Chapter XI: CORDS RESEARCH: FINDINGS, CONCLUSIONS:AND INTREPERTATION

By J. Beaman, E. Avedon, T. Stewart

Some readers, may have expected the final CORDS report to indicate national and provincial recreation resource requirements for the next decade or so. An objective such as this could never have been reached for a multiplicity of reasons. In general, these reasons fall into three major groups: administrative, epistemological, and data collection. The three final volumes of CORDS document these reasons.

Volume I in this series indicates some of the problems inherent in CORDS within an administrative context. The Volume describes the massiveness of the undertaking, and management problems which both helped and hindered the conduct of CORDS. Volume I also examines the many CORDS issues related to the interaction between policy, planning, and research.

Volume III describes the empirical issues confronted in CORDS. An attempt has been made in Volume III to illustrate the many problems inherent in collecting and processing national data. Issues regarding sample design,

Questionnaire construction, data collection, computer processing, and the like, are described in detail, in order to offer readers the opportunity to learn from the mistakes made during conduct of CORDS.

Volume II_I in contrast, is indeed "the heart" of CORDS. Very early in the conduct of CORDS it was recognized that numerous epistemological issues had to be solved before much "true" CORDS analysis could take place. The "deeper" CORDS researchers became involved with epistemological issues, the more they found themselves on the periphery of demand analysis methodology. They found that they were "forced" to go beyond what was known in order to attempt to achieve CORDS objectives.

Thus, although the original CORDS design did not envision methodological research as the dominant focus of CORDS, the sheer massiveness of this latter undertaking (of necessity) overshadowed all other aspects. As a consequence, CORDS research (in spite of a range of severe limitations) has made a major technical contribution, not only to the nation and to the provinces, but to recreation research in general. Volume II offers readers a knowledge of what CORDS researchers have learned within an epistemological context.

This chapter then, is an attempt to summarize epistemological contributions of CORDS, (those which seemed particularly important in the research context of the authors as of 1976) and indicate some of the questions that are still to be answered through future research efforts.

DESTINATION MODELLING

TN I established that a systems model could be defined to explain the day-use of parks. The model is a systems model because of the manner in which the alternative factor is defined. Since almost no variance was associated with the alternative factor or with the attractivity factor, these factors had no practical importance. (However, it must be noted that the regression analysis carried out was not completely valid, and thus the variance explained by the entire systems model is open to question.) This latter issue is explained in some detail in TN 19 and 35. Nevertheless, despite the structural problems in the model, some progress in this aspect of CORDS has been made. The model used for the analysis presented in TN 7 relied upon the model derived in TN 1; consequently, there is nothing that can be learned about the empirical validity of the model presented in TN 7. A lack of availability of data and better models prompted the approach presented in TN 7 and also provides insight into the research needs alluded to in TN 30 and 40.

The potential for formulating a good enroute-overnight park-use model was illustrated in TN 18. A concern for the accuracy of potential estimates is illustrated by the strategy of developing a model for one set of parks and then using the model to predict the use of another set of parks. However, it is an open question as to whether additional effort should have been made to examine alternative structures for the model. Availability of adequate data was a major problem in developing the model in the first place, and this prompted the formulation and testing of only one model structure. TN 18 perhaps serves as an object lesson for researchers who try to do more research than is feasible with the data they have at hand.

Basic parameters characterizing park-use (as indicated in TN 4) can be derived with a minimum of assumptions about how characteristics of origins of park users influence the emissiveness of the origin, and about how attractiveness of parks should be defined. Fortunately, the original research plan for TN 4 was altered, since the analysis proposed was not feasible with the type of data under consideration. In this instance, reliable alternative data were obtained; however, certain key data on visitor types, length of stay, weekend or weekday use, and the like, were not available, indicating once again the need to carefully plan data collection. The results obtained should not be construed as an indication that a "good" model had been developed. (See TN 35 and 11.) Much of what one might think can be learned about participation at various destinations is not to be found in the attractiveness or emissiveness coefficients computed. Comments regarding structural shortcomings in this model are presented in TN 11 and 33. These comments also foreshadow the difficulties inherent in generalizing a model.

