A Model for Using a Developing Country's Park System for Conservation Education

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ABSTRACT: Kinabalu Park in Malaysia is a clear example of the role parks can play in providing natural resource education in developing countries, as well as the critical role of education in conservation. I used a comprehensive approach based on an education evaluation model to develop, implement, and assess educational programs for four specific Kinabalu Park audiences: general park visitors, school groups, local villagers, and the public reached by mass media. The programs were developed based on information gleaned from surveys, interviews, and observations of the needs, goals, objectives, resources, and constraints particular to each target audience. The programs, including an interpretive nature trail, a school biology program, a mobile extension program, and a newspaper series, were then implemented and assessed. The results demonstrate that all these programs were successful in increasing environmental knowledge or fostering favorable attitude shifts toward the park system and conservation. The use of a systematic approach improved program content, provided accountability, and demonstrated the role a park can play in natural resource education, as well as the important use of park programs for natural resource management and conservation.

National parks have been established in more than 120 countries, and over 3,500 reserved areas have been designated (Brown et al. 1988; Sutton 1982). Park mandates vary widely but include preserving ecosystems, genetic resources, and watersheds; creating opportunities for tourism and local employment; and facilitating recreation, research, and education. Education, one of the most important functions, is frequently a poor stepchild to other uses. This is a critical oversight in developing countries where environmental information is not always readily available, where development projects are sometimes short-sighted and rapidly alter the environment, and where parks are often preserved only on paper. Although educational programs are not a panacea, they can help foster more favorable attitudes toward parks, promote natural resources conservation, train resource managers, and increase a park system’s flow of benefits to the public by serving as an educational resource (e.g., Dietz 1986; Fitter 1986; Jacobson 1987a; Olson 1984; Sharpe 1982).

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Unfortunately, educational programs in parks, if created at all, are often developed on an ad hoc basis. Few guidelines are available for the development of such programs, particularly in developing countries. Existing guidelines seldom include plans for evaluating and modifying old programs and implementing new ones, or determining their effectiveness (Paskowsky 1983; Burkholder 1983; Brace et al. 1977; Wood and Wood 1985). Parks have been called society's greatest classrooms without walls, yet to use a national park to its fullest potential for environmental education, a model is needed to help the staff guide such educational programs from conception to completion. The need for a prescriptive model is especially acute in developing countries, where park staff often do not have formal training in education or park interpretation.

Evaluation consists of the collection, measurement, analysis, and interpretation of data relevant to a park program's audience and environment. These data help park personnel to plan and implement programs and analyze and evaluate program products. A number of evaluation techniques have been developed over the past three decades, including the systematic approach of a model first introduced by Stufflebeam et al. (1971) that offers prescriptive guidelines for program evaluation. This type of approach considers a program from "womb to tomb," incorporating both formative evaluation for planning and implementing the program and summative evaluation for assessing the products of the program. The model is divided into four stages of evaluation: context, input, process, and product, and hence the acronym, CIPP. For each stage, the necessary information is delineated and obtained to assist the decisionmaking process (Figure 1). Context evaluation assesses the needs, goals, opportunities, and constraints of the program environment and provides a basis for defining objectives and making planning decisions. Input evaluation analyzes strategies for achieving the goals and objectives of the educational program, thus facilitating decisions determining project design. Once a strategy is implemented, process evaluation provides feedback about its effectiveness. Product evaluation assesses the extent to which the objectives are achieved and identifies secondary effects and needed modifications. Product evaluation enables administrators to judge or react to project accomplishments.

This model was used as a tool to develop and evaluate a multi-faceted educational program at Kinabalu Park during 1985 and 1986. In this article, I critique the comprehensive evaluation for guiding the development, implementation, and assessment of the park's educational programs, and provide a case study of the use of a developing country's park system for conservation education. The CIPP methodology and four educational programs designed for different audiences of concern to Sabah park administrators are illustrated. The evaluation model is enhanced by showing how the different components of the CIPP approach were used to evaluate the relevant stages in the development of each program. The specific programs and audiences included a park trail program for park visitors; a newspaper program for the general public; an elementary field science program for school groups; and a mobile outreach program to neighboring villages. Only one evaluation stage for each program is described to serve as an example of the process. The results of the other stages have been reported elsewhere (Jacobson 1986, 1987a, 1987b, 1988). These specific audiences and park programs were determined during the evaluation process and augmented existing programs. This study helps to fill a scholarly need for research on the use of nonformal learning environments, such as parks, for conservation education and a need for research on its evaluation (Nelson 1978; Stapp 1976; Wood and Wood 1985).

