, or lifelong involvement with one's home place (Seamon 1984).

Such emotional experience attached to the environment is not confined to rural communities. A recent study found that residentially mobile populations in the US had psychological bonds with home places as well (Feldman 1990). The psychological bonds with tangible environmental surroundings explain the way in which these experiences may generalize to the development of psychological bonds with types of settlements, or what is called "settlement-identity". Residentially mobile populations, despite the lack of lifelong stability of residence in one place, maintain the continuity of residential experiences by moving to similar types of settlements.

Many environmental sociologists recognize the "ecosystem-dependency" of humans (Duncan 1961; Dunlop and Catton 1979, 1983; Catton and Dunlop 1980; Schnaiberg 1980; Buttel 1986). This perspective, or paradigm, consequently stresses the importance of examining the relationship between social systems and local ecological conditions. It also sensitizes one to the historically unprecedented ecological impact of modern, industrial societies as well as to the potential social impacts of altered

ecological conditions (Barney 1980).

Machlis and Force (1988) used the term "resource dependency" to conceptualize the characteristics of rural communities that depend largely on natural resources. Natural systems have functions of providing employment, income, clean air and water, and recreational opportunities. They are also sources of social amenities such as security, stability, escape, sanctuary, aesthetics, history, religion or spiritual rejuvenation (see, for example, Burch 1977; Power 1983; Feldman 1990). Changes in resource dependency brought about by external forces, with little local control, often precipitate effects upon local social systems.

In summary, it is not possible to study social impacts without linking them with environmental changes. Likewise, it is impossible to evaluate environmental impacts without grounding them in a socially defined frame of reference. Social impacts are simply the behavioural responses of individuals as their relationships with the social and physical environments in which they live are modified or disrupted.

3.6. Social Impact Indicators

Impact identification and measurement are two major tasks in social impact studies. The first area of concern is related to finding indicators of social impacts. The field of social indicators research has largely been related to water resources development in the United States. It is said to have begun with President Hoover's Committee on Social Trends in the

1930s (Wish 1986). It gained important further impetus when a report entitled "Towards a Social Report" was published (US Department of Health, Education, and Welfare 1969). That report stimulated the publication of a series of social indicator reports in the United States on a regular basis (Eberts 1982). Researchers from diverse fields have maintained an interest in measuring the social well-being or quality of life in various geographical areas, including U.S. cities and states as well as in the international context (Liu 1976; Louis 1976; Estes as cited in Wish 1986).

There has been no agreement among researchers on the general components that comprise social well-being or quality of life. Smith (1973), for example, proposed a composite measure of quality of life embracing six major criteria: housing, health, education, social order, social belonging, and recreation. For Liu (1976), the quality of life is determined by six components- economic, political, environmental, social, health and educational. The concept of quality of life as proposed by Boyer and Savageau (1981) was composed of nine components: climate, housing, health, crime, transportation, recreation, art, economics, and education.

The US Water Resource Council (1973) first established a set of social well-being accounting principles and standards for assessing the social effects of their activities. The accounting system covered four major categories: (1) income; (2) security, health and safety; (3) educational, cultural and recreational opportunities; and (4) emergency preparedness. The Technical Committee of Water Resources Centers of the Thirteen Western States, or Techcom, developed a social impact assessment model

to identify the social factors that function in the system of decision making (Techcom 1974). The structure of the Techcom model is quite complex, consisting of nine major societal or primary goals which are further desegregated into subsequent layers of subgoals and finally to empirically-grounded social indicators.

In 1975, the US Bureau of Reclamation produced the Social Assessment Manual (Fitzsimmons, Stewart and Wolff 1975). The manual set forth five general categories of possible impacts. They were intended to cover a wide array of factors related to social well-being that were considered to be potentially affected by the development process. They included: (1) individual, personal effects; (2) community institutional effects; (3) area socio-economic effects; (4) national emergency preparedness effects; and (5) aggregate social effects.

Many social impact scholars have advocated the use of a "quality of life" perspective in social impact studies (Finsterbusch 1981b; Wolf 1976; Olsen, Melber and Merwin 1981; Olsen, Canan and Hennessy 1985). Finsterbusch (1975, 1977) proposed a conceptual framework, consisting of a relevance tree for identifying significant impacts. Olsen, Melber and Merwin (1981) also attempted to build a theoretical model for studying social impacts on the basis of the quality of "social" life. One of the major flaws of the Olson/Melber/Merwin model was that it took the community as the basic unit of analysis. Many other factors contributing to the overall quality of life such as psychological perceptions of satisfaction or well-being and the conditions of the natural environment were excluded.

Fundamentally, the model still reflected the strong influence of the functionalist approach, mainly dealing with direct demographic and economic changes rather than the effects of these changes upon the target population.

Just as in the field of social indicators research in general, the research literature on the concept of social well-being or quality of life reflects a wide variety of concepts and interpretations. There continue to be many areas where there is little consensus among the authors concerning the major social impact variables. This divergence of approach emphasizes the difficulty in comparing the results from different social impact assessment models (Andrews, Hardin and Madsen 1981). All these problems reflect the weak theoretical bases on which social impact models are built. The lack of a guiding "universal" perspective left the inclusion or exclusion of many impact variables unexplained and unwarranted and open to argument. Furthermore, little effort has been made to test the validity of these models.

In this study, one of the contributions which the systems approach can make is to define the social indicators to be included. From a systems perspective, the social system which is affected by the project can be regarded as composed of a number of subsystems at different organizational levels. The subsystems have distinctive features that are relevant to social impact analysis. The social impact indicators can be identified around these organizational levels (Figure 3-6-1). The application of this systems approach can aid in the process of selecting key social impact variables to be included in a social impact study. It should be pointed out, however, that professional knowledge and value judgments are still

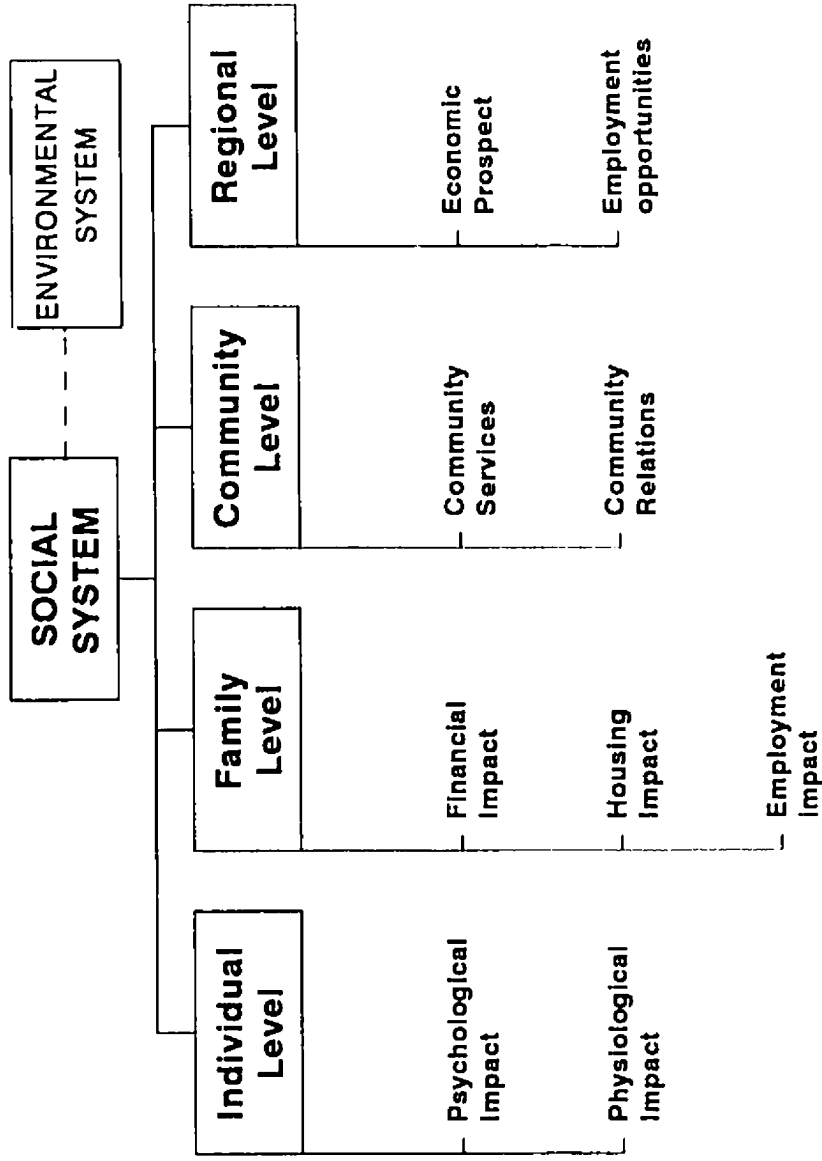


Figure 3-6-1. Social Organization and Social Impact Indicators

required in order to choose aspects of quality of life that most appropriately reflect the social reality of impacts.

3.7. Quality of Life Experience as Social Impacts

Research on social indicators and quality of life research both attempt to define and measure the same concept of "social well-being". But they emphasize different dimensions. Drawing mostly on functionalist theory,⁶ social indicators research stresses the importance of the social structural variables associated with socio-economic aspects of life, through measuring such "objective" factors as income, housing, health care, education, employment, leisure and various other social services (Liu 1976; Lee and Liu 1988). Quality of life researchers, however, focus their attention on variables based on people's experience, such as psychological states and the relationships among people as they "interact" with each other (Campbell 1976; Campbell, Converse and Rodgers 1976; Campbell 1981). The quality of life school identifies more with the interactionist theory.

As one of the representative interactionist theorists, Max Weber (1964:p.88) defined social action as "all human behaviour when and insofar as the acting individual attaches a subjective meaning to it... Action is social insofar as by virtue of the subjective meaning attached to it by the acting individual (or individuals), it takes account of the behaviour of others and is thereby oriented in its course." Many sociologists adopted this view by suggesting that reality does not simply exist "out there", waiting to be

observed or recorded. Rather, reality and the values attached to it are created through the subjective interpretations of individuals who "experience" the relationships between themselves and between the physical and social environments.

It has been customary in the study of social impacts to rely solely on social structural variables. There has been a tendency for those in the field to define concepts such as "social well-being" or "quality of life" in very broad terms which are represented by aggregate socio-economic data (Schneider 1976). For the past few years, the functionalist approach to social impact studies has increasingly been challenged by new research findings.

Functionalist scholars, including functionalist social impact assessors, commonly believe that structural socio-economic variables are "objective" in nature. They often deny, explicitly or implicitly, the existence of value judgments in their research, in spite of the fact that social impact studies always involve value decisions. The so-called "objective" social impact indicators are not exclusively objective. Individuals' values enter the research process in numerous ways. The initial selection of one problem instead of another for investigation involves value-based decisions. The selection of variables to be considered, the decision of how to calibrate the obtained measurements, and the final interpretation of the findings involve value judgments (Olsen, Canan and Hennessy 1985). The notion of "impact" itself presupposes a judgement through an established value system corresponding to the various interests of concerned social groups (Monosowski 1985). It is, therefore, impossible to assess the quality of life

in a community without grounding that assessment in value decisions (Olsen, Canan and Hennessy 1985).

When an assessment is declared value-free or when values are not explicitly stated in the assessment report, it is the researchers' values that implicitly determine whether or not an impact really exists, and, if it does, how significant the impact is. But this raises a serious question with regard to whose interests the researcher's values reflect- those of the developer, the beneficiaries, the affected community members, or others? Judgments based on different perspectives may result in totally different conclusions. In the context of relocation, for example, the weight placed on a home to be flooded by a dam project differs widely among different members of society. A home may mean very little to the developer and to the many consumers of electricity. But, both the value as a shelter for the family and the emotional value attached to it by the owner may be beyond the comprehension of many others.

A review of assessment studies on three dam projects in Brazil, Indonesia and New Zealand indicated that the studies were biased by an implicit value system, although there was no explicit acknowledgment of the values attributed by the different groups, including the researchers, to environmental and natural resources (Monosowski 1985). In the study on Brazil's Tucuruí Dam, for example, little importance was attached to the deleterious effects on fish. The Amerindians in the area, however, depend on fishing as a major source of food. A decrease in fish populations in the rivers crossing the Amerindian reserves as a result of damming is highly

significant for the survival of those native residents.

The tendency to regard non-structural variables as non-objective and ignore them in impact studies constitutes another bias of the functionalist perspective. Although seemingly "subjective", the socio-psychological and socio-cultural aspects in people's lives are in fact social realities and are as objective to those local residents as productivity and profit figures of goods and services are to the developers.

Meanwhile, there has been growing evidence to demonstrate that attitudes and perceptions played a very important role in affecting the responses of local residents to development proposals. Failure to give adequate consideration to such factors can result in costly delays or even a decision not to build the project (Albrecht and Thompson 1988). We are beginning to realize that an understanding of the different values, ideologies, beliefs, and norms within a community, which are the basis for individuals' interpretations of their relationships to the physical environment, is essential for predicting the social impacts of a change in the physical environment (Greider and Little 1988). As such, many social impact scholars claim that the study of attitudes, perceptions and opinions should have a central place in social impact assessment (see, for example, Lounsbury, van Liere and Meissen 1983; Meissen and Cipriani 1984; Albrecht and Thompson 1988).

There is a need to broaden the basis of inquiry in both the methodologies for measuring or inferring social impacts and in the theoretical perspectives for interpreting social impact research findings. One of the most pressing research needs is to test existing propositions and findings against

actual personal experiences of local residents (Freudenburg 1986b). In order to do so, it is essential that functionalist and interactionist perspectives are both brought into social impact analysis.

The functionalist and interactionist perspectives each have advantages and disadvantages in analysing social impacts. The usefulness of the functionalist perspective lies in that it operationalizes the social structure into discrete quantifiable components, or domains. This approach can play an indispensable role in establishing some of the most important contributors to, and sources of, quality of life. It enables an understanding of some of the fundamental structural properties at the higher levels of social organization. But this approach does not capture the real meanings of the structural variables to individuals in complex social settings.

If social impact studies are primarily concerned with determining changes in the quality of life of the populations involved, a new set of measures are needed that are different from those which are used to describe the socio-economic conditions- measures that go directly to the experience itself. It is at least arguable, therefore, that reliable social impact information should be solicited from the impacted subjects. These subjective measures have the advantage of dealing directly with the information a social impact assessor needs to know, that is, the changes in the individuals' sense of well-being. Thus, the deficiencies of the functionalist perspective can be compensated for by the integration of the interactionist approach, which stresses non-structural variables and the importance of human experience.

In summary, "real" social impacts are changes "felt" by individuals in the social and physical environments in which they live (Burdge 1977; Lewis 1980). A true understanding of social impacts requires knowledge of the feelings of the local residents about a proposed project and its associated changes and the motivations for such feelings (Lewis 1980). The above discussion is not meant to suggest that only non-structural (socio-psychological and socio-cultural) variables should be included in social impact analyses. Rather, structural and non-structural aspects are seen as complementary, instead of rival, quality of life domains. It is important that these two sets of domains are combined into a social impact analysis, since they both contribute to the overall well-being of the affected individuals.

3.8. Differential Impacts

It is often the case that those who derive benefits and suffer losses from a proposed action are not the same group of people. A proposed policy change, or a development proposal, which is intended to benefit the population as a whole may have negative effects on a specific region or a specific group. Even if the people who are negatively affected are among the beneficiaries, it is often the case that they are not adequately compensated for their losses. In many instances, the people and their communities are treated as resources, sacrificing them for the needed development (Lewis 1980). Such situations need to be more carefully

analyzed, for planners and policy makers usually assume that the benefits to this group of people would exceed the costs associated with the negative effects which they have to bear.

It is now generally accepted that social impacts are differential in nature, and that social impact assessment should concentrate on differential impacts. As Shields (1975: p.280) asserted:

"The point is that the impacts of high technology projects affect different people in different ways and at different times. Some people do lose a great deal, others gain, and others probably fall somewhere in between, gaining in some ways, but losing in others. And there are certainly some- indeed, many- who are virtually unaffected by project impacts. So it is quite clear that differential impacts are what social impact assessment is all about".

Despite the acceptance by researchers of the importance of focusing on distributional or differential impacts, it has not yet had much impact on the practice of social impact analysis (Dietz 1987). Meidinger and Schnaiberg (1980) criticized the undifferentiated analysis of impacts on the social system in which development takes place. They contended that many social impact studies treated a social impact as if it "were good or bad, very good or very bad, in itself, without reference to social groups" (*Ibid*: p.510). Lewis (1980: p.15) argued that researchers, planners, and decision makers should become more responsible, moral and competent in order to address the question: "What are the social costs of such a development and who should pay [for] them?"

One of the fundamental flaws with many social impact studies is the emphasis on the effects at the national or regional levels of society, rather than at the community and individual levels. It obscures the social reality that the introduction of a development project always creates social changes that are deemed to benefit some and disadvantage others.

There is a need to demystify what are termed "the public interests". The fact is that members of the public have "vested interests" in issues that involve their individual well-being. An individual may react to a project very differently, depending on whether he or she sees it as producing personal benefits or costs. For example, individuals who may favour the construction of a nuclear power plant for cheaper electricity may hold the opposite opinion if it is to be placed near their community. Cheaper electricity is preferable, as long as it (the nuclear power station) is not in their backyard.⁶ People can be expected to react the same way to a hydroelectric project. As long as it does not flood "my" land and "my" home, there is no reason why a project which may generate cheaper electricity should not be built.

It is meaningless to say that the aggregate social benefits of a project outweigh the aggregate social costs without further inquiring into how the social benefits and costs are distributed and how the negative social effects are to be mitigated. When project proponents make the claim that none of the affected parties will be left worse off, it reflects an understanding that it is unacceptable to implement projects that damage the interests of some social groups without proper compensation. Project proponents often

take advantage of the fact that differential effects are obscured to promote the project, by emphasizing the beneficial effects such as employment opportunities and new goods and services which the project may produce. But will these benefits proceed to the individuals who are negatively affected? Will their benefits, if any, outweigh their losses? These questions are, in most instances, left unanswered.

It is obvious that the disassociation of social costs and benefits creates an issue of social inequity. The pattern of distribution of these benefits and costs in any particular impact situation is an appropriate subject for assessment. It is a matter of social justice and social policy that those who acquire benefits should also bear the burdens (Wolf 1986). A similar principle applies to social costs; those who are negatively affected need to be properly compensated. For social impact assessments to focus on differential impacts will help generate knowledge more relevant to the making of decisions by government agencies overseeing the implementation of social and environmental impact legislation.

The study of differential impacts among the various social units requires a social profiling of the groups in the impacted area. There are a variety of ways of defining these social groups. The social profiling may be done on the basis of age, gender, education, race, religion, occupation, income or social status. Flynn (1985) distinguished categorical and functional social groups in his Group Ecology Method (GEM) for social impact assessment. According to Flynn, categorical groups are those created through common statistical or definitional characteristics (for example, age).

In contrast, the concept of functional groups is based upon social behaviour as expressed in terms of their differences in economic position (occupation, income, etc.), social interactions and political activities. He argued that functional groups existed in their own right, whereas categorical groups were the creation of the analyst or observer, and social impact assessment should focus on functional groups.

However, such a distinction seems arguable. Social behaviour may not only be dependent on economic positions, social interactions and political activities, but also on age, gender and other "categorical" variables. Besides, age and gender are not created by the analyst or the observer. Therefore, functional and categorical groups are both relevant to social profiling in social impact studies.

3.9. Summary

In conclusion, this chapter has attempted to propose a theoretical framework, in the form of a number of interrelated propositions, for social impact analysis. The framework has two unique features that are worth highlighting. First, it is interdisciplinary in nature. The framework draws on theoretical perspectives that are most relevant to social impact analysis from a variety of disciplines such as geography, psychology, and sociology. Second, the framework can be used to provide generic reference to other social impact situations, since the discussion relating to the theoretical formulations extends beyond the subject matter of dam-related relocation.

NOTES:

1. See, Leistritz and Murdock (1981: pp.xiii and 5). Leistritz and Murdock (*ibid*: pp.8-9) used the phrase "socio-economic impacts" to encompass "social" as well as "economic" impacts. Although effects on social organization, attitudes, perceptions and values are also included, they are concerns of least priority.
2. Functionalist scholars argue that human activities are organized in a local service and decision-making system that is functionally linked with that of the greater society. They contend that to understand social processes, it is necessary to examine the social structure within which such processes take place and the functions that social structures perform. See, for example, Bernard (1973). Haralambos (1980) also provides a detailed discussion of various theoretical perspectives in sociology, including functionalism.
3. For example, environmental sociologists speak of "societal-environmental relations" (Buttel 1986) or "(community) resource-dependency" (Burch 1977; Machlis and Force 1988). Human geographers refer to "man-environment relations (*sic*)" (Macgill 1986). Environmental psychologists use "man and his physical setting" (*sic*) (Proshansky, Ittelson and Rivlin 1970). Human ecologists are concerned with the "interactions between human and environmental systems" (Clark 1989).
4. The Yangtze River Planning Office (YVPO), "Resettlement Experience of the Danjiangkou Reservoir", Internal Document, YVPO, Wuhan.
5. See, *supra* note 2.
6. This is usually called the "NIMBY Syndrome". NIMBY stands for "Not In My Backyard".

Chapter Four. Research Design

4.1. Selection of the Case Study

The Mactaquac Dam Project on the Saint John River in the Province of New Brunswick was chosen as the case study for this research.¹ The project was built by the New Brunswick Electric Power Commission (NBEPCC), or NB Power, a provincial public utility agency in charge of producing and distributing electricity in the province. Construction of the Mactaquac Dam Project was started in 1965 and completed in 1968. The creation of the Mactaquac Reservoir or Headpond² affected over 1,000 property owners. Among them, 338 families or 1,115 people were relocated.

The Mactaquac Project provides an excellent opportunity for investigating long-term effects of relocation, since it was completed 24 years ago.³ A review of the literature indicates that very few studies have covered a time span longer than 10 years. It has been recognized that there is a great need to study the social impacts 10 to 30 years after relocation.⁴ The findings of this research will, therefore, fill this gap by facilitating the scientific understanding of the long-term social impacts of dam-related relocation.

According to statistics, there have been over 100 large dams built in the Maritime Provinces (CANCOLD 1984). However, there has been no research conducted on the social impacts of the associated relocation programmes. This research on the Mactaquac relocation programme, the largest dam-related relocation programme in the Maritime Provinces, will

provide a first insight into the social impacts of dam-related relocation in this region. In the national context, the social impacts of large dams, and of relocation in particular, have been attracting more and more attention from the scientific community, especially in central and western Canada (see, for example, Wilson 1973; Waldram 1980; Wertman 1983; Loney 1987; Berkes 1990). It is expected that this study will also help to understand the various issues of dam-related relocation at the national level.

The study is also of practical value to the New Brunswick Electric Power Commission. Since the early 1970s, NBEPC has been considering a number of further developments to harness the additional hydropower potential of the Saint John River and its tributaries within the province. Among them are the construction of a 300 MW power development adjacent to the existing Grand Falls Project and a 140 MW development at Morrill, both of which are on the mainstem of the Saint John River.⁴ Preparatory work is now under way for the Grand Falls re-development. For the past few years, the Power Commission has been surveying the properties that are to be affected by the project. Further, NBEPC is also considering the possibility of building a storage dam and power plant on the Green River, a tributary of the Saint John River, with a generating capacity of 160 MW. A proposal to build a dam on the main stem of the Saint John River on the American side, the Dickey-Lincoln development, is also being contemplated. Given the problems that have been encountered in property acquisitions, NBEPC has great interest in this study.⁵

The Power Commission provided invaluable support and co-

operation to this research. Files relating to the Mactaquac Project were released to the author and a contact person was made available by the Commission. Staff members at the Power Commission who were involved in the Mactaquac land acquisition and relocation programme provided assistance in locating the relocatees. Office space was also provided to the author in NBEPC headquarters in Fredericton during the data collection period. The support and co-operation from NBEPC greatly expedited data collection, and played an important role in the completion of this research project. More importantly, the Power Commission recognized the author's rights to independent inquiry in all phases of this study.

4.2. Questionnaire Design

As the main instrument for this study, a questionnaire was designed to obtain information directly from the relocatees regarding the changes in their quality of life which resulted from the relocation and implementation of the dam project. The full questionnaire is included in Appendix B. It contains a total of 96 questions, approximately 80% of which are close-ended. For each of these questions, a set of possible answers is provided. The remaining questions are open-ended.

The questionnaire is divided into 13 sections. The first section contains questions about the place and length of residence in the previous community, decisions about moving, and previous occupation of the respondent. The succeeding five sections are concerned with changes in the

overall quality of life, community services, community relations, the environment, and regional economy. The next three sections are related to compensation, performance of NBEPC during the relocation, and attitudes towards relocation. Changes in family housing conditions, land ownership and financial situation are included in the three sections that follow. Questions concerning personal information about the respondent and family are placed in the final section.⁷

It is often the case that the wording of a question may affect the response. In writing the questions for this study, every effort was made to ensure that they were not biased towards one answer or one set of answers. The questionnaire was tested in March, 1990, using a sample of four relocatee respondents.⁸ It was refined according to the responses.

4.3. Interviews

The names of the relocatee households were compiled from the Mactaquac Project files in the New Brunswick Electric Power Commission. Given the fact that the relocation took place over 20 years ago, it was discovered some of the relocatees were deceased. In order to obtain the names of those who were still alive, the name list was initially screened by several people who work at the Mactaquac power station and are familiar with the study area. Then the list was checked against telephone directories, and the property owners directory at the New Brunswick Geographic Information Corporation. A total of 109 names were compiled in the interview

list.

The relocatees selected for interviews were those whose names were listed in the Mactaquac Project files. They were apparently owners of the properties and also heads of the households. The head of the household was usually the major participant in negotiating settlements with the Power Commission on behalf of the family. The household head had also played a larger role in making decisions on matters concerning the relocation. It was, therefore, most likely that the head was the key informant in the household. In cases where the head was deceased or unavailable, the spouse was approached for the interview. Due to financial and time constraints, and a lack of information on the current locations of those who had moved away from the project area, only those who stayed in the general area were included in this study.

An introductory letter was sent to each of the potential respondents one week before they were to be visited. The letter contained a brief introduction to the research and a request for an interview (See Appendix). Of the 109 letters sent, 12 were returned with postal stamps indicating that the addresses were incorrect. It could have been that these people had actually died, but their names were still listed in the directories. There were ten people who were not available when the author visited their residences. Their homes were visited at least twice at different times of the day. Reasons for most of the absences were discovered from the neighbours, such as being hospitalized or travelling outside the region. Another 13 refused to be interviewed when they were visited.⁹ In total, 74

respondents (including the four test cases) were interviewed.

The interviews were conducted in person in the respondents' homes between April and July of 1990. Most of the interviews were done without the presence of a third person so as to avoid possible interference. There were a few cases where the spouses were present. In a couple of instances, the children and/or grandchildren were around for some time. Approximately half of the interviews were recorded, with the consent of the respondent and when it was convenient to do so. The average length of the interviews was approximately 60 minutes, but the majority were completed in 30 to 90 minutes. There were a dozen or so interviews which took longer than two hours. The information was transformed into machine-readable form from the completed questionnaires. Statistical analyses were then performed using the Statistical Package for Social Sciences (SPSS).

4.4. Secondary Data

Prior to the interviews, the author spent ten days in the NBEPD headquarters in Fredericton reviewing the Mactaquac Project files.¹⁰ The files contained the names of the property owners and in some instances descriptions of the properties that were to be acquired. They also contained various proposals and reports concerning the Mactaquac Dam Project and the Mactaquac Regional Development Programme, land acquisition and relocation policies, and internal correspondence (including memos) and minutes of meetings of the Land Acquisition Group, the Appraisal Group,

and the Board of Review.

The author also spent approximately two weeks in the major libraries in Fredericton, Woodstock and Nackawic. They included, among others, the Library of the Town of Nackawic, the Library of the Town of Woodstock, the Library of the Provincial Legislative Assembly, and the libraries in the University of New Brunswick. A large amount of information on the environmental, economic and social background of the project was gathered from newspapers, magazines, journals, reports and books.

Particularly, most of the news articles, editorials and letters to the editors concerning the Mactaquac Project, published in *The Daily Gleaner* (based in Fredericton) and *The Sentinel-Press* (based in Woodstock), were collected, covering the period from the announcement of the project in 1964 to the official opening of the power station in 1968. A number of local residents, including some respondents, also provided invaluable secondary information on the Mactaquac Project and on local history.¹¹

A variety of other data sources were also consulted. Among them were a number of government agencies in Fredericton- the Community Improvement Corporation (CIC), the Department of the Environment, the Department of Agriculture, the Department of Tourism, Recreation and Heritage, and the Department of Natural Resources and Energy.

4.5. Demographic Features of the Respondents

The average age of the respondents was approximately 68, with the youngest being 46 years of age and the oldest 90. The age structure of the respondents is shown in Figure 4-5-1. Fifty-five (74%) of the respondents were males and the remaining 19 (26%) were females. The respondents had received about nine years of education on average. Only two respondents had received post-secondary education. One half of the remaining 72 had attended one-to- four years in high school. The other half had attended three-to-eight years in primary school. The educational structure of the respondents is included in Figure 4-5-2.

Forty-four (59%) of the respondents were born in the communities in which they lived prior to the relocation. As can be seen from Figure 4-5-3, the majority (54 or 73%) of them had lived in the original communities for longer than 20 years, with the average length of residence being approximately 33 years. The respondents lived in 17 different communities when the relocation took place. They were living in 23 communities when the interviews were conducted. Fifty-two (70%) of the respondents stayed in the same community by building new houses or moving the old ones. The remaining 30% relocated to new communities. The average distance of the relocations was about seven kilometres.

