

R. Hopturn
NTB
Richard S.



INTERDISCIPLINARY STUDY
OF
TELECOMMUNICATIONS

"THE APPLICATION OF DYNAMIC MODELLING TO THE STUDY OF
TELECOMMUNICATIONS DEVELOPMENT IN CANADA"

2nd Annual Report
1973 - 74

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John C. Beal,
Coordinator.

Co-Investigators:

J.C. Beal (Electrical Engineering), J.W. Berry (Psychology),
F. Cooke (Biology), G.E. Dawson (Electrical Engineering),
C.E.S. Franks (Political Studies), K.A. Herman (Sociology),
J.G.M. McKirdy (Business), P.J. McLane (Electrical Engineer-
ing), L.E. Peppard (Electrical Engineering),
Queen's University, Kingston, Ontario, Canada.

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John C. Beal
Coordonateur

Chercheurs:

J.C. Beal (Electrical Engineering), J.W. Berry (Psychology),
F. Cooke (Biology), G.E. Dawson (Electrical Engineering),
C.E.S. Franks (Political Studies), K.A. Herman (Sociology),
J.G.M. McKirdy (Business), P.J. McLane (Electrical Engineering),
L.E. Peppard (Electrical Engineering),
Queen's University, Kingston, Ontario, Canada.

SOMMAIRE

Ce deuxième rapport annuel rend compte des travaux effectués pendant la période du 1 octobre 1973 au 31 mars 1974 sur le contrat numéro OSP3-0129 conclu entre l'Université Queen's et D.S.S./Communications Canada. Il s'agit de la conclusion de la deuxième année d'une enquête menée par une équipe où sont représentées six disciplines, ayant pour but l'étude du modelage dynamique en tant que moyen d'évaluer l'impact des télécommunications sur une région ou une communauté.

Les sections principales de ce rapport sont les suivantes:

- (i) Inclusion du tourisme dans le modèle régional préalablement développé du nord-ouest de l'Ontario.
- (ii) Rapport sur l'étude sociologique effectuée en 1973 dans Aroland et la Réserve de Longlake 58.
- (iii) Idées préliminaires sur la structure du modèle communautaire, et plans d'études pratiques pour 1974.
- (iv) Premiers commentaires sur l'inclusion des aspects biologiques de l'étude des communautés.

L'état actuel de développement du modèle régional devrait permettre de tester dans les mois à venir ses propriétés de simulation. Les modèles de communautés individuelles nécessitent encore des travaux importants, mais devraient pouvoir se prêter à l'expérimentation au cours de 1974-75.

SUMMARY

This 2nd Annual Report concentrates on the work done during the period 1 October 1973 - 31 March 1974 on Contract Number OSP3-0129 between Queen's University and D.S.S./Communications Canada. This represents the conclusion of the second year of a continuing investigation by a multi-disciplinary team from six disciplines, aimed at a study of dynamic modelling as a means of evaluating the impact of telecommunications on a region or community.

This report contains the following main sections:

- (i) inclusion of tourism in the previously developed regional model of northwest Ontario,
- (ii) report on sociological field work in Aroland and Longlake 58 Reserve in 1973,
- (iii) initial ideas on community model structure and plans for field work in 1974,
- (iv) initial comments on the inclusion of biological aspects of community studies.

The regional model has been developed to the point where substantial testing of its simulation properties should become possible in the months ahead. The models of individual communities require much further work, but should become available for testing during 1974-75.

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1. INTRODUCTION

1.1 Background

This report is the fourth in a series covering the work done since July 1972, by a multidisciplinary team under the sponsorship of Communications Canada, with an object defined as:

"To develop detailed dynamic models for use as means of evaluating the impact of telecommunications on developing areas in Canada."

This particular report summarizes the work of the last six months of the second contractual year (1973-74). As the 2nd Progress Report, dated 1 November 1973, described in detail the work of the first six months of 1973-74, there is no need for repetition of that material here.

1.2 Contents of this Report

As can be seen, this report indicates the beginning of a shift in emphasis away from the regional model of northwest Ontario towards the investigation of possible dynamic models of particular communities within that region.

The almost complete regional model, with tourism now included, is reviewed in full in Section 2. As noted in that section, the only major component remaining to be introduced into the regional model is that of a simplified submodel of forestry as a renewable resource; the previously developed forestry model (see Q.12 in Appendix A.2) is being adapted for this purpose.

Section 3 includes some initial ideas on community models, together with a report on the sociological field work carried out in Aroland and Longlake 58 Reserve in 1973 (available separately as report Q.16). Also included is some preparatory work for further field studies in Sioux Lookout, and a possible more remote community, in 1974. These three (possibly four) communities should form an adequate basis for the subsequent investigation of dynamic models during 1974-75, for which a further contract with Communications Canada has now been approved.

Section 4 presents a new viewpoint in this study: that of the relationship between a community and its biological environment, with an indication of the possible association with telecommunications facilities.

1.3 Other Aspects of this Study

As is reflected in Section 4 and partly in Section 3,

we have been able to add a further co-investigator, together with a research assistant, with an active interest in the biological aspects of the study. This had been encouraged by Communications Canada in the development of our proposal for further work in 1974-75.

No section explicitly on economics exists in this report as the recent work in this area has been on the tourism sector of the regional model and this is adequately summarized in Section 2. A detailed report on this subject will shortly be available as a separate paper (see Q.19 in Appendix 2).

Recent work on the psychological aspects of this study is included within Section 3; the field work of 1973 was fully covered in the previously issued 2nd Progress Report and will also be available in more detail as a separate paper (see Q.17 in Appendix 2).

During the earlier stages of the work it had become clear that incorporation of the political system directly within these models was not a useful approach. Decisions on policy are thus to be left as exogenous to the models, with the role of policy-maker being taken by a subsequent user of the model. He can change at will the various parameters of the models and observe the resulting computing simulations of the region or community. To further this end a major effort in 1974-75 will go towards running these simulations on a small local computer with a direct, real-time, interactive facility, and with the output of the models displayed almost instantaneously on a TV screen. Only at this later time will a commentary on the models as tools for decision-makers become useful.

1.4 General Comments

This project is being conducted in a Canadian university in which the normal university workload lightens dramatically during the summer months when there is little or no undergraduate teaching. It follows that research work tends also to follow this cycle, in a complementary sense, with most work being done during the months of May to September. An additional cyclic aspect to the work occurs because of the employment of students (both undergraduate and graduate) and research assistants whose normal period of involvement is likely to be one year. The disadvantages of these frequent changes in personnel are more than compensated by the adaptability of the people involved and by the general flexibility of approach that these changes encourage.

It is anticipated that the third year's work during 1974-75 will essentially complete this initial study of the use of dynamic models for the evaluation of telecommunications

impact on a region or community. Such completion should not be the end of the story, however. What is important, if the limitations and advantages of such models are ever to be fully understood, is that they be used and their performance discussed in depth and in comparison with other planning techniques and impact study methods. Such use should not necessarily be limited to this one particular region of northwest Ontario, but could be advantageously extended in later projects to other types of regions, such as the far north.

It has already become apparent that the model itself has acted as a very useful central focus for the attentions of the multidisciplinary members of the study team. Any impact study should certainly be multidisciplinary. In this study, while not everyone in the team becomes a skilled modeller, they do have a clearly defined common goal. Thus the models appear to have the useful additional advantage of actually encouraging cooperation between traditionally separate disciplines.

2. STATUS OF THE REGIONAL MODEL

2.1 Introduction

Since the last report on the state of the regional model for north-west Ontario (see 2nd Progress Report of 1 November, 1973, Section 2), effort has been directed to the following activities:

- (1) Following the six month period covered by the 2nd Progress Report, there has been a complete change-over of research assistant personnel involved in the modelling task. This is to be expected in any project supported on a yearly basis when salaries cannot be guaranteed for more than one year at a time. Thus, considerable time and effort have been spent in introducing new assistants to the concepts of dynamic modelling, as well as to the operation and structure of the regional model itself. These assistants begin full-time work as of 1 May, 1974.
- (2) A tourism sector has been added to the regional model which includes investment in tourism, development of tourist facilities, as well as environmental quality (level of pollution which could reduce tourism potential). The structure for this sector is described in this Section.
- (3) Additional computer simulation runs have been made to investigate the effect of the addition of the tourism submodel on the overall model behaviour. These will also be discussed in this Section.

It should be noted that the activity outlined in (1) above, as well as the additional responsibilities of both staff and students during the academic term, have resulted in somewhat less progress being made than in the previous six month period. This is to be expected in any research activity carried out in the University environment.

2.2 The Tourism Submodel

In the computer simulation runs described in the 2nd Progress Report, the economic base for the region was assumed to be nonrenewable resource production. Simulation runs indicated a peak in proven resources occurring within 50 years time (depending on the quantity and quality of minerals yet to be discovered) after which a decline in economic activity could be seen. Clearly, there are other sources for economic activity and growth in the region, such as timber production and tourism. A submodel describ-

ing timber production has been studied and is reported in Report Q.12 ("Dynamic Model of a Forest Tract"). It is planned that a simplified version of this submodel be added to the regional model in the near future.

It appeared that development of a tourist industry might be quite dependent on telecommunications development; hence effort was concentrated on developing a tourism submodel which is now part of the regional model.

The structure for the tourism submodel is shown in Figure 2.1. There are three levels of interest: pollution (POL), tourist activity (T) and capital investment in tourism (CIT). The following units of measurement are used:

POL - pollution units (one pollution unit corresponds to the current rate of resource production). Pollution is taken as an aggregate of air and water contamination as well as other environmental degradation which would affect tourist activity (reduction in wildlife, etc.).

T - Tourist person-days per year within the region.

CIT - dollars (1971) invested in tourist facilities.

Pollution is "absorbed" by the environment at a per-unit rate equal to POLAR which represents the capability of the environment to withstand a certain amount of pollution without exhibiting any long term degradation (at least from a tourist's point of view). New pollution is created at a rate R500I which is modified by the resource production rate D2. The initial (1971) net pollution rate is the difference between R500I and POLAR.

The rate of increase in tourist activity, R350 is initially equal to R350I and modified by the level of pollution, the number of tourist facilities (parks, roads, recreation developments, hotels, etc.), the disposable income of North Americans and the total telephone density (representing communications facilities).

Tourist facilities (measured by the dollar-value of tourist facilities plus roads) are a direct function of capital investment in tourism, CIT, and the road network, RN. Tourist revenue to residents of the area, TR, depends both on the tourist activity and the facilities available. This means that the existence of desirable facilities results in an improved revenue for the same number of tourists in the area. Tourist revenue contributes to the overall regional income RI at a proportion given by F357.

Depreciation of capital in facilities (and hence in the facilities themselves) is given by CITDR. Capital is

FIGURE 2.1

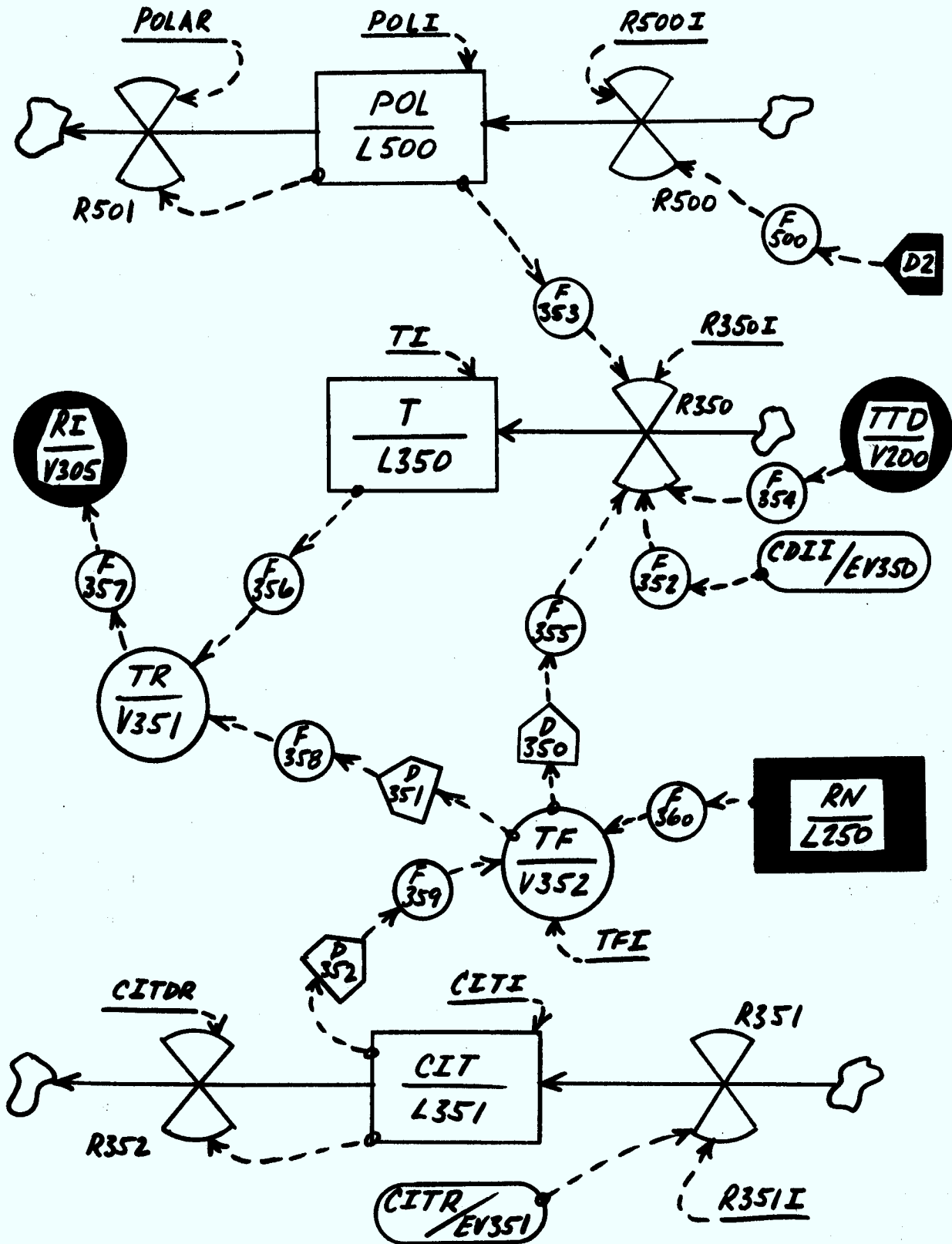
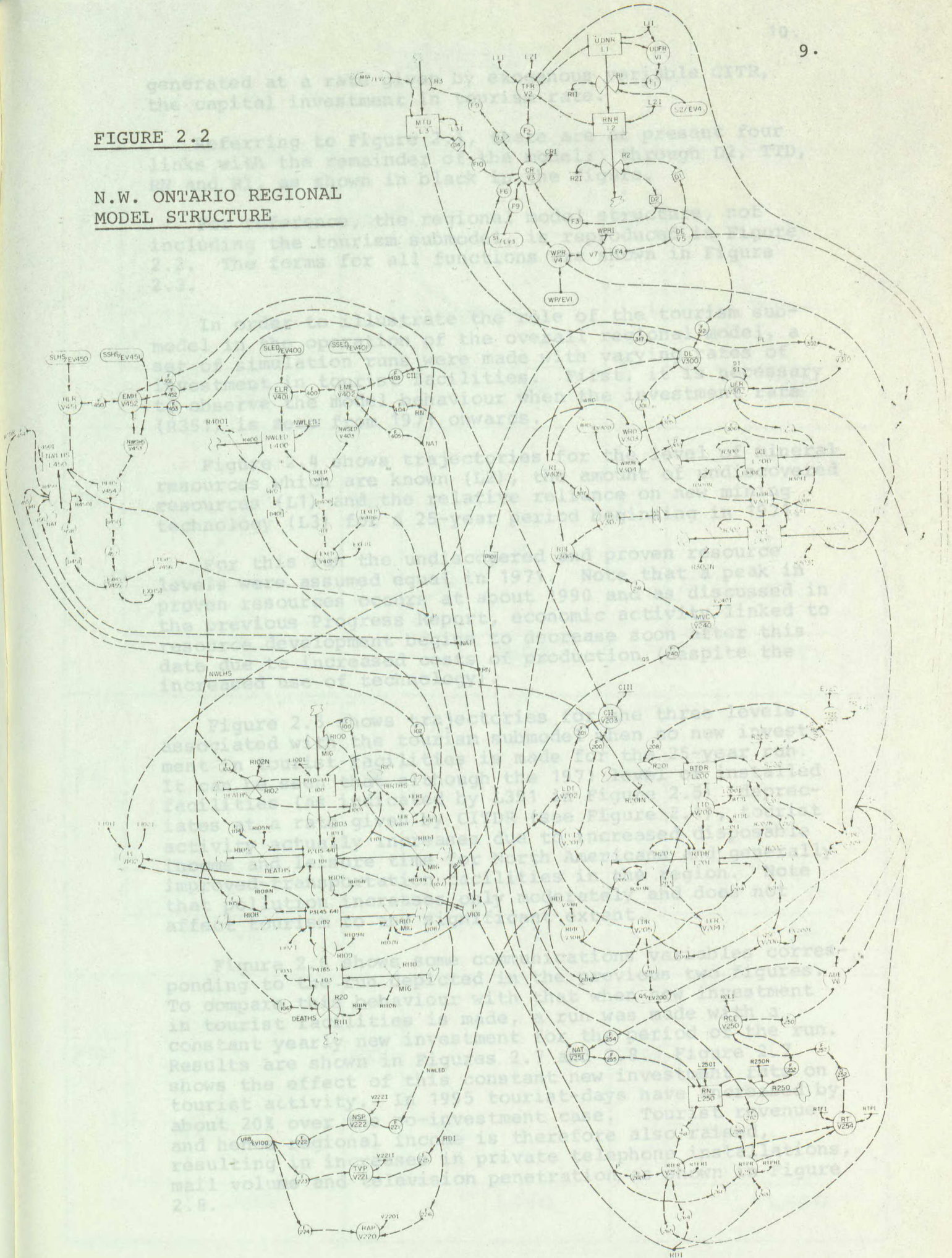


FIGURE 2.2

N.W. ONTARIO REGIONAL MODEL STRUCTURE



generated at a rate given by exogenous variable CITR, the capital investment in tourism rate.

Referring to Figure 2.1, there are at present four links with the remainder of the model: through D2, TTD, RN and RI, as shown in black in the figure.

For reference, the regional model structure, not including the tourism submodel, is reproduced in Figure 2.2. The forms for all functions are shown in Figure 2.3.

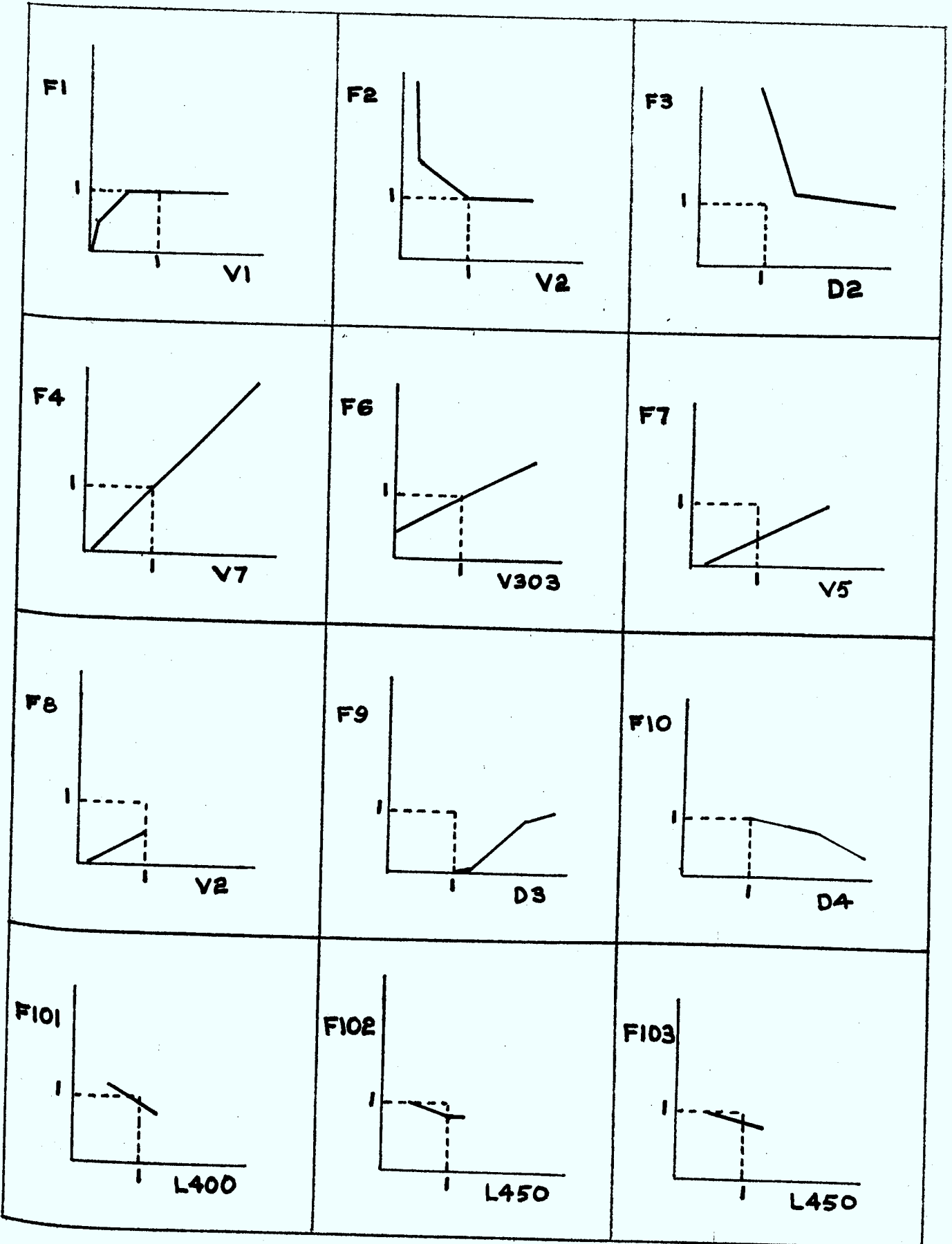
In order to illustrate the role of the tourism submodel in the operation of the overall regional model, a set of simulation runs were made with varying rates of investment in tourist facilities. First, it is necessary to observe the model behaviour when the investment rate (R351) is zero from 1971 onwards.