Context Evaluation

Evaluating a Park's Total Environment: An Example of a Program for Park Visitors

I used the development of the program for park visitors as an example of context evaluation—collecting data to help make planning decisions. These data included an assessment of the needs, goals, and objectives, as well as the resources and limitations, of the park program environment. For the program at Kinabalu Park, the needs of the Malaysian government, Kinabalu Park managers, and various park audiences were assessed based on the socioeconomic, historical, and ecological backgrounds of these entities. The needs assessment was then used to identify the goals and objectives of the program. This was followed by a determination of the educational opportunities available, given the number of park visitors, duration of visits, facilities and resources of the park, public interest, and outside resources. Likewise, constraints caused by limited funding, personnel, materials, and program perpetuity were determined.

Identification of Needs

Rich in natural resources, Malaysia enjoys a higher per capita income than many of her neighbors. Yet water and air pollution, toxic waste buildup, high deforestation rates, and other environmental stresses have accompanied development (Lim 1976; Myers 1980; Singh 1981). The need for effective stewardship of natural and cultural assets was recognized at an international conference on environmental education in 1977: "Individuals and communities need to acquire the knowledge, values, attitudes, and practical skills to participate in a responsible and effective way in anticipating and solving environmental problems, and the management of the
quality of the environment." (World Intergovernmental Conference 1977)

The educational needs relevant to Kinabalu Park include increasing public knowledge and appreciation of the park’s functions and processes. As a semigovernmental body, the park is dependent on public support and political will to maintain its land in perpetuity. Park administrators must foster public awareness about the ecological and economic value of the park in order to justify its continued existence. Educational programming also includes the management of visitors and the communication and enforcement of park regulations.

Because the needs of Kinabalu Park visitors vary with their backgrounds and interests, a written questionnaire was developed to determine visitors’ sociodemographic characteristics and environmental interests. A pilot survey of 50 visitors was followed by a survey of 858 visitors to the park (Figure 2). The majority of visitors came from Sabah, primarily from the capital city 90 km from Kinabalu Park; spoke Malay or Chinese; were between 19 and 28 years of age; had completed high school; and were students, civil servants, or business people. They came to the park for less than one day, in groups of four to six people, to relax. Most had visited the park before. They were most interested in plants, and they chose exhibits and nature trails from among a list of interpretive formats.

Identification of Goals and Objectives

A general goal of environmental education is “to develop a citizenry that is aware of, and concerned about, the total environment, and its associated problems, and which has the knowledge, attitudes, motivations, commitment, and skills to work individually and collectively toward solutions of current problems and the prevention of new ones.” (World Intergovernmental Conference 1977). For Kinabalu Park visitors, the goal defined by park staff was to increase public knowledge and appreciation of the park and natural resources. For each activity, objectives were developed that included measurable variables that could later serve as criteria for determining whether the activity was effective. A new interpretive nature trail was developed to increase visitor knowledge about biological diversity and the medicinal and economic values of native plants.

Identification of Resources and Constraints

An inventory of the park was necessary to identify resources and constraints that would influence program planning. Obviously, the natural resources of the park are its greatest asset. Kinabalu Park is located at 6°05’ N, 116°34’ on the northern tip of Borneo. It encompasses an area of 754 sq km and stretches from an altitude of 300 m to 4,101 m at the peak of Southeast Asia’s tallest mountain. Famous for its rich diversity of plant and animal life, the park contains representatives of over half the world’s families of flowering plants. These include over 1,500 species of orchids, 450 species of ferns, and 120 species of figs. Over 300 species of birds and 100 species of mammals, including a variety of endemics, have been recorded in the park (Jacobson 1985).

Established in 1964, Kinabalu was the first of Sabah’s six parks. Much of the park is above 1,200 m, and because of its basic soil and steep slopes it is unsuitable for agriculture. When it was established, it was uninhabited (Burrough 1978). The present relationship of the park with the local people is a symbiotic one. Over 100 workers are employed in the park, mostly from the neighboring area. Over 100 more are employed on a temporary basis or are self-employed park guides. The influx of visitors to the park—173,333 in 1985—has created a market for local produce. It has also resulted in regional infrastructural development, such as road construction and increased availability of public transportation (McCredie 1978).

The park is about 90% self-sufficient, receiving revenues from entrance and accommodation fees, equipment hire, and book and souvenir sales. Kinabalu is the most frequented and financially sound park in the Sabah system.

Park personnel are an important resource for the educational programs there. In 1980, an ecology section was established at Kinabalu Park to conduct research and to provide interpretation for park visitors. The staff now consists of five park naturalists and rangers with biological training specific to Mt. Kinabalu. In just a few years, they have developed a program of guided walks for visitors, an exhibit center, and an extension program. They have also produced several new publications about the park.