Among the reasons given by the respondents for "deciding to resettle in the present community", proximity to the original place of residence was cited by 34 respondents. The second most cited reason was

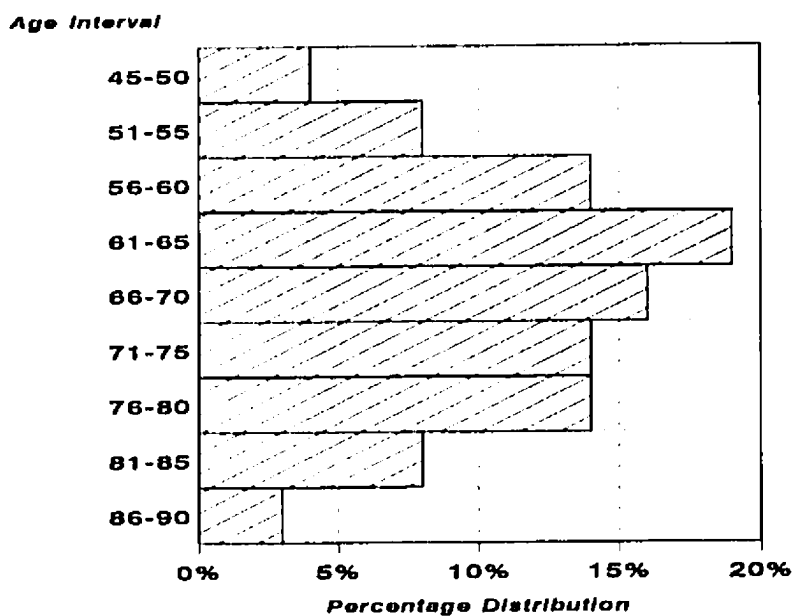


Figure 4-5-1. Age Structure of Respondents

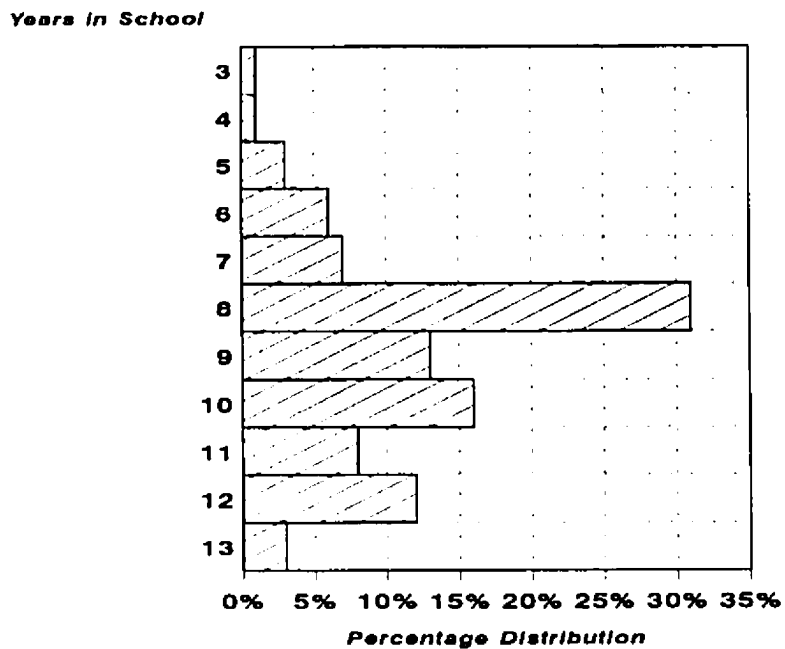


Figure 4-5-2. Education of Respondents

"nowhere to go" with 22 responses (f=22). It was followed by "close to relatives/friends" (f=13), "own property here" (f=13), "close to business/work" (f=12), and "handy to services" (f=1).¹²

At the time of relocation, the respondents were employed in 11 major occupations. The frequency distribution for each of the occupations is shown in Figure 4-5-4. Despite the wide diversity of the occupations, over half of the respondents reported the sale of farm or forest products as the major source of their family income, which gives an indication of the importance of land and related resources to the livelihood of the local residents.

At the time of the interviews, thirty-two of the respondents were retired. Only four were still involved in the farming business. One farmer claimed that he was forced to give up farming and had to turn to carpentry as a result of the loss of his land to the Mactaquac Project. Another respondent, who used to farm, was unemployed for the same reason. Among the 74 respondents, only six had worked in the Mactaquac Provincial Park and the Kings Landing Historical Settlement, which are concurrent developments of the Mactaquac Project. Not surprisingly, the incomes for about half of the families in the study came from non-working sources, which included primarily pensions, rents, bank interests, veterans payments, and unemployment insurance.

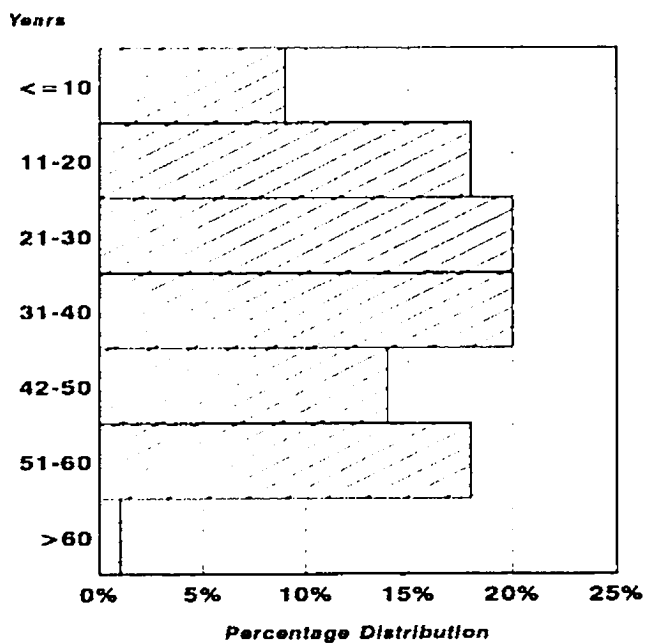


Figure 4-5-3. Length of Residence at Relocation

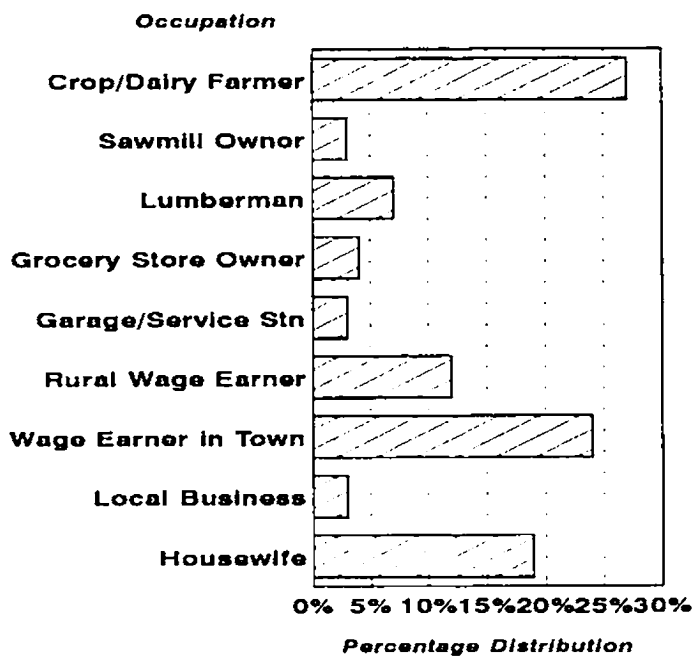


Figure 4-5-4. Occupational Structure at Relocation

4.6. Limitations of the Case Study

This study has a number of limitations which should be explicitly stated. One of the most pronounced is the fact that the study is confined to only those who stayed in the general project area. Therefore, caution should be exercised when attempting to generalize the specific findings concerning the social impacts of relocation to other relocatees who chose to relocate out of the region.

On the other hand, the author attempted to limit the statistical analyses to a few important variables so that the validity of the statistical analysis would not be sacrificed. This was partly due to the small number of respondents, and partly due to some special characteristics of the sample. For instance, income was not included in the bivariate correlational analyses, because its variation among the respondents was not large enough to derive meaningful conclusions. The reason for the small variation in income was the fact that a large majority of the respondents were aged, and depended on pensions and other non-working payments as their major source of income.

Despite these limitations, this case study has yielded sufficient information for testing some important hypotheses about the social impacts associated with dam-related relocation. More importantly, the case study has allowed the successful testing of the theoretical framework for studying social impacts.

NOTES:

1. Detailed descriptions of the Mactaquac project and its social and environmental settings are presented in Chapter Five.
2. The Mactaquac Reservoir is referred to by the local residents as "the Headpond".
3. Land acquisitions for the Mactaquac Dam Project started in early 1965. People living in the community of Mactaquac, near which the dam was located, began relocating in late 1965 to make way for the construction of the dam. Most of the moves in other communities took place in late 1966 and early 1967. By the time the dam was closed in November, 1967, all relocations were completed.
4. In commenting on this study, Dr. Thayer Scudder of the Division of Humanities and Social Sciences, California Institute of Technology, a renowned expert on relocation, stated, "As to relevance, there is a very great need to research what has happened to people 10-30 years after removal". (Letter to the author dated January 29, 1990).
5. The New Brunswick Electric Power Commission, "An Appraisal of the Power Development Potential of the Saint John River Basin: Summary", H.G. Acres & Company Limited, November 1973.
6. This is evident from a number of discussions with NBEPC officials.
7. The arrangement of the sections is intentional. (1) The first section and the introductory message before it are intended to create a favourable atmosphere, which is most important for the success of the interview. This is usually called the "warm-up" period and often takes a few minutes on average. (2) Personal information is considered sensitive. Asking personal information early in the interview may create suspicion and even hostility. Thus, personal questions are placed in the end of the questionnaire.
8. The test cases are also included in the analyses.
9. Two senior relocatees who were living in nursing homes were excluded from the interview list because they were found not capable of responding to the questionnaire.
10. The Mactaquac Project files were stored in six large boxes.

11. The materials provided by the local residents included slides, photos, newspaper clippings, personal correspondence, and a university term-paper concerning the Mactaquac project.

12. It should be pointed out that the responses were not mutually exclusive. A respondent may give more than one answer or may not give an answer at all.

Chapter Five. The Setting for the Mactaquac Dam Project

5.1. Location and Physical Setting of the Project Area

The Saint John River originates in Little Saint John Lake in the State of Maine, USA, flows through the Provinces of Quebec and New Brunswick and finally empties into the Bay of Fundy at the City of Saint John. The river is thus international and interprovincial, with about 36% of its total drainage area of 54,934 square kilometres lying in the State of Maine, 13% in the Province of Quebec, and the remaining 51% in the Province of New Brunswick.¹ With a course of 720 kilometres, it is the thirty-seventh longest river in Canada, and the largest river in the Maritime Provinces.²

The Mactaquac Dam Project, the largest of its kind thus far constructed on the main stem of the Saint John River,³ is situated in the Province of New Brunswick (Figure 5-1-1). "Mactaquac",⁴ a Maliseet Indian word meaning "big branch", is the name of a stream that joins the Saint John River at the community of Mactaquac. The Mactaquac Dam is situated approximately 19 kilometres upstream from Fredericton, the provincial capital of New Brunswick. The Mactaquac Reservoir⁵ extends a distance of 100 kilometres from the dam site to Hartland, New Brunswick.

Geologically, the basic physiographical subdivisions of the Saint John River basin are shared with the province as a whole, and represent an extension of the Appalachian system of uplands and highlands, which

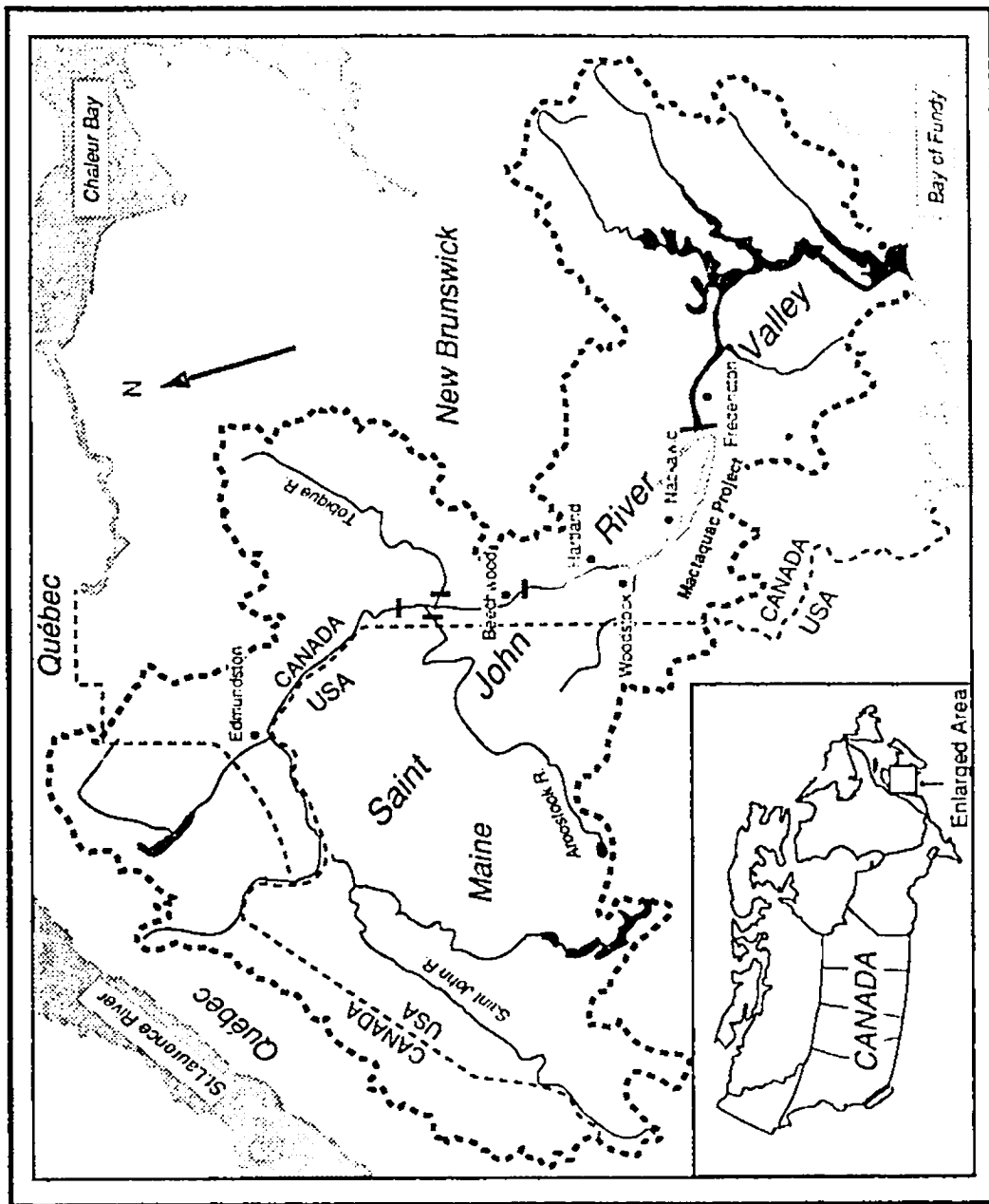


Figure 5-1-1. Location of the Mactaquac Dam Project

sweeps up the eastern flank of the North American continent. The project area traverses a major physiographic region- the New Brunswick Highlands- which is characterized by rugged topography. The best agricultural soils, consisting of sandy loams of alluvial origin, occupy the interval lands along the valley. The land on high ground, however, is characterized by shallow and stony soils.⁶

The climate of the project area can best be described as "humid continental", with long, cold winters, cool summers, and no dry season. The annual mean temperature is about 4 ° C, with a mean high of 19 ° C in the month of July and a mean low of -9 ° C in the month of January. The annual mean precipitation is in the order of 1020 to 1140 mm. Approximately 30% of the total annual precipitation falls in the form of snow. Less than 20% of the area consists of cultivated land, located mainly in the river intervals. The remainder is mixed coniferous and deciduous forest of secondary or tertiary growth.⁷

5.2. Hydropower Development in New Brunswick

For decades, the New Brunswick Electric Power Commission (NBEPC) or NB Power, the utility corporation owned by the Province of New Brunswick, has looked to the Saint John River as a source of hydropower that could be integrated with fuel-fired electric generating stations. There were three hydropower developments in the Canadian section of the Saint John River Basin before the Mactaquac development. These projects were

located at Grand Falls, Tobique and Beechwood. The Mactaquac has been the largest so far.

The first electric power plant was erected in New Brunswick in 1898. It was a small steam plant in the community of Campbellton at the mouth of the Restigouche River. Sackville, a college town near the border with Nova Scotia, acquired its electric supply in 1901. Then came Moncton, Fredericton, Newcastle, Loggieville, and Saint John. These early plants were powered by fuel. It was not until 1904 that the first attempt was made in the province to convert the power of falling water to electrical energy on the Meduxnekeag River, a tributary of the Saint John River, about 3 kilometres from the town of Woodstock. In the years that followed, many hydropower plants were constructed in the Saint John River Valley and on other provincial rivers.⁸

In 1918, the Water Power Commission of the Province of New Brunswick was established by an Order-in-Council to investigate the water power resources in the province. In 1920, the New Brunswick Power Act was passed by the Legislature and the New Brunswick Electric Power Commission was established, with a mandate to generate and distribute electric power within the province under public ownership. The first hydropower development built by the Power Commission was the Musquash Dam. This dam was completed in 1924 and situated on the mouth of the Musquash River near the City of Saint John. The first hydropower station on the main stem of the Saint John River in New Brunswick- the Grand Falls- was developed between 1926-1928, not by the Power Commission, but by

the Saint John River Company, a subsidiary of the International Paper Company.⁹ The Commission purchased the plant in 1958. Under the administration of NBEPC, a number of large hydropower stations had been constructed on the main stem of the Saint John River before the Mactaquac development, including the Sisson (consisting of four storage dams) constructed between 1951 and 1965, the Beechwood (1955-1958), and the Tobique (1950-1953).¹⁰

The Mactaquac Dam Project was initially considered as early as 1943. Preliminary investigations and test drilling were carried out in 1945, and continued sporadically for nearly 15 years. Between 1960 and 1962, the Mactaquac site and four alternative sites were investigated in detail by H.G. Acres & Company Limited. The studies concluded that the Mactaquac site, located at the confluence of the Mactaquac and Saint John Rivers, was the most economic location for development in the reach of the Saint John River from Fredericton to Woodstock.¹¹ NBEPC announced a final decision in January of 1964 proceed with the project at the Mactaquac site. Construction began in January of 1965. Three years later, the Mactaquac Power Station went into operation with three units on line. Units 4, 5 and 6 were commissioned in 1972, 1979 and 1980 respectively, bringing the project to its full potential in excess of 653,000 kilowatts.¹²

5.3. Engineering and Economic Features of the Mactaquac Project

The Mactaquac Dam is a rock-filled structure with a water-tight clay core. It is 1,006 metres long and 42 meters in height. The normal control level of the reservoir was originally set at 40 metres above mean sea level. In 1984, it was raised to 41 metres. The reservoir, or headpond, now covers a surface area of 88 square kilometres and extends approximately 100 kilometres from the dam site to Hartland. The maximum depth of the water immediately upstream of the dam is 15 metres; and the mean depth of the reservoir is 11 metres.

The powerhouse, containing the turbines and generators, is 183 metres long and 25 metres wide. The intake structure is a conventional mass concrete, gravity construction, housing 12 hydraulically-operated vertical-lift gates which control the flow of water into six penstocks. The water flows through a 180-metre-long approach channel cut in solid rock, and is guided through the gates to drive six turbines that propel the six generator units. The generators basically consist of a magnet rotating inside a wire coil, which creates an alternating current in the stator windings. The electric current, at 13,800 volts, is transmitted from the generators to the system grid. The switching station is situated on the east bank of the approach channel.

The highest flow of the Saint John River ever recorded at Mactaquac was 12,200 cubic metres per second (cms). The spillway of the dam was designed to allow a maximum discharge of 16,282 cms. It is

divided between two structures, consisting of ten vertical-lift gates. The spillway structure adjacent to the dam, called the "diversion sluiceway", served a dual function in that it was also utilized in a partially constructed state to divert and control the flow of the Saint John River during the construction of the main dam. The major engineering features are listed in Table 5-3-1.

With a total estimated cost of \$120 million, the Mactaquac Project was the largest single investment in the Maritime Provinces up to that time. The federal government contributed \$20 million during the construction period of 1965 through 1968, through the Atlantic Development Fund administered by the Atlantic Development Board (ADB).¹³ The rest was provided by the Provincial Government of New Brunswick. The total cost was divided between two major components: on-site costs and off-site costs. On-site costs included construction of the dam, the powerhouse and associated works, the turbines, generators and electrical equipment, and administrative expenses. Off-site costs were related mainly to the acquisition and relocation of private and public properties, reservoir clearing, and the construction of a fish hatchery. The detailed cost breakdowns are included in Table 5-3-2.

Table 5-3-1 Major Engineering Features of the Mactaquac Dam Project¹⁴

Parameter	Measurement
Installed capacity	653,000 kilowatts
Number of engines	6
Dam type	Compacted rockfill
Dam elevation	42 metres
Dam maximum height	55 metres above lowest foundation
Total length of dam crest	1,006 metres
Length of crest of main dam	518 metres
Intake structure	12 gates
Spillway structure	10 gates
Operating head	Elevation 24-35 metres
Normal tailwater	Elevation 6 metres
Reservoir length	100 kilometres
Reservoir surface area	88 square kilometres
Gross storage capacity	991 cubic kilometres

Table 5-3-2. Major Economic Features of the Mactaquac Dam Project¹⁵

Item	Estimate (1968 dollars)	
<i>1. On Site</i>		
General contract	50,000,000	
Other contract	23,300,000	
Administrative	9,600,000	
	Subtotal	82,900,000 (69%)
<i>2. Off Site</i>		
Land acquisition	8,334,000	
School relocation	530,000	
Church relocation	249,000	
Cemetery relocation	422,000	
Woodstock remedial works	2,557,000	
Power line relocation	340,000	
Highway relocation	4,158,000	
Railway relocation	4,196,000	
Bridges	2,400,000	
Reservoir clearing	2,225,000	
Fish hatchery	2,300,000	
Administration	1,350,000	
	Subtotal	29,061,000 (24%)
<i>3. Other</i>		
Interest	8,128,000	
	Subtotal	8,128,000 (7%)
GRAND TOTAL		120,089,000 (100%)

5.4. The Mactaquac Land Acquisition Programme

The creation of the Mactaquac headpond required the acquisition of 589 square kilometres of land, of which 31 square kilometres were forested to varying degrees and the remaining 558 kilometres were used for agricultural purposes. The acquired land was purchased in approximately 1,000 individual parcels. Except for a few corporate owners, the properties were all privately-owned by individual families.¹⁶

Just as most dam projects worldwide, the Mactaquac Project adopted a "no worse off" philosophy as the main objective for its land acquisition programme. Specifically, it was stated that "the Commission does not intend that anyone shall be less well off, due to the development of the Mactaquac Project, than at the present time."¹⁷ In the draft policy statement of the Land Acquisition Programme for the Mactaquac Project, the "no worse off" objective was defined to include only financial considerations:

"It is of course impossible to compensate for the loss of sentimental values and associations, however much we may wish to do so. It is necessary to request those situated in areas required by projects of this nature to accept some additional sacrifices for the good of the area, and the much greater numbers who will benefit together with their children and children's children. It is not necessary, nor indeed proper for these people to suffer financially; in fact they may rightly expect to be 'No Worse Off' and most probably a little better off financially, as a result of the project."¹⁸

To accomplish this objective, NBEPC formulated a number of

measures, which included, among other things, a 10% "disturbance bonus" (for forced taking) over the appraised market value, and the provision of first options for affected landowners to participate in the land-clearing programme. The "no worse off" objective and associated policy components of the Mactaquac Land Acquisition Programme generally imitated those of the Tennessee Valley Authority (TVA) (McCarthy 1949). Generally speaking, it was an approach based on cash settlements.

The 10% disturbance bonus for forced taking in the Mactaquac Land Acquisition Programme approximated that of the Columbia River Project built by the British Columbia Hydro and Power Authority in the same years (Wilson 1973). However, it was lower than the 15% allowance used in the St. Lawrence Seaway Project constructed from 1954 to 1958 by the Hydro-Electric Power Commission of Ontario.¹⁹ It should be pointed out that the allowance at all these projects was also supposed to cover all the costs incurred by the landowners, such as moving expenses when relocation was involved. At Mactaquac, in instances where part of a farm was required to the point where it could no longer be operated as an economically viable unit, the entire holding was considered for purchase. The price offered for the surplus land was at, or slightly above, the going market rate; i.e., the 10% disturbance bonus did not apply.

Before the Mactaquac Dam was closed and flooding occurred in 1968, all land below the elevation of 41 metres above mean sea level or, 1.5 metres above the normal headpond level, was cleared of all timber and brush. All fences and other debris were also removed from the flooded area.

A total of 3,068 hectares were cleared at an average cost of \$625 per hectare, excluding field administration, field inspection and fire prevention costs, which amounted to an additional \$86 per hectare. The costs for the clearing programme totalled approximately \$2,200,000. The former owners were given the first options to accept the clearing contracts. By allowing the landowners to derive the benefit of payments for clearing, NBEPC hoped that it would promote "public relations" and create good-will among the landowners. This policy created some employment in the area and directed a very large percentage of the approximately \$2,200,000 to the residents who were most directly affected by the flooding.²⁰

The Mactaquac Land Acquisition Programme contained a number of steps. The NBEPC field staff would first prepare a site plan for each individually-owned property, showing boundaries, buildings, fences and other important features. With this site plan, appraisers would inspect the property and prepare a detailed appraisal report that included the assessment of every element of the property. Shortly after the appraisal report was prepared, it was reviewed by the Chief Appraiser who would establish a tentative price. The entire file was then passed to the Manager of the Mactaquac Land Office for examination. The file was then put before a meeting of the Board of Review which studied the case and decided whether the appraised price was acceptable, needed to be modified, or re-submitted after a second appraisal.²¹ The organizational chart of the Mactaquac Land Acquisition Programme is shown in Figure 5-4-1.

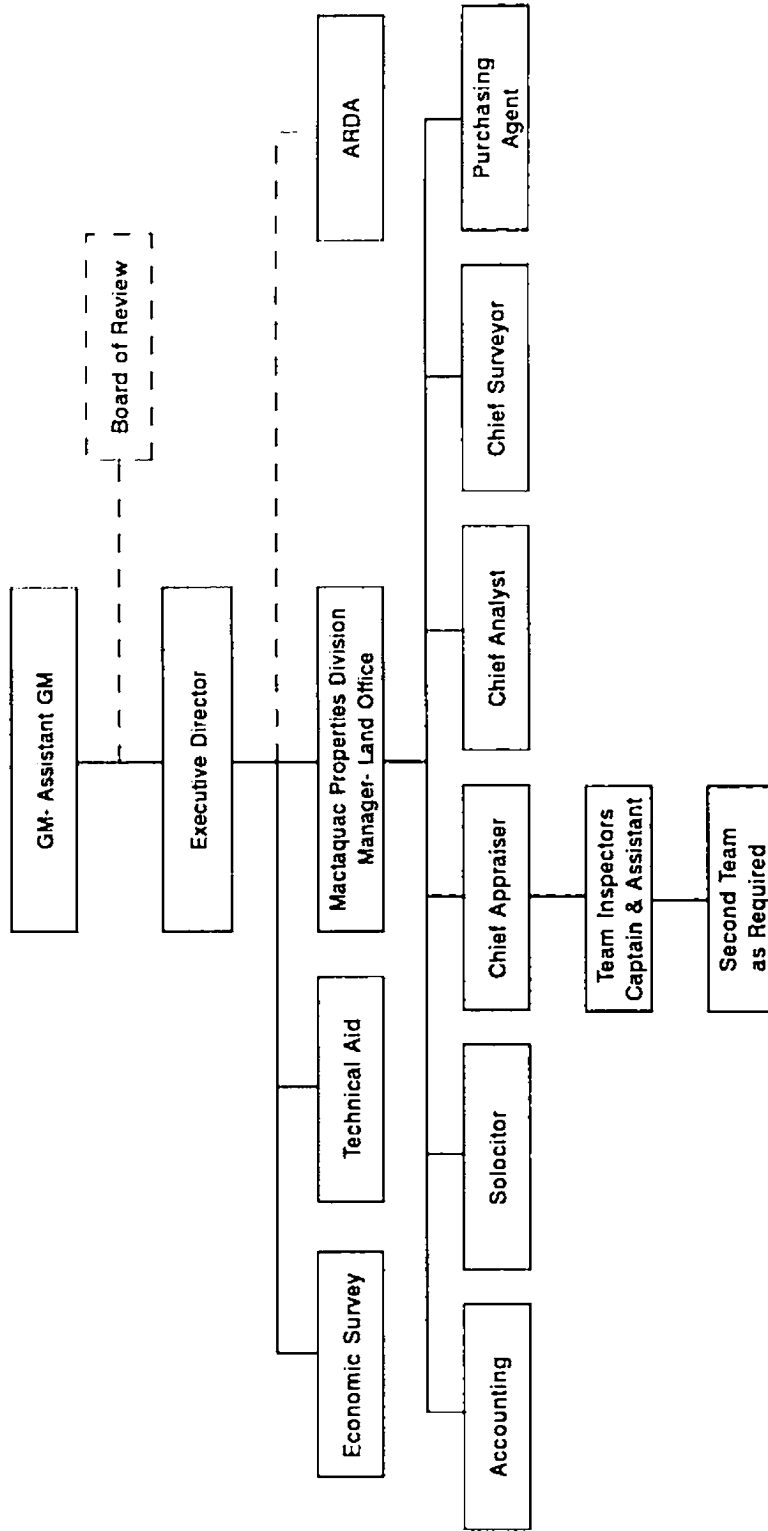


Figure 5-4-1. Organizational Chart of the Mactaquac Land Acquisition Programme

In order to create and maintain a fair and equitable price structure, a five-member Board of Review was established for the Mactaquac Land Acquisition Programme. The members of the Board were selected by NBEPC. They were local people drawn from the land acquisition area and the province, and with experience in agriculture and forestry as well as property evaluation. The terms of reference for the Board were set up by NBEPC: "to act as scrutineer in the interest of the general public and to insure that equity and uniformity prevails in all transactions". The Chairman of NBEPC claimed that the Board of Review would prove to be "a distinct benefit both to the landowners and the Commission".²²

The Land Acquisition Programme for the Mactaquac Project involved 17 communities, including the towns of Woodstock and Grafton. The remaining communities were small rural settlements. The village of Jewetts Mills was entirely submerged. The communities of Mactaquac, Bear Island, Central Kingsclear, Kingsclear and Longs Creek, which were close to the head of the reservoir, were also seriously affected. Among the approximately 1,000 affected property owners, 338 families were relocated from their old homesteads. The relocations were necessitated either because the house was standing below or near the projected flooding line, or the farm ceased to exist as an economically viable unit as a result of the acquisition involved.

The relocated families had a total of 1,115 people, with adults outnumbering children in the proportion of three to two. The adult population included full- and part-time farmers, retired rural residents, and active rural

residents (employed in service stations, restaurants, grocery stores, sawmills and other enterprises).²³ Most of the acquired houses were demolished and burnt. Some of them were physically moved to new foundations. A dozen or so houses of historical value were moved to the Kings Landing Historical Settlement.