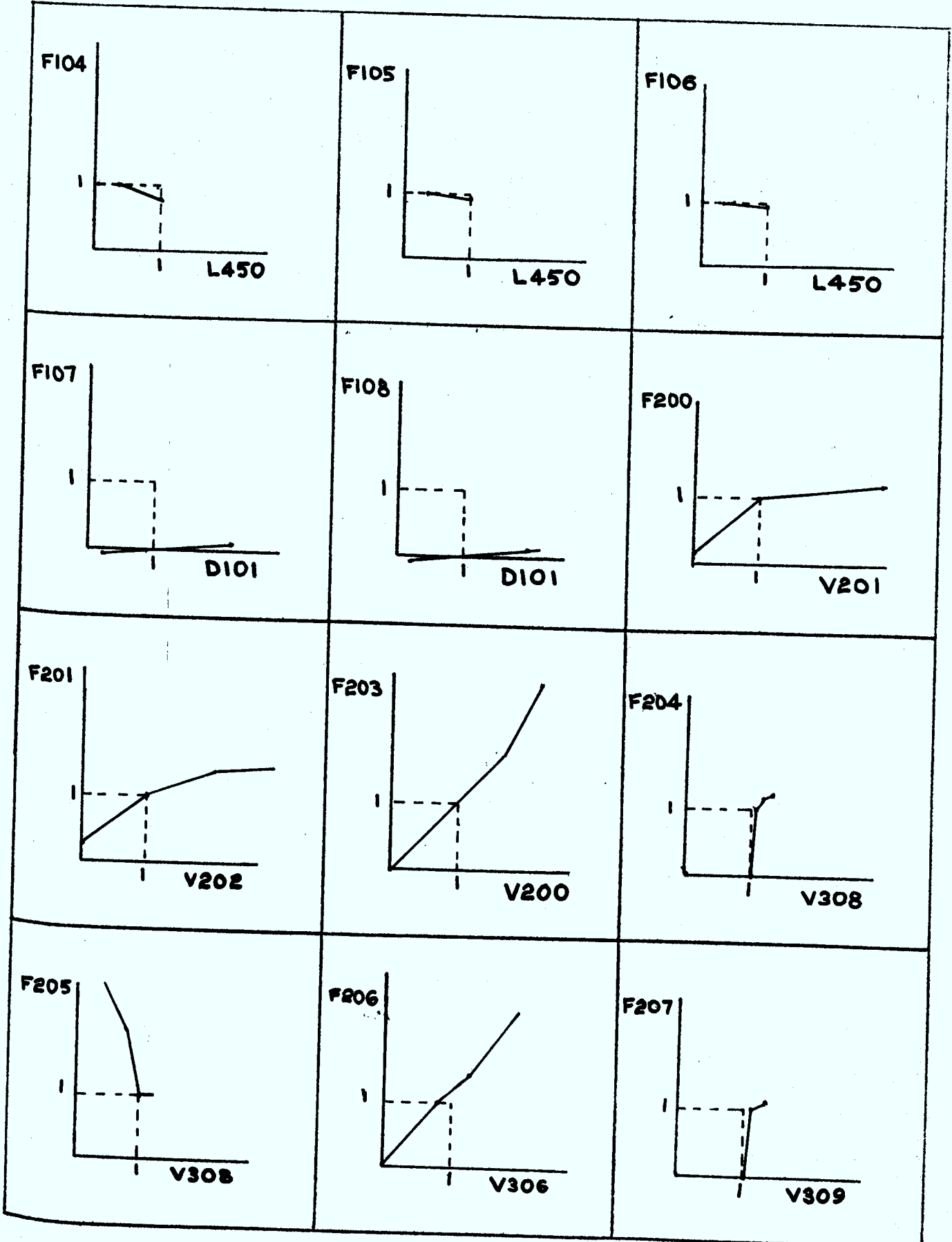
Figure 2.4 shows trajectories for the level of mineral resources which are known (L2), the amount of undiscovered resources (L1) and the relative reliance on new mining technology (L3) for a 25-year period beginning in 1971.

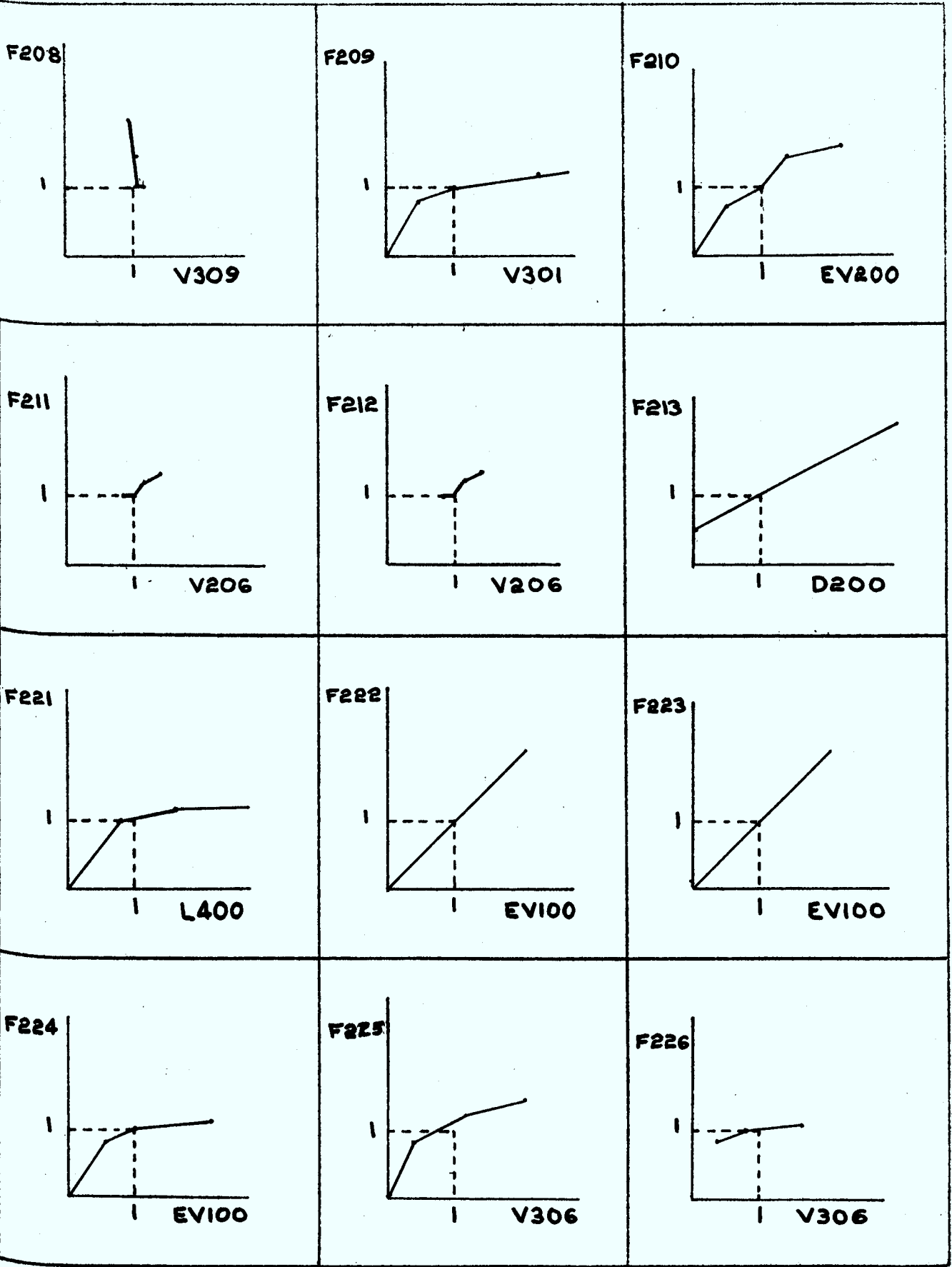
For this run the undiscovered and proven resource levels were assumed equal in 1971. Note that a peak in proven resources occurs at about 1990 and as discussed in the previous Progress Report, economic activity linked to resource development begins to decrease soon after this date due to increased costs of production (despite the increased use of technology).

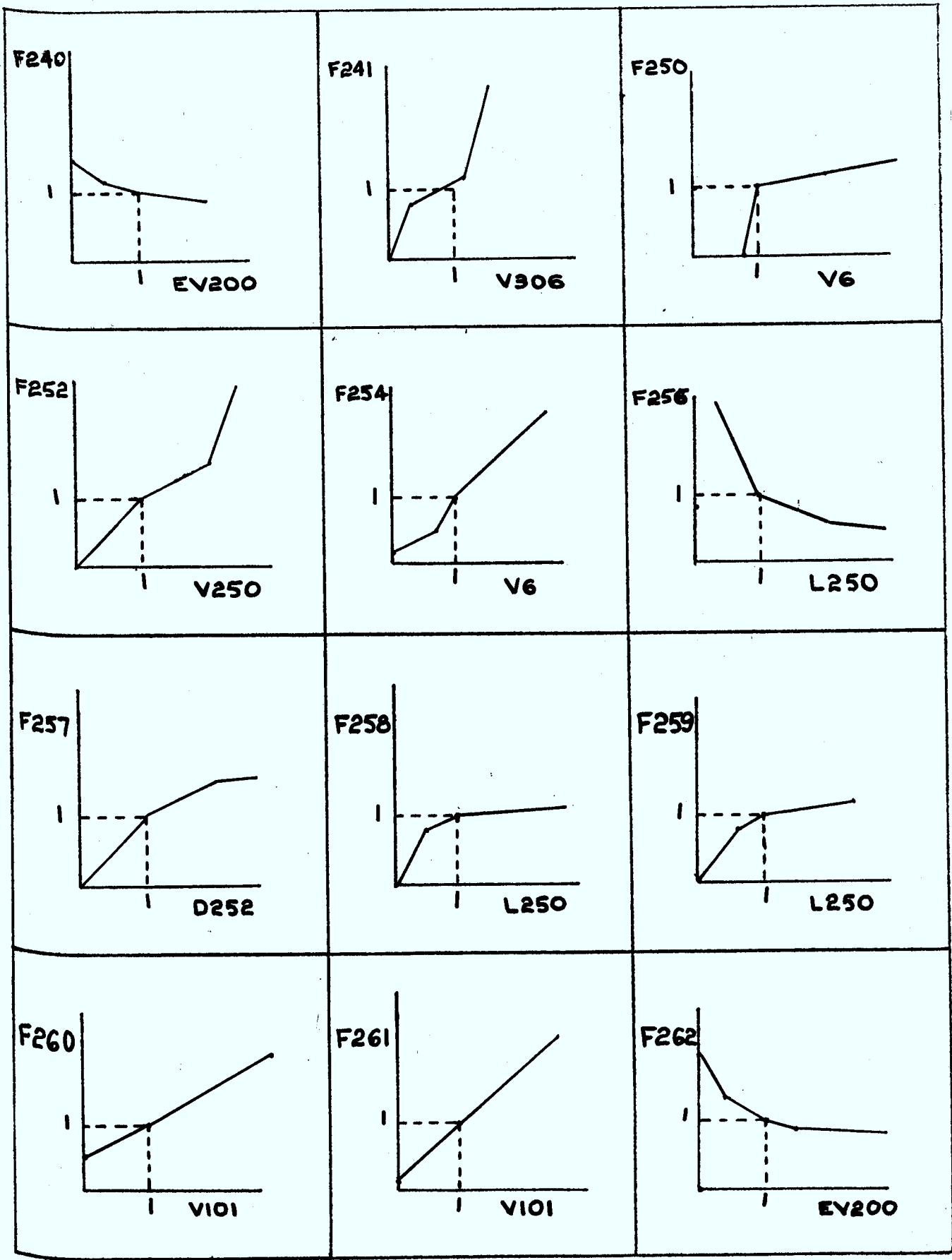
Figure 2.5 shows trajectories for the three levels associated with the tourism submodel when no new investment in tourist facilities is made for the 25-year run. It can be seen that although the 1971 level of installed facilities (as indicated by L351 in Figure 2.5) depreciates at a rate given by CITDR (see Figure 2.1), tourist activity actually increases due to increased disposable income and leisure time for North Americans and generally improved transportation facilities in the region. Note that pollution increases only moderately and does not affect tourism to any significant extent.

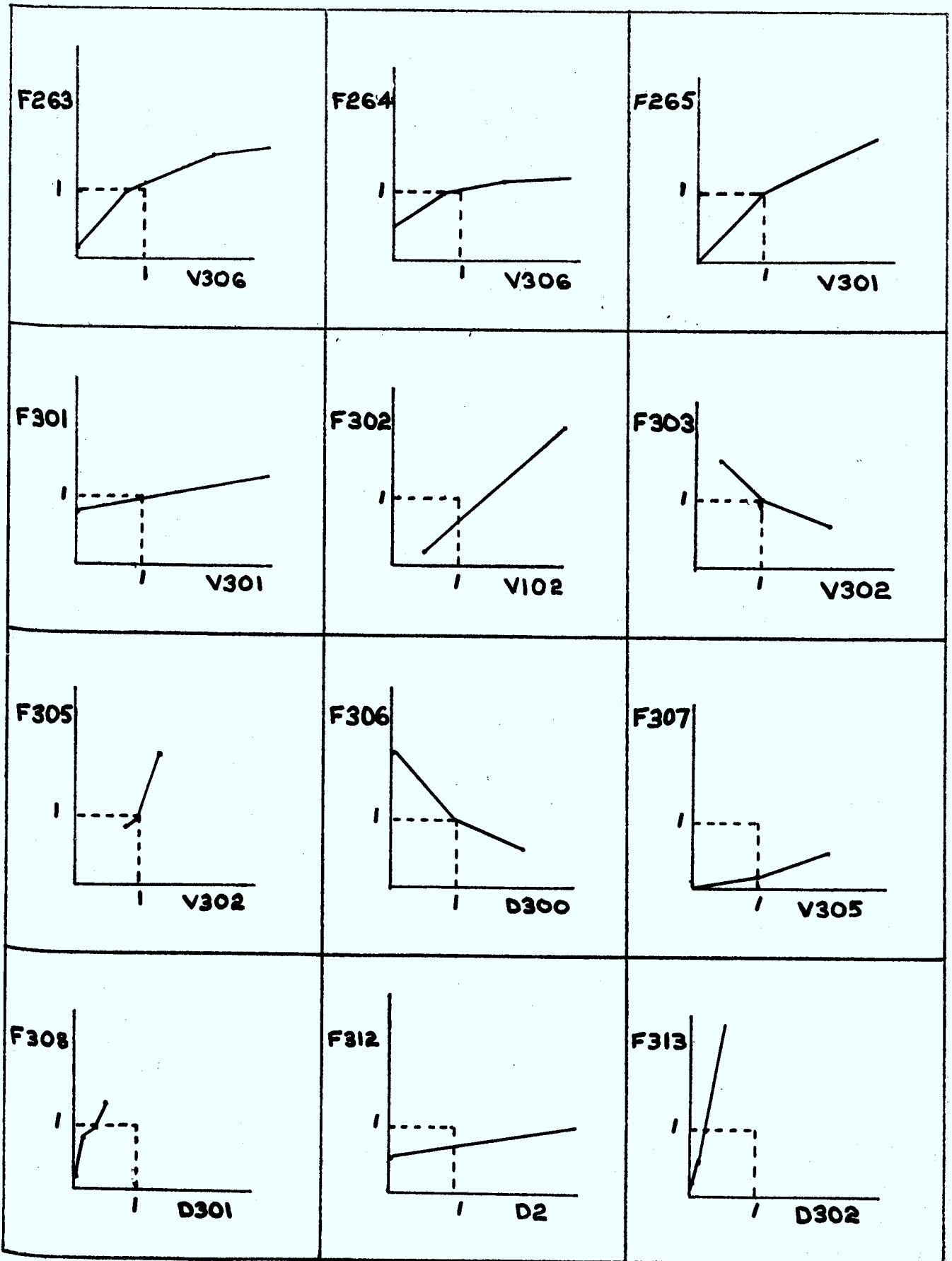
Figure 2.6 shows some communications variables corresponding to the run depicted in the previous two figures. To compare this behaviour with that when new investment in tourist facilities is made, a run was made with a constant yearly new investment for the period of the run. Results are shown in Figures 2.7 and 2.8. Figure 2.7 shows the effect of this constant new investment rate on tourist activity. In 1995 tourist-days have increased by about 20% over the no-investment case. Tourist revenue and hence regional income is therefore also raised, resulting in increases in private telephone installations, mail volume and television penetration, as shown in Figure 2.8.