In order that the reader not be misled about application of TN 4 results, TN 11 attempts to make clear that emissiveness values should not be expected to be a "fundamental" parameter of a city. These parameters almost certainly depend upon the aggregate demographic characteristics of the city's population, and to a greater degree, reflect a city's relationship to its supply of resources for recreation. TN 9 and TN 33 indicate that there is good reason to believe that attractiveness measures are deceptive, in that they are not simply a measure of the attractiveness of a particular park. Seemingly, other parks around a given park influence the attractivity of the park in question. Attractiveness and emissiveness parameters cannot be computed for the use of a new park using TN 4 methods.[1] A model for which parameters can be estimated is presented in TN 11 and it is predicated upon reasonably plausible behavioural assumptions. As a consequence, even though both the TN 4 models are structurally compatible, the model presented in TN 11 can theoretically result in more than parameter estimates. This is because the theoretical formulation presented in TN 11 indicates how park-use varies with the supply for a given model. Extending this approach (as in TN 33) can permit the development of more structurally sound models. Unfortunately, although several variations of the model could have been formulated, this did not occur.

A useful perspective for modelling behaviour is presented in TN 8. Researchers often employ one model to explain park visits on both weekdays and weekends. There is no reason to believe that weekday park-use should be "explained" by the same model which is used to "explain" weekend behaviour. This is also true for different types of park-users. TN 8 offers suggestions for the kinds of functions to be derived for these different types. (TN 40 comments on this latter point.) Confirmation of parameter estimates obtained using the "ordinary least-

[1] If a new park will not be close to other park sites, and will have little influence on total park use by residents of various cities, then it may be assumed that no city's emissiveness will be substantially influenced by the inclusion of the new site in the existing park system. simulation approach pursued in TN 35 provides another way of testing structural adequacy of models a method which some researchers prefer over the method discussed in TN 19.

squares regression approach" is discussed in TN 19. This approach is not statistically efficient. By using the regression approach proposed in TN 19, better estimates of parameters can usually be obtained with only half the data that are required for the former approach.

Many of the insights gained from the analysis presented in TN 35, are similar to those reported in TN 19. The important point in TN 35 is, however, that accuracy criteria appropriate to the problem being considered must be developed in order to derive "good" models. Overall χ^2 and individual residual χ^2 are extremely important in assessing model structural adequacy. The need to use χ^2 values to measure the validity of a model must be considered as a major, important and unexpected result of the derivation of a distribution of observed flows. The use of both GLS regression and "residual testing of model adequacy" is a very significant advance in modelling. Residuals for individuals mean little in origin modelling because of the large variance between observations, and the expected or probable behaviour is estimated. In origin-destination flow modelling a given flow may be accurate to plus or minus 1% if the flow is large.

The use of arbitrary assumptions to describe (a priori) how people respond to alternative park sites is discussed in TN 3. Such assumptions may lead to statements about behaviour which are illogical. TN 3 (originally prepared to further theoretical development of the model presented in TN 1) makes clear the importance of alternative factors in assessing how people respond to the supply of parks. It relates nicely to a variety of behavioural considerations which must be considered to construct "good" behavioural models which are discussed in TN 33. Still, one should note that elaborate models that tap aspects of behaviour, such as substituting one activity for another are not empirically validated *in 1976*.

In a number of CORDS efforts, data problems caused cancellation of planned research. TN 30 reports one of these cancelled efforts. As a consequence of formulating a work plan, it became apparent that there was little likelihood that CORDS objectives could be achieved. TN 30 is an example of good research practice, in that a research design should be developed to the point at which an assessment of potential success can be made. If this assessment reveals that CORDS objectives are unachievable, then research should be terminated. In addition to this "lesson", TN 30 also serves another function in that it brought together a number of inventive proposals for model development. These proposals have implications and interesting parallels with the formulations presented in TN 11. The proposals presented in TN 11 were independent of TN 30 - they were based on considerations raised by research questions reported in TN 4.