The facilities available at the park include a 60-seat auditorium, a laboratory, an herbarium, a mountain garden collection, a library, audiovisual equipment, four-wheel drive vehicles, and 11 km of graded trails around park headquarters at 1,554 m on Mt. Kinabalu. Housing accommodations in this area range from student hostels to luxury chalets.

Identifying these resources enabled the scope of potential programs to be delineated. The number of park personnel, accommodations, and facilities available determined the number of programs and individuals the park could serve at one time. The context evaluation provided the initial information for the successful development of educational programs. During the input, process, and product evaluation a variety of media were tested for their relative effectiveness in increasing visitor knowledge based on multiple choice tests given to 1194 visitors (Jacobson 1988). The product evaluation also specified other information, such as cost effectiveness, exposure to climate and vandalism, and so on, to provide guidelines for making decisions about interpretive programs for visitors.
Input Evaluation

Evaluating Alternative Strategies: An Example of a Mass Media Program

An input evaluation of the park’s mass media program was conducted and serves as an example of how other such input evaluations were done. Since 1981, Kinabalu Park staff have published interpretive materials and presented displays at local government extension programs, tourist conventions, and public libraries. Yet the mass media have not been used in any systematic way to reach beyond the park borders. A mixture of newspaper, radio, and television programs could be developed to reach a broader audience.

The major Sabah newspapers were surveyed from July through December 1985 to examine their coverage of natural resource conservation information. The Daily Express (circulation = 15,361) had an average of 1.6 conservation articles per week; the Sabah Times (circulation = 9,100) averaged 1.2 articles per week; and the weekly Borneo Bulletin (circulation = 26,000 in Sabah and Sarawak) averaged 1 article per week. Most television and radio programming in Sabah was similar to Peninsular Malaysia, where Kiew (1978) reported that about 58 minutes of television air time per week featured natural history and conservation-related programs, with little of that concerning local subjects. Malaysian radio rarely presented conservation programs. From this review, it was apparent that there was great potential for more coverage of environmental issues in the media.

After a review of the many options possible for a mass media approach, a newspaper article series was initiated with the local press. This decision reflected the results of a prior context evaluation that determined resources and constraints of a mass media program, such as time limitations, equipment available, and willingness of the Daily Express editor to publish articles about the park. A newspaper series could present information on the mission of the park system, Sabah’s natural resources, or local and global environmental concerns. Specific objectives could range from trying to increase park visitation to garnering public support for park policies. Programs could be tailored for different target groups, such as children, farmers, housekeepers, and others.

From discussions with park administrators, it was decided that the articles would be geared toward a general audience and designed to increase local visitation to Kinabalu Park. The process and product evaluations collected information about the operation of the newspaper series, which consisted of six feature articles about the park and the natural environment, published weekly in English and Malay. Although the product evaluation did not conclusively demonstrate an increase in visitation resulting from the publication of the series, secondary outcomes, such as the interest generated among government officials and the business community, provided information for a new context evaluation that would focus specifically on decisionmakers as a target audience (Jacobson 1987b). The input evaluation provided information for choosing among the different media strategies. With the feedback from the outcome, a new, more effective media program could be developed.

Process Evaluation

Evaluating Program Implementation: An Example of a Program for School Groups

A process evaluation of implementing the educational program developed for school groups was conducted by assessing the program implementation and providing information for making decisions about program operations. During the process evaluation for the school program, the activities selected for implementation were first introduced in a pilot program involving six school groups. The subjects covered basic biological principals, natural history, and environmental issues; activities included viewing audiovisual materials, participating in trail activities, doing art projects, and making scientific observations. The topics had been selected during the input evaluation to complement the primary school science curriculum and to be compatible with the park resources and policy (Jenkins 1976).

At the end of the pilot programs, the students and teachers filled out questionnaires, commenting on each of the activities, their relevance to their curricula, and improvements and suggestions for the future. As a result of their feedback, the park staff made some simple modifications to make the activities more interesting and effective and developed follow-up worksheets to extend the program to the students’ homes and schools (Jacobson 1986). A special booklet for teachers was also developed to explain more comprehensively the activities and expected results so that teachers could better assist with the program. The staff’s knowledge of park ecology pertaining to the program, and awareness of logistical problems of timing, weather, scheduling of schools, and equipment, all increased and could be incorporated into the final program.