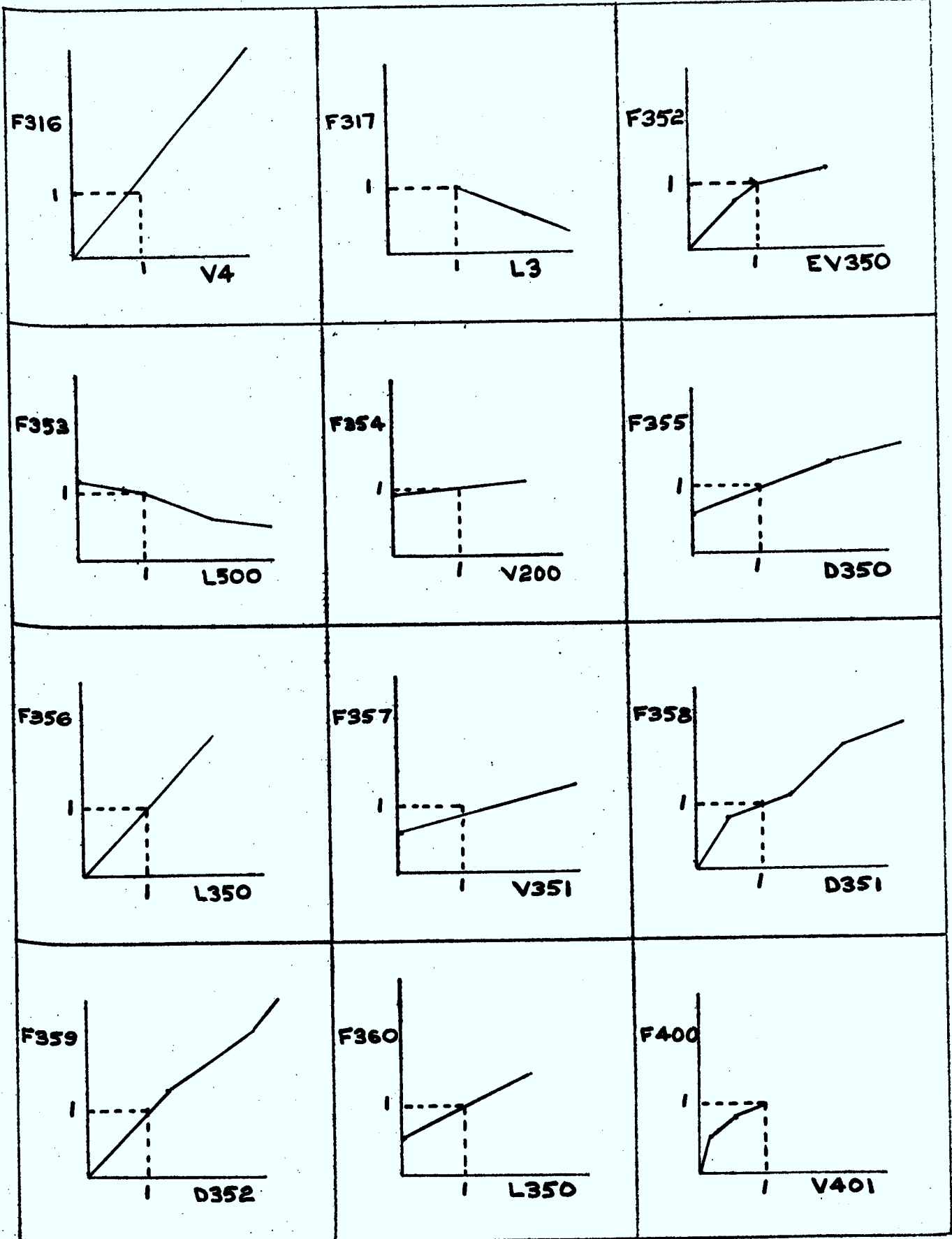


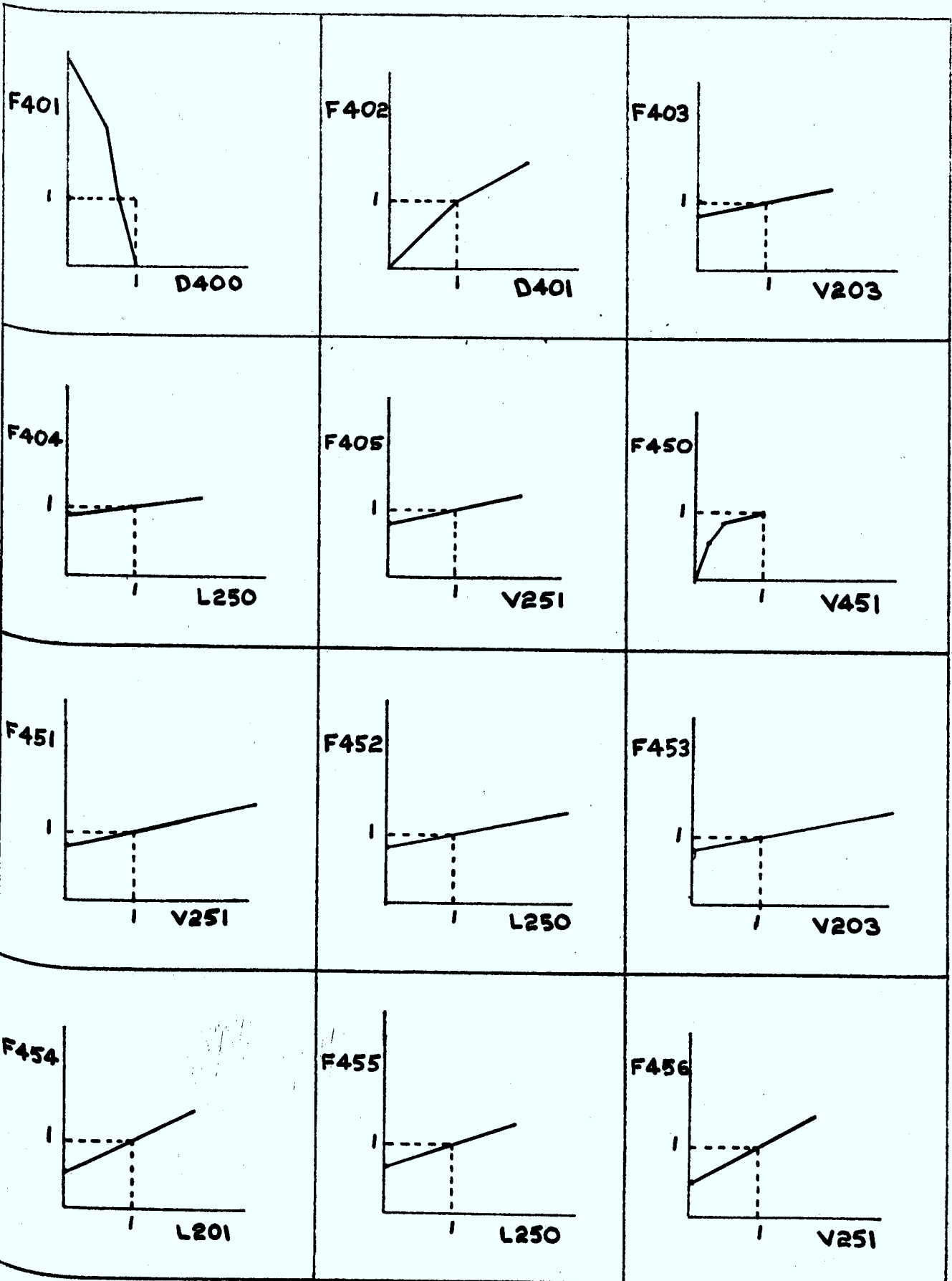


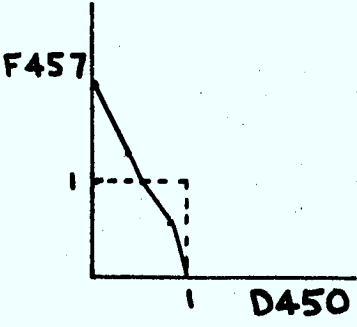
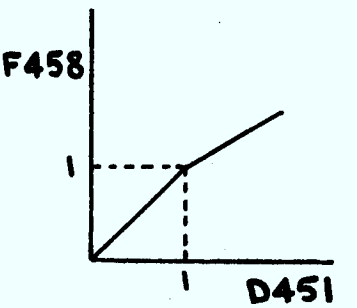
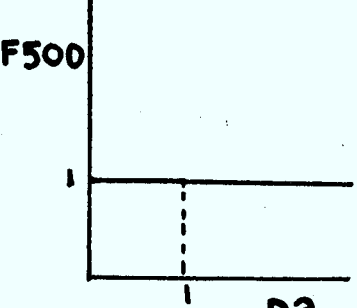










	 <p>A graph showing a downward-sloping curve. The vertical axis is labeled F457 and the horizontal axis is labeled D450. A point on the curve is marked with dashed lines extending to the axes, labeled '1' on both.</p>	
	 <p>A graph showing an upward-sloping curve. The vertical axis is labeled F458 and the horizontal axis is labeled D451. A point on the curve is marked with dashed lines extending to the axes, labeled '1' on both.</p>	
	 <p>A graph showing a horizontal line. The vertical axis is labeled F500 and the horizontal axis is labeled D2. A point on the line is marked with dashed lines extending to the axes, labeled '1' on both.</p>	