Generally speaking, the land acquisition policy was based on cash settlements. That is, the relocated families were compensated with cash and made their own arrangements for resettlement. Some relocatees decided to stay in the same community and simply moved or re-built their houses on higher ground on the same property or on a nearby property. Some moved away from the original communities, but resettled within the province. Others relocated out of the province, as far away as Florida, USA. There are no official statistics available on the percentages of the relocatee population which followed each of the above-noted relocation options. An unofficial account by the author of the community of Bear Island indicated that about 37% of the original population left the community.²⁴

The Mactaquac Project also necessitated the acquisition of ten churches. Of these, six were relocated; two were demolished and replaced by new ones; the other two were purchased and demolished. In addition, 38 cemeteries were also affected by the flooding to a more or less extent. Two of them were kept in the same location as a result of remedial work (raising the headstones and providing bank protection). The rest were concentrated in 10 new cemeteries. In total, the 38 cemeteries comprised 3,471 graves, of which 2,658 were re-interred. Four hundred and eleven (411) headstones

and monuments were relocated but the remains were left intact. About 24% of the graves were not relocated at the request of the relatives and thus were entirely submerged. The project also touched approximately 40 miles of railway lines, of which one mile above Woodstock was relocated; nine miles underwent bank protection; and the rest were abandoned and inundated because of low traffic. A number of public and commercial properties, including several schools, service stations, grocery stores, sawmills and maple processing plants were also taken for the Mactaquac Project. They were either relocated, replaced, or purchased and demolished.²⁵

5.5. The Mactaquac Regional Development Programme

When the construction of the Mactaquac Dam Project was authorized in January 1964, the Government of New Brunswick also announced that it would adopt a policy of multi-purpose resource development in that portion of the river basin which was to be affected by the construction of the Mactaquac Project. On March 1, 1964, a consulting company was authorized to collect and analyze information on the economic, social and ecological conditions of the reservoir area. They were also expected to propose a working programme leading to a plan for the economic development of the area, to the provincial committee of the federal programme known as the Agricultural Rehabilitation and Development Act (ARDA).^{26, 27} On September 20, 1966, the governments of Canada and

New Brunswick signed an agreement establishing a comprehensive rural development plan for the Mactaquac region, which included both sides of the Saint John River between Fredericton and Woodstock.²⁸

The primary objective of the Mactaquac Regional Development Programme was "to increase the level of incomes and the standard of living" of people presently residing in the area. This was expected to be achieved through full exploitation of the existing natural resources, as well as manpower training and other assistance programmes to improve the capabilities of the labour force. These activities were also expected to generate employment for people living in the designated area, by attracting private investment to develop the forest industry and recreational facilities.²⁹

Under the agreement, the federal government was to contribute \$15,358,000 (or 73% of the total budget), through ARDA, FRED³⁰ and other Canadian programmes, to the Mactaquac Regional Development Programme. The provincial government was to contribute the remaining 27% (\$5,592,000) to cover the costs of operation, maintenance and capital investment.³¹ Responsibility for the implementation, operation and maintenance of the programme was delegated to the Community Improvement Corporation, which was established in 1965 by the Government of New Brunswick to formulate, recommend and administer regulations respecting the "attainment of the more efficient use and economic development of land in any area of the Province".³²

As of March 31, 1983, the provincial government's expenditures under the Mactaquac Regional Development Programme totalled

approximately \$9 million, while the federal government's contributions amounted to another \$9 million. Of these funds, approximately \$4 million were spent on the Mactaquac Provincial Park; \$3.9 million on Kings Landing Historical Settlement; \$2.1 million on highways; \$1.9 million on the development of the Town of Nackawic; and \$1.4 million on school construction. Other expenditures included a grant for the St. Anne-Nackawic Pulp and Paper Mill (\$1.4 million), manpower training (\$0.8 million), industrial parks (\$0.7 million), a land consolidation programme (\$0.6 million) and administration (\$0.7 million).³³

By 1984, the Mactaquac Regional Development Programme had not achieved the benefits expected by the planners, except for the growth of tourism in the region. A particular failure was the lack of interest by private investors in some of the industries originally planned for the Nackawic area, including a planing mill, a kiln and air drying plant, and a plant manufacturing furniture components. The population of the Town of Nackawic in 1984 was approximately 2,000, which was considerably below the projected 5,000 residents. In the region as a whole, the consolidation of population into growth centres had not been accomplished to the extent originally anticipated. From an agricultural point of view, the consolidation of farms into more profitable operations had also failed. On the other hand, the programme had not deterred a net out-migration in many of the subdivisions of the Mactaquac development region, except for a few communities close to the City of Fredericton which was experiencing urban sprawl.³⁴

Except for the St. Anne-Nackawic Pulp and Paper Mill at

Nackawic, which employed about 100 local residents, the Mactaquac Regional Development Programme had little long-term impact upon the employment prospects in the region. The recreation- and tourism-related opportunities, as created by the construction of the Mactaquac Provincial Park and the Kings Landing Historical Settlement, along with the development of the Town of Nackawic, represented a significant portion of the total investment, but only generated a limited number of summer jobs, mainly for students. This emphasis on capital projects did not address the immediate needs or improve the standard of living for local, low-income residents. The assumption of adequate employment provided by the private sector, central to the Mactaquac Regional Development Programme, was not realized.³⁶ In retrospect, it is highly unlikely that the overall effect of the development programme on long-term employment opportunities could offset the loss of jobs resulting from the flooding of some of the best agricultural land in the province.

5.6. A Brief History of the Project Area

It is a generally accepted theory that the first inhabitants of New Brunswick came from Asia across the Siberian-Alaska bridge some 29,000 years ago. Among the three groups in the area- the Micmacs, the Maliseets and the Passamaquoddies- the former two are still inhabiting basically the same areas as they were when the Europeans arrived. The Micmacs are located along the Gulf of St. Lawrence and the Maliseets are concentrated

in the Saint John River Valley. The Passamaquoddies have been confined to an area around St. Croix, Maine, USA (Raymond 1950; Clarke 1952, 1958, 1974). The Indian period was succeeded by an Acadian era in which the Saint John River was named for Saint John the Baptist on June 24, 1604 by the Siers de Monts and Samuel de Chaplain. Significant settlements were started by the French in the latter half of the seventeenth century. French traders established themselves close to the Maliseet centres for reasons of transportation and markets. Many farmers did likewise, because of the alluvial soils of the intervals that occurred near river confluences. Thus, the scattered settlement pattern characteristic of the Maliseets was carried on by the Acadians.³⁶

During the seventeenth and eighteenth centuries, the French and British settlers were constantly at war. This had little effect upon the inhabitants of the valley until 1756, when the British expelled the Acadians from Nova Scotia. Many Acadian families came up the Saint John River to avoid the British along the coast. After the Treaty of Paris in 1763, the Acadians remaining at the mouth of the river were gradually forced to move up the valley. This initial movement eventually led to the establishment of the main French settlements along the river above Grand Falls.³⁷

The New England period began when settlers from the New England states came to inhabit the valley. In contrast to the Acadian period, when large tracts of land were granted to individuals to encourage settlement, groups of New Englanders formed companies to receive large land grants. The New England period, though short in duration and small in

terms of number of immigrants, was important in that it not only reinforced the original settlement patterns, but also introduced another characteristic—the settlement of friends or related families in close proximity to one another. This settlement pattern continued in the Loyalist period that followed, resulting in the establishment of a number of communities that were characterized by strong friendship or kinship bonds.³⁹

From 1776 to 1781, the colonists of neighbouring New England, who wanted to be free of Britain's authority over taxation, trade and other government controls, revolted. War broke out between those who wished to become independent and those who wished to remain loyal to Britain. During the course of the war and following the American victory, the Loyalists's lands and other possessions were either confiscated or stolen. An estimated 100,000 Loyalist refugees were then sent to Australia, the West Indies and Canada. About 14,000 settled in the Saint John River Valley and received land grants (Lawson, Farnsworth and Hartley 1985).

The influx of the Loyalists had a major impact on the lifestyles of the original settlers. In addition to enlarging the previous settlements in the Saint John River Valley, the Loyalists brought with them many new skills and interests, as there were among them judges, lawyers, doctors, tradesmen, ministers, teachers, fishermen, soldiers, labourers and slaves. However, the conditions they found upon arrival forced the great majority of them to turn to farming. Therefore, their settlements were spread along the waterways and on the best agricultural land available. The attempt by the British Crown to provide as many people as possible with access to a

waterway resulted in long narrow grants of land extending from the river bank to the uplands. This linear type of settlement pattern is still dominant today. Since the land in close proximity to the river was best suited for agriculture, this granting policy gave most settlers a small piece of fertile land for farming and a woodlot on the less fertile uplands.³⁹

The first half of the nineteenth century was characterized by rapid population growth. This resulted from an increase in the existing population combined with active immigration from England, Scotland, and especially Ireland. The new immigrants tended to concentrate on the fertile lands along the river beyond the existing settlements. They established themselves either in or near the previous centres, thus consolidating and enlarging them, or by joining those who were opening up new lands. The belief that everyone should have access to a piece of land to produce food and other necessities has deep roots in the social fabric of that area. The practice of supplementing farm income by the sale of timber started in this period of active immigration and has continued to date. Today, family income is supplemented either by the sale of pulp wood and wages earned in nearby communities and urban centres, or by transfer payments. This pattern has enabled the small farmers to continue to enjoy a high degree of independence, longer than their counterparts in other parts of the country.⁴⁰

5.7. Socio-Economic and Socio-Cultural Characteristics

At the time of the construction of the Mactaquac Dam in 1964,

there were 10,120 people in 2,247 households living in the designated Mactaquac development area. Of these, 1,238 lived in full-time farming households; 1,190 in part-time farming households; 6,237 in active rural resident households; and 1,455 in retired rural resident households.⁴¹ The average size of the households in the Mactaquac area was 4.6 persons, which was slightly higher than provincial and national averages (4.4 and 3.9 respectively). The majority of the residents had not changed their place of residence for a considerable length of time, indicating a low degree of mobility. The mean length of tenure for all households was 23 years. Full-time farmers and retired rural residents were the least mobile with an average length of tenure at 39 and 36 years, respectively. Relatively high mobility was displayed by part-time farmers and active rural residents with respective average lengths of tenure at 26 and 14 years.⁴²

The average age of the adult population was 40.4 years. Many of the household heads were in the older age group (22% were over 64 and 62% were over 44 years of age). In comparison to the national and provincial averages, a relatively small population (14%) was represented by the age group of 25 to 34. This was due to a number of factors. This pattern was due to emigration from the area by younger people and the return of emigrants when they became aged.⁴³

The average educational level of the adult population in the Mactaquac area was lower than that for New Brunswick and Canada. Only 40% had more than an elementary education. The comparable percentages from the 1961 Census for New Brunswick and for Canada were 43% and

53%, respectively. The total labour force in 1963 was estimated to be 2,850 workers, of which 1,700 had regular steady employment, 230 were unemployed and the remaining 920 were engaged largely in seasonal occupations and unemployed for parts of the year.⁴⁴ The average household income of \$3,340 in the area in 1963 was also lower than that for the province (\$3,718) and Canada (\$4,906) (1961 Census). On a per capita basis, the income in the Mactaquac area in 1963 was \$734. Comparable figures for New Brunswick and Canada were \$1,151 and \$1,734, respectively (1961 Census). The income disparities between the Mactaquac area and New Brunswick and Canada were smaller on a household basis than in per capita terms, reflecting the difference in the average household sizes. Off-farm earnings accounted for 72% of the average household income. There had been a gradual increase in off-farm employment among the farming population.⁴⁵

In terms of home ownership, conditions in the Mactaquac area were generally better than the rest of the province and in the country at large. Almost three-quarters of the households in the area owned their homes outright. Only 16% had mortgages and just 11% were tenants. By contrast, 29% of New Brunswick and 31% of Canadian households rented. The average dwelling size of 7.4 rooms in the Mactaquac area was larger than that for New Brunswick (5.9) or for Canada (5.3). However, the average age of the dwellings in the area was generally older. Forty-seven percent were built before 1914, while 44% of the dwellings in New Brunswick and 31% in Canada were built prior to 1920.⁴⁶

In various government documents, the Mactaquac regional development area was portrayed as suffering from a relatively low standard of living before the Mactaquac Dam Project and the Mactaquac Regional Development Programme were implemented. But it should be noted that the provincial and national income averages included urban areas and thus were not strictly comparable with those of the rural Mactaquac area.⁴⁷ The conclusions in the government documents were also not shared by the local residents who described their situation in terms of "adequacy", "prosperity" and being "contented".⁴⁸ There were feelings among some of the farmers that the government exaggerated the economic conditions of the area to gain support for the dam project:

"While the government of Premier Louis Robichaud, with the support of their research committees, attempted to make the purchase of marginal farm property appear a favour on their part, the farmers did not see it in the same light. In discussions with my father, who grew up in a farming community along the river, it seems more reasonable that the quality of land was quite adequate to provide a living for its owners. The mixed farming engaged in produced some grain crops, vegetables, and livestock, filling the resident food requirements and some additional monetary income. While they may not have been wealthy, they were certainly able to afford farm equipment, like tractors, and the students were bussed to the local high school. There is ample evidence to indicate that the farming situation was not as desperate as the government made it out to be, apparently an exaggeration created to further the development of the dam".⁴⁹

Like most regions throughout Canada, the Mactaquac area prior to the Mactaquac Project was characterized by a hierarchy of communities

having wide but less intimate political, social and economic influence. The hierarchy was made up of small river villages and interior settlements, the local centres such as Harvey and Millville, and finally the regional centres of Woodstock and especially Fredericton. Although the residents of the communities lived in several social worlds, the village still played an important role in shaping the cultural patterns characterized primarily by "collectivism".

The most important collective attributes could be traced to the primary organizational unit, the household. This unit was built around the extended family. In Kingsclear, for instance, extended family members, grouped in two or more dwellings, lived together. It was also common that unrelated or distantly related persons formed a subsidiary household on an adjoining plot of ground. Such an organization enabled the development of very strong ties of mutual obligation between members of these households. These linkages were instrumental in their survival and goal accomplishment by pooling production resources and maintaining mutual support.⁴⁰

Local co-operative arrangements also existed in the valley for full-time farmers. Farmers in the same neighbourhood achieved small economies of scale by acting collectively. The critical element in this type of collective behaviour was that goals were accomplished in this fashion rather than through individual actions at greater financial cost. In the Mactaquac area, collectivism usually involved all aspects of the farming operations and community life. Collective actions were indispensable in offsetting destructive effects from outside forces beyond the control of the local inhabitants, such

as inflation in feed costs and drops in market prices. Another form of collectivism was the formation of "community clubs" in many of the villages. As a typical example, the Kingsclear Community Club was originally established to take advantage of a medical health insurance scheme. Later, Club activities expanded to include the establishment of the community hall and the formation of the local fire brigade.⁵¹

5.8. Initial Reactions to the Mactaquac Dam Project

Speculation about a dam had been circulating in the project area for years before it was officially announced in January of 1964. But few of the potential relocatees expected to have to move, nor did they prepare for such an event. This sense of denial was reinforced by a substantial number of rumours surrounding the project at the time when the initial field survey work was undertaken. One rumour, for example, went, "The dam's not going to be built... Because the dam is going to be built on a soft sand bottom it will break".⁵² "I don't believe they'll ever build the dam", a local resident said, "they've been measuring the river for the dam as long as I can remember".⁵³

The Mactaquac Project also met with strong opposition from property owners along the headpond (Wright 1966). There was hostility towards the project for fear of disruption of friendships and neighbourhoods. As one elderly woman said, "I'm sick with the thought of the whole thing, sick to death. We retired here among friends and neighbours, people we've

known all our lives; we need them." Some property owners were opposed to the project for fear of business losses. As a Bear Island farmer remarked, "Right now I've got a several year programme under way to build up my layer business. I'm already in it, money and time... Don't they (the Power Commission) know a man with business has to plan two, three or more years ahead of himself?"⁵⁴

The strongest opponents were the Association for the Preservation of the Saint John River in Its Natural State, an organization formed immediately after the project was announced. The Association claimed that it was a non-political organization with over 1,000 members. It took a series of actions, which included placing advertisements in local newspapers and writing letters to the editors to raise public awareness,⁵⁵ petitioning⁵⁶ and organizing public and protest meetings.⁵⁷ In the advertisements, the Association contended that "the proposed dam at Mactaquac is unprogressive, short-sighted, and not in the economic interests of New Brunswick". It would result in the flooding of thousands of acres of fertile agricultural land, the disruption of the lives of the local residents, the destruction of the salmon industry, the submergence of historical sites of regional and national significance, and the destruction of valuable natural assets. The Association demanded that work be halted for further investigation into alternative sources of power development.

There were also some other organized opposition groups whose memberships were drawn primarily from the project area. The Queensbury Land Owners Association once blocked the highway leading to the

construction site on one side of the river for several days. Another organization, calling itself the Keswick Valley Recreational Council, submitted a brief of protest to the Provincial Centennial Commission in charge of the planning of the Mactaquac Provincial Park, claiming that it was "of little or no benefit to the residents of York County".⁵⁸ In addition, there were also frequent confrontations between the individual property owners and the NBEPC field crews. Many property owners got into arguments with members of the field crews over compensation offers and for trespassing. There was one case in which a landowner threatened the field crew with a rifle to prevent them from working on his property.⁵⁹

The local media based in Fredericton and Woodstock appeared to have been generally in favour of the Mactaquac Project, although concern over the possible negative effects in the area was sometimes expressed. The Mactaquac Project was described in an editorial as an opportunity for progress that would result in "an infusion of new life and energy for the area".⁶⁰ It was maintained in another editorial that "the basic error of those who are opposing the Mactaquac power development is that they are not thinking big enough".⁶¹ The affected property owners were also called upon to "put their personal considerations aside" to "earn the great respect of their fellow citizens, as well as their sympathy".⁶²

The local media interviewed a number of local people who attended two public information meetings organized by NBEPC on February 25 and 26, 1964, in the Provincial Legislative Assembly Chamber in Fredericton. The opinions of the respondents differed, depending on their

perspectives on the social benefits and costs involved.⁶³ Of the 15 interviews published in *The Daily Gleaner*, nine respondents supported the project (including two with some reservations for the loss of land and the relocation of people); four were opposed; and the remaining two were not sure whether the project was good or bad for the province. A resident of Ludlow, a supporter of the project, remarked, "I think it would be a good thing for the province. We need more power and this should be a way to develop cheaper electricity". A resident of McNamee, another supporter, stated, "It will be a good thing. It will bring in more industry and also cut hydro rates down". A resident of Mouth of Keswick expressed his strong opposition, "It shouldn't be built. It will destroy too much land". A Councillor of York County also disapproved of the project, "I don't think much of it. It will put a lot of people out of their homes".⁶⁴

To conclude this chapter, it is necessary to emphasize a number of factors which played an important role in the creation of the social impacts of the relocation at Mactaquac to be discussed in the following chapter. First, the land acquisition policies at Mactaquac were similar to those of the Columbia River Project and the St. Lawrence Seaway Project, both of which resulted in widespread social impacts to the property owners. Second, the partial taking policy at Mactaquac was also heavily biased towards farmer relocatees who were forced to sell their entire farms to the Commission at rates below replacement costs. Third, the Mactaquac Regional Development Programme, which was intended to increase the level of income and the standard of living of the local residents by promoting regional economic

development, failed to accomplish the anticipated results.

Other important factors that should be taken into account in identifying and evaluating the social impacts of the relocation at Mactaquac were the deep historical roots of the local residents in the project area and the value of land and associated resources to their economic and social well-being. Fostered by historical progression and ecological conditions, the Mactaquac area was also characterized by collectivism which affected all aspects of the economic and social life of the community members- from the establishment of the linear settlement pattern, co-operative arrangement in farming operations, to the formation of community clubs. By submerging large tracts of land and by forcing large numbers of people out of the communities, the Mactaquac Dam Project served to undermine the economic and social fabric of the local communities. This issue was not addressed by the land acquisition and relocation policies of the Mactaquac Project, nor was it successfully dealt with by the Mactaquac Regional Development Programme.

NOTES:

1. The Saint John River Basin Board, "Tourism and Outdoor Recreation in the Saint John River Basin", Report 10, September 1973.
2. The Saint John River Basin Board, "A Plan for Water Management in the Saint John River Basin", Final Report of the Saint John River Basin Board, Part I: Water Resources and Water Uses, Fredericton, New Brunswick, April 1975.
3. The "Saint" in "Saint John River" was commonly spelled as "St." in the early days. But lately, "Saint" has frequently been used. At present, both spellings are correct (Lawson, Farnsworth and Hartley 1985).
4. The name "Mactaquac" has had a number of variations in spelling. It has been written as, among others, "Macnaquac", "Mactnaquac", and "Macinquac". A final "k" has sometimes been added to all these names. The name is probably derived from the Maliseet word "Mak-te-quak", meaning "Big Branch" (Gordon and Grant 1972).
5. The Mactaquac Reservoir is frequently referred to as "the headpond" by the local residents, although "Mactaquac Lake" as well as "Mactaquac Reservoir" are also often used in the media, books and journals. These terms will be interchangeably used throughout the thesis.
6. The Saint John River Basin Board, *supra* note 2.
7. *Ibid.*
8. *The Daily Gleaner*, "History shows steady progress", June 21, 1968, p.25.
9. *Ibid.*
10. The New Brunswick Electric Power Commission, "Hydropower in New Brunswick", information brochure, no date.
11. The New Brunswick Electric Power Commission, "Report on the Mactaquac Development, Volume I", H.G. Acres & Company Limited, Consulting Engineers, Niagara Falls, Canada, May 1961.
12. The New Brunswick Electric Power Commission, *supra* note 10.

13. *The Daily Gleaner*, "Atlantic Development Board gives \$20 million grant for Mactaquac", January 11, 1964, p.1.

14. The figures in the text as well as in this table are adapted or calculated from the following sources: (1) The New Brunswick Electric Power Commission, "Hydro Power in New Brunswick", information brochure, no date; (2) J.O. Dineen, "Rivers, dams and floods with special reference to the 1973 spring runoff on the Saint John River", unpublished paper, New Brunswick Electric Power Commission, Fredericton, New Brunswick, March 1974; (3) A.H. Wark, W.P. Steadman and D.C. Willet, "Design and construction of the Mactaquac hydro-electric development", presented in Vancouver to the Engineering Institute of Canada Annual General Meeting, September 1969; (4) CANCEL (1984).

15. Data provided by NBEPC.

16. A.H. Wark, W.P. Steadman and D.C. Willet, "Design and construction of the Mactaquac hydro-electric development", presented in Vancouver to the Engineering Institute of Canada Annual Meeting, September 1969.

17. *Ibid*, p.12.

18. The New Brunswick Electric Power Commission, "Mactaquac Development Land Acquisition Program: Draft Policy Statement", August 1964, p.1.

19. The allowance for forced taking at the Seaway project varied between 10% to 25%. This was done to assist landowners who were drawn into the acquisition process at later stages to find suitable properties. Ontario Hydro set the allowance at 10% in the start of the acquisition program and increased up to 25% as the acquisition progressed. See, (1) The Hydro-Electric Power Commission of Ontario, "Report to Richard L. Hearn, Esq., Chairman and Commissioners, the Hydro-Electric Power Commission of Ontario, on Acquisition of Land and Related Matters for the St. Lawrence River Power Project", Toronto, Ontario, February 22, 1955; (2) The Hydro-Electric Power Commission of Ontario, "Supplementary Report to James S. Duncan, Esq., Chairman and Commissioners, the Hydro-Electric Power Commission of Ontario, on the Acquisition of Lands and Related Matters for the St. Lawrence Power Project", H. Hustler, Director of Property, Toronto, Ontario, January 2, 1957.

20. (1) The New Brunswick Electric Power Commission, "Mactaquac Hydro-Electric Development: Land Clearing Program- Suggested Procedures", no date; (2) The New Brunswick Electric Power Commission, "Mactaquac Hydro-Electric Development- Land Clearing Program", May 10th, 1964; (3) A.H. Wark *et al.*, *supra* note 16.
21. The New Brunswick Electric Power Commission, "Mactaquac Information Bulletin", November 1964.
22. (1) *The Daily Gleaner*, "Mactaquac review board appointed for land program", July 3, 1964, p.5; (2) The New Brunswick Electric Power Commission, "Draft Policy Statement of the Mactaquac Development Land Acquisition Program", June, 1964, p.2.
23. A.H. Wark *et al.*, *supra* note 16.
24. This figure is calculated by the author from an unpublished material written by a local resident about the effect of the Mactaquac Dam Project on Bear Island.
25. A.H. Wark *et al.*, *supra* note 16.
26. In realizing the need for financial assistance in the marginal areas of the country, the federal government of John Diefenbaker passed the Agricultural Rehabilitation and Development Act (ARDA) in 1961. The main objective of ARDA was to raise farm incomes by finding alternative and more profitable use for marginal and submarginal land, by encouraging projects that would create employment opportunities in agricultural regions. All the provinces entered agreements with Ottawa under the ARDA programme (Stanley 1984; Brown 1981).
27. The New Brunswick ARDA Committee, "The Mactaquac Regional Development Area: An Appraisal", H.G. Acres & Company Limited, May 1964.
28. Community Improvement Corporation, "Mactaquac Area: Federal-Provincial Rural Development Agreement", New Brunswick, 1966. Another federal-provincial comprehensive rural development agreement was also signed at the same time, covering an area in northeastern New Brunswick comprising Gloucester County and adjoining parishes in Restigouche and Northumberland Counties (Stanley 1984).
29. *Ibid*, (1).

30. The Fund for Rural Economic Development (FRED) was a subdivision in ARDA. Its role was to provide funds for comprehensive programmes in areas marked by poverty, poor educational opportunity and high unemployment (Stanley 1984).
31. Community Improvement Corporation, *supra* note 28 (1).
32. The Province of New Brunswick, "Community Improvement Corporation Act", Bill-80, 3rd Session, 45th Legislative Assembly, 1965, p.1.
33. E. Keith Bonnyman, "Comprehensive River Basin Development: An Evaluation of the Mactaquac Project", The Transportation Group, University of New Brunswick, Fredericton, New Brunswick, December 12, 1983.33.
34. *Ibid.*
35. The Joint Federal/Provincial Steering Committee, "Evaluation of the New Brunswick FRED Plans, First Interim Report: Retrospective", Prepared by ABT Associates Inc., Cambridge, Massachusetts, Submitted to the Joint Federal/Provincial Steering Committee to Review the FRED Plans, Ottawa and Fredericton, April 1969.
36. See, (1) Clarke (1952, 1968, 1974); (2) Searle (1973); (3) Lawson, Farnsworth and Hartley (1985); (4) Maxwell, Lilian M.B., "The History of Central New Brunswick", The York-Sunbury Historical Society, Fredericton, New Brunswick, 1984; (5) The Saint John River Basin Board, *supra* note 2.
37. *Ibid.*
38. *Ibid.*
39. *Ibid.*
40. *Ibid.*
41. The detailed criteria used were as follows:
- (1) Full-Time Farmer- derived over 50% of the household income from farming and/or forestry and worked less than 100 days of off-farm employment;
 - (2) Part-Time Farmer- lived on a farm but derived less than 50% of the household income from farming and/or forestry or worked more than 100 days at off-farm employment;
 - (3) Active Non-Farm- derived less than \$250 of the

household income from farming and/or forestry and more than 50% of the household income from off-farm employment;

(4) Retired- received at least two-thirds of the household income from non-work sources.

See, Laurence Simpson, "The Mactaquac Area: A Study of Social and Economic Factors", Prepared for the New Brunswick Department of Labour, Fredericton, New Brunswick, January 1965.

42. The New Brunswick ARDA Committee, "The Mactaquac Regional Development Plan: The People- An Economic and Social Evaluation", Interim Report, H.G. Acres & Company Limited, May 1965.

43. *Ibid.*

44. *Ibid.*

45. *Ibid.*

46. *Ibid.*

47. This was challenged in a report which argued that (1) a number of rural costs were higher due to transportation charges; (2) the income in kind was insignificant in the Mactaquac area; and (3) it implied that low incomes were apparently bearable. See, Laurence Simpson, *supra* note 42, for the above arguments. If the first argument was meant to suggest that the costs of living in the rural Mactaquac area were as high as in urban areas, it is obviously erroneous for a number of reasons. Savings resulted from the high incidence of home ownership, farm produce, home-made clothing, local building construction and other activities. These savings were most likely to exceed the increase in transportation charges. The second argument contradicted their own observation that "local co-operative arrangements" existed in almost all of the communities in the valley "to achieve small economies of scale". (See, The New Brunswick ARDA Committee, *infra* note 50).

48. "Bear Island's hub of farming in the valley. Fact is, Bear Island is the most prosperous farming community in the Saint John River Valley". See, The New Brunswick ARDA Committee, *infra* note 50, p.11.

49. Catherine Davidson, "An examination of the Mactaquac dam development project", Term Paper, History 377-01, University of Alberta, 21 November, 1988, p.8.

50. The New Brunswick ARDA Committee, "Mactaquac Regional Development Plan: Community Social Structure and Program Implementation", Interim Report, H.G. Acres & Company Limited, February 1965.
51. *Ibid.*
52. *Ibid*, p.47.
53. *The Telegraph-Journal*, "Valley viewpoint before the flooding: mixed feelings on Mactaquac", February 11, 1964, p.5.
54. The New Brunswick ARDA Committee, *supra* note 50, p.15.
55. Full-page advertisements opposing the Mactaquac project were placed by the Association in *The Daily Gleaner* on March 14 (p.9), March 29 (p.5), June 5 (p.6), June 26 (p.19), July 17 (p.2), August 7 (p.8), September 23 (p.2), October 2 (p.8), and October 22 (p.16) of 1964. Letters of protest, many of which were written by members of the Association, were frequently published in the two major local newspapers, *The Daily Gleaner* and *The Sentinel-Press*, in the period from early 1964 to late 1966.
56. *The Daily Gleaner*, "Delegation opposes Mactaquac", July 10, 1964, p.5.
57. See, for example, *The Daily Gleaner*, "Woodstock association plans Mactaquac protest meeting", April 14, 1964, p.3; *The Daily Gleaner*, "Anti-Mactaquac group asks study", April 16, 1964, p.16; *The Daily Gleaner*, "Over 200 attend Mactaquac protest meeting", "Speaker urges gathering to make their feelings known", October 26, 1964, p.nine.
58. *The Daily Gleaner*, "Present brief to commission: Keswick Valley group protests proposed Mactaquac park", March 20, 1965, p.5.
59. The above information was obtained from one of the interviews in this present study.
60. See, for example, *The Sentinel-Press*, "Mactaquac opens exciting prospect". Editorial, January 16, 1964, p.3; *The Sentinel-Press*, "Not a threat but an opportunity", Editorial, January 23, 1964, p.3; *The Sentinel-Press*, "We need Mactaquac", Editorial, March 26, 1964, p.3; *The Sentinel-Press*, "New life for a valley", Editorial, July 30, 1964, p.3; *The Sentinel-Press*, "Build Mactaquac, we need it", Editorial, September 3, 1964, p.3; *The*

Sentinel-Press, "An economic blow", Editorial, October 1, 1964, p.3.

61. *The Daily Gleaner*, "Not thinking big enough", Editorial, March 12, 1964, p.4.

62. *The Daily Gleaner*, "Mactaquac", Editorial, March 10, 1964, p.5.

63. *The Daily Gleaner*, "Mactaquac project discussed on 'the great debate'", February 23, 1964, p.5.

64. It is interesting to note that the two opponents quoted in the text were from communities directly affected by the flooding, while the two supporters were not. A clear point can be made from the published opinion poll. That is, the vast majority of the supporters were from outside the flooded area. Most of the opponents, on the other hand, were local residents living in the affected communities.

Chapter Six. Research Findings

6.1. Introduction

This chapter contains four sections. In the first section, the social impacts of the Mactaquac Dam Project on the relocatees are examined. In this discussion, responses from the interviewees are supplemented by information collected from secondary data sources. This allows the impacts as perceived by the relocatees to be compared with the intended objectives of the land acquisition programme, and the findings of previous studies to be related to the social and environmental impacts of the Mactaquac Dam Project.

The second section presents the results of a correlational analysis of major impact indicators as dependent variables against occupation of the respondent as an independent variable. In the third section, discriminant analysis is used to investigate the relationships amongst some of the major impact indicators. In particular, it is intended to determine the relative contributions of the individual domain impacts to the overall quality of the life of the relocatees. Two case analyses are presented in the fourth section. They represent two instances where the respondents reported very different impacts from relocation. It is hoped that these analyses provide further insights into the many factors at play.