Thus, a number of substantive methodological research projects in CORDS have been concerned with destination modelling. Many of these indicate that much of the current work on destination modelling results in models which do not explain data as one might expect. One major reason is the fact that often these models are developed from unreliable data. Another major factor is the lack of adequate consideration of the disaggregation of user groups into groups for which meaningful models can be developed. A serious question which must also be considered is that when use estimates are made for a given point in time, how can these estimates be extrapolated for future policy and planning? In reality, considering the various methodological problems and the special difficulties associated with the use of destination models in planning and policy analysis, it is apparent that progress made in this area is quite minimal.

ATTRACTIVITY ANALYSIS

How people respond psychologically to a landscape obviously does not have a simple relationship to estimating the number of visits that people will make to a particular park. The matters of park attractivity and wild river site attractivity have been examined as separate issues.

A consumer preference approach can be used to derive park attractiveness measures (TN 2.) However, there are a number of methodological problems associated with this approach as a consequence of limited and poor data. From a planning perspective, the ordinal attractivity scale has only limited merit in making use estimates for parks. TN 9 examines the question of what really is measured by different types of attractiveness measures, and which of three types under consideration, are compatible. One finding indicates that users respond not only to a park, but also to what is around it. TN 28 is concerned with another matter, namely, testing the "goodness" of attractiveness measures. There is controversy about this TN however, (see Chapter III, Review) because it was indicated that when two different measures, based upon different assumptions, are put into the same model, comparable explanations should not be expected.

Turning to site quality, the assessment of the quality of a site on a wild river cannot be explained by a linear combination of factors (TN 27.) From a practical point of view, park design models which only specify the relative importance of variables, and then just sum or multiply, are quantitatively and conceptually unsound. As indicated in TN 27, people usually consider several resources at one time. The available "computer attractiveness evaluation packages" do not allow for multiple-consideration of resource variables. Furthermore, even if computer programmes included such an approach, there is still need for a valid, empirically based model. Effective use of computers to generate maps of people's reactions to resources requires extremely sophisticated research work - work which has not been done as of 1976.

When it comes to examining the more general questions concerning attractiveness, such as how people respond to trails, or lakes, or scenic byways, and the like (see TN 22), this has obvious research implications. Such complexities as a response at a given time with respect to a given experience, or how the repetition of the experience may diminish the value of individual site qualities, creating a different response at different times; or how a variety of experiences may enhance total experience and thus alter response, are all research questions to be pursued.

SUPPLY ANALYSIS

The use of multiple regression to calculate "consumption" of recreation which is conditioned by socioeconomic characteristics is illustrated in TN 12. TN 6 demonstrates how the TN 12 calculation formula for making estimates is of such form, that accuracy of estimates can be derived. The merits of using the TN 12 methodology to make predictions must be viewed in light of the accuracy considerations offered in TN 6.

However, in this volume, it is also pointed out that the conceptual structural problems indicated in TN 13, and the model structural problems pursued in TN 20 must be recognized.

TN 20 indicates that the variance in participation data is not adequately explained by use of the TN 12 model. TN 20 was designed to determine interaction effects which could be introduced to improve the TN 12 model. It was demonstrated that some significant effects could be incorporated into multiple regression with dummy variables models[2]. However, when an AID analysis was compared to a multiple regression with dummy variables model analysis, it was found that a multiple regression with dummy variables model only explained about half of the variance it should have. Thus including interaction effects does not improve simple multiple regression with dummy variables models. The preceding means that accuracy estimation methods used in TN 6, can be used for models, but when interaction terms or supply factors are not properly considered or are not included in models, TN 6 formulae (at best) seriously

[2] Multiple regression with dummy variables models has been replaced in this chapter so one sees "multiple regression with dummy variables models."

underestimates the error to be expected.

A number of considerations are important in defining the quantity of supply. Supply measurement is discussed in TN 16, where the measurement of how much supply is actually at each of a number of locations, and not with perceived supply. It must be recognized that the manner in which supply measurements are taken in one political Jurisdiction may not be germane in another political Jurisdiction. In addition, the real supply may not have a simple direct effect on use levels. It was pointed out in TN 29 as well as TN 34 that there have been studies in which researchers specified supply factors, and introduced these as additional independent variables when deriving an origin model. However, it has long been recognized that response to supply is non-linear (see TN 11).