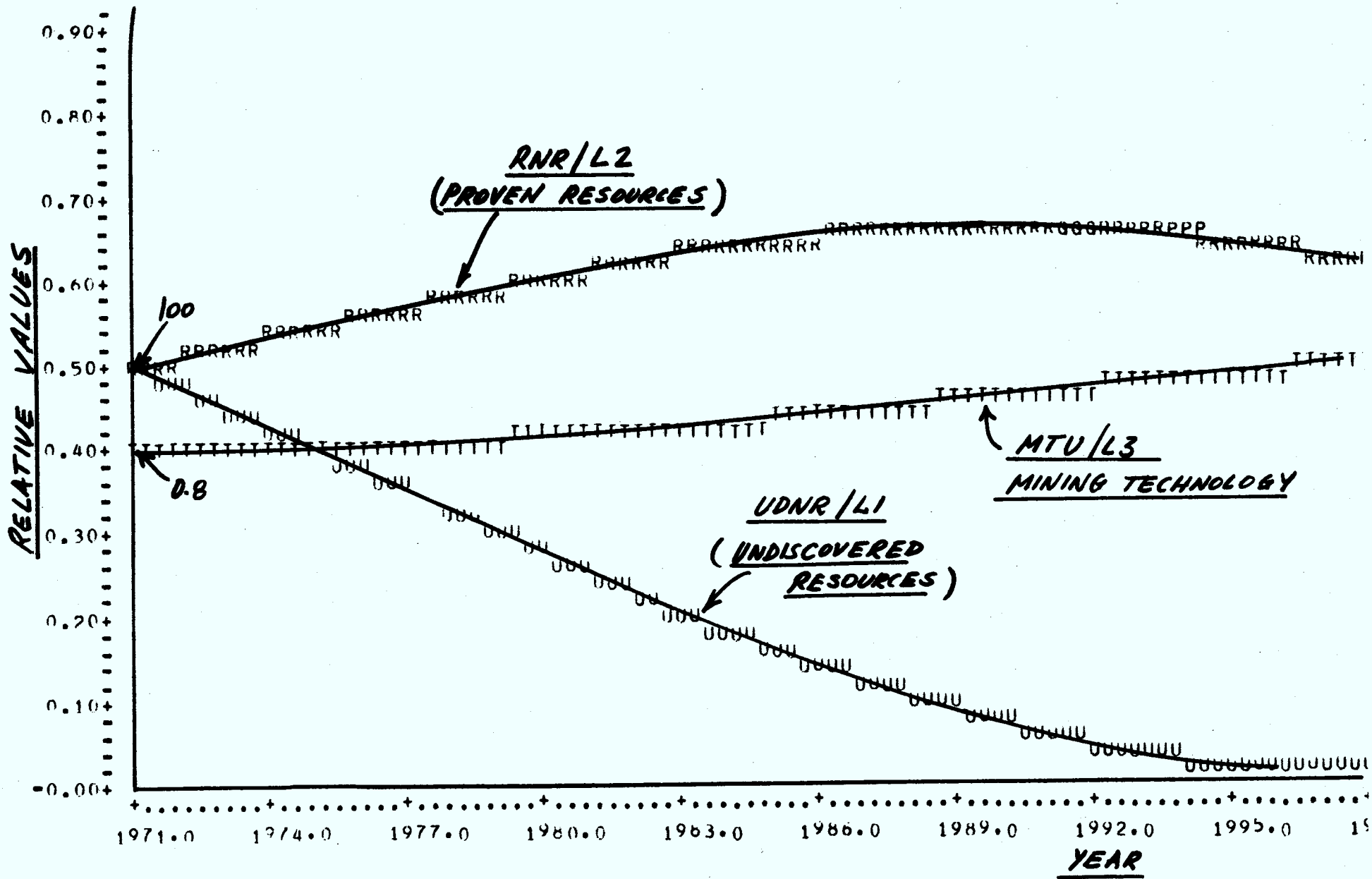


FIGURE 2.4

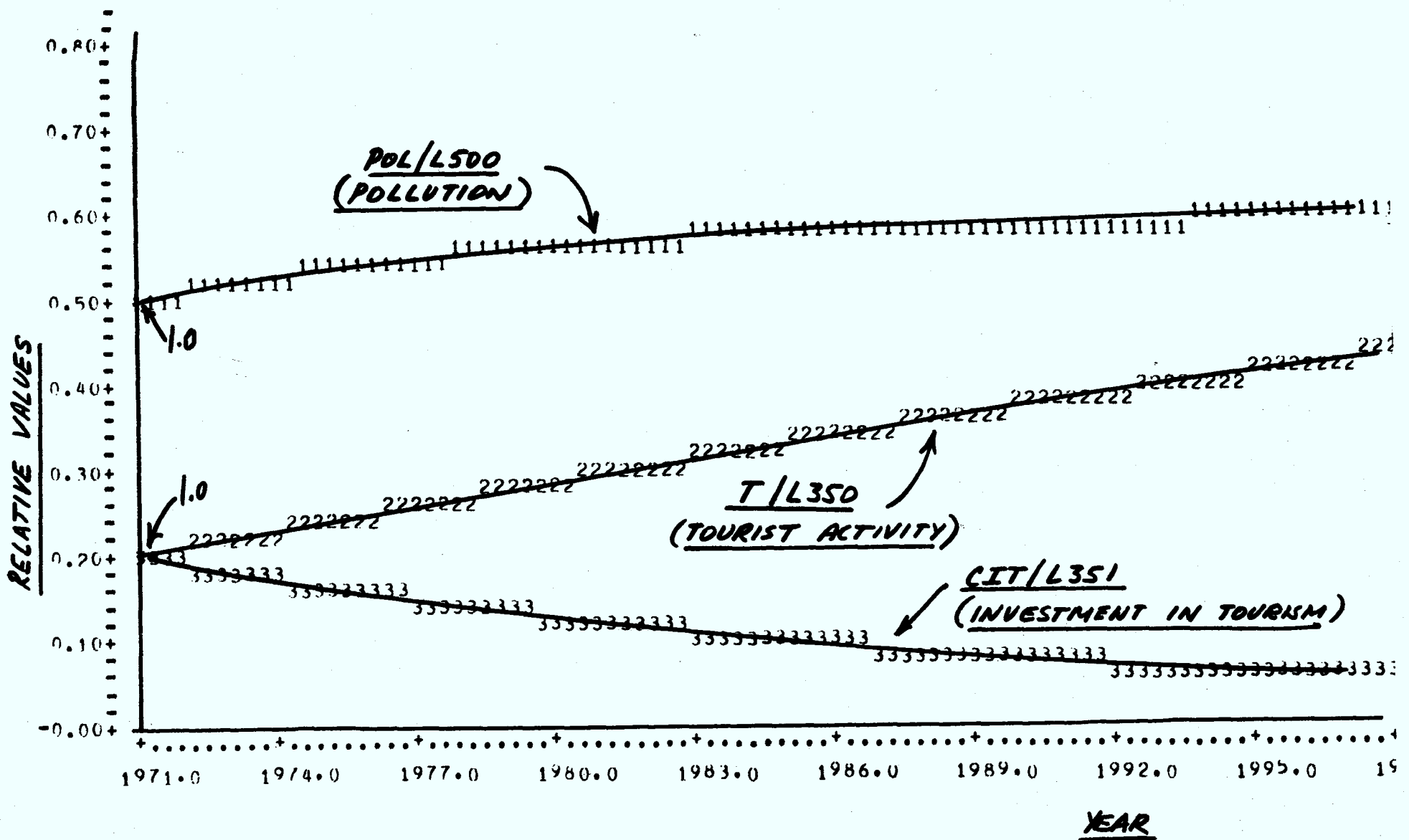


FIGURE 2.5

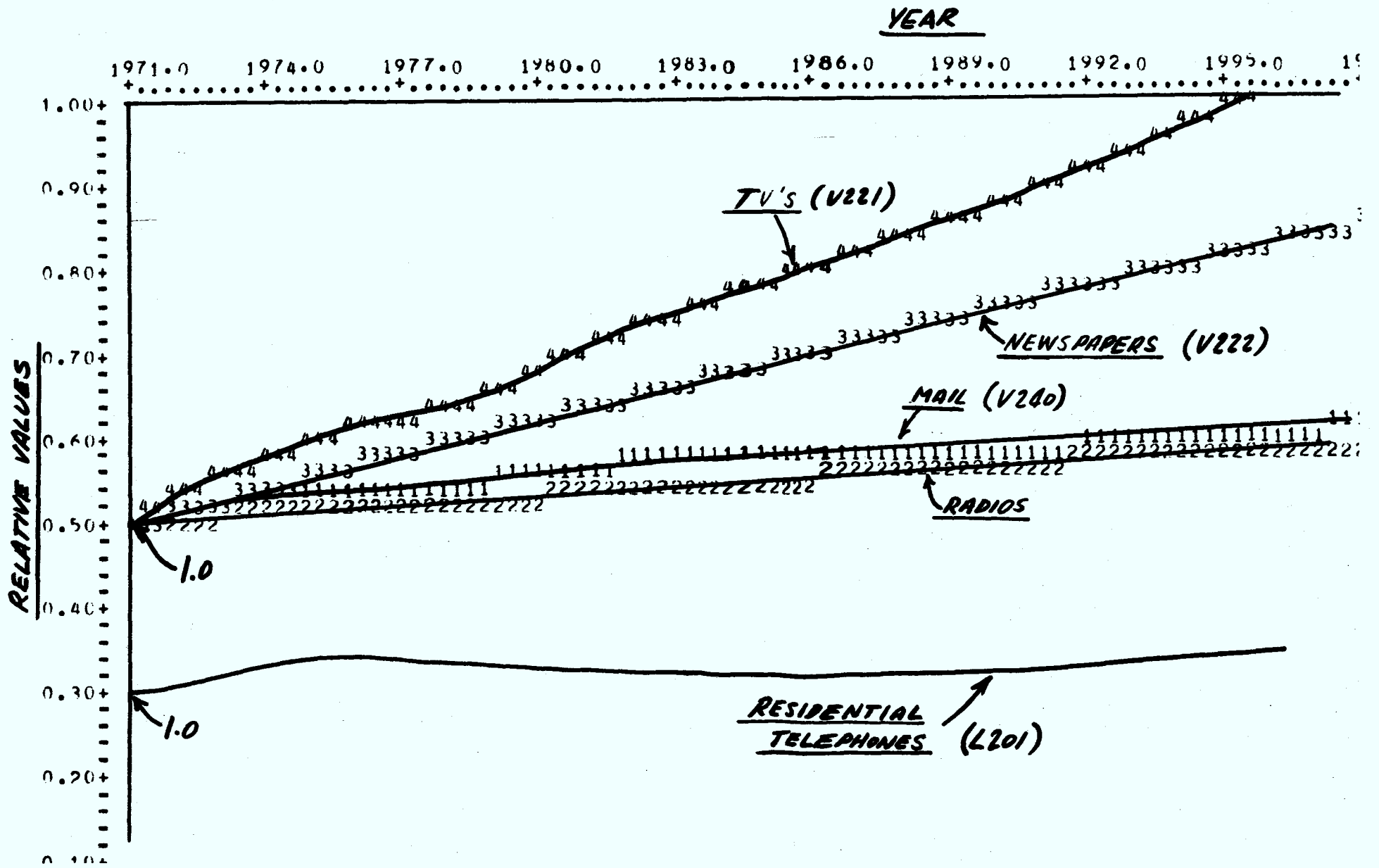


FIGURE 2.6

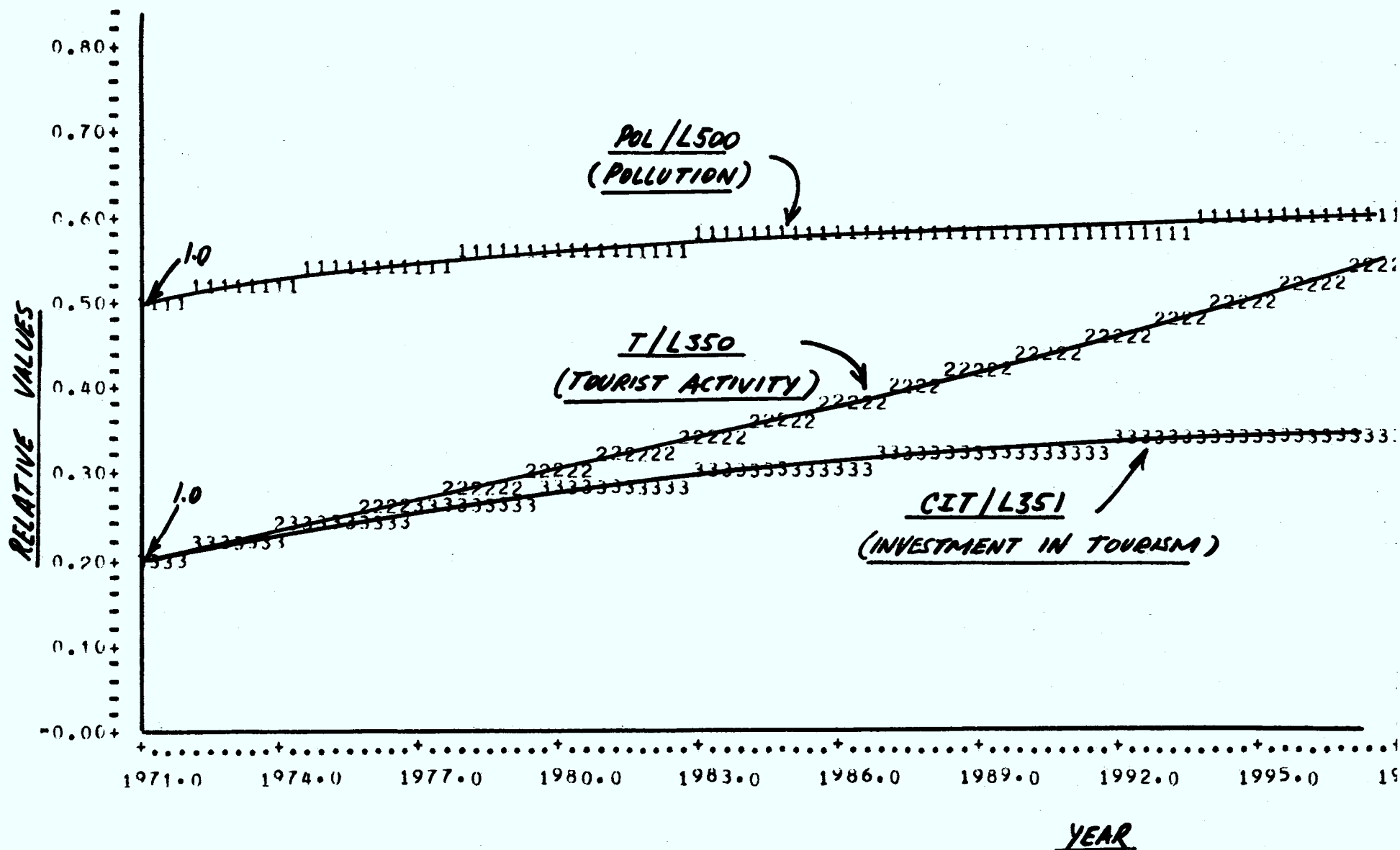


FIGURE 2.7

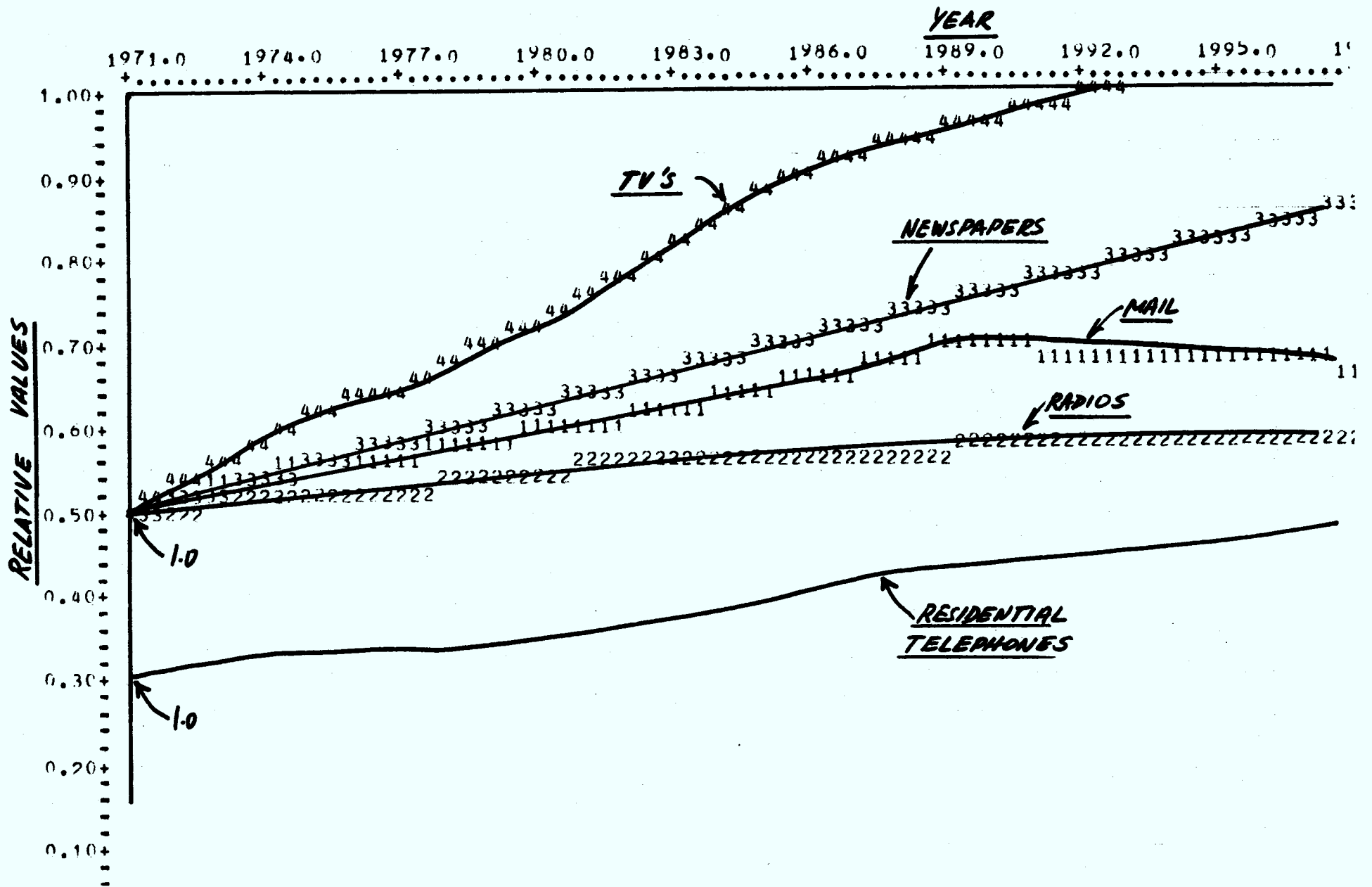


FIGURE 2.8

As seen in Figure 2.1, for the runs described above, the only outward link from the tourism submodel to the remainder of the regional model is to regional income. At the present time, links with other economic variables such as labour demand and government and private capital investment, are being considered.

2.3 Future Research Concerning the Regional Model

Three activities related to development of the regional model will be undertaken during the next year:

- (1) There remain a number of sectors to be added to the model before it can be called comprehensive. They include retail sales of goods and services, especially related to tourism, timber resource development and media impact links. Development of these aspects is currently underway.
- (2) In order to carry out extensive development of the model it will be necessary to have the simulation runs carried out on a small computer available for relatively long time periods. Toward this end, beginning on 1 May, 1974, an assistant will be assigned full-time to the task of adapting the regional simulation software for implementation on the DEC PDP-15 computer of the Electrical Engineering Department.
- (3) There remains the job of critically examining the behaviour of the model in terms of sensitivity to parameter perturbations, agreement with data, where available, and dependence on exogenous inputs. This task will be aided by (2) above in that graphical displays of model states will be conveniently available as parameters are adjusted for a series of runs.

3. COMMUNITY MODELS

3.1 Overall Considerations

(a) Community and Environment.

The environment of a community, in its most general sense, is the summation of all extra-systemic phenomena which affect the community. Since the portions of the environment which are most proximate are usually most significant, the definition of the community boundary becomes an important part of the modelling process. The kinds of boundaries which need appraisal are those geographic, economic and sociological discontinuities which delimit a community as a natural system.

Not only is the location of the boundary essential to determine, its nature is also relevant. Qualities of a system boundary include the degree of discontinuity, i.e., how smooth is the transition from system to environment, the boundary's role as an interface, how "permeable" it is and to which factors in particular.

The idea of boundary definition itself is worthy of close scrutiny. It is clear that a system as complex as a community cannot be considered as subject to deterministic causal influence from the environment in any simple fashion. All communities affect their environment and are in turn affected by the environment. This is more than circular causality, it entails transaction. Transaction may be defined for modelling purposes as the interaction of system and environment across a boundary. Thus the nature of the boundary is of basic import.

In the case of a particular community within the ecosystem, the creation of a boundary for modelling purposes must not introduce the notion that the community is a separate entity apart from the ecosystem. Though the ecosystem may be placed on the "outside" of a community model, in fact the community and ecosystem interact to such an extent that any boundary becomes questionable. But a boundary must be set, otherwise the process of modelling becomes a very difficult and confusing one.

Figure 3.1 illustrates the concept of interaction

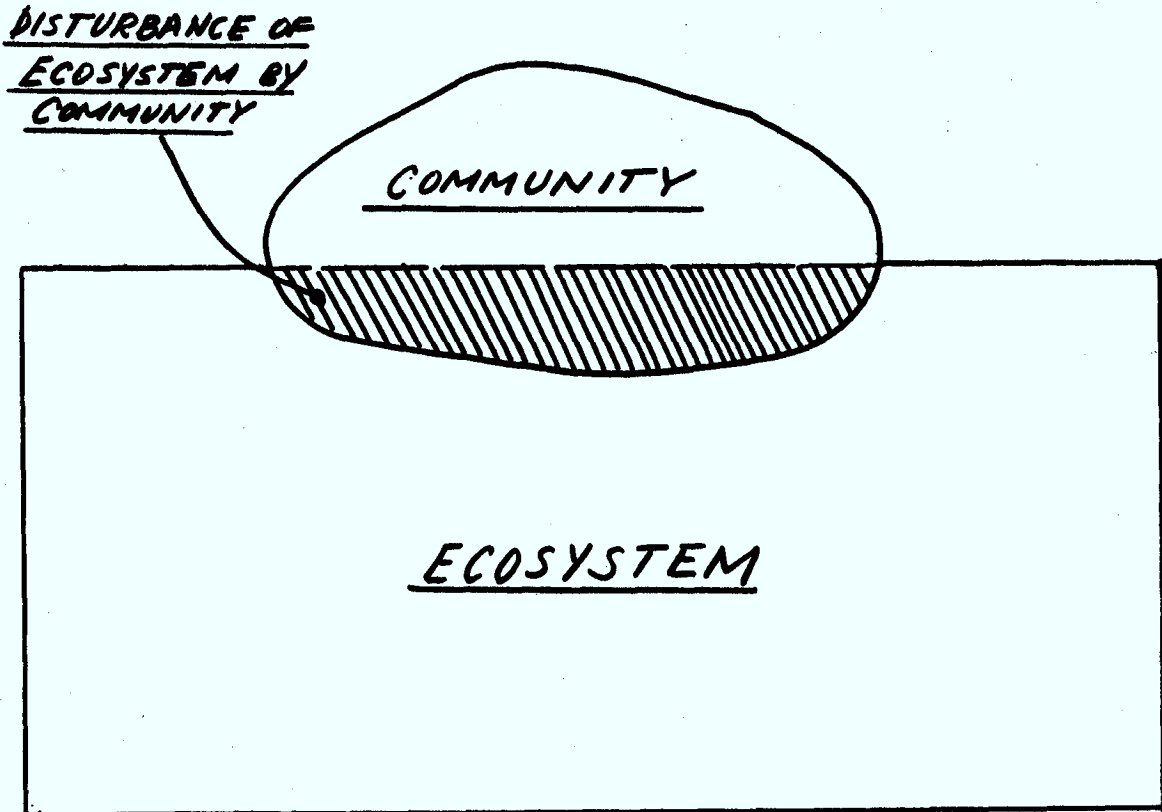


FIGURE 3.1

between a community and the ecosystem resulting in a disturbance or alteration of the ecosystem by the community. Dynamic interaction takes place in both directions across the "boundary" between the two systems. Most analyses of technological/economic systems don't lend themselves to consideration of ecosystem-community interaction. However, using the dynamic modelling approach, such interaction may be examined.

(b) Community Submodels

The regional model was developed through the integration of linked submodels in an additive fashion. However, since a community is much more of an integrated entity, this approach is not directly transferrable to the community modelling process. The interactions between the components of the different subsystems are too essential to the determination of each subsystem's state to permit the absence of a particular submodel in a realistic simulation. Notwithstanding this qualification, it is useful to consider sectors of the model defined by "fuzzy" sets of variables, especially in the initial analysis. One possible group of sectors could be defined as follows:

Resources - to include forest, mineral and animal resources.

Communications - entailing telecommunications, railways, media, and so forth.

Psychological/Social - psychological and sociological aspects of the community, especially in relation to telecommunications.

Demographic - much the same as the regional model's population submodel; considers migration, births, deaths, and factors affecting them.

Services - health services, educational services, etc.

Government - political and administrative aspects, both internal and external to the community.

Economy - economic phenomena at a more specific level than the regional model.

3.2 Approach

All models, irrespective of specific intent, may be evaluated according to three criteria; a model must be holistic, realistic and general. An holistic model is

one which emphasizes "elegance" and intelligibility - this is akin to simplicity. A model which is diffuse and confusing is difficult to comprehend, thus reducing its worth. A realistic model simulates, or mimics, the behaviour of the actual system closely. A general model is one of use in analysing and simulating systems similar to the one modelled.

The approach planned for the community model study is three-pronged:

- (1) To evaluate the usefulness of data and information obtained from field work carried out in Longlake Reserve and Aroland during the Summer of 1973, a dynamic simulation model for Aroland will be developed. It will include sectors similar to those suggested in 3.1 above and will, in addition, pay close attention to the community-ecosystem boundary.
- (2) Further field work is planned in two communities (see Section 3.4 for details) during the Summer of 1974. It is hoped that development of the Aroland model will aid in the design of these field studies and that the new information obtained will be useful in future model-building attempts for these communities.
- (3) In conjunction with (1) and (2) and realizing the value of model generality, the structure for a general model for a small community in a developing region will be developed. This model structure will be a useful starting point for future specific community model development.

3.3 The Social Model: Report of Field Work in Aroland and Longlake 58 Reserve

3.3.1. INTRODUCTION

The proposal to develop a community sub-model in parallel with the regional macro-model was made because we realized that aggregated demographic data, much of it collected for other purposes, can tell us little about the dynamics of social change at the local level. For this we needed to obtain relevant ethnographic data on social networks, systems of authority, patterns of social interaction, and value orientations in different modal types of communities, and from such data the dynamics of change could be inferred. Our original plan was to select three communities for such intensive study, each representing a different stage in the acculturation process.

Unfortunately for our purposes, our choice of communities was limited because of the presence in the area of the Northern Pilot Project. Fears were expressed that any intrusion on our part into any of the communities that had been selected for present or future inclusion in the NPP might jeopardize the success of that project. We had to select native communities outside that area. Finally, after considering the possibilities and after a visit to the area in February to talk with native leaders, we settled on two communities: Aroland and Longlake 58 Reserve. Native leaders in these communities agreed to cooperate and gave their consent to having two research assistants (from sociology & psychology) live in the communities for a period of from five to six weeks each, for intensive field study.

As it turned out, the work in Aroland was much more satisfactory for the sociologist than in Longlake. Living accommodation in the heart of the community was provided in Aroland and the researchers came to be much more fully accepted; they participated in the full life of the community and were well accepted by the residents. In Longlake, the field workers had to live off the reserve and they remained socially outside it as well; their presence was never fully understood, recognized or accepted. This should be born in mind when reading this report: the Aroland study is much more complete and, we believe, more authentic than that of Longlake 58. The field work was done between May 16 and August 10, 1973.

This Section is available as Report Q. 16, "The Social Model: Report of Field Work" by Gail Weinreb and Kathleen Herman.

3.3.2. AROLAND

1. General Description

The village of Aroland is located on the CNR line about 15 miles west of Nakina and 55 miles north of Geraldton. The land is crown-owned with the Aroland Indian Association holding a 99-year lease on it. The Association has been in existence for approximately eight years and functions as a type of local government for the village. It consists of a Chairman of the Board, Manager, and various committee members. Its most obvious function is the local co-operative store, though the various committees such as education and entertainment are intended at least theoretically, to

meet regularly for the purpose of thrashing out a position of policy on matters of importance to the village.

People have lived in the area around Aroland for centuries, though it has only developed into a permanent community in the past fifty years or so. Originally it was a summer camping ground of the Ojibwa because of its position on the water route south from the Albany, and the abundant supply of fish available. In the early 1930's it was a collection of shacks on the north side of the railway tracks. It was at this time that the Arrowland Sawmill Company was in operation. It supplied year-round employment to some of the native population who then took up permanent residence in the area. It closed in 1939 leaving only its name, in abbreviated form, behind. During the 1940's the Hudson's Bay Company built a trading post at Aroland, presumably because of its advantageous geographical position on the Kowkash River. This post was a further catalyst in drawing families to more permanent residence in Aroland. Since the 1950's, when the Hudson's Bay Post was shut down, the village gradually moved south of the railway line, where it is presently located.

In general appearance, Aroland is a hodge-podge of randomly placed houses and shacks, connected by dirt roads and foot paths. The houses were constructed by the residents themselves, apparently from scraps of lumber and other odds and ends. The only "modern" structures in the village are a trailer, formerly owned by a white store owner and now owned by the Association, and the day school operated by the Department of Indian Affairs. There are two interesting canvas-covered "tipi-like" structures in the village; both are owned and built by elderly women who use them for storage and drying fish.

Outwardly the houses appear to be in poor condition, few are painted and windows are often covered with cardboard. The interior of most houses reveals that conditions are crowded: it is not unusual for a family of seven or eight people to live in two rooms. Nevertheless, the women generally keep the houses clean and tidy. Despite the difficulty in obtaining water enormous amounts of laundry are done daily, as can be testified by walking through Aroland any day of the week. In fact, the interviewer found that most of the time the only way to talk to the women was to follow them back and forth from laundry tubs to clothes lines.

There is no running water and sewage system in the village, though two houses have pumps to draw water from adjacent wells. There are two usable community wells in the village, though only one is working at present. Many families go to the lake for their drinking water, which is considered fresher-tasting. The water is not chemically treated or boiled before use, though no one seems to suffer any ill-effects because of this.

Ontario Hydro was brought into the village in 1970 and every occupied dwelling now has electricity. This innovation brought with it several changes, especially in terms of the now widespread ownership of such items as television sets and freezers. More will be said later about the advent of widespread TV ownership. As for the now abundant use of freezers, this has had a very interesting result.

Before electricity, food was kept cold in summer by keeping it in a deep pit in the ground. Obviously this was not a particularly efficient method of preventing spoilage and as a result there was much sharing of game. One informant reported that only a few years ago, a man who had killed a moose would take it down to the river to butcher it and each family in the village would come to get its "share". Now, a man butchers his meat and it all goes into the deep freeze for the future use of his own immediate family. There is little sharing.

2. Demographic Characteristics

According to the list of residents for September 1971, the population of Aroland is 267. Although there have been additions and deletions since that time, this figure is still relatively accurate. Of this population, approximately 65% are Status Indians, being registered for the most part at the Longlake 77 and 58 reserves. The remainder are either Metis or enfranchised Indians but in everyday relationships, the fact of being status or non-status is totally irrelevant.

There are seven whites living in the community: an elderly man who has lived there for over 40 years and who is married to an Indian woman; a Roman Catholic priest (now retired) who has ministered to the area for almost 50 years; four teachers -two nuns and two men, one married.

a. Birth Rate: It is impossible to determine accurately the birth rate for the village of Aroland, but certain assumptions can be made from the number of children per completed family. Inferences can also be made about future trends from opinions expressed about limiting family size by young married and unmarried individuals who will be producing the next generation of Arolanders.

Eight couples in the age bracket of 35 to 50 have eight or more children -- including one family with eleven children. The age-spread of children is obviously quite great; it is not unusual to find families with both older children married or otherwise absent while at the same time there are very young children in the household. It is difficult to estimate median number of children per family, since many couples in the fertile bracket have not completed their families.

There seems to be some desire, even among the older women to limit family size. There is little evidence that this desire is reflected in successful practice, and it is difficult to say whether this lack of success can be attributed to inadequate information, the influence of the Roman Catholic Church, shyness in discussing such matters with a doctor or a combination of these factors. One 35-year old mother of 10 children mentioned that she really didn't want any more children, but her doctor took her off the contraceptive method she had been using and apparently didn't instruct her in any alternative means.

If one looks back a generation to the parents of those now in the fertile age bracket, one finds one family with 16 offspring (8 of whom died in childhood). The median number of children for families of this generation was five, but one can probably assume that actual number of live births per family was considerably higher since the informant was vague on childhood deaths occurring in that period.

It is probably safe to assume that the birth rate in Axoland is higher than the national or provincial average, and to predict that it will decline only slightly in the next decade. Many of the relatively young couples (late twenties) already have four or more children and these women rarely gave any indication that they intended to limit their families. Again, the reason for this can only be speculated upon, and so one might wonder what kind of effect a family-planning education program might have on the community. It is possible that such a program might have a good deal of impact if it is well organized and run by one of the local people. Already one young woman in the community has had training as a nurse's aide; it was expected that she would initiate such a program on her return to the community but to date this has not happened in any effective way.

It is obvious that communications media might be used in such a way as to encourage people to limit family size. Not only could TV and radio be used as an educational tool, supplying information about contraceptive methods, but exposure to the type of life-style one sees portrayed in most television programs might have the same effect. Already some of the younger people are questioning the value of large families. They feel that a large number of children places too great a strain on family finances; it doesn't allow one to get ahead or to provide enough for each individual child.

b. Death and Morbidity Rates: Here again, in the absence of hard data, one can only speculate on actual rates, while identifying the factors which might contribute to higher death and morbidity rates.

(i) Infant Deaths (under one year): We heard directly of only two infant deaths in the recent past, though this may not be accurate. One of the major factors which undoubtedly contribute to infant death and miscarriage is the difficulty in obtaining medical help. The nearest full-time clinic is in Geraldton, a distance of 55 miles over rough roads. A public health nurse and doctor from the Department of Indian Affairs hold clinics in the village every couple of months where children are given shots and TB tests are administered. This clinic is generally well attended, the time and place being announced regularly over Radio Kenomadiwin. There is also a public health clinic in Nakina, attended by a doctor twice weekly, but only one respondent mentioned using this service.