6.2. The Social Impacts of the Relocation at Mactaquac

This section is concerned with the analyses of the social impacts of the relocation at the Mactaquac Dam Project as perceived by the relocatees. In these analyses, the social impacts are examined in relation to the findings from previous related studies on the Mactaquac Project, as well as in relation to the objectives of the land acquisition and relocation programme and the beneficial effects of the project claimed by the undertaking agency and its proponents. In addition to the impacts on specific quality of life domains, a global impact indicator is devised to measure the overall effect of the Mactaquac Dam Project on the quality of life of the relocatees. The analysis of the global impact indicator is presented in the final part of this section.

6.2.1. The Impacts on Family Finance and Housing

The declared intent of NBEPC was that all people affected by the Mactaquac Dam Project would be fully compensated so that they would not be worse off financially or physically than they were before.¹ The negative impacts on the financial and housing conditions of affected families have been the most noted effects of relocation for many dam projects around the world. Thus, the inclusion in this study of the impacts on the financial and housing conditions of the family was intended to examine the respective policy outcomes of the Mactaquac land acquisition and relocation

programme.

The responses showed that 52 out of the 74 respondents reported that the relocation had no effects on their financial situation. Thirteen of the respondents believed that their financial situation was negatively affected, while four maintained their present financial situation had been improved by the relocation. Five respondents did not know, or could not tell, whether the financial conditions of their families had been affected either positively or negatively.

With regard to the impact of the relocation on present housing conditions, 46 respondents believed that it had made no difference to their present housing conditions. Twelve claimed that the relocation had negative effects on their present housing conditions. Seven reported beneficial effects. Nine respondents did not know, or could not tell, whether the relocation had any positive or negative effects on their present housing conditions.

It is worth noting that, in responding to the question on the adequacy of the compensation, 43 respondents maintained that the amount of compensation was not adequate to replace what was taken from them for the Mactaquac Project. They comprised approximately 58% of the sample. This percentage is substantially higher than those related to the negative effects on present family finance (about 19%) or those related to the negative effects on present housing conditions (about 18%). When asked why the under-compensation did not adversely affect the present financial and housing conditions of the family, most respondents usually gave one of two typical answers- "We had to work harder to be where we are now", or

"We have made the best out of the worst".

6.2.2. The Impact on Personal Health

The respondents were asked whether they or their spouses had developed any serious health problems over the years that might be related to the relocation. Eighteen contended that the relocation had negative effects on their spouses' health or their own, while 52 maintained that their spouses' health or their own had not been affected by the relocation. Four respondents were not sure whether the relocation had effects on their health.

The health problems reported by the respondents can be grouped into two categories: short-term psychological effects, and long-term or serious psychological or physiological effects. In the first category, there were seven cases in which the respondents reported symptoms, during or immediately after the relocation, described as "very depressed", "filled with sadness", "having bad dreams", or "roused suddenly from sleep at night and found myself crying".

The remaining 11 of the 18 cases had suffered serious outcomes or long-term consequences which included psychological disorders (personal withdrawal and speech impediment)⁷ and related physiological diseases, ranging from shingles and rheumatoid arthritis (five cases), heart attack (three cases), cancer (one case), to premature death of spouse (two cases).

The major cause of health impacts from the relocation was

stress. If the relocation process is divided into three phases, namely, pre-move, actual move and post-move, the form of stress in each phase is different. In the pre-move phase, the stress is characterized by grievance, anxiety, uncertainty and denial. In the case of the Mactaquac Dam Project, this type of stress was manifested in feelings which included,³ among other things, sadness and grievance about losing one's home and land⁴ (forty-six responses), anger and frustration about under-compensation or mistreatment⁵ (thirty-three responses), uncertainties about the future⁶ (twenty-eight responses), and denial⁷ (nine responses).

The grievance over the lost home was one of the major source of stress when the actual move took place. It was first conceptualized as a syndrome by Fried (1963) when he studied the relocation of the West End in Boston, USA, as a result of an urban renewal project. It was also observed in the St. Lawrence Seaway project in Canada when the water began to rise to fill Lake St. Lawrence; to quote Mabee (1961: p.222), "A women standing on a dike, watching, wiped away a tear. Her husband touched her gently. 'There goes our youth', he said."

At the Mactaquac Project, the time available for the actual move ranged from a couple of months to up to six months or even two years. During this period, the workload and inconvenience (whether it involved the relocation of the old house to a new homestead or the building of a new one) were often overwhelming to some. As one relocatee from the community of Mactaquac recalled:

"It took a lot of time and money to look around and find a new place. We spent nearly two years. We had three kids, one eleven-year old, one ten-year old and one four-year old. We first moved to Island View for temporary shelter in the fall and then moved to this place the next spring. We had a herd of one hundred and three cattle and all the feed with us during the move. And I was pregnant! Think about the frustration we had for those years. We almost had a nervous breakdown because of that. My husband was once hospitalized in Fredericton for nerve problems. Our life and health would have been better off if we had not been moved. I don't know how we went through it. It is still scary to think about it now."

Inconvenience was one of the most commonly heard complaints during the interviews. The stories differed, but they conveyed the same message. In the community of Kingsclear, one relocatee complained about the blocking of her family's spring well by a blasting crew from the Power Commission. As a result, the family was out of water for several days. The respondent recounted:

"Oh, there were just so many little things that bothered us. Even the house. When it was moved by Hydro, the plaster inside the wall had fallen down and covered or broke our heat vents going up from the furnace. We went through the whole winter without any heat in our bedrooms."

In the town of Nackawic, which was one of the four new community sites developed for the Mactaquac relocatees, yet another relocatee told her personal story about the inconvenience and its psychological effects (Lawson, Farnsworth and Hartley 1985: pp.244-245):

"Up until September 21 there was no road to our house. At this time a rough base was made as the start of a road, but below our house there was a mud hole which was not filled in until the next spring. All winter we took the car up Austin Munro's lane, wet or dry, and many times drifted high with snow. All our supplies had to be carried..... The fields would be frozen and dry when we left home in the morning but when we returned we had to wade in mud over our shoes to get across the road bed..... During the winter of 1966-67 I made a daisy afghan to keep my sanity. We had no neighbours and we couldn't see smoke from a chimney, or a light in a window. This situation I was not used to. If the flowers in that afghan could talk, what a story they would tell."

Post-move re-establishment was also a major source of stress for the Mactaquac relocatees, particularly for those who felt they were not adequately compensated. They had to do extra work to regain the economic position that they held before the move, which led to the development of stress-related health problems. In the community of Lower Woodstock, for example, one respondent claimed that he has experienced heart failure as a consequence of the relocation. The effort involved in fixing up the new house that he bought, as well as the extra work which he had to put into earning enough money to maintain his standard of living, were to blame for his heart problems:

"On April 29 of 1967, not long after we moved down here, I got a heart attack. I stepped down from the machine in the afternoon; the next thing I knew, when I gained consciousness, was that I was in the hospital. I have been hospitalized many times since. I was even sent to Montreal for a check-up a few years ago. It almost cost my life last year- my heart stopped beating five times. I had to stay in the hospital for a month. My

health was good, and I never had any trouble with my heart before that. I think it is because of overwork and stress. I bought this place here. It was an old house. I had to put a basement underneath and fix it up all by myself. The money I got from the damn Hydro was never enough to buy a house as good as I had. I had to put a mortgage on it. I had to take up two jobs to make up the loss. It was crazy."

6.2.3. The Impact on the Elderly

Health impacts on elderly relocatees were also widely reported in the project area. A not infrequent outcome was premature death. The death of an elderly resident in Kingsclear was attributed by his neighbours to a "broken heart". He died the day when a construction crew moved in on the farm which five generations of the family had farmed.⁴ Another relocatee in the same community also blamed the relocation for the deaths of both her mother and father:

"The relocation bothered me. But not as much as it did to mom and dad. Mom died of cancer just when they were starting to move people out of Kingsclear. It bothered her a lot and she had enough. Even when she was in the hospital with cancer and suffering, she was still worrying about where we were going and what kind of house we were going to get, although she knew she would never be able to move into it. She died in April of 1966 before the move. My dad, the night when we moved, he just sat there with tears in his eyes. He didn't want to leave the old house. He was very depressed. He didn't live long. He died a year later."

For some elderly residents, grievance over the lost home after

the relocation was too deep to overcome. The sense of having been uprooted accompanied them to the end of their lives. A respondent told the story of another elderly relocatee in Kingsclear:

"The dam shortened many lives in the valley. Milford Kitchen was one. He relocated first to Fredericton, then moved back to Kingsclear, then to Harvey. He just wasn't happy anywhere else afterwards, because he was pushed off his family farm. He could never get over with it until he was buried."

In the town of Nackawic, a local resident remembered an aged lady who was relocated from the community of Southampton as a result of the Mactaquac Project. The elderly relocatee did not have any relatives in the immediate area. She did not buy another house after her old house was taken and had to live with her niece in a distant community. She died about two years after the move. In the community of Grafton, an elderly relocatee refused to move out of his house when it was to be demolished, and had to be taken away by his son with help from his neighbours.

Sometimes people, particularly the elderly, cannot withstand the depression from forced relocation and may commit suicide. A respondent told a story about another farmer relocatee in the area who drowned himself in the river:

"When he was working in the potato field one morning, one of his neighbours saw that he was very depressed and said, 'How are you, Ken?'. 'Fine'. The same day in the afternoon, people found Ken's body near the bank of the river. He had taken off his glasses and drowned himself."

A similar incident was reported at the St. Lawrence Seaway project, where an elderly relocatee took his own life by drowning himself in the river. To quote Mabee (1961: p.220):

"Seeing all the past he knew being shaved off the landscape, a retired farmer of Aultsville, Ontario, in his eighties, grew lonely. One day, taking a last chance to recover his past, he took a boat to row over to one of the islands where he had lived on a farm as a child, an island that would soon be largely submerged. A few days later his body was recovered from the river. He was disturbed by the destruction around him, explained a daughter."

At Mactaquac, premature death of elderly relocatees was also reported in at least five instances in the communities of Kingsclear, Bear Island, Southampton, and Grafton. One farmer in Southampton, for instance, was said to have "died of a broken heart." One relocatee recalled, "He didn't want to lose his land. He didn't want to move. He gave himself up and died not long after he moved to Woodstock. The dam has shortened the lives of many old fellahs."

6.2.4. The Impact on Children

Twelve respondents reported that the relocation had negative effects on their children, while 44 said that their children were not affected in any way. The remaining 18 respondents did not respond to the question

because they either had no children or none of their children was living with them at the time of the relocation.

The twelve respondents who reported negative effects on their children were then asked in what ways their children were affected. Stress related to transferring schools was referred to six times.⁹ Stress related to the change of neighbourhood was mentioned twice. Being deprived of employment opportunities in farming as a result of the flooding was also mentioned twice.

There was an interesting case of negative inter-generational impacts. It involved a family that first relocated within the same community of Kingsclear by moving the grandfather's house to higher ground. They moved, shortly afterward, to the suburb of Fredericton where they are presently living. The respondent has a total of four children, a son and three daughters. The oldest two were born in Kingsclear and were four-years old and two-and-a-half-years old when the relocation took place. The first impact upon the children from the relocation was related to the short-term stress as a consequence of neighbourhood change. As the respondent recalled:

"It was just different for them when we first moved down here, because most of the old neighbours, the close handy neighbours, moved apart. It took quite a while for them to get used to the change. It was pretty hard for them. They were kind of stuck in the house after we moved here, wondering whether or not they should go out and bother the neighbours."

This case also provides an evidence of how relocation may

cause negative psychological effects upon children, arising from the disruption of people-place identity. It may also illustrate the transmission of the psychological impacts from the first generation to the second generation:

"The night when we moved into grandpa's house, my daughter sat there just crying. She knew grandpa's house and had often been over there in the house. It just wasn't home, I guess. The old house was home.

The two oldest children were going to Sunday school in the Second Kingsclear Church before the move. They wouldn't go to church down here. We had to drive them up. We still drive the two youngest ones up to Kingsclear every Sunday morning to Sunday school, because they wouldn't go down here when they first started Sunday school. They consider Kingsclear home. They were even not born up there..... Well, I guess it's probably through us, because whenever I say going to Kingsclear, it's always going up home."

The respondent also claimed that the relocation from a rural to an urban community reduced the playing space for the children, since the yard is now much smaller here than it was in Kingsclear. In addition, the children could "run into the country and do whatever they were pleased to" before the relocation.

6.2.5. The Impact on Community Services

After the Mactaquac Project was announced, the opponents were concerned with the effects of the flooding on the roads in the project area.¹⁰ In addressing this and other concerns over the effects on community

community services, the Chairman of NB Power claimed that a large proportion of the \$10 million to be spent on the Mactaquac Provincial Park development would be invested in the area surrounding the headpond, and would thus generate further economic activity. Together with other factors, this was seen as an opportunity for the re-organization and improvement of community services.¹¹

The impacts of the Mactaquac Dam Project on the quality of church life, on the quality of roads, highways and streets, on the convenience of shopping and visiting doctors in the project area as perceived by the relocatees were examined in this study. The responses are shown in Table 6-2-1. As can be seen from the table, the responses exhibit a similar pattern. That is, a large majority of the respondents believed that the project had not made any difference to the level and quality of community services. There were also considerable numbers of respondents who could not tell whether the quality of these community services (except for church life and visiting doctors) had been affected in any way. Only small percentages of the relocatees considered that the project produced either positive or negative impacts.

It is difficult to compare the impacts of the Mactaquac Project with those of other dam projects both in Canada and in other countries due to the lack of analogous data. If, however, the Mactaquac Project is placed in the context of the beneficial effects claimed by politicians and the officials of the undertaking agency, it is fair to say that most of the claims were proven false by the findings.

Table 6-2-1. Perceived Impacts of the Mactaquac Dam Project on Quality of Selected Community Services

Community Service	Frequency and Percentage Distribution			
	Positive	No Difference	Negative	Don't Know
Church Life	9 (12.2%)	48 (64.9%)	9 (12.2%)	8 (10.8%)
Transportation	8 (10.8%)	45 (60.8%)	5 (6.8%)	16 (21.6%)
Shopping	8 (10.8%)	48 (64.9%)	3 (4.1%)	15 (20.3%)
Visiting doctors	1 (1.4%)	54 (73.0%)	6 (8.1%)	13 (17.6%)

6.2.6. The Impact on Community Relations

The responses showed that 28 of the 74 respondents reported that their relationships with other members of the community had been adversely affected by the dam project, while the remaining 46 respondents did not perceive any negative effects on relationships within their communities.

Among the most common reasons the respondents mentioned for the disruption were "they tore us apart", "many of our neighbours moved away", and "lots of new people moved in". The break-up of neighbourhoods was vividly described by a respondent who relocated from the community of Kingsclear to a suburb of Fredericton:

"My grandfather lived on one side of me. My uncle lived on the other side. Now I feel like I am alone. My grandfather moved here and died shortly after. My uncle ended up living in Fredericton. The neighbours, who once lived across the road, moved to Nashwaaksis as far as I can remember. We were torn apart."

While the relocation from the old community proved to be a very painful life event, the integration into the new community was also a stressful experience to some of the relocatees of the Mactaquac Project. The respondent compared the different experiences within the two communities:

"The old neighbours were very close together. When my dad was in the hospital, they were always right there to give a helping hand. When my mom died up there, we just didn't have to get a meal. The neighbours brought the meals in. When my dad died living down here, one lady brought a pan of biscuits. That's it. You know, it's just not the same. But back then, if there was a death in someone's family, everybody would help, coffining, taking things, and looking after the kids when the family was down to the funeral parlour. People down here just don't do things like this. Or, well, maybe they do, but not to my knowledge."

Another respondent believed that the life of a lady, who was once very sociable in the previous community, was shortened when she moved to a new community. "She was very upset with that", the relocatee remembered, "She was a person who visited at least two families a day. But down in the new place, she never went out of the house." It was also reported by some respondents that the dam project has created distrust and conflict among some members in some communities. A detailed discussion on this topic is presented in Case Analysis (I) in Section 6.5.1.

In the case of the Mactaquac Project, the relationships among community members occurred in a number of ways by the relocation. First, in some instances, the flooding of land and homes forced many families out of the community. The community of Bear Island, for example, lost over 40% of its original 41 families by the end of the relocation programme. The relocation also resulted in a significant re-organization of neighbourhoods in some of the communities. The departure of community members and the re-organization of neighbourhoods disrupted established patterns of interaction. Secondly, the introduction of the project may have changed the ways in which the communities interact with the outside world. Particularly, newcomers have been attracted to the man-made lake area, and may have brought different lifestyles with them, which may not be preferable to the original residents. During the interviews, this "intrusion" was frequently mentioned by the respondents who are now living in the communities close to the dam.

6.2.7. Regional Economic Impacts

To gain support for the project, the provincial government of New Brunswick and the New Brunswick Electric Power Commission launched an extensive campaign to educate the public. Many claims were made with regard to the benefits to be created by the dam project itself and an associated comprehensive regional development programme (the Mactaquac Regional Development Programme),¹² both of which received financial assistance from the federal government.

According to an information brochure published by NBEPC, the Mactaquac Regional Development Programme was intended to provide "full development of the region's resources for the purpose of creating new job opportunities and increasing families' incomes and levels of living".¹³ In a provincial affairs address on October 21, 1964, the Premier of New Brunswick, Louis J. Robichaud, told the audience that the construction of the Mactaquac Project would create some 2,500 jobs and would stimulate a more rapid industrial expansion and "boost the whole provincial economy".¹⁴

In the first public meeting related to the project held in the community of Kingsclear on March 10, 1964, the General Manager of NBEPC told the local residents that, through provision of adequate and cheaper electric power, the Mactaquac Project would be a step toward greater industrial progress. Electric power from the project would "help develop the area's natural resources, create an industrial incentive and add

further to the development of New Brunswick's wood industry, mining, metallurgy and chemical industries". New Brunswick residents would thus benefit greatly from industrial, social and economic gains.¹⁵ In responding to objections to the Mactaquac Project, the General Manager anticipated that if all of the natural resource potential of the valley were developed through agriculture, forestry, recreation, inland transportation and others, the future returns would be greater than from the power generation alone.¹⁶

The responses from the interviews indicated that 41 of the 74 respondents believed that the economy of the project area as a whole has benefited from the construction of the dam project to a greater or lesser extent. Sixteen respondents reported that the dam did not make any difference. The remaining 17 said that the dam did not generate any benefit to the regional economy at all.

While most of the respondents acknowledged the creation of many short-term employment opportunities in the region during the construction phase of the project, a large majority (54) of them reported that the dam project did not make much difference for regional employment opportunities in the long-term. Thirteen interviewees maintained that there would have been fewer or many fewer jobs if the dam project had not been built and, therefore, suggested positive effects. Seven respondents believed that there would have been more or many more jobs available without the dam project, thus implying that the dam project had actually reduced the employment prospects in the region due to the flooding of large tracts of the best farmland.

A large number of jobs were created during the construction of the dam. In the peak of the three-year construction period, approximately 2,300 workers were employed.¹⁷ Among the relocatees interviewed, only eight had worked on the dam project during the period of its construction. Although it was maintained that the property owners affected by the project would be given preferential treatment in the hiring of construction workers, there was no evidence that such a policy had been implemented.

There may be two reasons for the low participation rate of relocatees in the construction of the dam. First, they were probably preoccupied with making arrangements for their own relocation. Secondly, the general contract for construction, involving the dam, powerhouse and all associated works, except for the turbines, generators and electric equipment, was awarded to the Dufresne Engineering Company Limited of Montreal. This firm consisted of the Canadian subsidiaries of two large British construction companies.¹⁸ This awarding drew strong criticism from members of the opposition party in the provincial government.¹⁹ NBEPC did not appear to have had any influence on the contractors' hiring policies, nor was there any evidence that NBEPC made any effort to do so.

Following construction, a few dozen permanent jobs remained in the Mactaquac power station, the Mactaquac Provincial Park, and the Kings Landing Historical Settlement. Seven respondents reported that members of their families found dam-related jobs, which refers to employment in the above-mentioned developments as well as the St. Anne-Nackawic Pulp and Paper Mill. This may have served to compensate for

some of the losses of the few relocatees involved, but most of the relocatees were not able to derive any benefits in this respect.

Some of the respondents had obvious misgivings about the effects of the Mactaquac Project on the economy and employment opportunities in the area. One relocatee in Woodstock charged that the dam "ruined the valley" by submerging large tracts of the best farmland in the area which could have helped reduce the number of young people leaving the area. Further, he charged that the project "made jobs for the feds" and the politicians in Fredericton but not for the local residents.

The main objective of the Mactaquac Dam Project was to produce electricity. It was maintained that the project would substantially lower the electrical rates for the consumers in the province.²⁰ This was also the justification for the approval of a grant of \$20 million by the federal government through the Atlantic Development Fund. They believed that the cost of electricity for New Brunswickers would have markedly increased without the power project.²¹

While 19 of the 74 respondents agreed, to a greater or lesser extent, that they would have been paying higher electricity prices if the Mactaquac Project had not been built, there were twice as many respondents who believed that the price of electricity would have stayed the same even without the project. Therefore, a considerable portion of the respondents believed that the sacrifices which they had made did not pay off in terms of reducing electricity prices as expected by the planners. Such opinions are justifiable since the electricity produced at Mactaquac only

constituted a very small percentage of the total power generation in the whole province in 1989.

A related issue which had raised great controversy was the true cost of electricity generated from the Mactaquac Project. The opponents of the Mactaquac Dam Project, especially the Association for the Development and Preservation of the Saint John River in Its Natural State, challenged the claim of cheap power from the Mactaquac Project on the grounds that other associated costs were not included.²²

A letter from a resident of Plaster Rock, New Brunswick, to the editor of *The Daily Gleaner* on March 24, 1964, asked, "would our government desecrate the agricultural, historical and beautiful St. John River Valley to supply electric power to other areas or even to other provinces and other countries?" A resident of Sussex, New Brunswick, also wrote to the editor of *The Daily Gleaner* on August 14, 1964:

"Our economists repeat the great future need of fertile earth for the world's booming population. Yet, in spite of this, we accept flowery propaganda that it is best that this lovely valley be destroyed for more power. More power to sell to the State of Maine. Some N.B. Progress that is!"

Another letter accused the Mactaquac Project of destroying the most beautiful parts of the province "for material gain".²³ A "worried man" from Fredericton also wrote to the editor,²⁴ saying, "We hear this development is the cheapest source of power in New Brunswick. I don't think this is correct, if you consider the value of the river. What is the St. John

River worth?"

The responses from a number of respondents in this study echoed these views. In pointing out the sale of about 50% of the hydropower produced in New Brunswick to the New England states, a respondent called it a "sell-out". He particularly questioned the wisdom of producing cheaper power to sell to the United States by "destroying" the valuable land resources.

6.2.8. Environmental Impacts

The impact of the Mactaquac dam and the man-made lake on the beauty of the landscape was one of the most controversial issues when the dam was announced. The proponents of the Mactaquac Project contended that the dam and the 100-kilometre-long lake would beautify the surrounding area; and the wider and deeper river would be "more scenic" than it was.²⁵ It was also asserted that the dam would not have any adverse effects on salmon fishing in the river.²⁶ The then Federal Minister of Fisheries predicted that the proposed Mactaquac fish hatchery would provide "a good solution with a good chance of success in maintaining the St. John River runs of salmon undiminished".²⁷ It was also claimed that the water quality after the dam would improve with anti-pollution measures.²⁸

But the opponents contended that the project would diminish the beauty of the landscape or that the salmon fishing would be negatively affected. The Association for the Development and Preservation of the St.

John River in Its Natural State claimed that the dam would destroy the natural scenic beauty and "wipe out" Atlantic salmon fishing in the river and its tributaries.²⁹ The New Brunswick Fish and Game Protective Association also voted to petition the government to undertake a study by "competent authorities" to determine the effect of the Mactaquac Project on the future of Atlantic salmon in the Saint John River.³⁰

From January 16, 1964, to October 30, 1965, a total of 102 letters of protest were published in the Daily Gleaner alone. They came from all over Canada and as far away as Florida in the United States. The possible adverse effects on the beauty of the landscape and on Atlantic salmon were two of the major arguments of the opponents of the project. The Ketepec-Belmont-Morna Outing Association, New Brunswick, for instance, wrote to the editor of Daily Gleaner on March 11, 1964:

"We feel that it is a violation of natural beauty of great recreational and tourist value both present and potential; that it usurps the rights of the farmers along the Valley; and furthermore, that it will inevitably destroy the salmon fishing in the river and Saint John Harbour."

It was concluded by NBEPC in 1979 that, 12 years after the completion of the project, the net environmental effect of the project on the Province was positive.³¹ Tourism, recreation and sport fisheries were listed as the major environmental benefits arising from the multiple purpose development.

Today, it can be contended that the recreational use of the river

has been enhanced as a result of the erection of recreational facilities along Mactaquac Lake. It is also true that Mactaquac Provincial Park has become one of the major recreational and tourist attractions in the Province. The fact that real estate values in the surrounding areas, particularly lake front properties, have soared since the lake was formed is also an indication of improved scenery.

According to the interview responses, 39 respondents believed that there had been a positive change in scenery. There were 11 respondents who were of the opinion that the change had neither improved nor damaged the scenery. Twenty-four respondents perceived the change in scenery to have been for the worse.

Although many of the latter two groups did not think that the change improved the scenic value of the area, they were well aware that many others, particularly those who were attracted to the area after the dam was built, preferred the man-made lake to the river. Yet, they maintained that they knew the river and were used to it. Additionally, the valley had been one of the most beautiful spots in the region and had attracted thousands of tourists from all over North America before the dam was built. The experience of a respondent in the community of Longs Creek was typical:

"Our house used to sit on the edge of the river. At night, we could hear the river run. Now it's dead, stagnant. The tourists may think the headpond is more beautiful. But they don't have a clue what the river used to look like. It was probably the most beautiful valley in the world. I think it's ruined by the dam."

The project has also created localized impacts on landscape of importance to some of the communities. In particular, all the islands along the river, which included, among others, Snowshoe Islands in Mactaquac, the Bear Islands in Bear Island, and Island Park in Woodstock, were submerged by the rising waters when the dam was closed. There was a story behind each island. They had symbolic, sentimental and historical values to the communities concerned. The repeated reference to them by the respondents during the interviews suggested that they were still deeply embedded in the memories of the local residents.

The questionnaire also contained a question on the effect of the dam on the water quality in the Saint John River. Fourteen respondents reported that the damming had improved the water quality in the river. The same number of people believed that the dam had not made any noticeable impact. However, 29 respondents reported that water quality had deteriorated as a result of the damming. There were 17 respondents who were unable to tell whether the dam had affected the water quality in the river in any way.

The perceptions of a negative impact on the water quality are validated by the findings of a scientific study on the environmental changes in the Saint John River (Dominy 1973). The profile of dissolved oxygen (DO) concentration in the surface water along the Saint John River in 1969 indicated a discernible lag in the Mactaquac reservoir (Figure 6-2-1). The lag was created by prolonged detention of oxygen-consuming organic substances, commonly referred to as biochemical oxygen-demand (BOD),

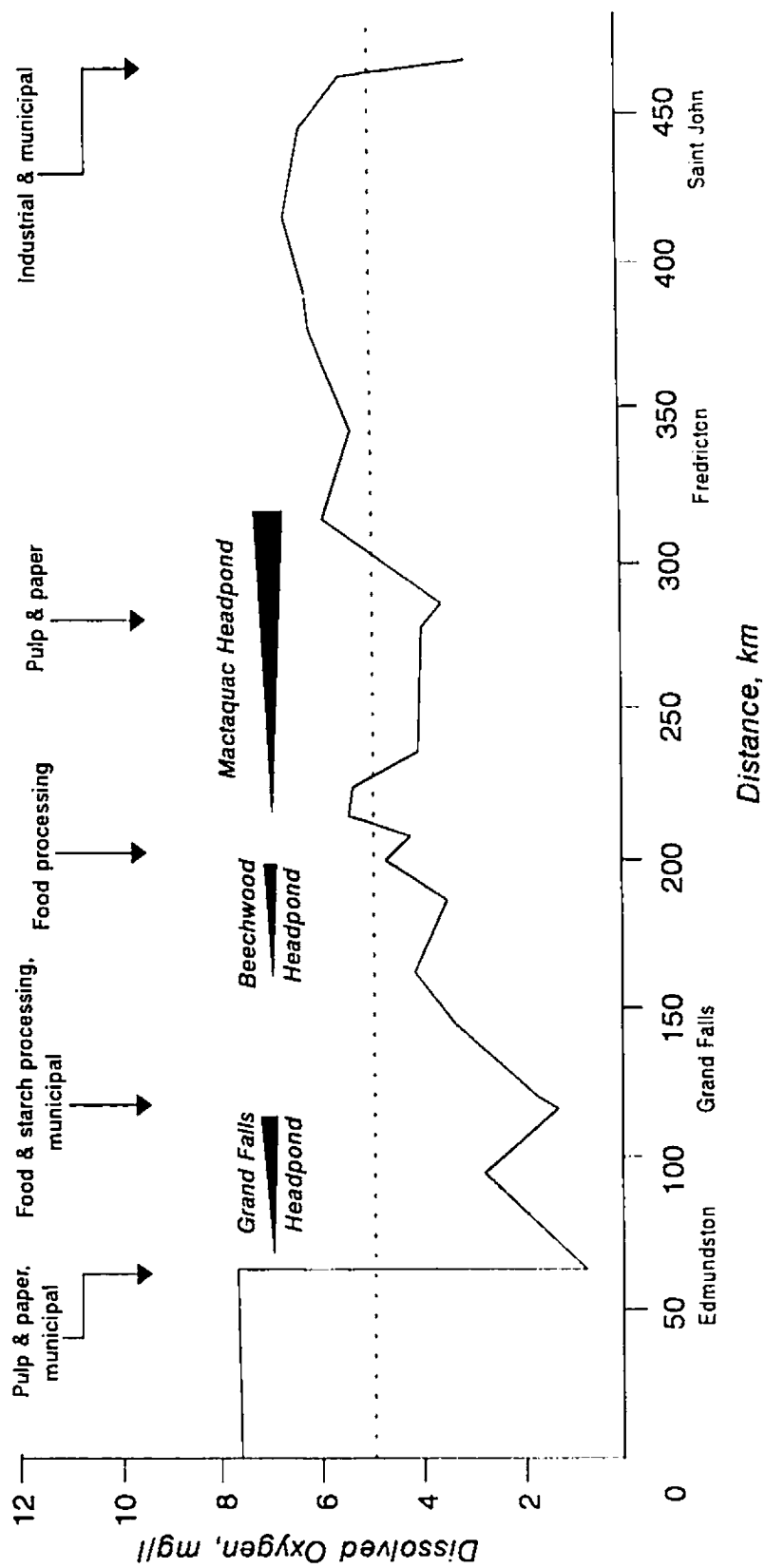


Figure 6-2-1. Profile of Dissolved Oxygen in the Surface Water of the Saint John River in 1969. The minimum acceptable level for salmonid fishes (5 mg/l) is indicated by the dotted line (Dominey 1973).

and by a lowered rate of re-aeration that would increase the DO level. According to Dominy, the rate of re-aeration in the Mactaquac reservoir had decreased approximately twelve-fold such that anaerobic conditions were created in some parts of the reservoir.