One important innovation nevertheless, presented in TN 29, was that the effects of supply in each of the origin areas could be defined by what people do in these areas (TN 29). The problem however, is determining how inventoried supply relates to the behaviourally based supply coefficients. There is a need to consider programming of facilities, cultural factors, and other factors to relate model parameters to real supply and how it is used. Deriving an equation relating real supply to perceived supply is not a straightforward matter (see TN 10 and 37). To do this there is a need to conduct supply research using very large data sets for model development.

METHODOLOGICAL CONSIDERATIONS

Methodological considerations not covered elsewhere under other headings are discussed in this section. To provide an illustration of how an analysis of variance (multiple regression with dummy variables model) model can be used, TN 15 was prepared. It was though that some readers might find the example helpful in examining the use of multiple regression with dummy variables model parameters in a number of the TN. Another area of methodological concern was data weighting. The procedures necessary to define appropriate weights for data collection involve a number of issues. TN 21 explores many of these issues; however, there is considerable room for development of new and more innovative weighting strategies. The material presented in TN 21 should not be considered optimal.

The processing of geographical information was yet another major area of methodological consideration. Many people frequently misuse computer systems in handling geographic information. There are numerous alternative methods of processing geographical information. However, often vast amounts of information are coded without regard to the ultimate research objective. Another major factor often ignored in computerized geographic data processing relates to the actual cost of manipulating information. In addition, there is a tendency, because of the range of computer assistance available today, for a number of researchers to code and process much more data than is actually necessary - just because the computer resources are available. Indeed, this is a poor use of resources.

The issue of data compatibility is discussed in TN 24. It was learned that certain data which should be compatible with other data, was not. This issue should have been pursued more fully in CORDS. The TN raises serious questions about the validity and reliability of data.

In a fairly unbiased manner, TN 10 explores a rather interesting methodological consideration. Using the same data concerning participation in outdoor recreation activities, researchers conducted an R-mode Factor Analysis of the data, and a Cluster Analysis. Unfortunately, results of these two techniques should not be (but often are) compared. "R" Factor Analysis groups activities, and Cluster Analysis groups like individuals. A Q-mode Factor Analysis could have been used for this comparison, but wasn't, since the point was to

demonstrate why R-mode Factor Analysis and Cluster Analysis differ. Similar methodological concerns are examined in TN 13, 32, and 37.

Thus, CORDS has explored a number of methodological considerations which are not only of concern to outdoor recreation research, but are relevant to all social and behavioural research. Findings indicate that it is important that similar methodological research be continued and considerable information exchange be encouraged. This latter point is particularly true with respect to the many fields of CORDS which have the came methodological concerns.

ALLOCATION MODELLING AND ALLOCATION EVALUATION

Prior to 1974, there was little available information on the economic value of park visits. There is need for researchers to develop this kind of information in a form acceptable to many economists, and also in a form that is meaningful for policy makers. TN 31 makes a unique and potentially controversial contribution by implying that a systems model (such as the one defined in TN 1) can be used to define a demand function for non-isolated sites. This is the type of research required so that economists and policy makers might have some understanding of the economic effect of changing a system, i.e. - what happens to demand under new supply conditions.

Another issue considered in TN 31 is the estimation per capita consumer surplus value. However, a special easy, fast, and cheap" means, is also described in TN 38. Many may argue That this approach in TN 38 is not defensible. Special attention should be paid to the listing of consumer surplus values presented in the Appendix to TN 38, since this listing is the most extensive and diverse listing for Canada available in 1976.

The concept of potential surfaces (both a sociologic and geographic concept) may be used to define measures for evaluating the distribution of opportunities to participate in outdoor recreation activities. Two approaches to measurement with respect to this concept are presented in TN 5, and in some respects, one can be said to be better than the other. The question of what distance function to use when certain gravity functions are specified remains unanswered. An interesting subsequent project would involve relating potential measures to some statement about perceived supply or to compare views about needs derived by the "Potential Surface" method with people's perception of their needs.