Two obviously pregnant women who were interviewed admitted that they should see the doctor but it was just too much trouble, especially when there were very young children in the household. One of these women also complained that she couldn't afford all the pills the doctor prescribed for her, so there was no point in seeing him. These two particular women

had access to their husbands' cars; for those who have to rely on others' cars or taxi, a trip to the doctor is even more prohibitive.

All babies are now delivered in the hospital at Geraldton and most women make it to the hospital in time. Only one case was reported of a woman giving birth in an ambulance on the way to the hospital. There is one woman in Aroland who used to act as midwife, but her services are no longer used.

(ii) General Death and Morbidity: One rather simple way of investigating deaths in a small community such as Aroland is to have a look at the local cemetery. The cemetery at Aroland is only about 10 years old, and contains about 15 graves. The graves are extremely well-kept with a profusion of plastic flowers and other ornaments; unfortunately they are not marked with the name or date of death and it was necessary to rely on an informant for a rundown of who was buried there and the cause of death. There were six accidental deaths: two children killed in a fire, two children killed in car accidents, one drowning and one death on the job. Death by natural causes was attributed to TB or other "lung trouble", perhaps pneumonia, in almost all cases.

This brings one to the rather startling realization that tuberculosis has in no way been eradicated in the north. Not only is it one of the leading causes of death, but several informants reported having spent various periods of time in the TB sanatorium in Thunder Bay.

As in infant deaths, accessibility to health services plays a role in death and morbidity rates. Other factors which might contribute to the prevalence of lung diseases are nutrition and crowding. Observation of the eating habits of Arolanders reveals that food intake is very high in carbohydrates and low in fresh fruits and vegetables. The local store carries fresh produce only occasionally, and the price is often prohibitive even at the Hudson's Bay store in Nakina. The effect of crowding and lack of sanitary facilities is instrumental in spreading highly contagious diseases such as influenza and colds which are quite prevalent during the winter and tend to be in epidemic form -- sweeping the whole village at once.

It is therefore likely that birth, death and morbidity rates for Aroland follow the pattern typical of native peoples in the north. Statistics available for Ontario in 1970 indicate that birth rate of the Status Indian population remains more than 13% higher than the provincial average. Indian death rates are now almost on par with rates for the whole province, though infant mortality rates remain higher. Certainly it is safe to assume (though no figures are available to back this up) that death rates in northern, more isolated settlements would be higher.

c. Migration: One highly noticeable feature of the migration patterns in Aroland is the ease with which people enter and leave. It is not unusual for a single person to move to Geraldton or Thunder Bay for employment or educational reasons and then return to Aroland- either to set up permanent residence or as a summer hiatus from city life.

There are 13 family names associated with Aroland and this has apparently been the case for some time. If you go back two generations to the grandparents of the present generation, you can find most of the established family names already present. Nevertheless, in each generation certain individuals and families are lost to the community. Nakina has the largest number of ex-Arolanders with seven families in which at least one of the spouses was from Aroland. Women are often lost to the community through marriage with men from outside. However, women are also brought into the community through marriage. In three recent cases, local men married women from Red Lake, Ogoki and Fort Hope and residence was set up in Aroland, presumably by reason of the husband's employment.

Employment is probably the most important factor drawing families and young married couples away from Aroland. Almost all of the emigrants have taken up residence in nearby towns or cities. Two families are in Thunder Bay; three in Geraldton and one in Sudbury. Close ties are usually maintained with these relations; visiting is the preferred mode of contact, rather than telephone or letter writing, presumably because they live in centres which have other attractions.

These figures refer to families more or less permanently settled in other areas and does not take into account the fluctuation of the younger and unattached population which floats in and out of Aroland as educational and employment opportunities seize them. There is always a relative who will provide you with accomodation while in Aroland so that for this group Aroland remains home, even while new experiences and life-styles are experimented with in the larger urban centres.

It is likely that the population of Aroland will remain relatively stable barring some shift in the employment situation. Should K-C begin laying off workers, there is likely to be an exodus from the area in search of new employment.

3. Economics and Natural Resources

Aroland is typical of most of Northwestern Ontario in that the economic base of the area is dependent on the availability and utilization of its natural resources.

The most obvious natural resource for exploitation is timber. Kimberly Clark is presently engaged in cutting operations in the Aroland area and it provides the majority of jobs for the working population of Aroland. About three-quarters of the male employable population of Aroland, 24 men, are employed by K-C in some capacity. Relations between K-C and its employees are perceived by Arolanders to be very good. The pay is high - an experienced cutter on piece work can make as much as \$600 every two weeks.

There were no serious complaints voiced about K-C's treatment of its workers, though there was some disaffection with K-C's practice of bringing in forestry students from Lakehead University as foremen during the summer.

Few men from Aroland work as foremen for K-C. One man assumed this position recently, upon his return to K-C after a two year stint with the Association. The other man is what might be called an "acting foreman". He told us that his boss was pleased with the way he had been handling the job, but he couldn't take on the work permanently as he can neither read nor write.

If the Anaconda Mine reopens or Kimberly Clark goes ahead with the planned sawmill in Aroland, some families and individuals could return from Geraldton or Nakina to take up residence in Aroland once more. Should the employment situation drastically improve it would be interesting to note whether outsiders, white or Indian, would move in en masse from other areas. In the past there has been almost no in-migration (aside from teachers and priests) by total outsiders and the structure of the community, not only in terms of physical relationships but in terms of social and kinship relationships as well, would be severely altered should this occur.

The other major source of employment is forestry. Nine men in Aroland are employed by the Department of Natural Resources in the capacity of fire fighting and park maintenance; two men work at the Air Base near Geraldton, and the rest go into Nakina each day to be transported to areas where there is work to be done. This is strictly seasonal work, though the length of employment depends on seniority and ability. A foreman might work from May to December, while younger, less experienced men may work for only a few months in the summer.

This leads us to the question of how the rest of the population supports itself and how men in seasonal employment support themselves during the winter months. For the past several years Aroland has had a LIP grant which employed many of the seasonal workers during the winter, at such activities as house repairs and carpentry work. This past spring (1973), Aroland became ineligible for LIP grants because it is "too affluent". What effect this will have on the working patterns of the people is difficult to say at this point. However, it seems likely that funds for projects such as housing repairs and construction can be obtained from other sources. Ontario Housing Corporation is presently financing the construction of 10 new houses at a site across the highway from the old village. The Community Development Branch is another possible source of funds for projects which would be of benefit to the whole community.

In the past two summers, Aroland has received an Opportunity For Youth grant from the federal government. This past summer the high school-aged young people have been working on cleaning up garbage, fixing up the Association store facilities and in writing a village newspaper. This project provides needed income and activity for the young people, especially the girls, who would otherwise find themselves idle and dependent on parents for money.

Employment opportunities for the women of Aroland are extremely limited. Lack of education is not the only drawback. Difficulties in transportation to centres such as Nakina and Geraldton where jobs in shops or restaurants could be found is also a deterrent. None of the

women in Aroland are presently employed in wage-paying jobs; however, some did report having worked at such seasonal jobs as cone-picking, tree-planting, and as domestic help in summer tourist camps. It is difficult to see how this situation could change unless work is available for these women right in the community.

Another source of income which has important cultural as well as economic implications lies in hunting and trapping. While it is almost impossible to maintain even a subsistence standard of living through traditional pursuits, a large proportion of Arolanders take to the trap line for various periods during the winter months. Animals most often trapped are beaver, lynx, otter, muskrat, martin and mink. Prices vary from year to year depending on the demand; for the past few seasons they have been good with a beaver pelt bringing as much as \$40 last winter. Furs are usually sold to the Hudson's Bay in Nakina.

The department of Natural Resources in Geraldton controls the allocation of trapping areas, though this is not done arbitrarily: a man will usually be given a traditional trapping area. Once a trapping ground is registered with the Department it has very definite boundaries which must be respected.

Trapping not only brings in a much needed supplement to wages or social assistance, but it is often seen as a recreational activity as well. Often the whole family will go out on the trap line for weeks at a time - a practice which the local school teachers find disturbing, as it takes the children out of school.

Old people, who can no longer work at regular full time employment, often see trapping as a way to keep themselves busy and maintain their sense of usefulness. One cannot ignore the intrinsic satisfaction that is gained by living in the bush. It is in many cases a release from the confinement of permanent village life. It is also seen by some elderly people as an escape from the wild parties which are sure to occur every Kimberly-Clark payday.

Even more, hunting and fishing function as recreational activities. Killing a moose not only provides a man and his family with a good supply of meat, but it is an exciting and sometimes dangerous activity. Recounting one's hunting exploits is a favourite pastime, and one that is sure to heighten the prestige of the hunter.

Moose is the only large animal specifically hunted for food. It is hunted year round despite formal legal restrictions, and it is generally understood that no action will be taken as long as the game is reserved for personal use. There are numerous black bears in the area but they are never hunted. Whether this is a recent phenomenon or one that goes back to traditional avoidance of harming the symbol of one's totem is difficult to say. Certainly I never saw nor heard of one incidence of a bear ever being killed.

The numerous lakes in the vicinity of Aroland are ideal fishing grounds for pike, pickerel and white fish. When fishing is considered

a recreational activity or a contest of skill, casting rods are used. If a man is simply interested in getting a large supply of fish to feed his family, then nets are set up at strategic points in the river. Several of the old women I talked to still walk down to the Kowkash River regularly to set their nets.

Guiding is another traditionally related occupation that supplements income. The Association runs an Outfitters Operation in the bush north of Aroland and guiding is one aspect of this operation. Some men have also worked as guides for various tourist operations in the area, though this type of employment is strictly seasonal and often undependable.

4. Education

Education in Aroland will be considered from two perspectives: level of education attained by the population, and prospects for the future in terms of level of service and possible changes in educational level achieved.

Of those interviewed in Aroland, it was found that 5 individuals (all of whom were over 60 years old) cannot speak any English. Another three respondents speak some English, but with difficulty. An interesting point about Aroland is that almost the total population is fluent in their native language and it is this language that the children learn first. However, most people under 50 years have a reasonably good grasp of English and the young people are actually quite fluent. Ojibway is in almost all cases the language of the home, so that often a child's first real introduction to the English language comes in school. That this creates some problems for the teachers is undeniable and more will be said of this later.

Out of forty respondents it was found that 12 are illiterate in the English language and three are semi-literate. Their average age is 54 years with the youngest being a female of 24 who never attended school because she always lived in the bush with her family. Of those who are illiterate in English, four can read and write in Indian syllabics.

For the over 40 group, there are no males who have attended school and only one female who went to residential school for two years. Not all of this group is illiterate, however, as two individuals reported that though they had never been to school their father, a white, had taught them to read and write. This lack of education is not surprising in the over 40 group since the school in Aroland only began in the late forties and prior to that time, residential school was the only facility available. Several of these respondents reported that they lived in the bush as children and their parents wouldn't allow them to go so far away to residential school.

For the 26 to 39 age group the average number of years of education is 7 for males and 5.5 for females. No one in this age group went beyond public school.

The youngest age group (16 to 25 years) has substantially improved on this educational level, at least for the males. The average number of years of education for males of this group is 11 years, with 10 being the median. Included in this group are three who have attended a community college for at least one year. For the females in this group, the average number of years of education is 7.5, the median being 8.5. These figures are artificially low since not all individuals in the youngest age group have completed their education. Last winter all the high school students quit, but many are considering returning in the fall.

The level of education attained by the people of Aroland is considerably lower than the Ontario average, though the younger group is catching up. In the older generation there are two basic factors which have influenced this low educational attainment: low level of service and competing life-styles.

Residential schools, besides being such a distance from home were often highly authoritarian and punitive. For the child with exceptional ability and motivation they could provide a rigorous academic education, but this applied only to a very small number and hardly suited him for the kind of life he knew back home and so severe conflict was generated, not only within the individual, but between child and parents. Parents were therefore reluctant to allow their children to go to the residential school. It was not only a matter of not wanting to be without the child for so long a period but the parents could see no tangible results from this type of education, especially in terms of preparing the child for a specific occupation. Education didn't give the child a well-paying job and at the same time it robbed him of the chance to learn traditional skills.

In some ways this notion of the "uselessness" of education is prevalent today. Parents are very ambivalent about how much education they would like their children to receive. When questioned directly on this point, many at first paid lip service to the notion that education is "good" and that everybody should get as much as possible. But there was also the qualifying statement that "around here people get along O.K. without education". Since they have no experience of one of their own getting ahead specifically because of education, the ideal and the practical sides conflict. Most parents maintain that how much education their child gets is the child's decision. They will help all they can but they won't push.

It is difficult to assess the existing level of educational service available in Aroland. There is a modern three classroom school in the community, staffed by four teachers, two of whom are nuns. From interviews with the nuns, who teach the lower grades, it is obvious that they have a good understanding of the difficulties

involved in teaching native children, especially in terms of mastering the Ojibway language.

This same kind of understanding of the problems involved in teaching Indian children is not evident in the two other teachers, both of whom are men in their twenties. The principal of the school is totally cut off from the rest of the community -- physically and socially. He lives in a modern house beside the school which creates quite a contrast to other houses in the community. He says, "You can't get too friendly with these people or they'll take advantage of you". He is so cut off from the life of the community that he maintains that the children don't really speak Ojibway fluently; they know a few phrases and that is all. I don't know where he got this notion but it is obviously false.

In terms of the education provided for the children, the principal sees his role as someone who tries to push as much Math, English, etc. as possible into the children for the time he has them, but if they aren't prepared for high school when they leave Aroland, then it really isn't his fault. He blames the parents of the children for not providing a stimulating home atmosphere and for not giving enough discipline to ensure that the children attend regularly and get there on time.

My conclusion would be that the educational service provided in Aroland is adequate in terms of physical facilities, but it is inadequate in terms of the teaching methods. While the teachers are undoubtedly adequately trained with respect to southern standards, there is, with the exception of the nuns, a lack of understanding of the special needs of Indian children. It is not only the teachers who are responsible for this difficulty however. The curriculum set out by the Department of Indian Affairs follows the provincial guidelines and therefore makes no provision for the cultural background of the children. No attempt is made to give the students special instruction in Ojibway history or language.

It is probably true, as one of the teachers maintained, that the children are not interested in their cultural history -- their main interest is cars and sports. Certainly no mention of this issue was ever made to the field worker by either parents or students. This is one area where communications media could fulfil a function: if TV, radio and newspaper (especially native newspaper) make the people conscious of the various Native Rights movements and the resurgence of traditional culture, then demands could be generated.

The people of Aroland are at present relatively apolitical. Their isolation and the retention of certain aspects of the "old life" have accompanied their relative affluence and have kept the people protected from the extreme social disorganization and feeling of cultural loss which is evident in so many other Indian communities. They are for the most part content with their lives in Aroland and see no need for any organized effort to improve their condition.

The Ojibway are traditionally an individualistic people to whom organized action, even on a community level, is foreign. The Association therefore finds itself in the position of being called into action only to cope with a crisis situation. Such an incident occurred two years ago when the women became dissatisfied with the school principal's treatment of their children. Their complaint was brought to John Therriault, the manager of the Association, who in turn registered the complaint with a personal contact he had in the Union of Ontario Indians. Indian Affairs speedily responded and the principal was replaced. It is obvious then, that while the people themselves are unaware of the governmental structures, they know where and whom to go to when they want something done. It is the community leaders who must direct these demands through the proper channels.

The future trends of educational attainment in Aroland do not look very bright. Of the three young people who made it through high school, two had their public school education in residential schools and their high school in Thunder Bay, and the other boarded with a family while attending high school in Geraldton. Presuming that the majority of children will finish their public school in Aroland, it is doubtful whether pushing them into Geraldton for high school will have any more success in the future than it has had in the past.

5. Health Services

The availability of health services has been outlined in the section on demographic trends. What has not been analysed is the use made of these services and the attitudes expressed about the quality of service. Of 35 respondents who gave detailed information on their use of health services, it was found that all but five had visited the doctor in the last year. Without exception, medical help was sought at one of the two clinics in Geraldton.

Of those who hadn't been to the doctor in the past year, three were under 25 years of age and maintained they simply hadn't needed to see a doctor. It is apparent, then, that health services are highly utilized but this should not be construed as meaning there is a ready acceptance of medical advice. There is evidence that there is a lack of understanding of the use of prescribed medicines especially among the older people. One respondent reported taking some pills the doctor had prescribed, but when they didn't seem to have any visible effect, she threw them away. Others reported running out of medicine but not going back to the doctor for more because they just found the cost prohibitive. However, if the symptoms return, the individual then feels there is a good reason to see the doctor and the cost and time involved is well expended.

This attitude towards the seeking of medical help is typical of a people who cope with a situation as it arises. It is similar to the attitude towards concerted community action - let well enough alone until a crisis occurs then lay the problem at the door of the man most qualified to deal with it.

In terms of the effect of communication media (or any other contact with the wider society) on attitudes towards health care, the largest influence would probably occur in the area of preventive medicine. People are aware of where to get medical help and they utilize this service readily enough when illness strikes. The main focus of any educational program for the betterment of health levels in the community should focus on aspects such as proper nutrition and sanitary standards, care of the teeth, importance of inoculations, and the need to follow through on medical advice.

The hospital in Geraldton is well used by the population of Aroland. All respondents but three (young people under 20) reported having been in hospital at some time in their lives. Nine people reported having been in hospital within the past year. Most cases are first taken to Geraldton, usually by cab or private car, unless the situation is an emergency at which time an ambulance is called in from Geraldton. The hospital at Geraldton is considered by Arolanders to provide excellent service and this is sometimes expressed as "they really treat Indians well there". Any patient with a serious or unusual illness is sent to the hospital in Thunder Bay to see a specialist.

Though medical facilities are a good distance from Aroland (an hour and a half drive over rough roads) they are not perceived by the people to be inadequate. There is a realization of the difficulties and expense involved in getting to the doctor or a hospital, but it is accepted as part of the price one pays for living in a relatively isolated community. The doctors and the hospital are always highly praised; any deficiency in health services provided to Aroland is only a matter of geographical distance.

6. Religion

We were not able to get much information on the religious activities of Arolanders. Ostensibly, all are Roman Catholic. The Jesuit priest who has ministered to the entire area for almost half a century, is now retired in the community. Mass is held regularly but, our observations suggest, poorly attended except for weddings and funerals. Nor were we aware of a strong attachment to traditional religion though we heard of at least one instance of a resident visiting the shaman at Longlake 77 during the time we were doing our fieldwork.

7. Social Control

Aroland is an orderly community; privatization is great and, for the most part, people mind their own business. Events do occur, of course, but then are handled as much as possible from within the community. It is very rare to have the police called in. Gossiping is an effective method of social control, as is ostracism. On one occasion, a woman (from outside the community) who had taken someone

else's husband, was put upon, beaten and driven from the community by the other women. Another time, the children vandalized the school severely; however, the principal of the time was so much disliked that the elders of the community did not consider it an unjustified misdemeanour (in fact, the decision was made to have the principal replaced!) Drunkenness occurs, and fighting, but these are seen as normal, and therefore tolerated. It is very rare for any member of the community to run so afowl of the law as to be charged in the courts.

8. Communications*

a. Telephone: Aroland has four pay telephones of which two are readily accessible to the community. All calls in and out of Aroland are long distance and must be made through the operator. Use of the telephone in Aroland is not very high. Six respondents (N= 45) reported using the telephone once a week; eight use it occasionally (about once every two weeks); eight seldom use it; and seven reported they never use the phone. Of this last group all are aged 60 yrs. or over and maintained that they wouldn't know how to operate the telephone. Over half the respondents reported that service calls i.e. to doctor and taxi, constitute their main use of the telephone. The rest were divided between business and personal calls.

Some factors which might affect this relatively infrequent use of the telephone are: cost, inconvenience in getting to the phone, difficulty with English, lack of friends and relatives outside the community who have phones.

In the past year a petition was organized and sent to the government and to Bell Canada requesting personal phones in Aroland. As yet this demand has not been met though there is speculation that dial phones are soon to be installed in Nakina and that this service will be extended to Aroland. Despite the fact that a petition was successfully organized, the people I talked to seemed either indifferent or opposed to the idea of having personal phones. "Children would misuse them", it was said, or "Large bills would be run up and then the phones would be taken out, just as happened in Longlake 58."

If phones were installed in private homes it seems likely that usage would increase, but the incidence of long distance calls would probably not increase radically. Better contact with friends and relatives in Thunder Bay would probably be increased but since many Indian families in Nakina and Geraldton have no phone and can be easily contacted in one of the many trips into those centres, this kind of personal or kinship call would probably not increase.

* The data presented in this section is taken from 45 unstructured interviews conducted over a 2-month period. The figures are presented to show trends only and cannot be viewed as hard data. No random sampling technique was used and some interviews were incomplete in certain areas. The major impressions were gained from direct observation and casual conversation. This type of approach was found necessary because of the problem of gaining relevant information from a long and elaborate interview schedule which left many areas of interest untouched and which respondents could often not understand.