The stretch of the Saint John River now covered by the Mactaquac reservoir had not been used for commercial fishing before the dam was built. It had, however, provided game fishing for the local residents. Salmon was the favourite species to local and visiting anglers (Clarke 1972).

The impacts of dams, including the Mactaquac Dam, on the Saint John River have been studied by a number of scientists. Dominy (1973), for example, investigated the effects of organic pollution and damming, including the Mactaquac Dam, on the salmon runs. It was found that, together with pollution from the industrial and municipal sources along the river (See, Figure 6-2-1), the construction of the dams at Grand Falls, Beechwood and Mactaquac on the main stem of the river reduced the quality of the migration route to and from the sea, and eliminated some of the spawning and rearing grounds. They also caused direct mortality of adult and juvenile salmon at the turbines and as a result of prolonged stay in the headponds. Dominy (*ibid*) found that the sport catch of salmon declined to less than one-third of its level in the early 1950s (Figure 6-2-2).

Another study found that a disease, known as "the gas bubble disease" associated with nitrogen supersaturation, resulted in two large fish kills at the Mactaquac Dam site in the summer of 1968 (MacDonald and Hyatt 1973). It was estimated that about ten percent of the 1968 upriver

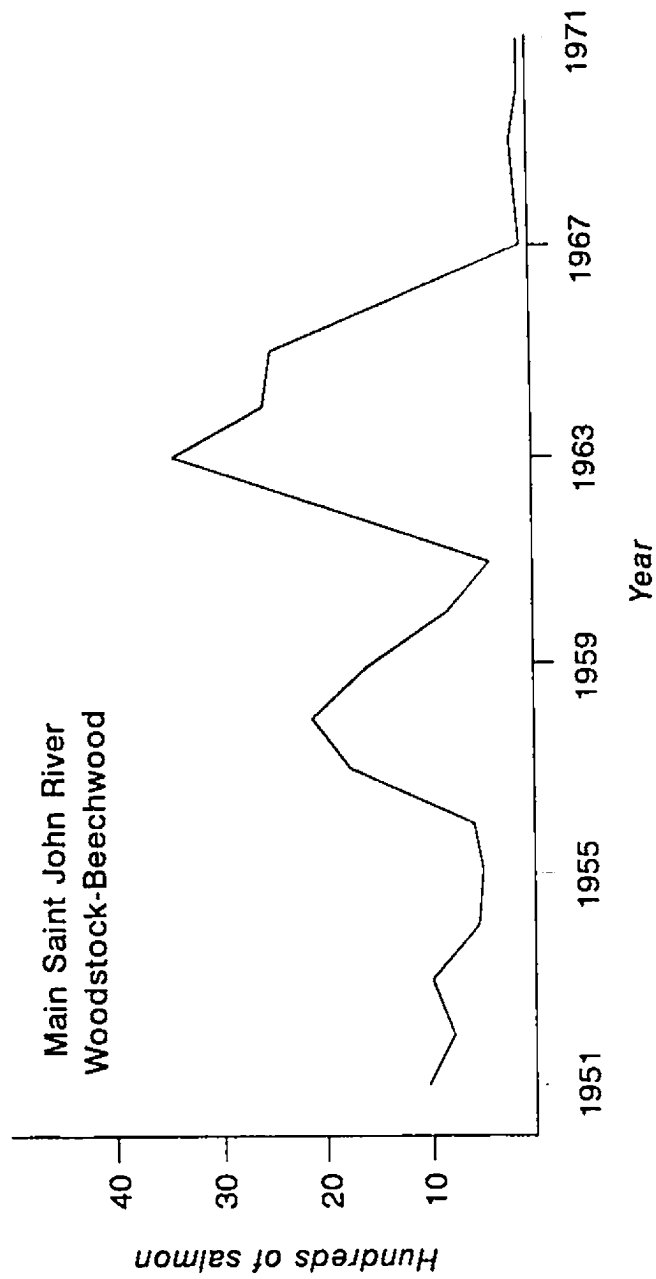


Figure 6-2-2. Atlantic salmon angling catches in the main Saint John River below Beechwood Dam, 1951-71 (Dominey 1973).

salmon runs passing Mactaquac were killed by this disease.

The responses from the interviews were consistent with these findings. In fact, all of those who used to fish before the dam was built reported that salmon fishing in the headpond had been almost completely eliminated. They pointed out that there used to be a salmon pool every seven or eight miles along the river. One respondent who relocated from Mactaquac to a community down the river reported that there were still plenty of salmon below the dam, although he also mentioned that no salmon could be caught in the headpond. This seemed to confirm the negative effects of the Mactaquac Dam on salmon fishing.

A salmon hatchery was established in 1967 at a cost of \$3.5 million a short distance downstream of the dam to mitigate the negative effects of the dam. It consists of fish collection facilities, which was built at the same time the dam was constructed. A rearing station was added in 1984. Once the salmon reach the dam, they are brought into the fishway through an artificial current created by two large pumps. The salmon are then lifted in specially designed hoppers into a truck and transported to the nearby fish hatchery. Other species captured in the fishway such as bass, pickerel, gaspereau and shad are loaded into tank trucks and released in the headpond. The rearing station, built primarily to raise 500,000 smolts per year, uses warm water to accelerate the incubation, hatching and early rearing of salmon, which reduces the time required to produce smolts from two years to one. The smolts are then trucked and released at several locations along the Mactaquac and Beechwood headponds.³²

In light of the responses from the interviews, the success of the hatchery in maintaining the salmon stocks in the Mactaquac headpond is debatable. No studies have been conducted regarding the effects of the rearing practice on the salmon runs in the upper reaches of the Saint John River and its tributaries. Therefore, the effects of the rearing station on the abundance of salmon above the Mactaquac headpond still await further investigation.

While detrimental to salmon, the ecological changes have resulted in enhanced populations of certain bass species in the headpond.³³ However, they are not prized by the local anglers and thus have little value as a game fish. Personal accounts provided first-hand evidence of the effects of the Mactaquac Project on fishing in the early years of the formation of the headpond. For example, at least 11 salmon could be landed daily during the fishing season at the Hartland Pool, also known as the Patterson Pool, before the Mactaquac Dam was built. However, in the two years of 1967 and 1968, only 15 salmon were caught in the pool.³⁴ Biologists and fishery experts attributed the virtual disappearance of salmon in the headpond to pollution and hydropower developments.³⁵

George Frederick Clarke, a renowned local doctor, historian, author and leading opponent of the Mactaquac Project, recalled that prior to the construction of the Mactaquac Dam, large numbers of salmon could still reach the Beechwood Dam. Local and visiting anglers made "phenomenal catches of the silver beauties" below the Beechwood Dam. He estimated that the total catch for the summer of 1959 totalled six or seven hundred. He

recounted the physical changes that the dam had brought to the river and the effects on the salmon fishing (Clarke 1972):

"But the old river, which de la Galissonieres and de Vauldreuil declared to be one of the most important gateways of New France, and tried hard to hold, no longer tumbles with a song on its lips over the bars and around the heads of its myriad islands. For from Mactaquac to within four miles of Hartland, or a distance of fifty-six miles, it is now a lifeless pond, and no more do salmon and grilse speed up it in their thousands to deposit their golden eggs in the far waters of the Tobique; and what once were gravelly bars in the St. John itself, now covered with noxious silt and pollution..... The door was shut. Howls of indignation! So, in September, 1969, the Fisheries Department dumped a few salmon of grilse-age into the headpond. In diminished numbers fishing was assumed. A few were caught. But, as someone put it, it was like hooking pet goldfish."

6.2.9. Overall Impact on Quality of Life

It was stipulated in the basic principles of the land acquisition policy of the Mactaquac Dam Project that none of the property owners who would be affected by the land acquisition programme would be left worse off after than before the project.³⁶ This was re-affirmed in the Provincial Legislative Assembly³⁷ as well as in the public meetings held by the New Brunswick Electric Power Commission in the project area.³⁸

In order to evaluate whether the objective of "no worse off" of the Mactaquac land acquisition and relocation programme had been accomplished, a global impact indicator was devised to measure the overall effect of the Mactaquac Project on the quality of life of the relocatees over the years since the dam was built.

The interview responses were codified into three general categories: "better off", "no difference", and "worse off". Out of the 74 respondents, 27 believed that the overall quality of their lives over the years would have been better if the Mactaquac Dam had not been built. This implied that their quality of life was negatively affected by the dam. Twenty-three maintained that the overall quality of their lives would have been worse if the Mactaquac Dam Project had not been built. Thus, they perceived the dam project as having had positive effects on the overall quality of their lives. The remaining 24 claimed that the overall quality of their lives would have stayed the same with or without the dam.

It was noted during the interviews that the respondents were

generally conscientious when considering the effects on the various aspects of their lives and tended to give definite answers. For instance, a respondent within the "worse off" group remarked:

"It created lots of strain, lots of confusion. I was scared. I didn't know what to do. It made me make some mistakes I would not have done otherwise. For example, I shouldn't have sold the land that remained after the taking. If I still had the farm, life would have been much easier for us".

A respondent in the "no difference" group stated, "It has affected us adversely in some ways. In some other ways, it was beneficial, like the shorter route to Fredericton. Overall, I wouldn't say I am made worse off. But I don't think I am made better off either". After enumerating the generous compensation, the low electricity rates, the beneficial effects on the family's housing conditions, better highways and employment opportunities in the area, a respondent who believed he benefited from the Mactaquac Dam Project commented, "Well, it has improved our life in a good many ways. It did not hurt me at all".

6.3. Differential Impacts on Farmers

The results of several correlational analyses will be presented in the following sections. The analyses are intended to test a number of hypotheses about the differential impacts of the Mactaquac Dam Project on the farmer relocatees as a group. Specifically, the impact indicators are

treated as dependent variables and correlated with occupation as an independent variable. Farmer relocatees are defined as those whose primary source of income came from farming when the relocation took place. Householder relocatees refer to those who lived in the project area but were not actively involved in farming.

6.3.1. Hypotheses

The major difference between the farmer and householder relocatees would be that the former lost not only their homes but also their land. Therefore, the farmers were more likely to be under-compensated than were the householders. It is more likely that the former as a group would experience long-term adverse impact on the financial conditions of their families.

In contrast to the householders, who would have wider and greater contact with the outside world and greater social mobility, the farmers in general would have greater dependency on the community for mutual support and friendship, and stronger social ties within the community. It is thus expected that the farmer relocatees would perceive a more severe disruption of community relations.

If it is true that the farmer relocatees would be more likely to suffer greater financial and social losses from the relocation in comparison to the householders, the former would be more likely to experience greater physiological and psychological stress. It is, therefore, anticipated that the

farmer relocatees would show a greater incidence of health problems. By the same token, the farmer relocatees would also be more likely to perceive a decline in the overall quality of their lives than the householders.

Similarly, the farmer relocatees would be less likely to consider the undertaking agency as generous in making compensation and as helpful in assisting the relocatees during the relocation process. They would also be expected to be less likely to be satisfied with the performance of the undertaking agency in resettling the relocatees.

6.3.2. Statistical Results

The impact on the overall quality of the life of the relocatees is represented by the interval variable of TOTALIMP which is measured in three scales: "better off" = 1, "no difference" = 2, and "worse off" = 3. The impact on family finances is represented by the variable of FINANCIAL. It has five interval scales which include "very negative" = 1, "somewhat negative" = 2, "no difference" = 3, "somewhat positive" = 4, and "very positive" = 5. The impact on community relations is designated as COMMUNITY which is dichotomously scaled, with "negative impact" being scored to 1 and "no impact" 2. The impact on personal health (HEALTH) is measured in the same way as that for COMMUNITY.

The ratings by the relocatees of the performance of the undertaking agency in the relocation process are represented by PERFORMANCE variable. It is an ordinal variable with four scales that

include "very good" = 1, "good" = 2, "poor" = 3, and "very poor" = 4. The helpfulness and generosity of the undertaking agency are given as HELPFUL and GENEROUS. HELPFUL is measured in a similar fashion as PERFORMANCE, whereas GENEROUS is scored as "very generous" = 1, "quite generous" = 2, "reasonable" = 3, "not very generous" = 4, and "not generous at all" = 5. The adequacy of the compensation to replace (REPLACE) what was taken by the project is also included in the analysis. It is dichotomously scaled, with "yes" being scored as 1 and "no" 2.

The results of the cross-tabulation of TOTALIMP by OCCUPATION are presented in Table 6-3-1. The results of the other cross-tabulations are included in Table 6-3-2. As can be seen from the tables, all of the dependent variables are correlated to a certain extent with the variable of occupation. Since the levels of significance are all below 0.05, all of the above hypotheses are accepted.

It can be concluded from the statistical results that, in comparison to the householder relocatees, the farmer relocatees of the Mactaquac Project as a group experienced greater negative impact in terms of their family finances, community relations and personal health. The perceived under-compensation to the farmer relocatees was also more pronounced. The undertaking agency was regarded by the farmer relocatees as less helpful and less generous and its performance rated as less satisfactory.

Table 6-3-1. Cross-tabulation of TOTALIMP by OCCUPATION

OCCUPATION	TOTALIMP		
	Better Off	No Difference	Worse Off
Farmers	5 (19.2%)	1 (3.8%)	20 (77%)
Householders	19 (39.6%)	22 (45.8%)	7 (14.6%)

Note: (1) N = 74.

(2) Chi-square = 29.68.

(3) Degree of freedom = 2.

(4) Significance < 0.00001.

Table 6-3-2. Cross-tabulations of Selected Impact and Performance Indicators by OCCUPATION³⁹

Indicator	N	df	Chi-square	Significance
FINANCIAL	72	3	13.3018	< 0.010
COMMUNITY	74	1	7.6652	< 0.006
HEALTH	70	1	10.8301	< 0.001
PERFORM	74	3	8.5845	< 0.036
HELPFUL	73	3	9.1781	< 0.027
GENEROUS	69	4	13.8161	< 0.008
REPLACE	73	1	10.9052	< 0.001

Note: (1) N = Number of cases.

(2) df = Degrees of freedom.

The main reason for the differential financial impacts on the farmer relocatees can be found in the land acquisition and relocation policy of the Mactaquac Project. In addition to inadequate attention being given to the extra hardship associated with livelihood re-establishment, the policy placed further financial strain on the farmer relocatees by its "partial taking" procedure. In many instances, the farm could not exist as an economically viable unit as a result of the acquisition. The owner had to sell the entire farm and relocate, or stay in the same area but quit farming partially or entirely. However, the 10% "disturbance bonus" of forced taking only applied to the part of land that would be flooded. Compensation for the rest of the property was based on current market value. Even in strict financial terms, the market transaction costs constituted a real financial loss to the land owner.

It is also apparent that the farmer relocatees of the Mactaquac Project had a stronger sense of the disruption of the community relations as a result of the relocation. This may be explained largely by their stronger dependency on the social support from the communities. When some members in the community departed, the social support network was undermined.

The experience from the Mactaquac Project has shown that relocation is more stressful to farmer relocatees than to people of other occupations, simply because they are likely to greater endure financial and social losses. On the basis of the self-reported illnesses, they also have a higher chance of developing psychological and physiological problems.

Taking all these aspects into account, they are more prone to experience a decline in the overall quality of their lives arising from the relocation.

6.4. Discriminant Analysis

The purpose of this section is to examine the relative contribution of each of the component impact variables to the global impact on the overall quality of life. To accomplish the task, discriminant analysis will be used. It is a technique which: (1) determines if statistically significant differences exist between the average score profiles of two or more *a priori* defined groups; (2) classifies statistical units (individuals or objects) into groups on the basis of their scores on several variables; and (3) determines which of the independent variables account for most of the differences in the average score profiles of the groups. It can be regarded as either a type of profile analysis or an analytical predictive technique (Hair, Anderson and Tatham 1987).

The major tool in discriminant analysis is the discriminant function. The function can be described in the following form:

$$Z = W_1X_1 + W_2X_2 + \dots + W_rX_r + \dots + W_nX_n$$

Where:

Z = discriminant score

W_i = the discriminant weight of X_i

X_i = the i th independent variable

In discriminant analysis, each independent variable is multiplied by its corresponding weight. The products for each individual cases in the analysis are added into a single composite discriminant score. By averaging the discriminant scores of the individual cases within a particular group, the mean score of that group, known as the centroid, can be derived. The allocation of a case to a particular group is determined by the proximity of the discriminant score of the case to the centroids.

One of the important tests for the statistical significance of the discriminant function or functions is the so-called "hit-ratio". It is the percentage of cases correctly classified by the discriminant function(s). A high hit-ratio indicates a high predictive capability of the discriminant function(s). Other useful parameters derived from the analyses include discriminant weights, loadings and potency indices.

6.4.1. Selection of Discriminating Variables

A total of fifteen domain-specific impacts are included as discriminating variables. They are the impacts on family finances

(FINANCIAL), housing conditions (HOUSING), personal health (HEALTH), regional economy (REGIONAL), employment opportunities (EMPLOYMENT), electrical rates (ELECTRIC), community relations (COMMUNITY), population density (CROWDING), landscape (LANDSCAPE), water quality (POLLUTION), fishing (FISHING), the quality of transportation networks (ROADS), the quality of church life (CHURCH), the quality of schools (SCHOOLS), and the convenience of shopping (SHOPPING).

The global variable of TOTALIMP has three categories: "better off" = 1, "no difference" = 2, and "worse off" = 3. Among the discriminating variables, HEALTH, COMMUNITY, CROWDING and FISHING are dichotomously coded, with "yes" = 1 denoting a negative impact and "no" = 2, no impact. FINANCIAL, HOUSING, EMPLOYMENT, LANDSCAPE, POLLUTION, CHURCH, SCHOOLS and SHOPPING are coded as follows: "very positive" = 1, "somewhat positive" = 2, "no difference" = 3, "somewhat negative" = 4, and "very negative" = 5. The impact on the regional economy (REGIONAL) has four categories: "benefited a lot" = 1, "benefited somewhat" = 2, "not benefited very much" = 3, and "not benefited at all" = 4. The impact on the price of electricity (ELECTRIC) is coded as follows: "no impact" = 1, "somewhat positive impact" = 2, and "very positive impact" = 3.

There were "don't know" responses to some of the questions related to the domain-specific impacts. In each of these cases, the respondent was not aware of, or did not perceive, any impact (positive or negative) on this specific domain. It is believed that the particular domain impact would not exert any influence in the calculus by the respondent of the

global impact. Therefore, a "don't know" response is coded into "no" = 2 for the dichotomous variables and "no difference" = 3 for the variables with five scales. A "don't know" response to the impact on electrical rates is coded into "no impact" = 1. A "don't know" response to the impact on the regional economy is coded into "not benefited much" = 3.

A step-wise procedure is used in this analysis.⁴⁰ This procedure ensures that the variable that minimizes the overall Wilks' lambda is selected for entry in the analysis. Some variables may be removed from the equation because of their insignificant contribution as additional variables are entered. The removal is based on the results of partial *F* tests which must be smaller than a given value (default = 1.0) for removal to occur. A number of variables (POLLUTION, FISHING, CROWDING, ROADS, CHURCH, SCHOOLS, and SHOPPING) have been removed from the discriminant function by the step-wise procedure.

6.4.2. Predictive Accuracy

The results of the analysis show that the two discriminant functions are highly significant at 0.0000 and 0.0172, respectively. The classification results are displayed in Table 6-4-1. It can be seen from the table that the percentage of cases that can be correctly classified by the model, i.e. the hit-ratio, is 86.5%.

Table 6-4-1 Results of Discriminant Analysis (I)- Classification Table

Actual Group	Number of Cases	Predicted Group Membership		
		1	2	3
Group 1 [Better Off]	24	21 (87.5%)	3 (12.5%)	0 (0.0%)
Group 2 [No Difference]	23	5 (21.7%)	18 (78.3%)	0 (0.0%)
Group 3 [Worse Off]	27	0 (0.0%)	2 (7.4%)	25 (92.8%)

To properly interpret the classification result, the hit-ratio has to be compared with the *a priori* chance of classifying individual cases without the discriminant functions. One approach to determining the *a priori* chance is to use the proportional chance criterion which has the following formula:

$$C_{pro} = p_1^2 + p_2^2 + p_3^2$$

where:

C_{pro} = the proportional chance;

p_1 = proportion of individual cases in group 1;

p_2 = proportion of individual cases in group 2;

p_3 = proportion of individual cases in group 3.

Here, $p_1 = (24/74) = 0.32$; $p_2 = (23/74) = 0.31$; and $p_3 = (27/74) = 0.36$.

Substituting the appropriate numbers in the formula, it is obtained that:

$$C_{pro} = (0.32)^2 + (0.31)^2 + (0.36)^2 = 0.33$$

Hair, Anderson and Tatham (1988) suggested that the acceptable level for predictive classification accuracy with groups of unequal size is 25% higher than the proportional chance. In this case, the acceptable accuracy is $(33\% + 25\%) = 58\%$. Since the actual classification accuracy of 86.5% is substantially higher than this standard, the classification model associated with the discriminant functions is valid. The scatter-plot chart is shown in Figure 6-4-1, which provides a visual presentation of the classification results.

6.4.3. Discriminatory Potency

When two or more discriminant functions appear, a "potency index" should be used for measuring the relative discriminatory potency of each of the variables. The index represents the relative importance of the variable in contributing to the discrimination. Perreault, Behrman and Armstrong (1979) suggested the use of the following formula for computing the "potency index":

$$PI_j = \sum_{k=1}^m [L_{jk}^2 (E_k / \sum_{k=1}^m E_k)]$$

Where:

PI_j = the potency index for the j th variable;

m = the number of significant discriminant functions;

L_{jk} = the loading of the j th variable of the k th discriminant function; and

E_k = the eigenvalue for the k th function.

The calculated potency indices for each of the discriminating variables are shown in Table 6-4-2. It can be seen from the table that eight variables are responsible for the discrimination of the global variable.

Table 6-4-2. Results of Discriminant Analysis (II)- Potency Index

Variable	Discriminant Loadings		Potency Index (PI)	Cumulative % of PI
	Function 1	Function 2		
FINANCIAL	0.62311	0.43983	0.37805	29.31%
REGIONAL	-0.50199	0.58177	0.25647	49.19%
HEALTH	-0.42016	0.06172	0.16747	62.17%
COMMUNITY	0.39398	0.30855	0.15208	73.96%
HOUSING	0.38180	-0.08935	0.13854	84.70%
ELECTRIC	0.32606	0.17296	0.10632	92.94%
EMPLOYMENT	0.25724	-0.16801	0.06418	97.92%
LANDSCAPE	-0.04639	0.11049	0.02679	100.00%

These eight variables include, in descending order of discriminating potency, FINANCIAL, REGIONAL, HEALTH, COMMUNITY, HOUSING, ELECTRIC, EMPLOYMENT and LANDSCAPE. They can be grouped into three general categories. The first category consists of FINANCIAL and REGIONAL which have a discriminatory potency of greater than 0.25. Taken together, their potency indices account for over 49% of the sum of the potency indices of all eight discriminating variables. The second category consists of HEALTH, COMMUNITY, HOUSING, and ELECTRIC. Their discriminatory potency indices are smaller than 2.0 but greater than 1.0; they each play a modest role in discriminating the global variable. The third category contains two variables (EMPLOYMENT and LANDSCAPE). They each have a

discriminatory potency of less than 1.0 and are therefore least discriminatory amongst the three categories for the global variable of TOTALIMP.

The relative contributions of the various factors to the impact on the overall quality of life of the relocatees have important implications for the mitigation of social impacts related to relocation. First, relocatees should be fully compensated for losing their properties and for suffering any other associated losses, so that they would not be made any "worse off" in financial terms. To achieve this goal requires a significant change in the land acquisition and relocation policies currently being used. Specifically, the basis for compensation which has been used worldwide, i.e., market value plus 10%, will not lead to achieving the goal of "no worse off".

The potential effects of a dam project on the economy of the project area should also be a priority consideration in the project planning process. It is important that efforts be made to ensure that sustained economic benefits can be derived by the people who live in the project area, including those directly affected. For this to happen, multi-purpose development should be implemented that can effectively stimulate economic activities and employment opportunities in the project area.

The psychological effects of change in landscape and community relations are inevitable consequences of the flooding and departure of community members. However, it might be possible to provide some mitigation by the addition of financial premiums in the compensation package. The impact on housing is directly related to under-compensation. If the relocatees are financially compensated adequately, the adverse impact

on their housing conditions would automatically be reduced or eliminated. The health impact is mostly derivative in nature. It is the outcome of the stress arising from other aspects of the relocation process. Therefore, it can be reduced by, among other things, proper financial compensation and improving the economic prospects of the project area. Although the process of relocation is always stressful, it is possible that the stress can be reduced to the extent that those involved would not develop serious or long-term physiological and psychological problems.

6.5. Case Analyses

6.5.1. Case Analysis (I)

The first case to be analyzed in this section involves an eighty-one-year-old resident from one of the two most affected communities adjacent to the dam site. He stayed in the same community by relocating his house to higher ground on the remaining property of the family. To facilitate discussion, the respondent will be referred to as "Ed". Ed was born and brought up in this community. In fact, his family history in this community went back three or four generations. There were four members in the family when the relocation took place, including the respondent, his wife, a son and a daughter. The two children were attending high school in an adjacent small town at the time of relocation.

Ed was one of the most successful full-time farmers in the area

when the Mactaquac Dam was built. By operating a mixed poultry and dairy farm with about 6,000 laying hens, 300 market hogs and 75 holsteins. His annual income was about \$60,000. Ed owned a total of 105 hectares of land, including holdings on the mainland and an island. Of the 36 hectares of tillable interval and island land, more than 24 hectares were taken for the dam. Ed was also the owner of one of the most attractive farm homes. The elms and oaks lining his lane complemented the antique beauty and quality of his home.⁴¹ This home together with 3 large farm buildings were also taken.

The new house is about half kilometre from the old homestead. When asked why the family decided to stay nearby instead of moving to another community, he cited two major reasons- his children and his attachment to the place:

"My wife really wanted to stay in this community. My son and daughter were quite young, going to high school. She didn't want them to live in a city environment. After considerable looking around the area, we decided to stay here. It is also easy for me, because it is always home to me. It would be really hard for me to live in a city environment."

Ed was visited by a reporter of a Canadian magazine in 1966 when the land acquisition program was in progress. In the interview, he described how over the years he had worked hard to expand the farm operations and to beautify the homestead so as to live a comfortable life. Ed was portrayed by the reporter as being filled with "reserved sadness" over

the losses of the farmland and the house. After twenty-five years, the grievance over his lost home and business, more importantly, the disruption of life, is still evident today:

"We really enjoyed it living down there. Life was really good. We were reasonably successful. We were well-established. The church, the community, they were all doing well. After all, everything was pretty good, who needed a change? That was the way we thought."

The fact that he is still living in the same community may indicate that the feeling of grievance is not related to the disruption of place-identity. Rather, a large portion of the grief feeling is directed mostly towards the loss of his business and inadequate compensation for the loss of his house. This is reflected in his response to the question of the negative changes that he thought the Mactaquac dam project brought to his family:

"The way it was with the buildings we had. The locations and ways they were constructed. It was very helpful to our business. We lost it. We didn't even acquire a corridor or anything for the cows. What I should have done was that I should have hired my own lawyer and gone into the court room. I failed to do that, because I was nearly sixty years old. If I had been a few years younger, I would have done it differently."

The community in which Ed had been living was a typical farming community, spreading over a distance of approximately 9 kilometres along one side of the Saint John River. The population before the relocation was 165 in about 40 households, compared to 104 just after the dam was

completed.⁴² That is, one-third of the population relocated out of the community. The land acquisition program for the Mactaquac dam project created a number of changes and related effects within the community, including the departure of some of the members, family breakup, distrust and conflict among the members, and disintegration of friendship and neighbourhood relations. As Ed recalled:

"I had a few neighbours down the road. They were a few years younger than I was. Twenty years younger or so. They coped by leaving the farm or quitting farming. They got jobs elsewhere. You see, there is one thing that I feel most upsetting- so many of the old neighbours have been forced away. On the other hand, the dam created a lot of distrust and conflict among us. To put it this way, the dam changed people. It really did."

Ed's experiences concerning the impacts of the dam project on the community were also echoed by another resident, "Jim", who was in primary school when the dam was built. Jim's father owned one of the large dairy farms in the area, the best acreage of which was also taken. Their house was required for the dam as well. The family moved to Fredericton afterwards as his father worked as a mechanic in town and had just recently returned to the community recently upon reaching retirement age. In a term-paper for a history class in the University of New Brunswick, Jim wrote about the effects of the land acquisition on the community.⁴³

"The implementation of the Mactaquac Dam Power Development caused much grief and disruption of people's lives

not only in this community but in several other communities along the river. It is hard for someone outside of the community to realize the effect on people's lives.

There were many conflicts caused by the dam such as the movement of both churches in the community. The decisions on if (*sic*) to move it, where, or to build new ones caused much anguish in the community. As with all buildings expropriated, the replacement cost was not paid but the buildings' appraised value. The community hall placement also caused conflict in the community.

There were three cemeteries in the community and all were flooded. They were dug up and moved to the present day cemetery by the Union Church. The movement of the cemeteries caused much anguish especially among the older residents of the community.

The basic lack of people (*sic*) caused the demise of the church groups and Women's Institute.

Several families were split up over issues about the community. Also neighbours split up over political issues with those supporting the Liberal government, in power at the time, against those who supported the Conservatives. Many friendships were broken and the rifts last even to present day."

Ed perceived the impact of the creation of the man-made lake on the landscape of the region as undesirable. The negative feeling towards the landscape change was directed towards the submerging of the two islands in the river and the elimination of salmon fishing. He remarked:

"I would say the lake has made this area look less beautiful. We can see it is bigger now, and wider. But it's stagnant, a dead body of water. We used to hear the water running. It was beautiful! Salmon fishing is completely ruined by the dam. There used to be a salmon pool every seven or eight miles. They are all gone now. Besides, it took the islands all away!"

His resentment about the financial compensation for his property was also apparent during the interview. He believed that he had been greatly under-compensated for his property. He was particularly resentful about the loss of his property and the resultant disruption and loss of business:

"To me, I thought one of two things. Either I got paid for my buildings, not business; just the buildings, I gave the land away. Or the other way around, I got paid for the land, I gave the buildings away. That's the way I see it. It was not generous at all. It was ridiculous. I'll tell you, the first offer was even more ridiculous. The relocation certainly didn't help us (financially). It took us something out of the situation. For years, we didn't earn anything. We lost a considerable amount of income. We continued our business, but in a much smaller scale. We were fortunate that we still had enough money to go around."

Ed also claimed that the compensation policy was not applied equitably among the property owners. Unlike some other respondents who related unfairness to fraud, he believed that the farmers were under-compensated in comparison to the householders in that the value of land and related properties to the farming families was under-estimated, and many of the related losses were unaccounted for:

"Everybody was different. Now the thing is, you take a man who had a house with no land. He may get paid 20 or 25 thousand dollars. At that time, he may be able to build a new house. That's all right for him. That was easy for him. We were different. Land was our business, our livelihood. How could you value this? In addition, I had to dispose of the hens, hogs and cattle. They were sold cheap. It was hard just to start all over again. It was devastating."