TN 17 offers an excellent example of the kind of issues alluded to in the comments on TN 5. It the policy decision is to provide opportunities for all people to have about the same per capita access to picnic sites within two hours drive of their homes, then there is no need to know how people behave, but rather there is need to have an Inventory of the available opportunities for picnics. Such opportunities must be related to the population that will use then and to the distance from opportunities, to the users. TN 17 provides a way of testing the goodness of any allocation. If certain access criteria are accepted, then TN 7 indicates how allocation evaluation measures can be defined by supply information. With the information produced from an "evaluation run" and information on expected population growth, facility development plans may be proposed based upon a knowledge of the "consequences" of changes in supply. This is accomplished by repeated "runs" of the model. Thus the model may be used to develop a "capital plan" for increasing supply - a plan that is consistent with budget forecasts over a period of time.

Concerns about the optimal use of land are examined in TN 23. One approach to defining optimal use is linear programming. However, the question is never really "should there be a park or timber production" - creation of parks rarely has a simple or single objective. For example, if the concern is employment, the computer might still select a capital-intensive solution. A solution to the land allocation problem might in fact take agricultural land out of production

when it might be more valuable at a later time for agriculture. Current automated evaluation and allocation procedures fail to take into account the multi-facted aspects of determining what may be "optimal" in a given socio-political situation.

Another issue concerning allocation models deals with behavioural data. TN 26 offers a method for using behavioural data in a disaggregated manner. For example, examining different age groups, or differences between males and females - rather than looking at crude participation rates for a "population". However, if a policy maker doesn't plan to make use of such information in planning or management action, such analyses are meaningless as the TN stresses.

In addition, sometimes data used for policy decisions are not quantitative. TN 25 indicates that it is possible to use intuition and judgement to scale qualitative data. The TN indicates that both quantitative and qualitative data should be used, however, controls should be built-in to prevent qualitative variables from dominating, and thus, making PPBS (Planning Programming Budgeting System) or similar management systems meaningless.

A focused review of traditional economic impact literature appears in TN 39. The TN leaves much to be desired because the literature is so extensive, and the issues are quite subtle. The TN should be considered as introductory to "the state of the art" as of the late 1960's. In contrast, TN 40 offers a perspective on what influences the development of a park. The TN points out problems of taking into account ¸that developments almost never proceed according to a proposed "master plan", particularly with respect to park acquisition negotiations. The question of impact assessment requires examination of a variety of exogenous and indogeneous variables. Finally, in the matter of the success of campgrounds, TN 41 must be considered a "first" guide for program managers and planners. The economics of campground development may not always be viewed within the context of the objectives of the proposed management.

Thus, it becomes obvious in this section that further research in the area of allocation modelling and allocation evaluation is necessary.

QUO VADIS

If any conclusion can be drawn from the myriad avenues of research that have been reported in this volume, it is that future research to improve models must not be pursued in a random or haphazard manner. Researchers must not accept only the priorities of policy and planning personnel, but must establish their own priorities. Some work must be done ahead if results are to be produced at the time when requests may be expected. Furthermore, policy and planning personnel must understand that marginally relevant research can sometimes pay high dividends, and thus must permit researchers the time, and the latitude to pursue the more esoteric lines of inquiry opened by CORDS.

While many readers of this volume may feel that some of the material presented is quite relevant to their concerns, it is expected that many do not understand how to use or adopt the methods presented to meet their needs. Interpretative material on how to use various methods developed by CORDS needs to be issued for practitioners. Practitioners have need of methodological guidelines and exemplar materials. Manuals for carrying out research and for deriving the implication of research findings for management must be conceptualized as "useable tools", if they are to be anything other than academic exercises. There are a limited number of researchers who have the background required to make use of the material presented in this volume in its present form. In fact, there is a limited number of source persons who have drawn together the various contents of the TN. Still, this volume now may serve as a text to increase the knowledge base of future outdoor recreation researchers.