The level of service at present is adequate in terms of the time it takes to put through calls, voice quality and so on. An increase in quality of service either through individual phones or in by some other means will not substantially improve the level of services in other areas. The phones are likely at present being used to capacity in the area of calls for cabs and doctor's appointments.

b. Newspaper, Magazines and Books: Reading material of any description is not readily available. Not only does the local store not carry magazines or newspapers, but most people do not bother to obtain them in Nakina or Geraldton. About 40% of respondents revealed that they never read magazines and 60% stated that they never read a newspaper. Included in this group, obviously, are some of those who can neither read nor write, but this certainly cannot account for the whole group. In fact, some individuals who are illiterate in English receive subscriptions to Nakina magazines written in syllabics.

The major reasons for this lack of use of reading materials is the difficulty in obtaining them and the low literacy level. When magazines become available as in the case of a departing teacher who left behind his collection of Time, they are quickly snatched up. Year old magazines were read cover to cover, or at least the pictures were well studied.

c. Television: It is probably safe to say that every household in Aroland has at least one TV - some having two or more. Three respondents had colour TV. Television viewing in Aroland is focused on certain specific programs. One seldom finds the case of the set being turned on in the morning and left on regardless of what the program is and who is watching. Naturally each individual has his or her own particular preferences, but respondents often reported they watched one or two favorite programs a week and nothing else. Television watching is therefore quite restricted, with the largest number of respondents reporting that they seldom watch TV.

Among the women the soap opera Edge of Night was mentioned by almost everyone. The men were interested most in sports with the news and late movies being other choices named. Four respondents reported listening to the news on a regular basis.

This low level of TV watching can probably be attributed to a lack of choice in program (with only the one station available) and the time spent in other pursuits. Few people complained about the lack of choice; they more or less accepted it as an inevitability in a community such as Aroland. Yet it is still true that this lack of choice restricts television viewing.

What probably takes people away from the TV set more than anything else is the availability of other activities. There is the possibility of fishing in the summer and hunting and trapping in the winter. Many individuals enjoy this kind of activity for its own sake, apart from the food, and revenue it provides. Therefore there is entertainment and enjoyment to be found outside of watching television.

d. Radio: Radio ownership is also quite widespread, though not as universal as TV ownership. Six respondents had no radio but they availed themselves of friends' or relatives' radios. Radio listening is a much more casual affair than television viewing because other activities such as housework can be done while the radio is playing in the background. The majority of respondents reported listening to the radio occasionally (at some time during each day if only for a few minutes). Rock and Country and Western music are the favorites, though a substantial portion reported listening to the news regularly.

Radio Kenomadiwin was known and listened to by all respondents. It seems to be very popular in the community because it plays the kind of music the people like. It airs requests and people of all ages avail themselves of this service. The "teaching" aspect of Radio Kenomadiwin is not very evident at the moment except for some announcements about civil rights. There are few complaints about this lack of genuine community radio, except among some of the younger people who are aware of the original purpose behind Radio Kenomadiwin and deplore its failure to live up to expectations. Thus, not only lack of resources and personnel keep Radio Kenomadiwin from becoming a community radio; the complacency of the people and their acceptance of it as a medium designed solely for entertainment are significant as well.

e. Letters: Letter writing is an activity which basically requires two things: 1) an ability to use language in written form; 2) somebody with whom to correspond. This may seem like an obvious assumption but it is these two factors which keep letter writing at a low level in Aroland. We are looking here at letter writing as a social activity: keeping friends and relatives informed of one's activities. We make this distinction because everyone in Aroland sends and receives business mail such as cheques, bills, premium notices, etc. as a matter of course.

About half the population pick up their mail in Aroland where it is delivered three times a week via the local taxi. The others go into Nakina to pick up their mail. This seems to be a desire for privacy since mail coming into Aroland is scrutinized by the local postmaster and anyone else who happens to drop in at the community store.

Only 13 respondents reported ever writing letters for other than business purposes. Of these, four who reported writing often (within the past 2 weeks) were under 22 yrs of age. It is not unreasonable to expect that younger people, being more at home with written English and having a wider range of experience outside the community, would be the more prolific letter writers. It was found that younger people write to friends as opposed to relatives more often than their elders. Many reported having pen pals as far away as New York and London with whom they maintained a regular correspondence. Also these young people had made friends while going to school in Thunder Bay or elsewhere and their friendships are maintained by correspondence.

Those over 25 who reported some letter writing revealed that they corresponded occasionally with relatives outside Aroland, usually Thunder

Bay. The large majority of respondents reported no letter writing at all, usually because of illiteracy. Three older respondents reported that sons or daughters helped them to handle their business mail.

3.3.3 LONGLAKE 58

This report on the reserve community of Longlake 58 is presented for the purpose of comparison with Aroland which is a non-reserve community. This report on Longlake 58 will be briefer than that on Aroland with only the interesting points of comparison made and some explanations given of the similarities and differences. This approach is necessitated by the shorter length of time spent on the reserve and the way in which the research was conducted. There was no accommodation available for us on the reserve and so we were forced to live in the town of Longlac, about $1\frac{1}{2}$ miles away. We do not feel we got to know Longlake 58 as intimately as we did Aroland; most of the activities of interest occurred at night and on weekends when we were away from the reserve. Our report on Aroland is a much more complete ethnographic account, with most of the information obtained through participation in the full life of the community, and supplemented by data from more structured interviews. Most of the data presented in this part of the report was obtained almost entirely from 35 interviews which were slightly more structured than the Aroland interviews, but basically covered the same area.

1. General Description

Longlake 58 reserve is situated on the northern route of the transcontinental highway (Ont. 11). The town of Longlac, which is a regular stop on the CNR main transcontinental line, is about $1\frac{1}{2}$ miles away on the other side of the road.

In appearance, Longlake 58 is a fairly neat, attractive community, laid out on a street plan. The frame houses, built by DIAND in the recent past, have been freshly painted in bright colours with the help of a LIP grant last winter. Some of the more affluent residents have quite large and well furnished homes. There is a well-built community centre which has just been enlarged, a skating rink and baseball diamond. A new Roman Catholic church is being built (with the help of a LIP grant); the Jesuit priest lives in a new house in the community. There is a public school on the reserve, but no high school. Students are bussed to Geraldton for high school.

The Indian agent lives in Geraldton, about 23 miles away. The management of the reserve is in the hands of the band chief and a band manager, who acts as welfare officer as well.

2. Demographic Characteristics

The total population of the Longlake 58 band according to DIAND figures for 1971 is 623. Only a portion of those registered with this band actually live on the reserve, however. (Indeed, most of the status

Indians in Aroland are registered at Longlake 58, though they have never lived there.) The on-reserve population at Longlake 58 is estimated at 369.

Birth and death rates are almost impossible to estimate, though large families of more than five children are quite common. There is no evidence that even the younger women are attempting to limit family size. Three female respondents under 25 already had three or more children.

There is widespread drinking, and this has effects on the morbidity and death rates, both directly and indirectly. Money needed for groceries is often spent on liquor or beer, and this is especially true for pregnant women. Informants told of two cases where women either miscarried or lost the baby at birth, allegedly because they drank excessively during their pregnancy.

Drunkenness also plays a part in some injuries and deaths. During the five-week period of our fieldwork one person drowned while drunk; one person died in a car accident because he was driving while impaired; and several injuries occurred during drunken fights.

Even though Longlake 58 has closer proximity to facilities than Aroland, the widespread social and personal disorganization appear to mitigate against any reduction in morbidity or mortality rates.

(see section 6 below)

3. Economics

The major sources of employment for men on the reserve are the Weldwood plant in Longlac, Kimberly Clark, Forestry, and work on the reserve such as carpentry etc. In actual fact, few of the men are employed full-time. Only one man interviewed reported being employed and he had some technical training and worked for Weldwood.

It is difficult to assess what exactly is at the root of this unemployment problem, though it is likely several factors are at play. First, there is the absence of jobs for unskilled workers: few young people have more than a few years of high school and the older men are in an even worse position. Second, there is the poor work record of some of the men. Two respondents reported that they lost their jobs because of continual absenteeism, drinking on the job and so on. These men both expressed their regret at having been so foolish and were trying to find work again with the hope that they might fare better next time. It is not difficult to understand how even those with the best intentions could be drawn into the nightly drinking parties with the resulting damage done to their ability to cope with their job. No doubt there are other reasons as well.

These unemployed men seemed to want to find work. All reported that they went daily or made phone calls to Longlac to look for work but with no results. This brings up the question of why they don't

relocate in Geraldton or some place where jobs are available. With the exception of some of the younger men, it was apparent that there was a deep attachment to the reserve where they had grown up and where their friends and relatives lived. Then there is the added problem of financing this type of move. A man who is unemployed simply does not have the funds to relocate, not to mention the benefits which would have to be forfeited. As long as he stays on the reserve he has a house and DIAND assistance - once he leaves he is more or less on his own.

It is difficult to see an end to the unemployment situation in Longlake 58. Even if a new industry were to enter the area and open its doors to the reserve population, it is difficult to see that patterns of life would change drastically. The idleness, the drinking and the violence are part of the way of life on the reserve and the lack of work reinforces this pattern. But whether simply changing the employment situation would bring an end to the social instability and disorganization is another question.

4. Education

The prevalence of illiteracy in Longlake 58 seems about the same as that for Aroland, with those over 40 yrs. of age having low literacy levels. Again this is a function of the educational system of an earlier age as those who are illiterate report never having attended school.

One surprising factor about the people of Longlake 58 in contrast with Aroland, is the disappearance of Ojibway as the every-day language. Only one woman interviewed spoke mostly Indian and only two others reported they were fluent in Indian. Most people know a few words and phrases in their native language but maintain that they use English almost 100% of the time.

From the interviews conducted it would appear that the level of education is lower in Longlake 58 than in Aroland though one has to be careful in making these assumptions since those interviewed in no way represent a random sample. In the 16-25 yr. age group average years of education is 9 for males and 7 for females. In the 26-39 age group it is 7 and 6.5 for males and females respectively and in the 40 plus group the females fare better with an average of 2 yrs. of education while the males have none.

The figures for the youngest age group are undoubtedly artificially low since all those interviewed in that age group had quit school. There is a sizeable group of students under 16 who are still at school and one can only speculate on the level they might reach. Distance to the high school in Geraldton might play a role; the Longlake students have a much shorter trip than Aroland students and so they might be more disposed to stay in school longer. Home conditions will also play a role with factors such as crowding, fights and other disruptions interfering with a student's ability to do well. In Aroland crowding is a universal problem, while family instability is more highly evident in Longlake 58. In the most part,

there is little encouragement from the parents in either community, and this too has a negative effect on the child's motivation to stay in school.

5. Health

One factor which would seem to work to raise the level of general health in Longlake 58 is the proximity of health services. There is a clinic in the town of Longlac and a health unit trailer on the reserve where the doctor from town visits twice a week. The trailer is also staffed by an Indian who has some training in emergency health care. There is the added factor that the hospital in Geraldton is only 23 miles away as compared to the 55 miles which the people from Aroland must travel to get to the same facility.

Almost half the respondents (12) had been to the doctor in the past month: half to the clinic in Longlac and half to the trailer on the reserve. There does not seem to be any reluctance to use the health services available and many people reported seeing the doctor for minor ailments such as colds, upset stomach, etc. Easy access to the doctor was mentioned by several respondents and is no doubt an important factor in this high level of use.

With the exception of three young people everyone interviewed had been in the hospital at some time, most in the past year. There were three respondents who had gone to the hospital in Thunder Bay, two to hospitals in Winnipeg, and the rest to Geraldton. Just as in Aroland, lung ailments especially pneumonia are a major reason for hospitalization. I heard no reports of anyone confined to the sanitorium for tuberculosis, though possibly there are some cases.

It is safe to assume therefore, that accessibility of health services plays a role in their use though not necessarily in their effectiveness. It is impossible to say whether the general level of health is any higher in Longlake 58 than in Aroland or whether once they get to the doctor either community receives better treatment or at least follows through their treatment with more diligence.

6. Social Control

One does not have to be in Longlake 58 for very long before one realizes that there is extreme personal and social disorganization there, which is in stark contrast to Aroland.

Marital and family instability is a feature of life in Longlake 58 and this is apparent at every turn. There were several instances of common-law relationships, separations and divorces, and a higher incidence than Aroland of single women with one or more children.

Drunkenness and associated vandalism and violence is a weekly, if not daily occurrence. During one memorable weekend party I witnessed fist fights, hysteria, destruction of personal property and child abuse. This type of occurrence is apparently not at all unusual if one is to believe the reports which drifted in every Monday morning.

There is also a high incidence of juvenile delinquency, usually involving theft, vandalism and automobile infractions. The police and social workers are frequently called to the reserve to settle fights, remove children and make arrests. The day the court is in session usually sees a large number of Longlake residents up before the judge.

One is hard put to find the kind of inner and informal control mechanisms at work that are so much a part of the Aroland control structure. It is therefore appropriate that some comment be made about this difference between Aroland and Longlake 58. Doubtless, several factors are involved but one of the main ones would seem to be the difference in economic level. It is not only that most men in Aroland are employed and most men in Longlac unemployed, but it is the meaning given to making a living. In Aroland there is a feeling of pride associated with one's work. A man knows he can provide well for his family by sticking to his job and he is extremely reluctant to let anything, including illness, keep him from that job. There is also the factor of outside activities which keep the people occupied and provide them with entertainment and satisfaction. Families in Aroland are more likely than those in Longlake 58 to go out in the bush for the weekend and this is sometimes directly motivated by a desire to stay away from the drinking parties back home. Also it is a family activity, whereas drinking parties either at home or in the bars is a more or less male pursuit; and Arolanders appear to value their family structure highly.

7. Communication

a. Telephone: About half the households in Longlake 58 have telephones. At one time this proportion was higher, but several families have lost their telephone because of failure to pay the bills. Because access is easier and immediate payment not necessary, more use is made of phones in Longlake 58 than in Aroland.

Ten respondents reported using the phone at least once a day and eight of these owned their phone. Of the eight respondents who said they seldom use the phone (less than once a week) six had no phone of their own. As opposed to the predominantly service nature of the phone calls in Aroland, Longlake 58 residents use the phone most often for personal calls, and most of these are to friends and relatives on the reserve. Some respondents reported that this was their primary means of visiting other people on the reserve. Service calls came after personal calls in frequency; with calling the police being mentioned most frequently. For those without phones the usual practice is to use neighbours' or relatives' phones, and here the phone calls are usually restricted to service and business purposes.

Only four respondents reported making long distance calls in the recent past and in all cases these were calls to relatives in Thunder Bay or elsewhere. There is some concern over the indiscriminate use of the phone for long distance calls, and this was sighted as a major reason for people not having their phones.

It would seem that Longlake 58 residents have adapted to the use of the telephone as an instrument for casual conversation much along the same lines as occurs in any southern community. There exists the ability to "visit" via the phone so that face-to-face communication is apparently not a necessity. A very different situation exists in Aroland where not language but sheer presence of the individual is a requirement for interpersonal communication. This is in keeping with the different demeanor easily observable in the two communities. Longlake 58 residents seem on the surface at least to be more talkative and outgoing as opposed to the more quiet and reserved aspect of Arolanders. Whether the advent of phones in Aroland would change this characteristic or not is an interesting question. One wonders what visiting and communication patterns were like in Longlake 58 before the advent of phones.

b. Newspapers, Magazines and Books: Only one individual reported having a subscription and this was for the Indian News. However, magazines and newspapers are frequently bought in Longlac with about 70% of respondents reporting that they read magazines at least some of the time. The types of magazines most frequently mentioned were comics, true stories and detective stories, with Maclean's and Women's magazines mentioned fewer times.

Three respondents reported reading newspapers often (everyday). In all cases this was the Thunder Bay newspaper. Six respondents reported reading the paper only occasionally and six seldom read a newspaper. The newspapers mentioned were the papers from Thunder Bay the Geraldton paper and the Toronto Star. Fourteen of the 35 respondents said they never read a newspaper.

Three respondents mentioned having read a book recently and in all cases these were pocket books of the detective or mystery type. Only one respondent claimed ownership of books. He said he owned about three books, one of which was a book on improving one's English.

Use of reading materials is apparently higher in Longlake 58 than Aroland though it is of a different nature. Whereas Arolanders read native newspapers and news magazines, Longlake 58 residents tend more towards the comic and true confession type of material which is more of a purely entertainment as opposed to informative type of reading.

c. Television and Radio: Television viewing is much more prevalent in Longlake 58 than in Aroland. Over one-half of the respondents reported watching TV for over 3 hours a day. Their television viewing is also not as selective as it is in Aroland. Most homes visited during the course of interviewing had a TV set operating regardless of the time of day. Choice of favorite programs is also much broader in Longlake 58, though here again soap operas and movies are popular.

Detective shows were mentioned by nine respondents; the fascination with these type of shows lying in their violent nature. One can speculate to what extent this is a reflection of the extreme preoccupation with aggression which is characteristic of reserve life. The young men are especially sensitive about their physical prowess: who can beat up whom and how this can be accomplished (in graphic detail). The young man watching detective shows on television identifies with the virile, aggressive hero who can handle all opponents with his fists and do so with style. Being able to handle oneself physically is a great source of personal pride and satisfaction.

Radio listening follows a similar pattern to that which exists in Aroland, though there is a greater interest in music, especially country and western, and less interest in news and public affairs programs. Only one respondent reported listening regularly to the news on the radio. Nor was this deficiency taken over by TV, since only six respondents said they watched the television news regularly.

In this regard, the greatest difference between Aroland and Longlake 58 is in the critical comment made on the quality of TV and radio broadcasting in the north. Arolanders accept the limitations, but Longlake 58 residents are vocal in their complaints. Each respondent was asked whether he was satisfied with the type of TV and radio he received, but often even before the question was asked criticisms would be voiced. The most common complaint was the limitation of choice. With only one channel, people feel they are compelled to watch programs in which they are not really interested. This is interesting, since it doesn't seem to occur to them to find an alternate form of entertainment when programs they don't like are on. This is in contrast to the approach to television viewing prevalent in Aroland: choose the programs you like and find different activities for the rest of your free time.

Television viewing is the major form of entertainment in Longlake 58. Few families take to the bush in the evenings or on weekends and with the high unemployment rate, many people have unlimited spare time to fill. It is therefore not surprising that they are critical of the TV they receive.

d. Letter Writing: Two-thirds of the respondents reported that they never write letters for other than business purposes; half of this group never write letters at all. This is surprising when one considers that many respondents have relatives in Thunder Bay and elsewhere with whom they are in contact by phone or visits. Writing seems to be used only when other methods are impractical, as when a relative or friend is confined to a hospital or jail in Thunder Bay. There is a greater dependency of Longlake 58 people on telephone and personal contact, which is easier for them since they are not as isolated as Arolanders. There is good bus service from Longlac to points east and west, as well as a local bus running twice daily between Longlac and Geraldton. The only way that one can get out of Aroland is by private car or taxi.

3.3.4 IMPLICATIONS FOR TELECOMMUNICATIONS POLICY

This ethnographic account of two Indian communities has been presented in considerable detail for the implications it has for telecommunications policy, particularly with respect to native peoples. That policy will be informed, in part at least, by the more general policy and goals concerning the position of native peoples in Canadian society: goals that are defined not solely by the Canadian government and by white society but, increasingly, by native peoples themselves. We assume that Canadians are committed to the value of cultural pluralism, and that it is this value that shapes our national policy with respect to all cultural groups within the society, including native peoples. The corollary of this assumption is that cultural assimilation and social homogeneity are rejected as overarching political goals. The conclusion to be drawn from these assumptions is that communications technology is a resource available (though not necessarily equally available) to native peoples to be used in the satisfaction of their needs and aspirations as they define them.

Our study of the Aroland community suggests to us that this particular group of people, at least, has been able to selectively take some institutions from the surrounding white society and adapt them to their own needs and purpose, while rejecting others.

This process of institutional selection is almost complete in the economic sector: entrepreneurial activity, full time employment, a wage economy, purchase and use of consumer goods (cars, freezers, TV, etc.), and participation in public, long-term financial assistance programs (e.g. Ontario housing). But even in this institution the assimilation process has not been total; traditional ways of obtaining food supply are used extensively.

Less total but still considerable is the acceptance of the legal and political institutions of white society: the formal structure of the Community Association, for example, is that of a legal-rational organization, although its informal operation derives at least as much from traditional native patterns of individualism and privacy. These same values make traditional modes of social control effective except in extreme situations when the white man's institutions of the police and the law are accorded some level of legitimacy.

Acceptance of the education and religious institutions is much more partial and superficial; while the traditional institutions of kinship and the family have remained more or less intact.

This pattern of penetration of white into native institutions can be diagrammed thus:

Institution:	White	Native
Economic	██████████	██████████
Political	██████████	██████████
Legal	██████████	██████████
Education	██████████	██████████
Religion	██████████	██████████
Kinship & Family	██████████	██████████

Note that "private" institutions appear to be less susceptible to cultural penetration than those that functionally are more "public". Telecommunications can hasten or impede this process.