The Power Commission received the lowest rating from Ed for its performance in the handling of the resettlement. Again, perceived under-compensation served as one of the primary reasons behind the response, "Well for whom? Not well for us at all. We were frustrated, we were awfully upset, because we were robbed, to tell you the truth."

There were other factors that may have contributed to the poor performance rating. One of them was the fact that the Power Commission offered little help to the relocatees during the relocation process. For instance, when asked about the help from the Power Commission during his resettlement, the response from Ed was very negative: "They didn't do anything for us. They only made life harder." Ed also expressed dissatisfaction with the way in which NB Power officials treated people. The poor attitude which NB Power crews and officials sometimes exhibited in dealing with the property owners was also a contributing factor.

The lack of friendliness on the part of the Power Commission in handling land acquisitions was apparent in some cases. To quote the term-paper of Jim:

"Everyone in the community experienced the poor attitude of the 'expropriators'. The 'expropriators' seemed to look down on the residents of the community as 'dump people'. Many of the people working as surveyors, etc., were often very rude."

It is apparent that the image of NBEPC as a public agency was seriously tarnished by the ill-formulated land acquisition policy and its poor

implementation. When asked about his feelings towards the Power Commission during the relocation process, Ed gave the answer in one word- "hatred". When asked about the image of the Power Commission in his mind now, he responded, "We don't think a whole lot of the Power Commission".

The reactions from the property owners during the land acquisition and relocation process varied. On the one hand, they adopted whatever ways they could find to resist. On the other hand, many of them simply resigned themselves to an outside force which they believed was too powerful to overcome. Although people resisted for various periods of time, resignation was inevitable. This was clearly reflected in Ed's comments- "I guess (it was) just something we had to do. You got to go, you got to go. There's nothing you can do about it, right?"

Relocation is believed to be one of the most stressful life events. It was found in previous studies that dam-related relocation could create many health effects and even premature death (Scudder and Colson 1984). The respondent in this present case study provides further evidence that the health of a relocatee could be negatively affected:

"It was very stressful, to say the least. We were devastated. It was so bad that, at one time, my daughter took me to her graduation ceremony in Nackawic. In the first place, I didn't want to go. When I went, I didn't want to meet people. I didn't want to talk to people. It was just that bad that I didn't care. When she drove back, I just turned my back to her. I had never felt like that before. Since then, I always feel shy from people."

This type of syndrome, which may be termed as "personal withdrawal", was also reported by another farmer relocatee in the same community. He claimed that, after going through the relocation, he didn't want to talk to people, was nervous in speech, and lost interest in community affairs.

The health impacts of relocation are not limited only to the syndrome of personal withdrawal. Ed also believed that the relocation might be partly to blame for his wife's death from cancer in 1989 at the age of 72. He commented, "She was very depressed too. I cannot say it's because of stress. I cannot say it had nothing to do with it. It surely did no good."

6.5.2. Case Analysis (II)

The second case concerns a relatively young householder relocatee, "Ray",⁴⁴ who was about 30 years of age when the Mactaquac Dam was constructed. He turned 53 in 1990. Ray's house was situated in the so-called "Suckers' Flat" in the Town of Woodstock, which was once home to about 30 families before being submerged by the rising waters of Mactaquac Lake.

Ray was born in the same community on higher ground. He bought the house in the Suckers' Flat when he was married and lived there for about seven years before the relocation. His family had three members when the relocation took place, including Ray, his wife and a four-year old daughter.

Ray was employed as a truck driver for the Town of Woodstock

at the time of the relocation, and is currently working as a clerk in a liquor store. His wife was working at home at that time and is now a part-time supervisor in a tomato packing plant. The daughter now resides in Fredericton and works as a postal officer.

When relocated, the family bought the house in which they are currently living. It is located in the community of Grafton which is a twin town to Woodstock on the opposite side of the river. It is about 9 kilometres from Suckers' Flat.

Ray was very pleased with the relocation, because he had wanted to move out of the community for a long time. He was one of the two non-white families that were relocated by the Mactaquac Dam Project. Prior to the move, Ray and his family had been experiencing a great deal of racial discrimination in the neighbourhood. At one time, one of his neighbours circulated a petition to evict him from the community. The discrimination served as a major reason for his desire to leave the community- a move which was facilitated by the building of the Mactaquac Project.

Suckers' Flat was subject to heavy flooding almost every summer before the construction of the dam. Like many of the houses on the flat, his house had seepage problems in the basement, which also had some bearing on his attitude towards the relocation:

"For one thing, I didn't like the community. I wanted to get out of the town, but not far out. The flat got quite a bit flooding before, lots of water in the basement."

Ray believed that his family financially benefited from the relocation in the short-run, although he didn't think the relocation had any effect on the current financial situation of the family. This is evident in the following comments:

"I wouldn't say it has made much difference to the financial situation of my family in the long run. I don't think so. But it gave us a better kick out here at that time. We were young, not well-established. With the money we got, we were able to buy this house, which was a lot better than the one we had, and more land too. It was probably the nicest thing that has ever happened to us."

Ray regarded his age as the major advantage that enabled him to have benefited from the relocation. He acknowledged, on a number of occasions during the interview, the hardship which the elderly had experienced during the relocation. Ray maintained that, if he had been older, he would not have wanted to move. He expressed his sorrow for and reservations about the elderly who had to relocate in responding to the question on whether governments had the right to relocate people for development projects.

Not surprisingly, Ray considered the compensation for his property as fairly generous. He spoke with gratitude of the benefits which he derived from the relocation:

"The first offer was \$4,600. I immediately took it. I thought I'd have only got \$3,000. If it had been sold in the market at that time, I doubt I'd have got that much; I'd be lucky

to sell for \$3,000. It was a small house. I hadn't finished it yet. My case was settled early. The Power Commission let me live in the house for a whole year for just a dollar after it was taken and later sold to me for a dollar. I tore it down and sold the materials. I also bought two more houses from the Power Commission and made quite a bit profit by doing that. I profited from the move."

Ray also believed that the relocation affected his daughter in a positive way. He claimed that she was moved away from an urban environment and was not influenced by the "many bad things" in the town. She was also able to make many life-long friends after the move. As might be expected, the residential change was for the better in terms of community relations, as Ray professed that he was very glad to belong to this present community and liked his present neighbours much more than the old ones.

Ray perceived the Mactaquac Dam Project as having had neither positive nor negative effects on any of the services in his community. At the regional level, he believed that the area in which he was living had benefited to a certain extent, while the benefits to areas closer to the head of the Mactaquac headpond were greater. Ray pointed to the new golf courses, the Mactaquac Provincial Park and the Wolastock Wildlife Park.

Ray expressed his concern over water pollution in the river, but believed that it was getting better for the past few years. He didn't think that the dam had made any difference in terms of the water quality, but recalled that it was quite bad right after the dam was closed. He also believed that the Mactaquac headpond was a great improvement to the landscape of the

region.

However, like everyone interviewed in the Town of Woodstock, Ray showed deep grievance over the loss of Island Park. It was situated on the island in the middle of the river and was very frequently used by the local residents as a recreational centre. Most local events were held on the island, including, among others, the Old Home Week celebrations, the big King Road midway, the commercial and industrial exhibit, the wildlife display, the hobby show and the nightly dances.

The island was about 40 hectares in area and perfectly flat with a broad belt of trees surrounding the entire island. At the upper end, a beautiful grove of shade trees was situated. Under the shades of the trees, there was a picnic ground complete with tables, cooking facilities, barbecue pits and a children's playground. There was a tourist camp site at the lower end of the island. Other features on the island included the race track of the Woodstock Driving Club, one of the best in this part of Canada, fully equipped for night racing. It was also the site of the Community Arena, an up-to-date rink with a large ice surface and artificial plant, the Community Swimming Pool, a wading pool, and sports facilities, including several baseball diamonds for seniors, intermediate, juvenile and little league play, as well as a softball diamond.⁴⁵ The flooding submerged the island, and the Park was relocated to the fringe of the town. As Ray remarked:

"It was moved, but it isn't the same as it was on the Island. It hurt the town very badly. It seemed part of the town had been taken away. We used to go to the Park all the time.

It was nice and cold in the summer, lots of trees. We now very seldom go to the new park."

When asked about the effects of the dam on fishing, Ray commented, "the dam ruined our salmon pool, the Patterson Pool.⁴⁰ I used to fish a lot, but haven't fished the river after the dam, not even once."

In addition to favourable ratings on generosity and fairness, the respondent also reported that the Power Commission was very helpful to him on his own resettlement, and that officials from the Commission were very friendly in dealing with him. He gave the highest rating to the Power Commission on its overall performance on the relocation, as he responded:

"All were very well handled. I cannot think of anything that was handled poorly. No problem about that. They set up an office on the Flat. We were always received well. They would answer any questions you would have. They were always good."

NOTES:

1. *The Daily Gleaner*, "Power experts explain project", February 26, 1964, p.1.
2. See Case Analysis (I) in Section 6.4.1. for detailed discussions.
3. It should be pointed out that the responses were not mutually exclusive. That is, a respondent may have indicated more than one feeling in the list.
4. Typical responses included, "I was very sad" or "I was very upset" that "I had to move".
5. Typical responses included, "I was angry" or "I was frustrated" that "they treated me like that".
6. Typical responses included "I didn't know where to go" and "I didn't know what to do".
7. For example, "I couldn't believe the water could rise that high to flood the house".
8. "Bitter last days of happy valley", *Maclean's*, October 2, 1965, p.22.
9. It should be pointed out that a respondent may have given more than one answer. Some respondents may not have given an answer.
10. *The Daily Gleaner*, "Against building the dam", Letter to the Editor, February 6, 1964, p.4.
11. *The Daily Gleaner*, "NBEPCC Chairman sees major recreational park for Mactaquac", October 16, 1964, p.16.
12. Community Improvement Corporation, "Mactaquac Area: Federal/Provincial Rural Development Agreement", New Brunswick, 1966.
13. The New Brunswick Electric Power Commission, "Mactaquac", Information Brochure, no date.
14. *The Daily Gleaner*, "Mactaquac Project will boost economy says N.B. Premier", October 22, 1964, p.eleven.

15. *The Daily Gleaner*, "Kingsclear hears about Mactaquac: more progress through power is NBEPC plan", March 10, 1964, pp.1-2.
16. *The Daily Gleaner*, "Mactaquac principle adopted: Premier says all objections will be heard", February 27, 1964, pp.1-2.
17. *The Daily Gleaner*, "\$120 million project opens Saturday; 36-month job", June 21, 1968, pp.17-29.
18. *The Daily Gleaner*, "NBEPC discusses Mactaquac bids", January 15, 1965, pp.1-2; "Lowest bidder gets go-ahead for power dam", January 16, 1965, pp.1-2.
19. *The Daily Gleaner*, "Two PC supporters critical of contracts given at Mactaquac", May 7, 1965, p.eleven.
20. *The Daily Gleaner*, "Power experts explain project", February 26, 1964, p.1; "More progress through power is NBEPC plan", March 10, 1964, p.1.
21. "Mactaquac Dam Project", Federal/Provincial report, no date.
22. The Association placed a number of full-page newspaper advertisements expressing its views in opposition to the dam. One advertisement in *The Daily Gleaner* (June 5, 1964, p.6) called the Mactaquac project "destructive power development". There were many people who wrote to the local newspapers and *Maclean's Magazine* against the building of the dam. Two such letters, for example, were published in *The Daily Gleaner* on February 19, 1964, p.4, and on Monday, June 8, 1964, p.4. Another three opposition letters appeared in *Atlantic Advocate* in the March issue of 1965 and *Maclean's* on December 1, 1965.
23. *The Daily Gleaner*, "Mactaquac opposed", Letter to the Editor, February 19, 1964, p.4.
24. *The Daily Gleaner*, "The cost of Mactaquac", Letter to the Editor, March 17, 1964, p.4.
25. See, for example, *The Daily Gleaner*, "NBEPC Chairman says Mactaquac Dam will beautify river", June 19, 1964, p.5; "All for Mactaquac", Letter to the Editor, February 7, 1964, p.4; "The Benefits of Mactaquac", Letter to the Editor, March 5, 1964, p.4.

26. *The Daily Gleaner*, "People of area worried- NBEPC explains project", January 25, 1964, pp.1-2.
27. Hon. H.J. Robichaud, Federal Minister of Fisheries, "Salmon and the Mactaquac Dam", *The Atlantic Advocate*, October 1965, pp.12-14.
28. John Braddock, "Mactaquac- for business & pleasure", *The Atlantic Advocate*, November 1967, pp.12-16.
29. *The Daily Gleaner*, full-page advertisements by the Association, March 14, 1964, p.9, and May 29, 1964, p.5.
30. *The Daily Gleaner*, "Mactaquac study urged", May 11, 1964, p.5.
31. John Mercer (The New Brunswick Electric Power Commission), "Development of multiple purpose uses on Mactaquac Lake". Presented to the Hydraulic Power Session, Canadian Electric Association, March 1979.
32. (1) The New Brunswick Electric Power Commission, "Hydro Power in New Brunswick", Information Brochure, no date, 12pp. (2) A.H. Wark, W.P. Steadman and D.C. Willet, "Design and construction of the Mactaquac hydro-electric development", presented in Vancouver to the Engineering Institute of Canada Annual Meeting, September 1969.
33. See, John Mercer, *supra* note 31.
34. Jim Morrison, "Development and pollution: death for fishing?", *Atlantic Advocate*, September 1969, pp.18-24.
35. *Ibid.*
36. (1) The New Brunswick Electric Power Commission, "Summary of the Basic Principles of the Mactaquac Land Acquisition Program", no date. (2) The New Brunswick Electric Power Commission, "Draft Policy Statement of the Mactaquac Development Land Acquisition Program", August 27th, 1964.
37. *The Daily Gleaner*, "Power experts explain project", February 26, 1964, p.1.
38. See, for example, *The Daily Gleaner*, "Kingsclear hears about Mactaquac: more progress through power is NBEPC plan", March 10, 1964, p.1-2.
39. Farmers were more negative.

40. The subcommand is "METHOD=WILKS".

41. The above information is from an article written by a reporter of a Canadian magazine and published in 1966. The reporter visited the project area and interviewed a number of land owners who were to be affected by the Mactaquac project. Ed was one of the respondents. For the sake of confidentiality, the source will be withheld.

42. The numbers of residents and families in the community are estimated from a term-paper on the history of the community. It was written in 1984 for a history class at the University of New Brunswick. The author was a local resident whose family was also relocated. The name of the author will be withheld, since its disclosure may violate the confidentiality of the information source and may reveal the identity of the subject of the case analysis.

43. *Ibid.* "Jim" is a fake name for the author.

44. This is a fake name. The true identity of the respondent is withheld to ensure the confidentiality of the information source.

45. *The Telegraph-Journal*, "Site of Old Home Week: history of Island Park", July 31, 1964.

46. The Patterson Pool at Hartland, twelve miles north of Woodstock, was believed to be one of the best salmon pools in New Brunswick (Clarke 1972). Clarke recalled that salmon as large as twenty-four pounds or more could be caught there. It was estimated that during the summer of 1959, some sixty to seventy salmon were taken from the pool.

Chapter Seven. Discussion and Conclusions

This study was aimed to achieve three major objectives: (1) to develop a generic theoretical framework for social impact analysis; and (2) to demonstrate the use of the framework using a practical case study; (3) to test some hypotheses, formulated under the guidance of the framework, about the social impacts of population relocation at the Mactaquac Dam Project. The results indicated that these objectives have been accomplished.

Specifically, with the use of the Mactaquac case, the study has produced very interesting findings about the social impact of population relocation in a number of principal areas. These areas included: (1) the long-term social impacts, in terms of the various quality of life domains, of relocation upon the population concerned, (2) the role of the interruption of human-environment interactive patterns in the social impacting process, (3) the differential impact on farmers, and (4) the relative importance of domain-specific impacts to the impact on overall quality of life. By providing indispensable guidance to the case study, the framework has demonstrated its utility in the social impact situation of population relocation. Although the Mactaquac Project is only one case with many limitations, the study has nevertheless provided evidence of the worth of pursuing inquiries in other social impact situations along the line of the proposed interdisciplinary framework.

The following sections are intended to review the highlights of the framework, to examine the research findings in regard to the social

impacts of relocation at the Mactaquac Dam Project, to offer a policy-relevant definition of the issue of relocation and discuss the implications for social impact management, and, finally, to suggest future research needs.

7.1. The Theoretical Framework

In the field of social impact studies, the need has long been recognized for broadening social impact inquiries in both the theoretical perspectives and the methodologies for impact identification and evaluation and for interpreting impact research findings. This reflects the general failure of social impact scholars in attempts to develop impact theories that encompass the full range and real meaning of social impacts in all important dimensions, and in pinpointing the social impact areas that can best reveal the priority concerns of the affected parties and are most likely to engender social conflicts.

Among the major obstacles to a successful endeavour of social impact analysis has been a heavy reliance on single disciplinary approaches, which renders it very difficult to apprehend the process of social impacting in all its most important dimensions. Biophysical impact assessors tend to focus on the ecological processes generating environmental impacts, with little reference to the impacts on the human beings who depend on those ecosystems for their biological, social and cultural survival. Social scientists, on the other hand, tend to concentrate on the social processes in question, by and large overlooking the role of biophysical processes in social

impacting. Consequently, what is usually neglected has been the interface between people and the environment. Theoretical orientations, which could foster the bridging between biophysical and social impact understanding as well as facilitate the integration of human-environment interactions, are the only way out of this dilemma.

This study represents one of the preliminary attempts along this line. One significant characteristic of the framework is that it is interdisciplinary in nature. It draws on theories and insights from a number of relevant disciplines in both the biophysical and social sciences, and attempts to integrate them into a single analytical framework in such a fashion that variables most critical to the process of social impacting, whether they are biophysical or social ones, are properly considered.

Of central importance to the framework is the recognition of human values in social impact analysis. Human values enter the social impact research process in numerous ways, from the selection of problems to be studied, the variables to be considered, to the final interpretation of research findings. Social impact assessors need to be clearly aware that different actors in society, including researchers themselves, each have vested interests. Making judgments from different standpoints may derive totally different conclusions about the existence and significance of impacts. It is at least arguable, therefore, that reliable social impact information should be solicited from the impacted subjects.

Thus, it is not difficult to understand the differential nature of social impacts. It is meaningless to simply say that the aggregate social

benefits of a project outweigh the aggregate social costs without further inquiring into how the social benefits and costs are distributed. The pattern of distribution of these benefits and costs in any particular impact situation constitutes an appropriate subject for a social impact study. The results of social impact studies focused on differential impacts will help to generate knowledge more relevant to project planning and decision-making in numerous ways. Project proponents, for instance, can utilize the research findings, if they are to become responsible and competent, to understand whom their actions will negatively affect and through what mechanisms, and, more importantly, to devise proper mitigatory measures. This is very important because effective impact mitigation has become one of the critical factors in determining the fate of a proposed project.

The theoretical importance of the concept of differential impacts may relate to its contribution to existing knowledge about social consequences of rapid growth, particularly related to energy development in the Western United States- often referred to as boomtown studies. Early boomtown studies emphasized the negative consequences and concluded that rapid growth in relation to Western energy development caused significant social disruption among boomtown residents (see, for example, Kohrs 1974; Gilmore and Duff 1975; Little 1977; Cortese 1979). More recently, however, Wilkinson *et al.* (1982) have disputed these findings. They asserted that "the assumption that energy development causes social disruption in Western communities is based on undocumented assertions, questionable interpretations of evidence and superficial analyses" (*ibid.*:

p.275). While some studies have provided more empirical and comparative analyses, they have not settled the question of whether rapid growth results in social disruption (England and Albracht 1984; Freudenburg 1984; Krannich and Greider 1984; Krannich, Greider and Little 1985). These differences in findings and interpretations may be explained by the concept of differential impacts.¹

It is further proposed in the framework that a full comprehension of the linkage between the natural environment and the social systems which it supports is the key to the understanding of the process in which social impacts are created. Broadly envisaged, the natural environment has at least two sets of interrelated utilities or values to its inhabitants- instrumental and expressive. The instrumental value of the natural environment provides its inhabitants with life-supporting resources such as air, water, land and so on. The expressive value is manifested in people's affective bond with, or emotional experience of, the natural environment, including sense of attachment, at-homeness, rootedness and place-identity, and various social meanings associated with them. Any change in the natural environment will have repercussions for the local residents. It is, therefore, impossible either to study social impacts without linking them to environmental changes, or to evaluate environmental impacts without grounding them in a socially-defined frame of reference. In this sense, an environmental impact is in most, if not all, instances socially defined, and thus becomes a social impact as well. Social impacts can be viewed as behavioral responses of the affected individuals as their relationships with the social and natural environments in

which they live are modified or disturbed.

Finally, it is argued that functionalism, which has been a predominant paradigm in social impact analysis, has resulted in many deficiencies. One of such deficiency is reflected in the fact that its heavy dependence on socio-structural variables fails to pinpoint the priority concerns, needs and expectations of the affected parties, and thus addresses poorly real social impacts. It is proposed in the framework that social impact studies bring in the interactionist perspective and concentrate on the quality of life experiences of the affected individuals. The scope of social impact analysis should be enlarged to include the full range of socio-cultural and socio-psychological as well as socio-economic dimensions since they are important quality of life components.

By emphasizing the importance of human experiences, the proposed framework has an additional advantage of dealing with what a social impact analyst needs to know, that is, the changes in the sense of well-being of the affected parties. In reality, the reactions of local residents to a proposed project are guided, in most instances, by what they perceive may happen to them, not by what will actually occur. When the affected parties believe that their concerns over the effects on their well-being are not being properly addressed, they would most likely try to stop or resist the development in organized ways or through individualized efforts. A focusing of social impact studies on human attitudes, beliefs and behaviours will sensitize project proponents, and government agencies alike who are in charge of overseeing the implementation of social impact legislation, to

areas that are most likely to engender social conflicts.

Despite rapid progress in the past 20 years, social and environmental impact studies to date still suffer from many deficiencies due to over-reliance on single disciplinary perspectives or the lack of appropriate theoretical and conceptual bases. In attempting to provide a more coherent conception of social impacts and to integrate more relevant theoretical constructs, it is hoped that the framework proposed here could stimulate more interdisciplinary research which can facilitate the theoretical and methodological development of social impact analysis.

7.2. The Social Impacts of Relocation

For the past 30 years or so, research on relocation in connection with large water resources development projects has generated convincing evidence, both in developing as well as in developed countries, that relocation can often generate serious negative social impacts. Many previous studies have shown that relocation is generally an extremely stressful life event that can result in many social consequences for the people concerned in the short-term. This study of the relocation associated with the Mactaquac Dam Project has generated evidence that relocation may have long-term social impacts as well. The Mactaquac Project was constructed between 1965-1968, thus providing an excellent opportunity for investigating the long-term effects of the project on the quality of life of the relocatees. As the main instrument for this study, a questionnaire was used

to obtain information directly from the relocatees on the changes, as a consequence of relocation resulting from the implementation of the dam project, in the most important domains of their quality of life.

An analysis of the interview results has shown that the social impacts of relocation on many domains of the quality of life of some of the relocatees were still highly visible after 24 years. At the family and individual levels, the long-term social impacts involved the financial and housing conditions of the family, personal health, children and the elderly. At the community level, both community services and relations were adversely affected. At the regional level, some relocatees suffered from diminished economic prospects and employment opportunities in the long-run. Environmental changes in relation to landscape, water quality and fishing were also found to be of concern to the relocatees.

The responses showed that 52 out of the 74 respondents felt that the relocation had no effects on their present financial situation. Thirteen respondents maintained that their present financial situation had been negatively affected, while four reported some improvement. With regard to the impact of the relocation on present housing conditions, 46 respondents believed that it had made no difference. Twelve claimed that the relocation had negative effects while seven reported beneficial effects. Among the reasons given by those who reported negative effects were under-compensation and subsequent inability to obtain replacement residential and business properties.

Another interesting finding of this study relates to the perceived

health effects of relocation. In the literature on dam-related relocation, short-term health effects in terms of increased mortality and morbidity are controversial among sociologists. Epidemiologists have attributed increases in mortality and morbidity to the spread of water-borne diseases. The Mactaquac Project, unlike dam projects in the tropics where most of the health effects have been reported, did not involve the factor of water-borne diseases. Therefore, the health impacts as perceived by the relocatees can be related solely to the stress of relocation.

The short-term psychological effects reported at Mactaquac included depression, sadness, and sleep disturbances. A case of suicide was also attributed to the relocation by some respondents and local residents. The most acute physiological effects reported in the case of the Mactaquac Project were pre-mature deaths, especially among the elderly relocatees, during or within five years after the relocation. In regard to the long-term health effects of the relocation, the respondents reported a number of psychological disorders and physiological illness, including personal withdrawal, speech impediment, shingles, rheumatoid arthritis, heart attack, and cancer. These self-reported illnesses are consistent with the findings in the field of stress and health.

The stress of relocation in the case of Mactaquac was found to occur in three phases, namely, pre-move, actual move and post-move. In the pre-move phase, the stress was characterized by grievance and sadness about losing one's home and land, anger and frustration about under-compensation and/or mistreatment, uncertainties about the future, and

denial. During the period of the actual move, the above stressful experiences were further compounded with the workload and inconvenience of relocating the old house to a new homestead or the building of a new one. Post-move re-establishment was also a major source of stress, particularly for those who were not adequately compensated. The stress was associated with the effort to regain the previous standards of living.

The severity of the above-mentioned multi-dimensional stress may have been more acute for elderly relocatees due to a number of reasons. First, having had life-long contact with the physical settings, the elderly were more strongly attached to the home place. Secondly, they had greater attachment to and dependency on neighbourhood and friendship networks. The drastic environmental changes as a result of removal from previous home places and disruption of social relations as a result of the departure of neighbours, friends and relatives created stronger senses of uprootedness and grievance. The elderly also had relatively fewer personal and social resources for coping with the stress. Therefore, they were more likely to suffer from the stress of relocation, including pre-mature death. This study has provided evidence on how dam-related relocation may cause negative effects upon children as a consequence of neighbourhood or school change, or disruption of people-place identity. It has also illustrated the transmission of the psychological impacts from the first to the second generation.

In terms of the environmental effects of the project, the formation of the Mactaquac Lake was seen by many as an improvement to

the regional landscape. Some of the relocatees, however, saw it differently. In fact, 24 respondents perceived the change in scenery to have been negative by abruptly modifying the landscape and, particularly, by submerging all the islands along that stretch of the river. There was a story behind each island. They had symbolic, sentimental and historical values to the local residents. In terms of water quality, 29 respondents reported that water quality had deteriorated as a result of the damming. These perceptions of a negative impact on the water quality were validated by the findings of a scientific study on the environmental changes in the Saint John River. The reservoir resulted in a lowered rate of re-aeration and prolonged detention of oxygen-demanding substances to the effect that the profile of dissolved oxygen (DO) concentration in 1969 showed a discernible lag and anaerobic conditions were created in some parts of the reservoir.

All of the respondents expressed their displeasure with the drastic reduction of salmon- a major source of game fishing for local residents- as a result of the damming. The responses were consistent with two previous scientific studies which found that the Mactaquac Dam served to obstruct and reducing the quality of the migration route to and from the sea, to eliminate some of the spawning grounds, and to cause "gas bubble disease" and direct turbine mortality. It contributed, to a significant extent, to the virtual elimination of salmon fishing in the main stem of the river above the dam. These adverse environmental effects on salmon fishing, on water quality, and on landscape had a negative effect on the sense of well-being of the local residents.²

In addition to the impacts on the specific quality of life domains, a global impact indicator was devised in this study to measure the effect of the Mactaquac Project on the overall quality of life of the relocatees over the years since it was built. The global impact indicator can allow for an evaluation of whether or not the objective of "no worse off" of the Mactaquac land acquisition and relocation programme had been accomplished. It is found that 27 respondents, or 36% of the sample, believed that the overall quality of their lives over the years would have been better if the project had not been built. That implies that they have been made "worse off" as a result of the project.

The data set in this study has allowed for a statistical testing of differential impacts by two occupations- farmers and householders. The statistical results indicated that in comparison to the householder relocatees, the farmer relocatees of the Mactaquac project, as a group, experienced greater negative impacts in terms of their family finances, community relations and personal health. The perceived under-compensation to the farmer relocatees was also more pronounced. The main reason for differential financial impact on the farmer relocatees can be traced to the land acquisition and relocation policy of the Mactaquac Project. The compensation criterion of market value plus 10% "disturbance bonus" was generally inadequate for replacing property losses incurred by the land owners. The farmer relocatees had to bear additional hardship from livelihood re-establishment when land, which represented a major source of income, was taken. They were further strained financially by the "partial

taking" procedure, which excluded the 10% "disturbance bonus" for the part of land above the flood line. This study also found that the farmer relocatees had a stronger sense of disruption of community relations as a result of the relocation. This may be explained largely by their stronger dependency on social support from within the communities. The departure of community members undermined their social support network. The flux of newcomers from nearby urban centres also altered the way of life of the local farmers in undesirable ways.

It can be concluded from the experience of the Mactaquac Project that relocation is more stressful to the farmer relocatees than to people of other occupations, simply because they are more likely to endure greater financial and socio-cultural losses. Based on the result of this study, they also have a higher chance of developing psychological and physiological problems. Taking all these aspects into account, they are more prone to experience a decline in the overall quality of their lives arising from relocation. Two individual cases involving a farmer and a wage-earner were included to highlight the differential effects of the relocation and the underlying factors.

Using discriminant analysis, this study has also examined the relative contributions of the individual domain-specific impact variables (discriminating variables) to the global impact on the overall quality of life of the relocatees. Of the 15 discriminating variables included in the analysis, seven were eliminated by the step-wise procedure as their relative contributions to the discrimination of the global impact were negligible. The

remaining discriminating variables are, in descending order of discriminating potency, impact on family finance, regional economic impact, impact on personal health, impact on community relations, impact on family housing conditions, impact on electricity price, impact on regional employment opportunities, and impact on regional landscape.

The above findings demonstrated the value of the framework in the case of the Mactaquac Project in many ways. First, it is the framework that provided guidance to the identification of the most critical variables to be reckoned with in the analysis. Second, the proposition in the framework concerning the interrelationships between social and environmental impacts led to the inclusion of the environmental variables. Third, the concept of differential impacts as a major component of the framework assisted in proposing and testing the respective hypothesis about the differential effects of relocation on farmers and non-farmers. Finally, it is the framework that guided the methodological design of the study in relation to the collection of information, the format of analysis, and the interpretation of the results.

7.3. Towards a Definition of the Issue of Relocation

In Canada, as in many other countries around the world, large dams are built to achieve a combination of objectives such as electricity production, flood control, municipal and industrial water supply, navigation and recreation. The generated benefits may reach places hundreds or even thousands kilometres away. The production of electricity, for example, is

often intended to serve customers in large, remote urban centres. Large dams can also relieve downstream areas of flood threats, and provide water for large cities and industries.

It is often the case that many of the project benefits accrue to outsiders, whereas many of the adverse environmental and social consequences are absorbed by local residents. As a result of flooding, many local residents are forced to leave their land and the homes in which they have lived for generations. They have to suffer the consequences of reduced natural production, damaged ecosystems, lifestyle modification, social disruption, and sometimes welfare dependency. Their livelihood, values, beliefs, lifestyles, and their strong ties with their social and natural environments receive little sympathy or respect.