If this analysis has any validity then the implications for policy are as follows. Community control of communication systems (particularly TV and video because of the high visual orientation of native peoples) will further reinforce cultural values and normative structures in the "private" sector, particularly with respect to cultural belief systems and the primary institutions of socialization, the family, religion, education. At the same time, community involvement at ownership, management and program levels of communication media, because of the logic of the organizational structure required, reinforced by our hypothesized propensity to adapt "foreign" technological, political and managerial knowledge and adapt it to their own needs, would facilitate the further integration of native and white institutional structure in the more "public" sector. *

On the other hand, where the process of cultural loss has been more extensive, as in the case of the Longlake 58 reserve, but with limited assimilation of the group into white society, community control of communication media could well hasten the process of social and cultural disorganization.

Selective experimentation in different types of communities would test these hypotheses.

* Our use of the public / private dichotomy to characterize institutions closely parallels the external / internal classification of Parsons, "Pattern Variables Revisited," American Sociological Review, Vol. 25, August 1960.

3.4 Aroland Community Model

As described in Section 3.2, one of the objectives of the community model research is to evaluate the usefulness (in the task of model synthesis) of information collected concerning Longlake Reserve and Aroland, which were the subjects of field work carried out during the Summer of 1973, which is reported in the previous Section. Since the study of Aroland was considered the more complete, it was decided to concentrate the initial modelling effort on this community. The aims of the exercise are both to increase our understanding of the role of communications in the community through the modelling process and to aid in the design of future field work such as that planned for the Summer of 1974 (see Section 3.5).

Figure 3.2 is a block diagram representing some of the variables which might be included in an Aroland community model. The demographic and resource structure is similar to that used in the regional model with the addition of nutrition and public utilities, variables which affect the birth and death rates. Measurement of the average level of nutrition is straightforward while utility variables present greater difficulty. At the present time, the contamination and proximity of the water supply are taken to be representative of the level of sanitation utilities in the community.

Both level and style of education must be considered which affect the attitude of the people to the dominant Canadian society, the level of individual stress and the degree to which telecommunications and media services are utilized. The stress-induced social deviance variable can be taken to be the level of alcohol consumption which has been shown to affect the death rate (see Section 3.3).

It should be pointed out that the model shown here is only included to indicate some of the variables which are presently being considered for inclusion in the Aroland model. The final model may contain more or less variables and certainly more specific interactions between variables. A series of discussions has been held which has resulted in more detailed block diagrams for the demographic, resource and employment sectors. These will be discussed in a future report.

3.5 New Field Work

(a) Sociological Aspects.

In our field work of 1973, we studied two very different types of native communities. Aroland, we saw as a community which had been extensively exposed to white influences, but which had maintained many traditional values and pursuits. Longlake 58 Reserve had also been

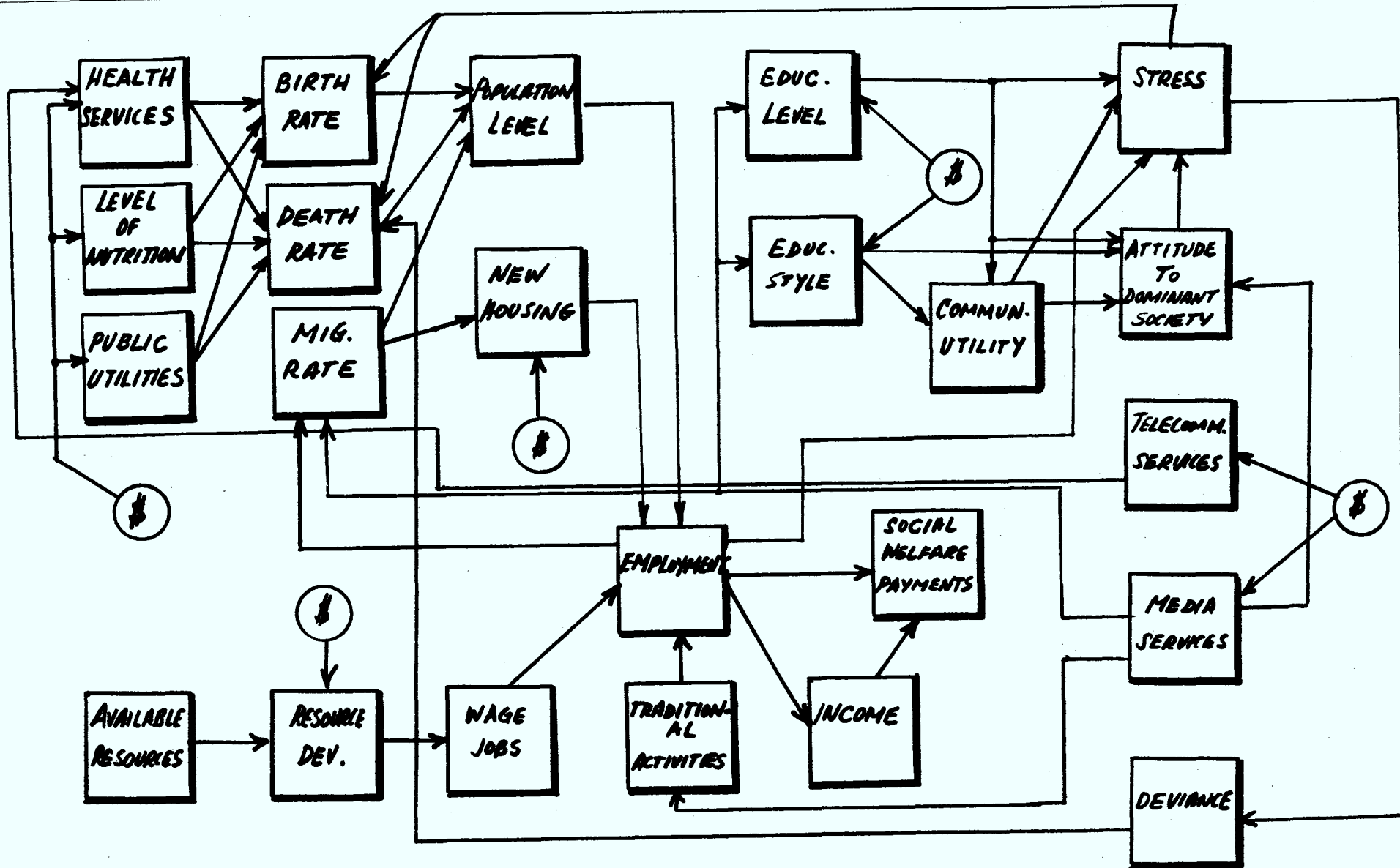


FIGURE 3.2

exposed to outside influences but it had not held onto the traditional way of life, nor had it replaced it with another viable system.

Using Aroland, the community from which we gained the most information, we have begun the process of developing a community model (see Section 3.4). From this model of a very specific community we hope to gain some useful insights into the development of a more general community model.

What we are now lacking is more intensive knowledge of a wider range of communities in northwestern Ontario. For this reason we have chosen Sioux Lookout as representative of a white frontier community and an isolated Indian community (yet to be decided upon) as representative of a traditional native community.

Our approach to the study of Sioux Lookout will, of necessity, be much different from the ethnographic approach used in all previous studies of native communities. The very size and diversity of the population demands some sampling technique whereby different strata of the community will be represented. We also plan to use more structured interviewing techniques, though it should be emphasized that much valuable information can also be obtained through observation and casual conversation. There will also be contacts with young people, people in the service sector (doctors, teachers etc.) and with community leaders so that an overall view of the community can be obtained.

In our interview schedule we are using the household as opposed to the individual, as our unit of analysis. This approach is useful in light of our interest in kinship and mobility patterns, as well as providing a broader range of information in our limited study time.

These areas of mobility and kinship are our prime areas of interest. How we see these patterns developing will have significance when we look at other areas, such as education, employment and communications. The rate of the communications media in facilitating and retarding geographical mobility, to take one example, is of prime importance when one considers the economic and employment situation of the area.

The study of kinship ties gives one an indication of the degree of community attachment and commitment which again has ramifications in many other sectors, such as community participation and decision making.

We will also obtain detailed data on the adult members of the household in the areas of employment history, education, health, government, and use of communications facilities.

While we will amass a certain amount of hard data from our interviews, it is important to note that much information will be of a qualitative nature. The researcher's own impressions are useful, not only in terms of producing a meaningful view of life in the community, but also in terms of gaining a better perspective from which to view model construction.

In our study of a traditional native community our approach will be similar to that used in our previous studies. We will, of course, concentrate on obtaining quantifiable data, where possible, especially in the area of use of communications facilities.

(b) Psychological Aspects

The central purpose of the psychological work for the summer is to extend the bounds of the area covered on the continuum of community "level of acculturation" within the geographical region being studied. Sioux Lookout will provide a control, as a predominantly white settlement representing the larger society, and, hopefully, the second community will represent the other end of the scale, having less contact with white society than either Longlake or Aroland.

All of the measures used in last year's research will be applied in the new communities. Of special interest will be the tests of auditory perception: explanation must be sought for the low level of performance evident in the samples measured thus far. Some possible influences include low auditory differentiation, a high rate of auditory defects related to the high incidence of ear infections, and unfamiliarity with the testing procedures. Replication of the testing and observation within this year's communities should provide some ideas about this problem. In addition, other possible influences on the rates of use of telecommunications equipment will be investigated.

With regard to the community model, the psychological variables presently under consideration will be examined for applicability to the new communities, and other variables relevant for all communities will be sought.

(c) Biological Aspects

Three main sectors of biology, in its broadest sense, are to be investigated: resource ecology, the ecology of pollution and human biology. This compartmentalization is made with dynamic interactions between the three compartments implicitly understood. Clearly pollution affects human biology; and human biology affects pollution. Resource ecology, likewise, interacts with pollution.

The relationship between human biology and resource ecology is somewhat more obscure. Research work concentrating on this interaction will be relatively less comprehensive, considering the subtlety and range of interrelationships between resources and the biological situation of a human population (see Figure 3.3).

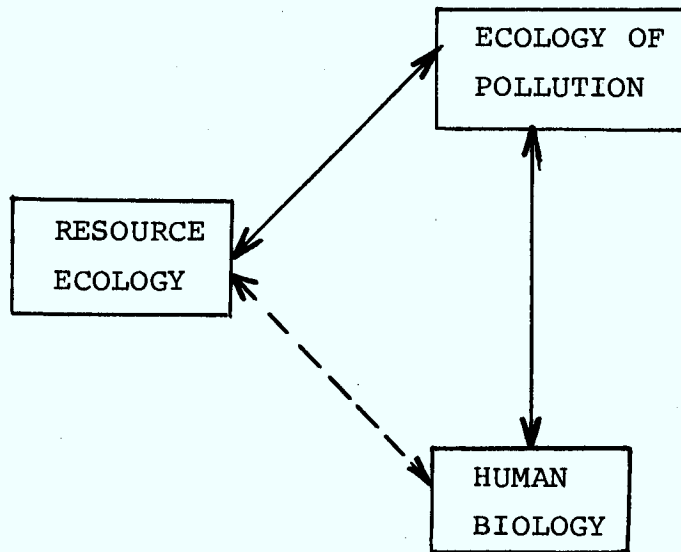


FIGURE 3.3

(i) Most of the data to be used in modelling resource ecology is to be gathered from archival sources. Government statistics, corporate records, and departmental reports will provide much more comprehensive information than could be yielded from work in the field. The scope of information needed is simply too broad for primary research to be feasible.

Expert opinion will be employed to generate model parameters which not only reflect the data, but are also reasonable when examined in terms of the ecosystem as a whole. In addition, a selection of the professional literature on the topic shall be employed to develop the model structure.

(ii) Information for the modelling of pollution ecology will be assembled in a manner similar to the above. However, since this is a more controversial and contested

area of ecology, the literature search will necessarily be of greater depth and range. Organizations like Pollution Probe may be used as supplemental sources of information. All sources will be closely scrutinized in view of the extensive misinterpretation of data in this field.

A simple field test may also be employed. One such field test would be a water contamination assay. In light of the fact that most of these kinds of tests have already been reliably performed by Dept. of Health personnel, such tests are of low priority.

(iii) Research into various aspects of human biology will also be primarily reliant on statistics. The main areas of concentration will be epidemiology and nutrition. Some genetic, especially racial, factors may be incorporated. These will probably not be emphasized.

The community will be considered in terms of the medical/ecological surround it provides for the human organism. By employing this kind of context for research into human biology, the data will be more readily interpretable in systemic terms, thus facilitating the modelling process considerably.

Questions relating to medical complaints, preferred foods, frequently consumed foods, etc. may be incorporated in the sociological interview schedule. It is doubtful that any incisive data can be gathered in this fashion, though such data could be of suggestive value. Local medical staff will be interviewed to provide some expert opinion as to a particular community's epidemiological status.

3.6 Sioux Lookout Demographic Data

From our experience with the Aroland and Longlake field study, the need for preliminary research about a town before entering for field work, is fully appreciated. We have, therefore, collected some important data about Sioux Lookout which will be beneficial for our field study in that community.

Sioux Lookout is a predominantly white town in the Kenora Territorial District, situated in the Kenora-Rainy River Federal Electoral District. It comprises four enumeration areas. It has the structure of an incorporated municipality represented by a mayor.

Population

<u>1921</u>	<u>1931</u>	<u>1941</u>	<u>1951</u>	<u>1956</u>	<u>1961</u>	<u>1966</u>	<u>1971</u>
1,127	2,088	1,756	2,364	2,504	2,453	2,667	2,530

Population in the Sioux Lookout community has shown a general increase in its past history. Between 1961 and 1971, it had a population rise of 3.1%. Males and females appear to be almost equally represented.

Birth and Death Rates:

Sioux Lookout's birth rate illustrates a gradual decline, as is the trend for most of Canada at present. Its rate, as of 1971 was 26.1 births per thousand population; this exceeds Ontario's birth rate of 16.9 per thousand. The community experiences a very high infant mortality rate of 45.5 deaths per thousand live births (1971). Sioux Lookout's total death rate during this same year was 10.7 per thousand population; the province of Ontario's rate was 7.4 per thousand.

Migration:

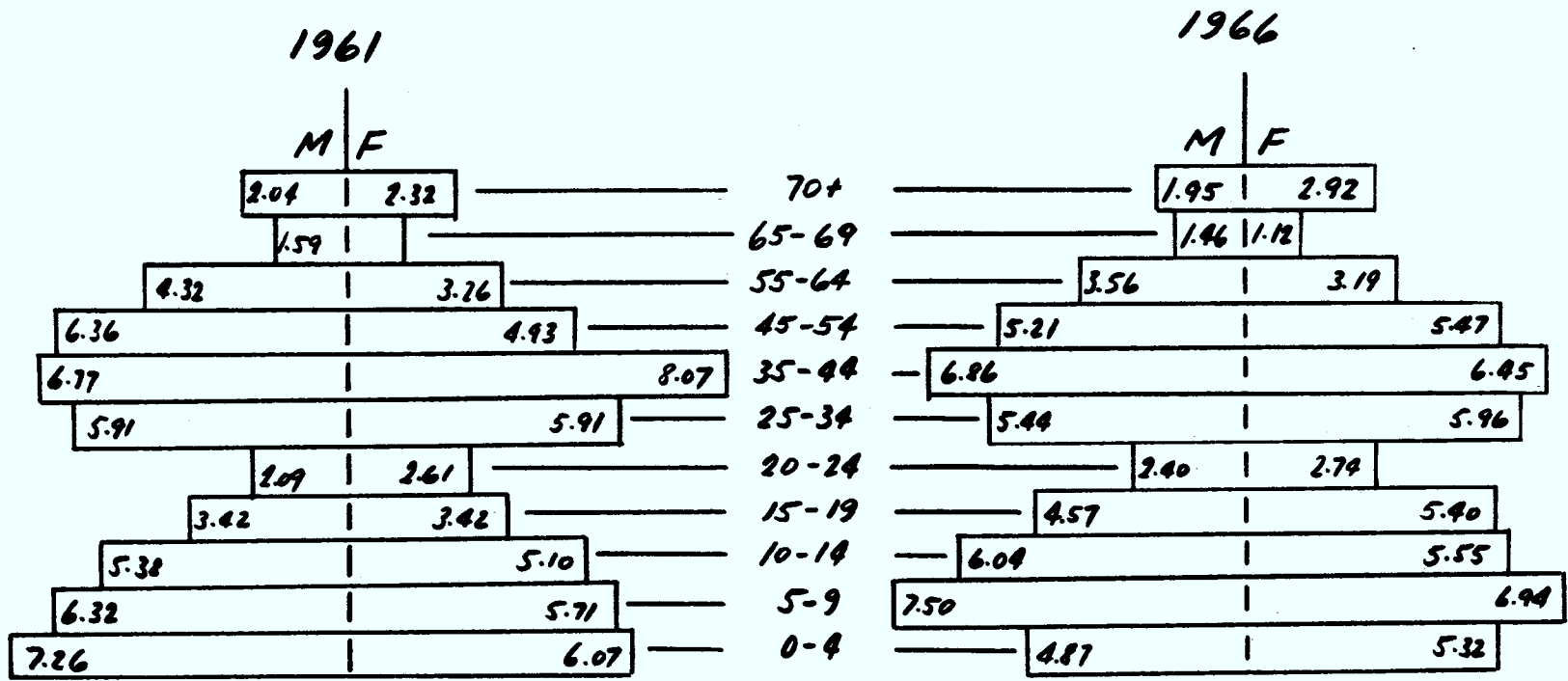
Actual migration statistics for communities the size of Sioux Lookout are not published, hence we have only been able to derive aggregate totals of net migration using the formula: $\text{Net Migration} = \text{Total Population Increase} - \text{Net Natural Increase (Births - Deaths)}$.

Sioux Lookout has a most interesting migration pattern, not at all representative of Ontario. It experienced a net loss, owing to out-migration during the period 1961-1966 of 106 persons. During the years 1966-1971, this loss was even higher, at 313 persons. This outflow phenomenon is typical of the whole Kenora and Rainy River regions.

This year in our field work in Sioux Lookout, it will be helpful to investigate which segment of the population exhibits the highest mobility tendencies. According to the analysis of population pyramids drawn up from census break-downs of population by sex and age, for 1961 and 1966, it appears that the 15-24 age group of both males and females is vastly under-represented in Sioux Lookout. For a comparison with the population pyramid for all of Ontario in 1966, see Figures 3.4 and 3.5. The largest segment of the population is the 35-44 age group, which is uncommon. Such divergences, we anticipate, will provide interesting results in our interviewing.

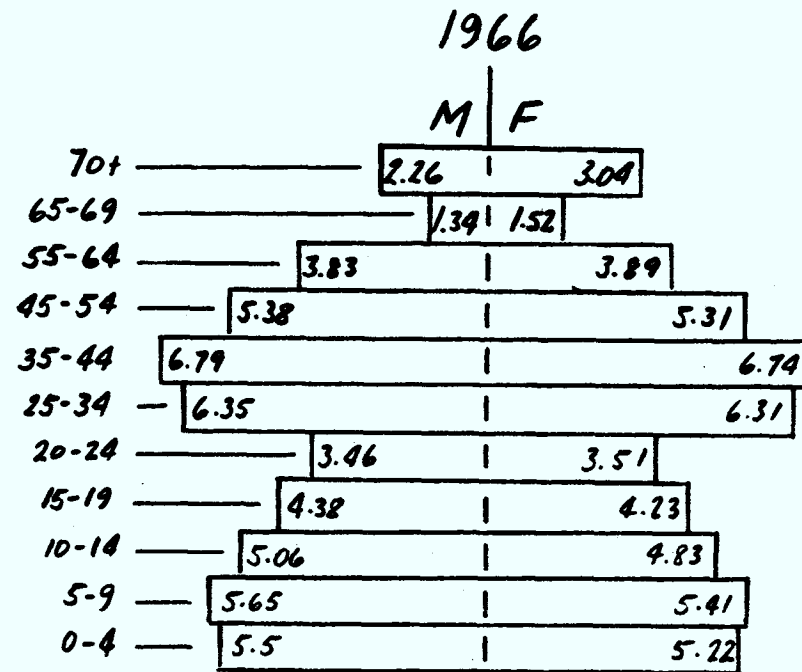
Households and Families:

As opposed to our individual interviewing technique utilized last year in Aroland and Longlac, this year we intend to interview by households. Sioux Lookout has shown a 21.5% increase in households from 1961-1971, now registering 730 such dwellings. There were 3.4 persons on the average per household, in 1971. This



SIoux LOOKOUT

FIGURE 3.4



ONTARIO

FIGURE 3.5

figure per household has decreased from 3.9 in both 1961 and 1966.

Of the 730 households existent in Sioux Lookout in 1971, 500 were owned and 230 were rented. The rented households may possibly be indicative of transient population, or at least less permanent persons. Since 1961 rented households have shown an increase of 94.9%, while owned households have increased by only 3.5%. It is hoped that results of our interviewing will explain this phenomenon.