While proponents and supporters of large-scale water resource development projects continue to make claims of benefits to local residents, findings from many studies, including this present one, have indicated the contrary. A review of 186 studies of rural development projects in the US has also shown that the actual consequences often differed from the intended effects (Summers 1974, 1977, 1978). In the majority of cases, only a small proportion of newly-created job opportunities were filled by previously unemployed and poor local residents. Further, the jobs they did get were mostly in non-skilled and low-paying categories.

Sociologists are not alone in questioning the merits of large water resource development projects. Resource economists have also demonstrated the inaccuracy of what is commonly termed the "trickle-down"

theorem of distributional effects. A study by Haveman (1965) of such projects in the US, for example, suggested that water investments did not benefit the median- and low-income groups in affected regions. It is often the case that large industrial projects, including large dams, tend to enlarge, instead of narrow, inequitable income distributions within project areas. The anticipated multiplier effects from newly-created secondary job creation, increased local purchases of goods and services, business expansion, and so on, often do not occur to a significant extent. Most importantly, costs are often borne by groups who could ill afford them- the impoverished farmers, the elderly, the less educated, females and minority groups.

Assuming that all the social impacts are properly mitigated, the developer of a project will have to commit more financial resources. On the other hand, the proponent, by ignoring social consequences, may attain a considerable amount of savings. If the existence of social impacts is interpreted against the principle of "no worse off", it is obvious that social impacts, and environmental impacts alike, are in fact part of project costs that are localized or externalized. It can be said that the localization of social and environmental costs has been fostered by inherent deficiencies in project planning processes. One of the most noted deficiencies was a heavy reliance on economic and engineering feasibility studies, and subsequent lack of adequate attention to environmental and social factors. This so-called economic-engineering bias has not been limited to the field of water resource development, but can be seen in the entire realm of natural resource development (Cernea 1988a).

The Mactaquac Project was conceived and built in the 1960s—a period characterized by supply-oriented planning approaches (Quinn 1977). Water resource development projects, particularly large dams, were among the most impressive symbols of progress. The prevailing philosophy was that Canada was wealthy in water and the major challenge was to harness the resource by means of structures for storage and withdrawal from nature. Technical and economic considerations were therefore given top priority. Planners for water resource development projects were almost entirely engineers and hydrologists. Taking the whole period into account, the techniques used to evaluate project proposals placed heavy emphasis on engineering and physical sciences, with the only technique adopted from the social sciences having been benefit-cost analysis (Tate 1981).

In the case of the Mactaquac Project, engineering and economic feasibility studies began as early as in the 1950s. However, sociological studies did not commence until the project was ready to start. There was little time to do a systematic analysis. Moreover, by the time the studies were finished, the entire project was near its completion. The findings from these *ad hoc* studies were not utilized in project design or in the formulation of land acquisition and relocation policies.

From an international perspective, the handling of involuntary relocation in connection with natural resource development projects funded by the World Bank was equally flawed by a lack of social planning and by insufficient financial and technical resources (Cernea 1988a). Provisions for relocation were often omitted from main project design and consequently

from the project's institutional and financial arrangements. The implementation of relocation programmes was often delegated to second-rank agencies which usually were not adequately staffed, equipped, or funded to carry out the task. Inadequate recognition of relocation issues at the planning stage of a project led to incomplete design, which in turn resulted in underfinancing. Incomplete costing of the losses caused by dislocation and the investment costs for adequate resettlement produced enormous project difficulties and sometimes disastrous relocation programmes.

Another significant deficiency in project planning was the exclusion of the local residents, particularly the affected land and home owners. Traditionally and even until very recently, decisions on the acceptability of a proposed development were made by officials from governments and industries, rarely involving interested and affected publics. By the time the publics were contacted, the planning process was already completed. At this stage, the dominant form of interaction was education and information. The Mactaquac Project was characteristic of the water resource development approaches of the 1960s when development agencies still found the notion of public participation alien. For the most part, communication was a one-way process. To the extent that public input was solicited, it was done through public information meetings- the only mechanism used both for informing publics and for inviting reactions.

Not surprisingly, an evaluation of public participation in the Mactaquac Project indicates a general failure to create meaningful and

effective public participation. This failure was evidenced by the frequent confrontations during the land acquisition process, and by the poor performance rating and low level of popular support for the undertaking agency by the affected property owners. It is clear that this top-down, paternalist approach failed in understanding their needs, concerns and expectations, or in identifying potential social impacts and conflicts. It also illustrates a more critical failure to formulate social impact mitigation measures and to accommodate conflicting interests in the planning process.

7.4. Implications for Social Impact Management

Appreciation of the importance of social impacts of water resource development in policy-making is of relatively recent origin. However, during the past few decades, it has become increasingly apparent that water resource development planners can no longer ignore such factors in their development plans. Rising public concerns clearly indicate the need for systematic investigation and consideration of social effects before commitments are made.

Large-scale water resource development projects are almost exclusively undertaken by public agencies. It is, therefore, obvious that the success or failure of a particular project should not be judged only by its technological and economic excellence, but also by its impacts on people's lives. Acceptance or rejection of project proposals, opposition to project siting, and litigation often have their roots in concerns about project-induced

effects on the well-being of local residents. Social impacts require careful assessment and consideration, both in terms of the public and legislative obligations to assess social impacts that are of critical importance to residents of impacted areas and in terms of project approval.

It is apparent that the days are over when a water resource development project which is likely to cause serious social impacts would be proposed, planned and built, without putting forward effective impact mitigation measures and without involving the general and directly affected publics. This is particularly true for the Canadian North, where traditional land-based, resource-dependent pursuits remain a crucial component of the way of life, both economically and culturally, for the natives. Past experience has shown that the introduction of hydroelectric development into native communities may cause severe social disruption (Waldram 1980, 1987, 1988; Loney 1987). Clearly, one of the most crucial aspects of the proposed James Bay II in Quebec is the potential impacts of the dam and flooding on native economy and culture in which hunting, trapping and fishing still play an extremely important role.

The inclusion of social impact assessment in the planning and decision-making process offers a good chance for the solution of many of the social problems that water resource development projects can create. Social impact analysis, in many cases mandated by environmental impact legislation, provides an important mechanism to achieve a better understanding of the interactions among social impacts, characteristics of the environmental and social systems, and various components of related

policies.

Public participation in the decision-making process is commonly regarded as necessary to prevent negative social impacts (Bowles 1981). It is well understood that properly devised public participation programmes can yield information about the potential social impacts upon the affected individuals, about the needs, concerns, desires and expectations of the affected parties. The fact that there are provisions for public participation in most jurisdictions which have regulations governing impact assessment reflects such an understanding. Public participation should continue to be treated as an integral component of social impact assessment.

It is widely recognized that preventive and mitigatory steps taken early in the planning process are essential to minimize the adverse effects of water resource development and to reconcile conflicting interests (Cernea 1988a). One of the crucial requirements for effective prevention of social impacts lies in timely and sufficient impact information. Therefore, a social impact study should be carried out at the same time as economic and engineering investigations. Study results can thus be integrated into early policy design.

The greatest challenge for the next decades in the realm of water resource development is to learn how to deal with social impacts. In spite of the ambitious goals of social impact regulations designed to approach these problems, successful social impact management will rest on a number of factors: legislative change, institutional change, and effective public participation.

7.5. Future Research Needs

There is a pressing need for researchers to continue to accumulate social impact knowledge to be used to improve planning exercises for water resource development. There are currently many issues concerning the social impacts of water resource developments in general, and relocation in particular, that warrant further research. One of these issues relate to differential impacts. This study has provided evidence of the worth of pursuing this line of inquiry. This investigation was limited by the relatively small sample and a constrained attribute set. Future research should enlarge the scope of theoretical and empirical analysis to other social groups, and to test hypotheses about differential impacts by gender, economic position, social status and so on.

To date, few formal monitoring programmes have been established for tracking actual social impacts of development projects, although much could be learned from past experiences (Armour 1990). In the absence of hindsight assessment, there is a risk that mistakes will be perpetuated and that more fruitful approaches will be ignored. The monitoring of social impacts allows for an analysis of both the actual impacts and the effectiveness of preventive measures and can thus yield a full range of social impact information. This information can be used as the knowledge base for developing revised impact projections. In addition, it would also give project planners, and government agencies alike responsible for overseeing the implementation of social impact legislation, a better comprehension of

the social consequences of development activities.

The phenomenon of social impacts related to water resource developments is a very complex in nature. The strong connections between the issues in social and environmental impact analysis in general mean that a wealth of information relevant to social impact analysis exists in other disciplines- for example, anthropology, economics, geography, human ecology, philosophy, political science, psychology, and sociology. Interdisciplinary perspectives are therefore needed to achieve a comprehensive and systematic understanding of the full range of social impacts and the processes by which the impacts are created. This study represents a preliminary attempt to integrate theories from relevant disciplines in dealing with the complexities of social impacts. It is hoped that the subject of the social impacts of relocation as well as the entire field of water resource development will witness continuing and growing interdisciplinary endeavour.

NOTES:

1. In fact, many of the studies concentrated on sub-populations. Nevertheless, both sides of the dispute have tended to over-generalize their findings to a larger analytical unit.
2. There have been cases in Canada in which compensation was granted to local residents over the loss of fish production from damming. For example, compensation payments to the commercial fishermen in the South Indian Lake for declines in whitefish and catches as a result of the Lower Nelson Diversion Project totalled approximately \$1 million over the period of 1977-1982. In 1983, an agreement between Manitoba Hydro and the fishermen provided for a one-time cash settlement of \$2.5 million for all future commercial fishery losses (Bodaly *et al.* 1984). The White Dog band of the Islington Reserve on Tetu Lake, Ontario also filed a claim with the Federal Provincial Loans Committee for \$380,000 losses over the commercial fishing ruined by mercury pollution as a consequence of the Caribou Dam built by Ontario Hydro. (See, "It is no longer possible to be an Indian", by Chief John Henry, *MacLean's*, Vol.84, No.6 (1971): pp.47-48).

Appendix. Introductory Letter and Questionnaire



QUESTIONNAIRE FOR THE MACTAQUAC RELOCATION STUDY

INTERVIEW NUMBER: _____ 01-03/
NAME OF INTERVIEWER: _____ 04/
NAME OF RESPONDENT: _____ 05-07/
ADDRESS: _____ 08-11/

INTERVIEW DATE: Year _____ 12-13/
Month _____ 14-15/
Day _____ 16-17/

TIME INTERVIEW BEGINS: _____

TIME INTERVIEW ENDS: _____

WEATHER: _____

QUESTIONNAIRE FOR THE MACTAQUAC RELOCATION STUDY

Hello, my name is Zhizhong. I am from Dalhousie University, Halifax. I am doing a study on the relocation of the Mactaquac Dam Project. I understand that you were one of the about 350 families relocated by the project. I have selected a representative sample from those relocated and you are one of them. I would like to talk with you about your life and work since you were relocated. I think your experience is a valuable part of the history of this region, and it is important and necessary to have it told. Your information will also help understand relocation better and suggest better policies for future relocation programs around the world. It will only take a short while and I thank you very much for your time.

In this interview, I would like to ask a few questions. For some of the questions, I will give you a set of possible answers. I would like you to tell me the one that is closest to what you truly feel. For other questions, just tell me what comes to your mind.

I. PLACE OF RESIDENCE AND OCCUPATION BEFORE RELOCATION

1. Where did your family live before you were relocated?

COMMUNITY: _____ 18-19/
COUNTY: _____ 20-21/

2. How long did your family live in that community before the relocation?

YEARS _____ 22-24/

3a. Is this community the only place you have lived since you were relocated?

YES.....[ASK Q-3b]...1 25/
NO.....[GO TO Q-3f]...2

3b. Could you tell me how you moved here?

MOVED ON HIGHER GROUND.....[GO TO Q-3d]...1 26/
ON OWN PROPERTY IN SAME COMMUNITY.....[GO TO Q-3d]...2
ON NEWLY-BOUGHT PROPERTY IN SAME COMMUNITY...[GO TO Q-3d]...3
ON OWN PROPERTY IN NEW COMMUNITY.....[ASK Q-3c]...4
ON NEWLY-BOUGHT PROPERTY IN NEW CUMMUNITY.....[ASK Q-3c]...5
OTHER (SPECIFY): _____[ASK Q-3c]...6

3c. How far is it from here to your original home before the relocation?

27-30/

DISTANCE IN MILES: _____

3d. Did you actually move the house from the old foundation, or was it newly-built when you were relocated?

31/

- MOVED OWN HOUSE.....1
- BOUGHT OTHER'S HOUSE & MOVED HERE.....2
- RE-BUILT THE HOUSE.....3
- OTHER (SPECIFY):.....4

3e. Could you tell me why you decided to resettle here, instead of somewhere else? [1.CLOSE TO ORIGINAL HOME/ 2.CLOSE TO RELATIVES/ 3.HAVE PROPERTY/ 4.NOWHERE TO GO]

32-35/

[GO TO Q-4].

3f. Could you tell me something about your first relocation and the places you have lived afterwards? [DIST FRM FIRST RELOCATION TO ORIGINAL HOME, ETC]

36-39/

4. How did you like your previous place of residence before the relocation?

40-43/

5a. What was your major occupation at the time of relocation?

44-45/

CROP/DAIRY FARMER.....	[ASK Q-5b]...01
SAWMILL OWNER.....	[ASK Q-5b]...02
LUMBERMAN	[ASK Q-5b]...03
FISHERMAN.....	[ASK Q-5b]...04
CRAFTSMAN.....	[ASK Q-5b]...05
CARPENTER.....	[ASK Q-5b]...06
RESTAURANT OWNER.....	[ASK Q-5b]...07
GROCERY STORE OWNER	[ASK Q-5b]...08
SERVICE STATION/GARAGE.....	[ASK Q-5b]...09
BLDG CONSTRUCT'N & REPAIR.....	[ASK Q-5b]...10
WAGE EARNER IN THE RURAL AREA (SPECIFY):	
_____	[ASK Q-5b]...11
WAGE EARNER IN TOWN (SPECIFY):	
_____	[ASK Q-5b]...12
HOUSEWIFE.....	[GO TO Q-6a]...13
RETIRED.....	[GO TO Q-5c]...14
OUT OF JOB/UNEMPLOYED	[GO TO Q-5c]...15
OTHER (SPECIFY):	
_____	[ASK Q-5b]...16

5b. What else did you do in addition to _____ [MAJOR OCCUPATION]?

46-47/

CROP/DAIRY FARMER.....	01
SAWMILL OWNER.....	02
LUMBERMAN.....	03
FISHERMAN.....	04
CRAFTSMAN.....	05
CARPENTER.....	06
RESTAURANT OWNER.....	07
GROCERY STORE OWNER.....	08
SERVICE STATION/GARAGE.....	09
BLDG CONSTRUCT'N & REPAIR.....	10
WAGE EARNER IN THE RURAL AREA (SPECIFY):	
_____	11
WAGE EARNER IN TOWN (SPECIFY):	
_____	12
NONE.....	13
OTHER (SPECIFY):	
_____	14

[GO TO Q-6a].

5c. What was the last job you held before you were _____ [OUT OF JOB/ RETIRED]?

48-49/

- CROP/DAIRY FARMER.....01
- SAWMILL OWNER.....02
- LUMBERMAN.....03
- FISHERMAN.....04
- CRAFTSMAN.....05
- CARPENTER.....06
- RESTAURANT OWNER.....07
- GROCERY STORE OWNER.....08
- SERVICE STATION/GARAGE.....09
- BLDG CONSTRUCT'N & REPAIR10
- WAGE EARNER IN THE RURAL AREA (SPECIFY):
.....11
- WAGE EARNER IN TOWN (SPECIFY):
.....12
- OTHER (SPECIFY):
.....13

6a. Have you ever thought of moving from this present residence to another place?

50/

- YES.....[ASK Q-6b]...1
- NO[GO TO Q-7]...2

6b. Where and why are you thinking of moving?

(1) First choice

- Location: Community _____ 51-52/
- County _____ 53-54/
- Province _____ 55-56/
- Distance to pre-relocation home in miles: _____ 57-60/
- Reason moving to: _____ 61-62/

(2) Second choice

- Location: Community _____ 63-64/
- County _____ 65-66/
- Province _____ 67-68/
- Distance to pre-relocation home in miles: _____ 69-72/
- Reason moving to: _____ 73-74/

II. LIFE IN GENERAL AFTER RELOCATION

{CODING CARD TWO}

7. Now, I would like to know how satisfied you are with your present life today in general. Would you say your present life today in general is very satisfactory, somewhat satisfactory, not very satisfactory, or not satisfactory at all?

01/

VERY SATISFACTORY.....1
 SOMEWHAT SATISFACTORY.....2
 NOT VERY SATISFACTORY.....3
 NOT SATISFACTORY AT ALL.....4

8. Think about your life in general in the past twenty years or so since you were relocated. How satisfactory do you think your life in general has been in the past twenty years or so since you were relocated?

02/

VERY SATISFACTORY.....1
 SOMEWHAT SATISFACTORY.....2
 NOT VERY SATISFACTORY.....3
 NOT SATISFACTORY AT ALL.....4

9. Compared with people currently living around you who were also relocated, would you say you have been doing better or worse in the past twenty years or so than they did?

03/

MUCH BETTER.....1
 SOMEWHAT BETTER.....2
 NO DIFFERENCE.....3
 SOMEWHAT WORSE.....4
 MUCH WORSE.....5
 [HARD TO SAY/DON'T KNOW].....6

10. Compared with people currently living around you who were neither relocated nor affected in any way by the Mactaquac Project, would you say you have been doing better or worse in the past twenty years or so than they did?

04/

MUCH BETTER.....1
 SOMEWHAT BETTER.....2
 NO DIFFERENCE.....3
 SOMEWHAT WORSE.....4
 MUCH WORSE.....5
 [HARD TO SAY/DON'T KNOW].....6

11. Would you say your life in the past twenty years or so would have been better or worse if there had not been the Mactaquac Project?

05/

- MUCH BETTER OFF.....1
- SOMEWHAT BETTER OFF.....2
- NO DIFFERENCE.....3
- SOMEWHAT WORSE OFF.....4
- MUCH WORSE OFF.....5
- [CANNOT TELL/DON'T KNOW].....6

12. Could you tell me what positive things the Mactaquac Project has brought to you and your family?

06-11/

13. What are the negative things the Mactaquac Project has brought to you and your family?

12-17/

III. COMMUNITY SERVICES

14a. I would now like to ask how you feel about some of the main public services in the area where you are living. First, how well do you think the streets, roads and highways are kept around here now?

18/

- VERY WELL.....1
- FAIRLY WELL.....2
- NOT VERY WELL.....3
- NOT WELL AT ALL.....4

14b. How do you compare the streets and roads here now with the streets, roads and highways before you were relocated? Do you think the streets, roads and highways are better or worse now than before you were relocated?

19/

- MUCH BETTER NOW.....1
 SOMEWHAT BETTER NOW.....2
 NOT MUCH DIFFERENCE.....3
 SOMEWHAT WORSE NOW.....4
 MUCH WORSE NOW.....5

14c. Do you think the streets, roads and highways around here would have been better or worse today if there had not been the Mactaquac Dam Project?

20/

- IT WOULD HAVE BEEN MUCH BETTER.....1
 IT WOULD HAVE BEEN SOMEWHAT BETTER.....2
 NOT MUCH DIFFERENCE.....3
 IT WOULD HAVE BEEN SOMEWHAT WORSE.....4
 IT WOULD HAVE BEEN MUCH WORSE.....5
 [CANNOT TELL/DON'T KNOW].....[GO TO 15a]..6

14d. Why do you think so?

21-24/

15a. How good do you feel the quality of the public schools is in this area now?

25/

- VERY GOOD.....1
 FAIRLY GOOD.....2
 NOT VERY GOOD.....3
 NOT GOOD AT ALL.....4
 [DON'T KNOW/NO KIDS IN SCHOOL].....[GO TO Q-16a]..5

15b. How do you compare the public schools now with the public schools before you were relocated? Would you say the public schools are better or worse now than before you were relocated?

26/

- MUCH BETTER NOW.....1
 SOMEWHAT BETTER NOW.....2
 NOT MUCH DIFFERENCE.....3
 SOMEWHAT WORSE NOW.....4
 MUCH WORSE NOW.....5

15c. Do you think the quality of the public schools in this area would have been better or worse today if there had not been the Mactaquac Project?

27/

- WOULD HAVE BEEN MUCH BETTER.....1
- WOULD HAVE BEEN SOMEWHAT BETTER.....2
- NOT MUCH DIFFERENCE.....3
- WOULD HAVE BEEN SOMEWHAT WORSE.....4
- WOULD HAVE BEEN MUCH WORSE.....5
- [CANNOT TELL/DON'T KNOW].....[GO TO Q-16a]..6

15d. Why do you think so?

28-31/

16a. How good do you feel church life is in this area now?

32/

- VERY GOOD.....1
- FAIRLY GOOD.....2
- NOT VERY GOOD.....3
- NOT GOOD AT ALL.....4
- [DON'T KNOW/NO PARTICIPATION].....[GO TO Q-17a]..5

16b. How do you compare church life now with the church life before you were relocated? Do you think church life is better or worse now than before you were relocated?

33/

- MUCH BETTER NOW.....1
- SOMEWHAT BETTER NOW.....2
- NO DIFFERENCE.....3
- SOMEWHAT WORSE NOW.....4
- MUCH WORSE NOW.....5

16c. Do you think church life in this area would have been better or worse today if there had not been the Mactaquac Project?

34/

- IT WOULD HAVE BEEN MUCH BETTER.....1
- IT WOULD HAVE BEEN SOMEWHAT BETTER.....2
- NOT MUCH DIFFERENCE.....3
- IT WOULD HAVE BEEN SOMEWHAT WORSE.....4
- IT WOULD HAVE BEEN MUCH WORSE.....5
- [CANNOT TELL/DON'T KNOW].....[GO TO Q-17a]..6

16d. Why do you think so?

35-38/

17a. Where do you do most of your shopping?

39/

FREDERICTON.....1
 NACKAWIC.....2
 WOODSTOCK.....3
 OTHER (SPECIFY).....4

17b What do you think about the convenience of your shopping now?

40/

VERY CONVENIENT.....1
 FAIRLY CONVENIENT.....2
 NOT VERY CONVENIENT.....3
 NOT CONVENIENT AT ALL.....4

17c. How do you compare the convenience of shopping now with before you were relocated? Would you say shopping is more or less convenient now than before you were relocated?

41/

MUCH MORE CONVENIENT NOW.....1
 SOMEWHAT MORE CONVENIENT NOW.....2
 NOT MUCH DIFFERENCE.....3
 SOMEWHAT LESS CONVENIENT NOW.....4
 MUCH LESS CONVENIENT NOW.....5

17d. Do you think the convenience of shopping in this area would have been better or worse today if there had not been the Mactaquac Project?

42/

WOULD HAVE BEEN MUCH MORE CONVENIENT.....1
 WOULD HAVE BEEN SOMEWHAT MORE CONVENIENT.....2
 NOT MUCH DIFFERENCE.....3
 WOULD HAVE BEEN SOMEWHAT LESS CONVENIENT.....4
 WOULD HAVE BEEN MUCH LESS CONVENIENT.....5
 [CANNOT TELL/DON'T KNOW].....[GO TO Q-18a]...6

17e. Why do you think so?

43-46/

18a Where do you go and see a doctor?

47/

- FREDERICTON.....1
- NACKAWIC.....2
- WOODSTOCK.....3
- OTHER (SPECIFY).....4

18b What do you think about the convenience of seeing a doctor now?

48/

- VERY CONVENIENT.....1
- FAIRLY CONVENIENT.....2
- NOT VERY CONVENIENT.....3
- NOT CONVENIENT AT ALL.....4

18c. How do you compare the convenience of seeing a doctor now with before you were relocated? Would you say it is more or less convenient to see a doctor now than before you were relocated?

49/

- MUCH MORE CONVENIENT NOW.....1
- SOMEWHAT MORE CONVENIENT NOW.....2
- NOT MUCH DIFFERENCE.....3
- SOMEWHAT LESS CONVENIENT NOW.....4
- MUCH LESS CONVENIENT NOW.....5

18d. Do you think seeing a doctor today would have been more or less convenient today if there had not been the Mactaquac Project?

50/

- WOULD HAVE BEEN MUCH MORE CONVENIENT.....1
- WOULD HAVE BEEN SOMEWHAT MORE CONVENIENT.....2
- NOT MUCH DIFFERENCE.....3
- WOULD HAVE BEEN SOMEWHAT LESS CONVENIENT.....4
- WOULD HAVE BEEN MUCH LESS CONVENIENT.....5
- [CANNOT TELL/DON'T KNOW].....[GO TO Q-19a]..6

18e. Why do you think so?

51-54/

IV. NEIGHBORHOOD AND COMMUNITY RELATIONS

- 19a. How do you like your neighbors around here? 55/
- LIKE THEM VERY MUCH.....1
 SOMEWHAT LIKE THEM.....2
 NEITHER LIKE THEM NOR DISLIKE THEM.....3
 DON'T LIKE THEM VERY MUCH.....4
 DON'T LIKE THEM AT ALL.....5
- 19b. Whom do you like more, your present neighbors or your previous neighbors before you were relocated? 56/
- LIKE PRESENT NEIGHBORS MUCH MORE.....1
 LIKE PRESENT NEIGHBORS SOMEWHAT MORE.....2
 NO DIFFERENCE.....3
 LIKE PREVIOUS NEIGHBORS SOMEWHAT MORE.....4
 LIKE PREVIOUS NEIGHBORS MUCH MORE.....5
20. Are you glad to belong to this community? 57/
- VERY GLAD.....1
 QUITE GLAD.....2
 NOT VERY GLAD.....3
 NOT GLAD AT ALL.....4
 [HARD TO SAY/NO OPINION].....5
21. Do you think people in this community care much about each other? 58/
- VERY MUCH.....1
 SOMEWHAT.....2
 NOT VERY MUCH.....3
 NOT AT ALL.....4
 [HARD TO SAY/NO OPINION].....5
- 22a. Do you think the Mactaquac Project has affected the relationship among people living in your community? 59/
- YES.....[ASK Q-22b]...1
 NO.....[GO TO Q-23a]...2
 [DON'T KNOW].....[GO TO Q-23a]...3

22b. How has the Mactaquac Project affected the relationship among people living in your community?

60-63/

{CODING CARD THREE}

V. ENVIRONMENT

23a. What do you think the water quality in the St John River? How serious is the water pollution in the river?

01/

VERY SERIOUS.....1
 QUITE SERIOUS.....2
 NOT VERY SERIOUS.....3
 NOT SERIOUS AT ALL.....4

23b. Do you think the Mactaquac Dam has made the water quality of the St. John River better or worse?

02/

MUCH BETTER.....1
 SOMEWHAT BETTER.....2
 NO DIFFERENCE.....[GO TO Q-24]...3
 SOMEWHAT WORSE.....4
 MUCH WORSE.....5
 [CANNOT TELL/DON'T KNOW].....[GO TO Q-24]...6

23c. Could you tell me some details?

03-04/

24. Does the Mactaquac Lake make this area look more or less beautiful?

05/

MUCH MORE BEAUTIFUL.....1
 SOMEWHAT MORE BEAUTIFUL.....2
 NO DIFFERENCE.....3
 SOMEWHAT LESS BEAUTIFUL.....4
 MUCH LESS BEAUTIFUL.....5

25a. Do you like fishing or angling?

06/

YES.....[ASK Q-25b]...1
 NO.....[GO TO Q-26a]...2

25b. Do you think fishing or angling in the river has been affected in any way?

07/

YES.....[ASK Q-25c]...1
 NO.....[GO TO 26a]...2

25c. Could you give me some details?

08-11/

26a. Do you feel your community is over-crowded?

12/

VERY CROWDED.....[ASK Q-26b]...1
 QUITE CROWDED.....[ASK Q-26b]...2
 NOT VERY CROWDED.....[GO TO Q-27]...3
 NOT CROWDED AT ALL.....[GO TO Q-27]...4

26b. Does this have anything to do with the Mactaquac Project?

13/

YES.....1
 NO.....2
 [DON'T KNOW].....3

VI. REGIONAL ECONOMIC EFFECTS

27. Next, I am going to ask some questions about the effects of the Mactaquac Project on the area around the reservoir as a whole. My first question is, how much do you think the economy of this area has benefited from the Mactaquac Project over the years?

14/

BENEFITED A LOT.....1
 BENEFITED SOMEWHAT.....2
 NOT BENEFITED VERY MUCH.....3
 NOT BENEFITED AT ALL.....4
 [DON'T KNOW].....5

28a. How easy is it now to find jobs in this area around the reservoir? 15/

VERY EASY.....1
 SOMEWHAT EASY.....2
 NOT VERY EASY.....3
 NOT EASY AT ALL.....4
 [DON'T KNOW].....[GO TO Q-29a]...5

28b. How do you compare the ease or difficulty of finding jobs now with before you were relocated? 16/

MUCH EASIER NOW.....1
 SOMEWHAT EASIER NOW.....2
 NO DIFFERENCE.....[GO TO Q-29a]...3
 SOMEWHAT MORE DIFFICULT NOW.....4
 MUCH MORE DIFFICULT NOW.....5
 [DON'T KNOW].....[GO TO Q-29a]...6

28c. Would you say there would have been fewer or more jobs now if there had not been the Mactaquac Project? 17/

MUCH FEWER JOBS.....1
 SOMEWHAT FEWER JOBS.....2
 NOT MUCH DIFFERENCE.....[GO TO Q-29a]...3
 SOMEWHAT MORE JOBS.....4
 MUCH MORE JOBS.....5
 [DON'T KNOW].....[GO TO Q-29a]...6

28d. Why do you think so? 18-21/

29a. Could you tell me something about the local taxes in this area? Do you think the local taxes here are very high, somewhat high, not very high, or not high at all? 22/

VERY HIGH.....1
 SOMEWHAT HIGH.....2
 NOT VERY HIGH.....3
 NOT HIGH AT ALL.....4
 [DON'T KNOW].....[GO TO Q-30a]...5

29b. Compare the amount of local taxes you are paying now with the amount of local taxes you paid before you were relocated. Would you say you are paying higher or lower local taxes now than before the relocation?

23/

- MUCH HIGHER NOW.....1
- SOMEWHAT HIGHER NOW.....2
- NOT MUCH DIFFERENCE.....[GO TO Q-30a]...3
- SOMEWHAT LOWER NOW.....4
- MUCH LOWER NOW.....5
- [DON'T KNOW].....[GO TO Q-30a]...6

29c. Do you think the local taxes now would be higher or lower if there had not been the Mactaquac Project?

24/

- MUCH HIGHER.....1
- SOMEWHAT HIGHER.....2
- NOT MUCH DIFFERENCE.....[GO TO Q-30a]...3
- SOMEWHAT LOWER.....4
- MUCH LOWER.....5
- [DON'T KNOW].....[GO TO Q-30a]...6

29d. Why do you think so?

25-28/

30a. Do you think the price you are paying for electricity is low or high?

29/

- VERY LOW.....1
- QUITE LOW.....2
- REASONABLE.....3
- QUITE HIGH.....4
- VERY HIGH.....5

30b. Would you say the price you are paying for electricity would have been the same or higher if there had not been the Mactaquac Project?