We acknowledge that families do not completely comprise household units, though they are by far the majority. There were 604 families in Sioux Lookout as of 1971. This was a 6.7% increase over 1961. Since there were 2,235 persons in 604 families in 1971, the average number of persons per family is 3.7. This number has decreased from 3.8 in 1961 and 4.0 in 1966.

Ethnic Groups and Mother Tongue:

The 1961 census was the last to publish pertinent data on ethnic group break-downs. Though this information is dated, we think it is still significant enough to the community to be utilized in our study. According to the census, almost 45% of Sioux Lookout were British Isle descendants; 10.7% Italian; 10% Ukrainian and 8.6% French. There is only a fringe population of about 1.6% native Indian or Eskimo people in Sioux Lookout.

According to the 1971 census, 77.9% of Sioux Lookout registered English as their mother tongue. French was represented by 4.0% of the populace there. This leaves 18.2% of Sioux Lookout with neither French nor English mother tongue. Through our field research this summer, we hope to obtain more applicable data.

Religion:

The 1961 census classified Roman Catholicism as representing 39% of the Sioux Lookout population. In descending order, the United Church and the Anglican Church claim relatively large minorities as well.

3.7 Sioux Lookout Other Data

Employment:

In the community of Sioux Lookout, the economic activity appears to be concentrated in the non-basic spheres, such as the government services and tourism. Manufacturing employs less than 100 persons. As of 1972 the employing industries in Sioux Lookout consisted of: the Canadian National Railway, Lac Seul Land and

Lumber Sawmill and Chipping Mill, pulpwood and sawlog cutting, fishing, construction and contracting, and the Allfar Manufacturing Company. From its past performance, Sioux Lookout has been labelled a slow-growth community with limited growth prospects. It is a region of very low average income. As of 1966 the average income per taxpayer was less than \$5,000. per year.

Government Services:

Sioux Lookout is moderately well represented by both provincial and federal governmental services. Provincially there are departments in: Health services, Justice and Attorney-General, Lands and Forests, Public Works, Social and Family Services, Mines and Northern Affairs and Transport & Communications. It has federal government services in: National Health and Welfare, Forestry, Indian Affairs and Northern Development, Manpower and Immigration, Transport, Postal Services and the Canadian Broadcasting Corporation.

The town is classified as having a predominantly non-basic economy, with 79.5% of the economy in this category. It can be assumed then that a large segment of the population is employed in government services or in areas such as tourism and recreation. Sioux Lookout has recreational facilities of a provincial park and a ski area.

The community of Sioux Lookout has two hospitals: the Sioux Lookout General Hospital is a municipally owned public hospital, and the Sioux Lookout Zone Hospital is a federally controlled hospital of the Department of National Health and Welfare. The General Hospital has facilities of 50 beds and bassinets normally set up for use, with 63 full-time personnel on staff. The Federal Hospital has a 70-bed capacity, plus 5 bassinets and 2 incubators. It employs 90 full-time personnel.

There are five education institutions in Sioux Lookout. Three are primary public schools, one is a high school, and one other is a special school. The nearest universities in the region are located in Thunder Bay and Winnipeg. This may be a minimal factor in the high out-migration of the 15-24 age bracket.

Transportation and Communications:

Sioux Lookout is well served by railway transportation. It is on the Canadian National Railway transcontinental east/west line as well as the south line to the Lakehead. The community has a Department of Transport Airport, with paved runways, and there are innumerable water airstrips. It is also serviced by charter airlines, truck transportation companies and a Sioux Lookout Bus Line.

In terms of the communications aspects of our study, we recognize that Sioux Lookout must be approached in a

different manner than the Aroland and Longlake study. Sioux Lookout has a more highly developed network of communications, and will therefore, present more complex problems in modelling. The town of Sioux Lookout has its own CBC television (CBWDT) and radio relay stations but originates no broadcasting of its own. Outside of the local CBC radio station, radio signals are also received from the Winnipeg and United States areas. The nearest truly local radio station (originating its own programs) is in Dryden (CKDR) and is controlled by Lake of the Woods Broadcasting Co. There is, however, a rapidly growing interest in the development of local radio programming in Sioux Lookout itself. It will be interesting in our study to compare these more complex communications influences on the town of Sioux Lookout, with the limited influences affecting Aroland and Longlake.

Sioux Lookout, as well, has its own newspaper, the Daily Bulletin, which was established in 1936. This paper has a circulation of 901 and is published daily in the evenings, except on Saturdays and Sundays. It claims itself to be independent in politics.

The telephone network in Sioux Lookout is serviced by Bell Canada. Of significant note also is Sioux Lookout's Indian Fellowship and Communication Centre (established by the Ontario Department of Mines and Northern Affairs). This agency is the location of a central radio-telephone network establishing communication links with most northern Ontario settlements. It is an attempt to bridge the difficulties of the low degree of connectivity between other places in the same area.

3.8 Other Plans:

In order to provide background for the general community model, a comprehensive literature search will be performed. There is abundant material relating to the resource, economic, population and other aspects of community organization. From this variety of sources the modelling process will be fertilized by a diversity of viewpoints on the social, economic, and other systems which create community structure. Further, some reliance on the literature will result in a study more readily comprehensible in terms of other work, and thus more generally accessible.

4. BIOLOGICAL ASPECTS OF COMMUNITY

4.1 Introduction

Beginning in early 1974, the research team has been augmented by a biologist (Dr. F. Cooke) and a full-time research assistant. It was felt that the role of the environment and its limitations was an element missing from the regional model study and would be increasingly important in the community model studies. This Section is an attempt to put forth an ecological viewpoint of the dynamics of a community moving from a "natural" state, linked closely with the ecology of the region, to a "technological" state dependent on the economy of the outside world. This viewpoint may prove useful in defining variables in the community models which describe the transition of a community from, say, a traditional style to a style typical of a community in southern Ontario. Since telecommunications may be an influencing factor in how and if this transition is made, it is important that we examine all possible ways of depicting these types of changes. Too, it is useful to be reminded of the ultimate dependence of technological communities on the environment, especially from the standpoint of disruption caused, in part, by environmental contamination.

4.2 Biological Foundations of Community

All human populations, and thus all communities, have the same basic needs. These are food, water, shelter, fuel and clothing; all essential to the maintained viability of human organisms. Secondary needs, for such things as health services and recreation are not as basic, though certainly important. By considering the dynamics of community in terms of these biological necessities, the fundamentals of community dynamics, rather than the more ancillary aspects, are emphasised.

Though the biology of human life is more or less constant in any given geographical region, the response to the biological situation will vary between communities of differing technologies. One simple criterion for classifying these cultures may be based on the extent to which upper level technology is used by the community to meet its needs. We assume upper level to mean industrial level, and higher, technologies. Using

this typology we may posit a sequence from "natural"* (i.e., low level technologies) to technological communities (high level technology), along which the methods used to support life vary. Doubtless other typologies may be employed. However, this one is most convenient for our purposes.

In northwestern Ontario there is a reasonable spread along the natural to technological community continuum. This continuum is parallel and related to patterns among these communities' social structures. Since the cultural continuum may be linked with the kind of technology employed to meet biological needs, variation in the approach to accomodating such needs provides a worthwhile foundation for the dynamic modelling of northwestern Ontario communities. To illustrate this claim two extremes of community type, one natural and one technolgical, will be considered in biological terms, with the emphasis on showing how the ecology of the community situation is an integral part of the community dynamics.

4.3 Biology of the Natural Community

The most elementary aspect of the biology of the natural community is its ecological health. The size of the community, its overall viability, and so forth, will be closely tied to the immediate ecosystem. The feedback controls to which the population is subject will, in the main, be ecological or social adaptations to ecological constraints. If the ecosystem suffers a low energy input in a given year, with a resultant decrease in food availability, the community will starve and the population will decrease (sometimes aided by social factors, as well). If the water supply is badly contaminated, epidemics and heavy mortality will result. Thus the natural community may be considered to be primarily ecological in dynamics.

Water, food, fuel, clothing and shelter must all be generated from sources within the immediate ecosystem. Since a natural community will not have efficient transportation services, it must have its own water supply, harvest its own food, make its own clothes, and build its own shelters. Thus the natural, ecological community is supported by its immediate ecosystem only, resources from other ecosystems not being available. This may be described as a geographical restriction of the community resource base.

Natural communities are, in the ecological sense, conservative. The same hunting ranges will be used from generation to generation; the same water supply is relied upon down through the decades. If the community were to

* One example of a natural community is the original Indian hunting community, with its use of simple tools and weapons.

deplete its game populations it would starve. Thus sustained expansion of the community economy is impossible; the ecology/economy is steady-state. The overall teleology of the community dynamics maintains the maximum stable population based on naturally renewing resources. In addition to ecological limiting factors, there are usually social adaptations to ecological constraints which contribute to the normal population regulation mechanisms.

In such a natural community, "pollution"*, as such, rarely exists to any important degree. If the population were to foul the ecosystem in any significant way, negative ecological feedback would act to reduce the population to a level where it didn't pollute the ecosystem significantly. Such feedback mechanisms include disease outbreak, food toxicity and food resource disruption. To summarize, a natural community will possess a low pollution rate, a stable resource ecology and a regulated population size; such a community ecology will be indefinitely sustainable.

4.4 Biology of the Technological Community

The technological community is in large part uncoupled from the ecosystem. Such communities are not, in general, subject to biological feedback controls; uncontrolled epidemics, massive starvation, etc., do not usually occur, no matter how fouled or sterile the immediate environment is. Instead, the community is dependent upon the economic situation: recessions, booms, and so forth. Thus, in their normal condition, technological communities are subject to economic, rather than biological, feedback controls.

These economic feedback controls are only ultimately dependent on biological and physiographic factors. Since a technological community is only part of a network of communities - all of which exchange resources through trade - these biological and physiographic factors act upon these interdependent communities as a whole, subject to economic disparities. And it is through the net effect on these communities that, in an indirect fashion, the individual community is regulated. This situation may be described as a geographic extension of the community's resource base, enabling it to operate beyond its ecosystemic limits.

It is the nature of technological communities to have expansionist economies. There is an emphasis on continually increasing production and consumption. This is an economy which, in ecological terms, emphasizes the flow of ever increasing quantities of energy (packaged as products, services, etc.); resources are

*Pollution is defined here as the disruption of closed cycling of materials and energy in the ecosystem, as well as the introduction of contaminating materials from outside of the ecosystem.

rarely recycled. This is made possible by exogenous (i.e., from sources external to the community's immediate ecosystem) input of raw materials and power, in conjunction with an increasing population (reproductively, or through immigration) provided with a largely exogenous food supply.

This is not to say that all technological communities have expanding economies and growing populations; clearly some do not. However, such expansion is the goal which the teleology of technological community dynamics tends toward. All technological communities act to maximize the quantities of goods and services producible and consumable by the largest population.

Perhaps the most important ecological facet of the technological community is its dependence on exogenous resources. Such dependence is, of course, most crucial in the case of food and water needs. Further, the greater the flow of goods and services (which the dynamics usually act to maximize) the more concentrated is the population and industry of a technological community. This results in an abandonment of endogenous food production and the pollution of any endogenous water resources. Thus, the more economically successful the technological community, the more it is dependent on trade to obtain its biological needs.

Each unit of energy, in the form of processed materials or power, flowing through the system will result in some "leakage" or waste (i.e., pollution). Thus an increasing flow of energy through a community of given size will inevitably result in increasing pollution. Further, the emphasis is on through-put of energy in technological economies, to say nothing of the expansionist tendencies. Thus natural resources will be consumed in a non-recycling fashion; they will inevitably be depleted. Since the food supply is supplemented, the population size is not subject to normal ecological restraints. Thus the population density may exceed the carrying capacity of the community ecosystem.

4.5 From Natural to Technological; Economic Development and its Biological Consequences

In general, all Canadian communities are moving toward the technological end of the scale. This is economic development, in a broad sense, a near universally valued process; it has even been termed "progress". Most communities, and all governments and corporations, favour more goods and services, more employment, better jobs, and so on.

Economic development has certain biological consequences which become important considerations in modelling communities which, on the whole, will tend to be of an increasing technological nature. From the discussion of the technological community it is clear that an extended resource base is involved, with many of the biological essentials obtained from exogenous sources. The biological necessities are caught up in the community's economic behaviour. Hence the community is economically, not biologically regulated, at least in its normal state. With an emphasis on technology, there is an increasing conversion of resources into economically useful, rather than ecologically useful, objects. Thus highly processed, highly marketable foodstuffs of minimal nutritional value may be produced in a technological community. A natural community could not risk such ecologically wasteful efforts.

The transition from natural to technological community-type is an essentially irreversible process. The economically developed, urban community completely disrupts the normal functioning of the immediate ecosystem. Once extensive areas of land have been paved or excavated they are of no further use in cultivation. The problem of waste disposal, especially sewage and effluent, renders endogenous water supplies useless by destroying the normal aquatic life forms and replacing them with blooms of bacteria and algae which can live off such wastes. These replacement organisms completely foul the water. Thus an increasingly technological community not only exceeds the carrying capacity of its ecosystem, it also reduces the carrying capacity.

It follows that the most important biological feature of the transition from a natural to a technological community is a decrease in ecological self-sufficiency. The natural community is independent, having adequate endogenous resources for community survival. The technological community is reliant upon exogenous resources, especially for fundamental needs like food and water. The degree of endogeneity vs. exogeneity of vital resources is a key facet of a community's dynamics.

4.6 The Role of Telecommunications

In terms of endogeneity vs. exogeneity, telecommunications may, in some cases, play a crucial role. Given a community, such as may be found in north-western Ontario, which is not accessible by normal means of communication, telecommunications could well be the vital link between that community and the outside world.

The "outside world" is, in this case, technological society. Most of the isolated communities are closer to the "natural" end of the scale. Clearly, telecommunications linkage will affect the endogeneity, and thus the "naturalness", of the community.

A loss of endogeneity could be the result of one or all of the following circumstances. With increasing communications, economic ties may become stronger, especially when government support is provided. Telecommunications could facilitate the development of "technological tastes" among the members of the natural community, resulting in a greater tendency to consume ecologically inefficient products. This would undermine the ecological health of community.

Along with the introduction of telecommunications may well come an increase in education for functions or jobs useful only in technological societies. Traditional skills, of use primarily in the harvesting of endogenous resources in an ecosystem maintaining fashion, would be lost as the community became more and more educated to life in a technological society.

To conclude, telecommunications may well alter the ecological effects of a natural community by changing its dependence on, or attitudes to, the ecosystem.

Appendix A.1

PERSONNEL INVOLVED IN THE PROJECT
DURING 1973-74

The following persons at Queen's University have been involved in this project in the roles indicated.

(a) Co-investigators (all unsalaried except Dr. L.E. Peppard)

Dr. J.C. Beal, Associate Professor, Department of Electrical Engineering. Overall coordinator of the project; part-responsibility for communications technology aspects.

Dr. J.W. Berry, Associate Professor, Department of Psychology. Responsible for pscho-cultural aspects in close cooperation with Professor K.A. Herman.

Dr. F. Cooke, Associate Professor, Department of Biology. Responsible for biological aspects.

Dr. G.E. Dawson, Assistant Professor, Department of Electrical Engineering. Responsible for natural resources aspects in close cooperation with Professor J.G.M. McKirdy.

Dr. C.E.S. Franks, Associate Professor, Department of Political Studies. Responsible for political aspects.

Prof. K.A. Herman, Assistant Professor, Department of Sociology. Responsible for sociological aspects in close cooperation with Dr. J.W. Berry.

Prof. J.G.M. McKirdy, Assistant Professor, School of Business. Responsible for economic aspects in close cooperation with Dr. G.E. Dawson.

Dr. P.J. McLane, Associate Professor, Department of Electrical Engineering. Part-responsibility for communication technology aspects and close cooperation with Dr. L.E. Peppard on the development of the modelling process.

Dr. L.E. Peppard, Research Associate and Special Lecturer, Department of Electrical Engineering. Assistant coordinator; central responsibility for the development of the modelling process.

(b) Graduate Students

J. Aitken, M.B.A. student, School of Business.
Working with Prof. J.G.M. McKirdy and Dr. G.E. Dawson.
(April - May 1973)

R. Cameron, M.B.A. student, School of Business.
Working with Prof. J.G.M. McKirdy and Dr. G.E. Dawson.
(April - May 1973)

R. Chambers, M.A. student, Department of Political
Studies. Working with Dr. C.E.S. Franks.
(April - August 1973)

Y. Vautrin, M.B.A. student, School of Business.
Working with Prof. J.G.M. McKirdy and Dr. G.E. Dawson.
(July 1973 - March 1974)

(c) Undergraduate Students

J. Kane, B.A. student, Department of Psychology.
Working with Dr. J.W. Berry.
(April - August 1973)

J.A. Love, B.Sc. student, Department of Electrical
Engineering. Assistant on general modelling.
Working with Dr. L.E. Peppard.
(January - March 1974)

L.N. Mombourquette, B.A. student, Department of
Sociology.
Working with Prof. K.A. Herman.
(January - March, 1974)

M. Rose, B.Sc. student, Department of Biology.
Working with Dr. F. Cooke.
(January - March 1974)

(d) Other Assistants (with various degrees of part-time involvement)

R. Adomavicius, B.Sc., Mathematics and Engineering.
Assistant on general modelling, resources sub-model,
and general data collection.
(April - August 1973)

T.A. Mawhinney, B.A., Psychology.
Working with Dr. J.W. Berry.
(February - March 1974)

H.K. Tang, B.Sc., Electrical Engineering.
Assistant on Communications.
(April - August 1973)

Other Assistants - Cont'd.

V.G. Weinreb, B.A. Sociology.
Working with Prof. K.A. Herman.
(April - August 1973; March 1974)

Secretary:

Mrs. F.G. Kennedy, (approximately half-time).

Appendix A.2

PROJECT REPORTS AND WORKING PAPERS

(Available on request from the coordinator.)

<u>Report No.</u>	<u>Author</u>	<u>Title</u>	<u>No. of Pages</u>
Q. 1	R. Chambers	Government Involvement in Northern Developments.	57
Q. 2	L.E. Peppard	Forrester Modelling and Flow-Diagrams: An Introduction.	12
Q. 3	H.K. Tang	Ontario Hydro in NW Ontario.	5
Q. 4	H.K. Tang	The Anik Satellite System.	5
Q. 5	H.K. Tang	The Unfinished Mystery of Radio Kenomadiwin.	6
Q. 6	H.K. Tang	Telephone Service in NW Ontario.	9
Q. 7	K.A. Herman, G. Weinreb.	Demographic Profile of Northwestern Ontario - with detailed statistics.	28
Q. 8		1st Progress Report to Communications Canada (dated 11 Jan. 1973) on this project, covering the period 1 July - 31 Dec. 1972.	53
Q. 9	R. Adomavicius, L.E. Peppard & G. Weinreb.	Report on Visits to Interdisciplinary Modelling Projects at Oregon State University, and the University of British Columbia.	22
Q. 10		Question Form - QUIST Community Study, 1973.	4
Q. 11	R.J. Adomavicius & L.E. Peppard.	Causal Description of the Regional Model.	17
Q. 12	R.A. Cameron	Dynamic Model of a Forest Tract.	65
Q. 13	J. Aitken	Telecommunications and Regional Development.	70
Q. 14		1st Annual Report to Communications Canada covering the period 1 July 1972 - 31 March 1973.	41

Appendix A. 2 Cont'd.

Q. 15		Digital Computer Programme for NW Ontario Regional Model.	24
Q. 16	G. Weinreb, K.A. Herman.	The Social Model - Report of Field Work (in Aroland and Long Lac).	25
Q. 17	J. Kane	Perceptual Differentiation in Ojibway and White Populations.	26
Q. 18		2nd Progress Report to Communi- cations Canada covering the period 1 April - 30 September 1973.	60
Q. 19	Y. Vautrin	A Dynamic Model of Tourism and Recreation in Northwestern Ontario.	85

- NOTE:
- (i) Q. 1 to Q.16 were previously listed in the 2nd Progress Report.
 - (ii) Q.16 is also included in the main part of this present report.

Appendix A.3

PUBLISHED PAPERS ARISING FROM THIS WORK.

1. L.E. Peppard, R.J. Adomavicius, J. Aitken, J.C. Beal, J.W. Berry, G.E. Dawson, C.E.S. Franks, K.A. Herman, J.G.M. McKirdy, P.J. McLane, H.K. Tang and G. Weinreb, "The Application of Dynamic Modelling to a Multi-disciplinary Study of Telecommunications Impact on Developing Regions", International Electrical Electronics Conference and Exposition, Toronto, Ont., Oct. 1-3, 1973.
2. J.W. Berry, "Education Communication and Housing in Northern Canada: Applications of Cross-Cultural Psychological Research", American Psychological Association, Annual Meeting, Montreal, August 1973.