30/

- THE SAME.....1
- SOMEWHAT HIGHER.....2
- MUCH HIGHER.....3
- [CANNOT TELL/DON'T KNOW].....4

31a. Has the construction of the Mactaquac Project had any effects on land prices in this area over the years?

31/

- YES.....[ASK Q-31b]...1
- NO.....[GO TO Q-32a]...2
- [DON'T KNOW].....[GO TO Q-32a]...3

31b. How has the construction of the Mactaquac Project affected the land prices over the years?

32-35/

32a. Has the Mactaquac Project had any effects on the price of buying a house over the years?

36/

- YES.....[ASK Q-32b]...1
- NO.....[GO TO Q-33a]...2
- [DON'T KNOW].....[GO TO Q-33a]...3

32b. How has the Mactaquac Project affected the price of buying a house over the years?

37-40/

33a. Before the Mactaquac Project was constructed, many young people left the reservoir area for better opportunities elsewhere. Have you seen more or fewer people leave over the past twenty years or so since the Mactaquac Dam was built?

41/

- MUCH MORE SINCE RELOCATION.....1
- SOMEWHAT MORE SINCE RELOCATION.....2
- NOT MUCH DIFFERENCE.....3
- SOMEWHAT FEWER SINCE RELOCATION.....4
- MUCH FEWER SINCE RELOCATION.....5
- [CANNOT TELL/DON'T KNOW].....[GO TO Q-34a]...6

33b. Do you think it would make any difference if the Mactaquac Project had not been built?

42/

- YES.....[ASK Q-33c]...1
- NO.....[GO TO Q-34a]...2
- [CANNOT TELL/DON'T KNOW].....[GO TO Q-34a]...3

33c. Why do you think so?

43-46/

VII. COMPENSATION

34a. Next, we are going to talk about compensation from the Mactaquac Project. First, as I understand, property taken for the Mactaquac Project was paid for at its market value plus a ten per cent "disturbance" bonus. Was your property paid for this way?

47/

- YES.....[GO TO Q-35]...1
- NO.....[ASK Q-34b]...2
- DON'T KNOW.....[GO TO Q-35]...3

34b. How was your property paid for?

48-49/

35. Do you think the compensation you got for your property was very generous, fairly generous, reasonable, not very generous, or not generous at all?

50/

- VERY GENEROUS.....1
- FAIRLY GENEROUS.....2
- REASONABLE.....3
- NOT VERY GENEROUS.....4
- NOT GENEROUS AT ALL.....5

36a. Do you think people were treated fairly, that is, everyone was treated more or less alike, in being compensated?

51/

- VERY FAIRLY.....[GO TO Q-37a]...1
- QUITE FAIRLY.....[GO TO Q-37a]...2
- REASONABLY FAIRLY.....[GO TO Q-37a]...3
- NOT VERY FAIRLY.....[ASK Q-36b]...4
- NOT FAIRLY AT ALL.....[ASK Q-36b]...5

36b. You said that the treatment of people was not fair. Could you give me one or two examples?

52-55/

37a. Was the compensation you got enough for you to buy property as good as what was taken from you?

56/

YES.....[GO TO Q-38]...1
NO.....[ASK Q-37b]...2

37b. How much more money, do you estimate, was needed for you to buy property as good as what was taken from you at that time? Say, 10%, 20%, 30%, 50%, 100% or more?

57-59/

PER CENT _____

38. Could you tell me what other financial losses you had suffered from the relocation that should have been compensated?

60-63/

39. Could you tell me what buildings, including your house, were taken from you for the Mactaquac Project?

NUMBER OF HOUSES: _____ 64/
NUMBER OF BARNs: _____ 65/
NUMBER OF GROCERY STORES: _____ 66/
NUMBER OF RESTAURANTS: _____ 67/
NUMBER OF SERVICE STATIONS: _____ 68/
OTHER (SPECIFY) _____ : _____ 69/
OTHER (SPECIFY) _____ : _____ 70/

(CODING CARD FOUR)

40. Could you tell me how much land was taken from you for the Mactaquac Project?

TOTAL (IN ACRES): _____ 01-03/
 OF WHICH
 ARABLE (IN ACRES): _____ 04-06/
 WOODED (IN ACRES): _____ 07-09/

41a. Can you recall Hydro's first compensation offer to you for property taken for the Mactaquac Project?

YES.....[ASK Q-41b]...1 10/
 NO.....[GO TO Q-41c]...2

41b. What was the first compensation offer?

DOLLARS _____ 11-15/

41c. Can you recall how much compensation in total you finally got for your property?

DOLLARS _____ 16-20/

41d. How much in total do you think your property was worth at the time of taking, if it had been sold in the market?

DOLLARS _____ 21-25/

42a. Did you have any legal dispute with Hydro?

YES.....[ASK Q-42b]...1 26/
 NO.....[GO TO Q-43]...2

42b. Could you tell me something more about the legal dispute?

AMOUNT SUITED FOR (\$): _____ 27-32/
 LEGAL FEE (\$): _____ 33-36/

REMARKS: _____ 37-42/

VIII. NB POWER PERFORMANCE ON RESETTLEMENT

43. In your opinion, how well did Hydro handle the resettlement job? 43/

VERY WELL.....1
 QUITE WELL.....2
 NOT VERY WELL.....3
 NOT WELL AT ALL.....4

44. Generally speaking, how helpful was Hydro to you on your resettlement? 44/

VERY HELPFUL.....1
 QUITE HELPFUL.....2
 NOT VERY HELPFUL.....3
 NOT HELPFUL AT ALL.....4

45a. How friendly were the Hydro officials you met? 45/

VERY FREINDLY.....[GO TO Q-46a]...1
 QUITE FRIENDLY.....[GO TO Q-46a]...2
 NOT VERY FRIENDLY.....[ASK Q-45b]...3
 NOT FRINDLY AT ALL.....[ASK Q-45b]...4

45b. Could you give me an example? 46-49/

46a. There were several public meetings held in early 1965 in the communities of Kingsclear, Mactaquac, Lower Southampton, and Grafton, etc. Did you go to any of those meetings?

50/

YES.....[ASK Q-46b]...1
 NO.....[GO TO Q-46f]...2

46b. Which one? 51/

PLACE OF MEETING: _____
 DATE: _____

46c. Did you ask any questions at the meeting?

52/

- YES.....[ASK Q-46d]...1
- NO.....[GO TO Q-46e]...2

46d. What questions?

53-56/

[GO TO Q-47a]

46e. How helpful was the meeting in informing you about the Mactaquac Project itself and Hydro's relocation policies?

57/

- VERY HELPFUL.....1
- SOMEWHAT HELPFUL.....2
- NOT VERY HELPFUL.....3
- NOT HELPFUL AT ALL.....4

46f. Why you didn't go to the public meeting?

53-56/

47a. Do you think you had enough say in deciding how much compensation you should get for your property?

57/

- REASONABLY MUCH.....[GO TO Q-48a]...1
- NOT VERY MUCH.....[ASK Q-47b]...2
- TOO LITTLE.....[ASK Q-47b]...3
- ALMOST NOTHING.....[ASK Q-47b]...4

47b. In what way do you think you should have had more say?

58-61/

48a. Could you recall how much moving cost you? 62-64/
 DOLLARS _____

48b. How much money did you get from Hydro for covering your moving expenses? 65-67/
 DOLLARS _____

49a. Did you get a contract from Hydro to clear the land you sold for the Mactaquac Lake? 68/
 YES.....[ASK Q-49b]...1
 NO.....[GO TO Q-50]...2

49b. How much did you earn from the clearing contract in total? 69-72/
 DOLLARS _____

50. Were you given enough time to prepare for the move? 73/
 YES.....1
 NO.....2

{CODING CARD FIVE}

51a. Now, I am going to ask you some questions about who were most helpful to you during your relocation. First, tell me: who were most helpful to you during the relocation?

		01-09/
	MENTIONED	NOT MENTIONED
NO ONE HELPED/DEPENDENED ON SELF..	1	2
OLD NEIGHBORS.....	1	2
NEW NEIGHBORS.....	1	2
FRIENDS.....	1	2
RELATIVES.....	1	2
CHURCHES, ASSOCIATIONS, ETC.....	1	2
HYDRO.....	1	2
GOVERNMENT AGENCIES (SPECIFY):		
_____	1	2
OTHER (SPECIFY):		
_____	1	2

51b. [IF HELP IS REPORTED] What help did you get from them during relocation? 10-17/

	YES	NO
LOANS.....	1	2
HELPED BUILDING HOUSE.....	1	2
HELPED BUYING/RENTING HOUSE.....	1	2
TRANSPORTATION.....	1	2
TAKING CARE OF KID(S).....	1	2
FOOD.....	1	2
COUNSELING/COMFORTING.....	1	2
OTHER (SPECIFY):	1	2

52a. Were any schools relocated in your community? 18/

NONE.....[ASK Q-53a]...1
ONE.....[GO TO Q-52b]...2
TWO.....[GO TO Q-52b]...3

52b. Were people in your community satisfied with the relocation of school(s)? 19/

VERY MUCH SATISFIED.....1
SOMEWHAT SATISFIED.....2
NOT VERY SATISFIED.....3
NOT SATISFIED AT ALL.....4

52c. Could you tell me something more about the relocation of the school(s)? 20-23/

53a. Were there any church buildings affected in your community? 24/

NONE.....[ASK Q-54a]...1
ONE.....[GO TO Q-53b]...2
TWO.....[GO TO Q-53b]...3

53b. How satisfied were people with the relocation of the church(es)? 25/

VERY SATISFIED.....1
SOMEWHAT SATISFIED.....2
NOT VERY SATISFIED.....3
NOT SATISFIED AT ALL.....4

53c. Could you tell me something more about the relocation of the church(es)?

26-29/

54a. Were there any cemeteries relocated in the community?

30/

- NONE.....[GO TO Q-55a]...1
- ONE.....[ASK Q-54b]...2
- TWO.....[ASK Q-54b]...3
- OTHER (SPECIFY):.....[ASK Q-54b]...4

54b. How satisfied were people with the relocation of the cemetery(ies)?

31/

- VERY SATISFIED.....1
- SOMEWHAT SATISFIED.....2
- NOT VERY SATISFIED.....3
- NOT SATISFIED AT ALL.....4

54c. Could you tell me something more about the relocation of cemetery(ies)?

32-35/

55a. In your opinion, what aspects of the resettlement job were well handled?

36-39/

55b. In your opinion, what aspects of the resettlement job were badly handled

40-43/

56a. How did you feel when you were first told by Hydro that you had to relocate for the Mactaquac Dam Project? [1. SAD/2. ANGERY/3. DISBELIEF, ETC]

44-47/

56b. Why did you feel like that?

48-51/

56c. How do you feel now?

52-55/

57a. What did you think of Hydro, that is, what was the image of Hydro in your mind, during your relocation?

56-59/

57b. What do you think of Hydro now?

60-63/

IX. ATTITUDE TOWARDS RELOCATION

{CODING CARD SIX}

58a. A lot of people are relocated every year to make way for building dams, reservoirs, highways, urban renewal and so on. Do you think governments have the right to relocate people for development projects, if proper compensation is given?

01/

- YES.....[GO TO Q-59a]...1
- NO.....[ASK Q-58b]...2
- [DON'T KNOW].....[GO TO Q-59a]...3

58b. You said governments do not have the right to ask people to make way for development projects. But there are still many people who are actually relocated every year. What do you think people should do if they do not want to leave?

02-05/

59a. There are at least three ways by which the owner of a property can be compensated. The first way is to use its value sold on the open market. The second way is to use the market value plus some "disturbance" bonus. The third way is to use the so-called "replacement value", i.e., the amount of money needed to buy property of the same quantity and quality. Now, which way do you think is the most acceptable to you?

06/

- MARKET VALUE.....[GO TO Q-60]...1
- MARKET VALUE PLUS BONUS.....[ASK Q-59b]...2
- REPLACEMENT VALUE.....[GO TO Q-59c]...3
- [DON'T KNOW].....[GO TO Q-60]...4

59b. What do you think would have been the appropriate disturbance bonus for the Mactaquac Project, say, 10%, 20%, 30%, 50%, 100% or more above the market value?

07-09/

PER CENT _____

[GO TO Q-60].

59c. You said property taken should be paid for by replacement value. In your opinion, how much on average should the replacement value have been for the Mactaquac Project, say, 10%, 20%, 30%, 50%, 100% or more above the market value?

10-12/

PER CENT _____

X. HOUSING AND POSSESSIONS

60. Next, we are going to talk about your housing conditions. First, how satisfactory do you think your present housing conditions are?

13/

- VERY MUCH SATISFACTORY.....1
- SOMEWHAT SATISFACTORY.....2
- NOT VERY SATISFACTORY.....3
- NOT SATISFACTORY AT ALL.....4

61a. Do you own or rent your present house?

14/

- OWN.....[ASK Q-61b]...1
- RENT.....[ASK Q-61c]...2

61b. Could you tell me how much you think your house is worth if it were to be sold on the market?

15-20/

DOLLARS _____ [GO TO Q-62].

61c. Could you tell me how much you pay for the rent each month?

21-23/

DOLLARS _____

62. How many rooms are there in this house, including kitchen and excluding bathrooms?

24-25/

ROOMS _____

63. [SOME OF THE FOLLOWING CAN BE FILLED IN THROUGH OBSERVATION. IF NOT, ASK] Do you have _____ in this house?

26-36/

	YES	NO
ELECTRICITY.....	1	2
RUNNING WATER.....	1	2
TELEPHONE.....	1	2
MICROWAVE.....	1	2
VCR.....	1	2
TV.....B/W____; COLOR____; NONE____		
HEATING.....GOOD____; POOR____; NO____		
BATHROOMS.....	0 1 2	3 4
CARS.....	0 1 2	3 4
TRUCKS.....	0 1 2	3 4
TRACTORS.....	0 1 2	3 4

64. In comparison with people currently living around you who were not relocated, would you say your present housing conditions are above average, about average, or below average?

37/

WELL ABOVE AVERAGE.....	1
SOMEWHAT ABOVE AVERAGE.....	2
JUST ABOUT AVERAGE.....	3
SOMEWHAT BELOW AVERAGE.....	4
WELL BELOW AVERAGE.....	5
[CANNOT TELL/DON'T KNOW].....	6

65. In comparison with people currently living around you who were also relocated, would you say your present housing conditions are above average, about average, or below average?

38/

WELL ABOVE AVERAGE.....	1
SOMEWHAT ABOVE AVERAGE.....	2
JUST ABOUT AVERAGE.....	3
SOMEWHAT BELOW AVERAGE.....	4
WELL BELOW AVERAGE.....	5
[CANNOT TELL/DON'T KNOW].....	6

66a. Would you say your present housing conditions would have been better or worse if there had not been the Mactaquac Dam Project?

39/

- MUCH BETTER.....1
- SOMEWHAT BETTER.....2
- NO DIFFERENCE.....[GO TO Q-67a]...3
- SOMEWHAT WORSE.....4
- MUCH WORSE.....5
- [CANNOT TELL/DON'T KNOW].....[GO TO Q-67a]...6

66b. Why do you think so?

40-43/

67a. Did you own or rent your former house before relocation?

44/

- OWNED.....[GO TO Q-68]...1
- RENTED.....[ASK Q-67b]...2

67b. How much did you pay for the rent?

45-47/

DOLLARS: _____

68. Could you recall how many rooms you had in your former house before relocation, including kitchen and excluding bathrooms?

48-49/

ROOMS _____

69. [ASK FOR EACH ITEM] Did you have _____ in your former house?

50-58/

	YES	NO		
ELECTRICITY.....	1	2		
RUNNING WATER.....	1	2		
TELEPHONE.....	1	2		
TV.....B/W____; COLOR____; NONE____				
HEATING.....GOOD____; POOR____; NO____				
BATHROOMS.....	0	1	2	3 4
CARS.....	0	1	2	3 4
TRUCKS.....	0	1	2	3 4
TRACTORS.....	0	1	2	3 4

XI. LAND

{CODING CARD SEVEN}

70a. Do you own or rent land now?

01/

YES.....[ASK Q-70b]...1
 NO.....[GO TO Q-71a]...2

70b. How much land in acres do you now own, rent out to others and rent from others?

	OWN	RENT OUT	RENT FR OTHER <small>(9 x 3) 02-28/</small>
a.1. ARABLE LAND _____			
a.2. _____			
a.3. _____			
b.1. WOODED LAND _____			
b.2. _____			
b.3. _____			
c.1. OTHER _____			
c.2. _____			
c.3. _____			

71a. Did you own or rent land before you were relocated?

29/

YES.....[ASK Q-71b]...1
 NO.....[GO TO Q-72]...2

71b. How much land in acres did you own, rent out to others and rent from others before you were relocated?

	OWN	RENT OUT	RENT FR OTHER <small>(9 x 3) 30-56/</small>
a.1. ARABLE LAND _____			
a.2. _____			
a.3. _____			
b.1. WOODED LAND _____			
b.2. _____			
b.3. _____			
c.1. OTHER _____			
c.2. _____			
c.3. _____			

72. [IF OWNED AND STILL OWN LAND] How do you compare the quality of the land you have now with the quality of the land you had when you were relocated?

57/

MUCH BETTER NOW.....	1
SOMEWHAT BETTER NOW.....	2
NOT MUCH DIFFERENCE.....	3
SOMEWHAT WORSE NOW.....	4
MUCH WORSE NOW.....	5

XII. FINANCIAL SITUATION

73. Now I would like to ask about your financial situation at the present time and before you were relocated. First, how satisfactory do you think the present financial situation of your family is?

58/

VERY SATISFACTORY.....	1
FAIRLY SATISFACTORY.....	2
NOT VERY SATISFACTORY.....	3
NOT SATISFACTORY AT ALL.....	4

74. In comparison with people currently living around you who were not relocated, would you say your financial situation today is above average, about average, or below average?

59/

WELL ABOVE AVERAGE.....	1
SOMEWHAT ABOVE AVERAGE.....	2
JUST ABOUT AVERAGE.....	3
SOMEWHAT BELOW AVERAGE.....	4
WELL BELOW AVERAGE.....	5
[CANNOT TELL/DON'T KNOW].....	6

75. In comparison with people currently living around you who were also relocated, would you say your financial situation today is above average, about average, or below average?

60/

WELL ABOVE AVERAGE.....	1
SOMEWHAT ABOVE AVERAGE.....	2
JUST ABOUT AVERAGE.....	3
SOMEWHAT BELOW AVERAGE.....	4
WELL BELOW AVERAGE.....	5
[CANNOT TELL/DON'T KNOW].....	6

76. Would you say your financial situation today would have been better or worse if there had not been the Mactaquac Project?

61/

- MUCH BETTER.....1
- SOMEWHAT BETTER.....2
- NOT MUCH DIFFERENCE.....3
- SOMEWHAT WORSE.....4
- MUCH WORSE.....5
- [CANNOT TELL/DON'T KNOW].....6

XIII. INFORMATION ABOUT RESPONDENT AND FAMILY

77. The respondent is:

62/

- MALE.....1
- FEMALE.....2

78. Could you tell me your age please?

63-64/

YEARS OLD _____

79. What is the highest grade or year you completed in school?

65-66/

- | | | | | | | | | | |
|--------------|---|---|---|---|----|---|---|---|---|
| GRADE SCHOOL | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| HIGH SCHOOL | 1 | 2 | 3 | 4 | | | | | |
| COLLEGE | 1 | 2 | 3 | 4 | 5+ | | | | |

80. Apart from being Canadian, to what ethnic or cultural group do you consider yourself to belong?

67-68/

- ACADIAN.....01
- BRITISH.....02
- DUTCH.....03
- FRENCH.....04
- GERMAN.....05
- IRISH.....06

ITALIAN.....	07
JEWISH.....	08
NATIVE INDIAN.....	09
RUSSIAN.....	10
SCANDINAVIAN.....	11
UKRAINIAN.....	12
"JUST CANADIAN".....	13
OTHER (SPECIFY): _____.....	14

81a. What is your religious preference?

69-70/

NONE.....	[GO TO Q-82a]...01
ANGLICAN.....	02
BAHAI'.....	03
BAPTIST.....	04
GREEK ORTHODOX.....	05
JEWISH.....	06
LUTHERAN.....	07
MENNONITE.....	08
PENTECOSTAL.....	09
PRESBYTERIAN.....	10
ROMAN CATHOLIC.....	11
SALVATION ARMY.....	12
UKRAINIAN CATHOLIC.....	13
UNITED CHURCH.....	14
OTHER (SPECIFY) _____.....	15

81b. How often do you go to church now?

71/

ONCE OR TWICE A WEEK.....	1
ONCE EVERY TWO WEEKS.....	2
ONCE EVERY MONTH.....	3
ONCE EVERY TWO OR THREE MONTHS.....	4
ONCE A YEAR.....	5
ALMOST NONE.....	6

82a. Have you yourself have had any serious health problems over the years that you think might be related to the relocation?

72/

YES.....	[ASK Q-82b]...1
NO.....	[GO TO Q-83]...2

{CODING CARD EIGHT}

82b. Could you tell me some details?

[(2+1+1) x 6] 01-24/

YEAR	PROBLEM	OUTCOME
a.1. _____		
a.2. _____	_____	
a.3. _____		_____
b.1. _____		
b.2. _____	_____	
b.3. _____		_____
c.1. _____		
c.2. _____	_____	
c.3. _____		_____
d.1. _____		
d.2. _____	_____	
d.3. _____		_____
e.1. _____		
e.2. _____	_____	
e.3. _____		_____
f.1. _____		
f.2. _____	_____	
f.3. _____		_____

83. Are you currently married, separated, divorced, widowed or never married?

25/

PRESENTLY MARRIED AND

LIVING WITH SPOUSE.....[ASK Q-84a]...1
 WIDOWED.....[ASK Q-84a]...2
 SEPARATED.....[ASK Q-84a]...3
 DIVORCED.....[ASK Q-84a]...4
 NEVER MARRIED.....[GO TO Q-85]...5

84a. Were you married, separated, divorced, widowed, or single when you were relocated?

26/

MARRIED & LIVING WITH SPOUSE.....[ASK Q-84b]..1
 WIDOWED.....[GO TO Q-85]..2
 SEPARATED.....[GO TO Q-85]..3
 DIVORCED.....[GO TO Q-85]..4
 SINGLE.....[GO TO Q-85]..5

84b. DOES/DID your _____ [WIFE/HUSBAND] have any health problems that you think might be related to the relocation?

27 /

YES.....[ASK Q-84c]...1
 NO.....[GO TO Q-85]...2

84c. Could you tell me some details?

[(2+1+1) x 6] 28-51/

YEAR	PROBLEM	OUTCOME
a.1. _____		
a.2. _____	_____	
a.3. _____		_____
b.1. _____		
b.2. _____	_____	
b.3. _____		_____
c.1. _____		
c.2. _____	_____	
c.3. _____		_____
d.1. _____		
d.2. _____	_____	
d.3. _____		_____
e.1. _____		
e.2. _____	_____	
e.3. _____		_____
f.1. _____		
f.2. _____	_____	
f.3. _____		_____

85. How many people were there in your family, including yourself, before you were relocated?

52-53/

PERSONS _____

86. How many people, including yourself, are there in your family now?

54-55/

PERSONS _____

87a. One thing that people tend to think about when they move is the effect on the children. I would like to ask you a few question about your children. First, how many children do you have?

56-57/

NONE.....[GO TO Q-88a]...00
 NUMBER OF CHILDREN: _____[ASK Q-87b]

87b. Could you tell me something more about them?

(SEPARATE CARD)

xx-xx/

	M/F	AGE AT RELOC.	RESIDENCE AT RELOC.	CURRENT RESIDENCE
a.1.	_____			
a.2.	_____			
a.3.	_____		_____	
a.4.	_____			_____
b.1.	_____			
b.2.	_____			
b.3.	_____		_____	
b.4.	_____			_____
c.1.	_____			
c.2.	_____			
c.3.	_____		_____	
c.4.	_____			_____
d.1.	_____			
d.2.	_____			
d.3.	_____		_____	
d.4.	_____			_____
e.1.	_____			
e.2.	_____			
e.3.	_____		_____	
e.4.	_____			_____
f.1.	_____			
f.2.	_____			
f.3.	_____		_____	
f.4.	_____			_____
g.1.	_____			
g.2.	_____			
g.3.	_____		_____	
g.4.	_____			_____
h.2.	_____			
h.3.	_____		_____	
h.4.	_____			_____
i.1.	_____			
i.2.	_____			
i.3.	_____		_____	
i.4.	_____			_____
j.1.	_____			
j.2.	_____			
j.3.	_____		_____	
j.4.	_____			_____

[CODING CARD NINE]

87c. Do you think the move affected your children in any way?

01/

- YES.....[ASK Q-87d]...1
- NO.....[GO TO Q-88a]...2

87d. In what way?

02-05/

88a. What is your major occupation now?

06-07/

- CROP/DAIRY FARMER.....[ASK Q-88b]...01
- SAWMILL OWNER.....[ASK Q-88b]...02
- LUMBERMAN[ASK Q-88b]...03
- FISHERMAN.....[ASK Q-88b]...04
- CRAFTSMAN.....[ASK Q-88b]...05
- CARPENTER.....[ASK Q-88b]...06
- RESTAURANT OWNER.....[ASK Q-88b]...07
- GROCERY STORE OWNER[ASK Q-88b]...08
- SERVICE STATION/GARAGE.....[ASK Q-88b]...09
- BLDG CONSTRUCT'N & REPAIR.....[ASK Q-88b]...10
- WAGE EARNER IN THE RURAL AREA (SPECIFY):
 _____[ASK Q-88b]...11
- WAGE EARNER IN TOWN (SPECIFY):
 _____[ASK Q-88b]...12
- HOUSEWIFE.....[GO TO Q-89]...13
- RETIRED.....[GO TO Q-88c]...14
- OUT OF JOB/UNEMPLOYED[GO TO Q-88c]...15
- OTHER (SPECIFY):
 _____[ASK Q-88b]...16

88b. What else do you do in addition to _____[MAJOR OCCUPATION]?

08-09/

- CROP/DAIRY FARMER.....01
- SAWMILL OWNER.....02
- LUMBERMAN.....03

FISHERMAN.....04
 CRAFTSMAN.....05
 CARPENTER.....06
 RESTAURANT OWNER.....07
 GROCERY STORE OWNER.....08
 SERVICE STATION/GARAGE.....09
 BLDG CONSTRUCT'N & REPAIR.....10
 WAGE EARNER IN THE RURAL AREA (SPECIFY):
 _____.....11
 WAGE EARNER IN TOWN (SPECIFY):
 _____.....12
 NONE.....13
 OTHER (SPECIFY):
 _____.....14

[GO TO Q-89].

88c. What was the last job you held before you were _____ [OUT OF JOB/ RETIRED]?
 10-11/

CROP/DAIRY FARMER.....01
 SAWMILL OWNER.....02
 LUMBERMAN.....03
 FISHERMAN.....04
 CRAFTSMAN.....05
 CARPENTER.....06
 RESTAURANT OWNER.....07
 GROCERY STORE OWNER.....08
 SERVICE STATION/GARAGE.....09
 BLDG CONSTRUCT'N & REPAIR10
 WAGE EARNER IN THE RURAL AREA (SPECIFY):
 _____.....11
 WAGE EARNER IN TOWN (SPECIFY):
 _____.....12
 OTHER (SPECIFY):
 _____.....13

89. Could you tell me three most important sources of income of your family now?
 (3 x 2) 12-17/

SALE OF FARM PRODUCTS [CROPS, LIVESTOCK &
 PRODUCTS, POULTRY AND PRODUCTS, ETC.].....01
 SALE OF FORESTRY PRODUCTS.....02
 WAGES.....03
 BUSINESS.....04
 RENT FROM LAND.....05
 RENT FROM BUILDINGS.....06
 MINERAL RIGHTS OR ROYALTIES.....07

BANK INTEREST OR DIVIDENDS.....	08
VETERANS PAYMENTS.....	09
RETIREMENT DISABILITY OR PENSIONS.....	10
UNEMPLOYMENT INSURANCE.....	11
OTHER (SPECIFY): _____	12

90. Could you tell me the total income of your family in 1989, before paying taxes?

18-19/

0-\$1,999.....	01
\$2,000- \$3,999.....	02
\$4,000- \$5,999.....	03
\$6,000- \$7,999.....	04
\$8,000- \$9,999.....	05
\$10,000- \$11,999.....	06
\$12,000- \$13,999.....	07
\$14,000- \$15,999.....	08
\$16,000- \$17,999.....	09
\$18,000- \$19,999.....	10
\$20,000- \$24,999.....	11
\$25,000- \$29,999.....	12
\$30,000- \$34,999.....	13
\$35,000- \$39,999.....	14
\$40,000- \$44,999.....	15
\$45,000- \$49,999.....	16
\$50,000 AND OVER.....	17

91. Could you tell me three most important sources of income of your family before you were relocated?

(3 x 2) 20-25/

SALE OF FARM PRODUCTS [CROPS, LIVESTOCK & PRODUCTS, POULTRY AND PRODUCTS, ETC.].....	01
SALE OF FORESTRY PRODUCTS.....	02
WAGES.....	03
BUSINESS.....	04
RENT FROM LAND.....	05
RENT FROM BUILDINGS.....	06
MINERAL RIGHTS OR ROYALTIES.....	07
BANK INTEREST OR DIVIDENDS.....	08
VETERANS PAYMENTS.....	09
RETIREMENT DISABILITY OR PENSIONS.....	10
UNEMPLOYMENT INSURANCE.....	11
OTHER (SPECIFY): _____	12

92. Can you estimate your family's total income on an average year before you were relocated, before paying taxes?

26-27/

0-\$1,999.....	01
\$2,000- \$3,999.....	02
\$4,000- \$5,999.....	03
\$6,000- \$7,999.....	04
\$8,000- \$9,999.....	05
\$10,000- \$11,999.....	06
\$12,000- \$13,999.....	07
\$14,000- \$15,999.....	08
\$16,000- \$17,999.....	09
\$18,000- \$19,999.....	10
\$20,000- \$24,999.....	11
\$25,000- \$29,999.....	12
\$30,000- \$34,999.....	13
\$35,000- \$39,999.....	14
\$40,000- \$44,999.....	15
\$45,000- \$49,999.....	16
\$50,000 AND OVER.....	17

93a. Has there been a time, since the relocation, when you used more alcohol than you would like?

28/

YES.....[ASK Q-93b]...1
 NO.....[GO TO Q-94]...2

93b. Could you tell me something more about it?

29-32/

94a. Have you received social assistance of any form, including unemployment insurance, over the years since you were relocated?

33/

YES.....[ASK Q-94b]...1
 NO.....[GO TO Q-95a]...2

94b. Could you give me some details?

34-43/

95a. Did you receive social assistance of any form, including unemployment insurance, before you were relocated?

44/

YES.....[ASK Q-95b]...1
NO.....[GO TO Q-96]...2

95b. Could you give me some details?

45-54/

96. We are finished with the interview now. Is there anything more you would like to tell me?

55-60/

(1) YES. [SUMMARIZE RESPONDENT'S REMARKS BELOW. USE BACK PAGE IS NECESSARY. SAY "THANK YOU" WHEN INTERVIEW ENDS].
(2) NO. [SAY "THANK YOU" AND INTERVIEW ENDS].

[END OF QUESTIONNAIRE]

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