The results of pre- and postactivity tests conducted in the product evaluation showed that students had significantly increased their ecological knowledge and demonstrated the effectiveness of the program (Jacobson 1986). The process evaluation had helped assess and improve the program during implementation, thus increasing the likelihood of the program’s success.

Product Evaluation

Evaluating Program Outcomes: An Example of a Park Outreach Program

Product evaluation provides information for judging and reacting to program accomplishments. The product
evaluation for the park outreach program was conducted to determine the effectiveness of the program and to identify potential areas for improvement. This provided feedback to the process evaluation and aided in making decisions about future support for the program.

Like the product evaluation for the school groups, the product evaluation for the park's outreach program involved a pretest and posttest format. Since its inception, Kinabalu Park's mobile unit outreach program has visited 51 villages, reaching an audience of about 7,000 people. The program, developed and implemented by park staff in the park's ecology section, consisted of a slide show about the park and local natural resources, a discussion period, and a wildlife film. It used slides and stories about local areas to illustrate basic biological concepts and problems, such as watershed maintenance and soil erosion, and also highlighted the economic benefits derived from the park, such as employment opportunities and infrastructural development.

Although mobile unit programs are commonly used for rural conservation education programs (Boulton 1982), their effectiveness has seldom been evaluated. For this product evaluation, a survey instrument was designed to obtain information about villagers' attitudes toward the park before and after exposure to the mobile unit program (Jacobson 1987a). Additionally, the survey collected data on the villagers' backgrounds and their use of natural resources.

An oral questionnaire was tested on a trial basis and then modified to serve as a written questionnaire. The final surveys presented seven statements to determine the villagers' attitudes toward the park (with responses based on a Likert-type scale—agree/disagree/no opinion) and six questions to assess respondents' age, sex, occupation, their use of forest products and their visitation to the park. Four hundred eighteen surveys were completed in 11 villages.

The results of this formal evaluation process revealed that the program was effective in fostering favorable attitude shifts among villagers toward the park system. It showed that even a brief evening program has the potential to influence perceptions about natural resources, at least on a short-term basis.

The evaluation process was instrumental in helping the park staff modify the program to increase its effectiveness. For example, some survey respondents agreed with the statement, "Kinabalu Park is too large," both before and after attending a park outreach program. Plans for future programs were then modified to explain that a large area is needed to maintain some animal populations and that the diverse forest types and unique microhabitats scattered throughout the park are biologically important.

The results of the sociodemographic questions indicated that the audience sampled can be characterized as farmers who do not hunt, yet do use natural forest products. The majority of respondents had visited Kinabalu Park at least once, and 73% of the villagers attending the program were under 30 years of age. By collecting specific sociodemographic information about a target population, it becomes possible to tailor educational programs to the needs of that group. The predominance of young people attending the program helps dictate the type of music and dialogue to accompany the program, as well as the content. More emphasis can be given to the uses of natural forest products, rather than hunting, to reflect the occupations and interests of the villagers. Issues relevant to farmers, such as watershed maintenance and soil erosion control, can be emphasized. Furthermore, by assessing who is attending the mobile unit program, population subgroups that are not being reached can be identified and subsequently attracted.

In addition to identifying necessary program modifications, the formal product evaluation process was used by park staff to bring needed structural changes, such as a new sound system and vehicle, to the attention of the administration. In an organization where a systematic review is not always conducted, the product evaluation was important in documenting the success of the mobile unit program in achieving its objectives, and in improving the program.

Conclusion

Policy makers, special interest groups, the business community, and the general public dictate a park's existence and influence its management objectives. As biologist George Schaller has stated, "Without the support of the local population, conservation cannot succeed." Individuals have an impact on a park not only by their use of the park itself, but by their use of surrounding lands and, on a larger scale, by legislation that directly affects a protected area. As a result, park administrators must develop educational programs to promulgate public attitudes sympathetic with park policies and increase public knowledge about natural resource management and conservation. By providing environmental education, a park can increase its flow of benefits to the public.

At Kinabalu Park, the programs for general visitors, school groups, local villagers, and the public reached by mass media achieved their educational objectives and demonstrated the role a park can play in conservation education. The CIPP evaluation approach provided a comprehensive format for collecting data for the development, implementation, and assessment of these educational programs.

The context evaluation carefully shaped the development of each program by identifying needs, goals, and objectives. The first step of the evaluation determined the various park audiences and ascertained their background and interests. Several survey instruments had to be developed toward this end. The recognition of the
program's opportunities and constraints helped to shape it further. Decisions made at the context stage included questions about whether goals should be modified, what target audience priorities should be, and what kinds of program outcomes were desirable.

The input evaluation provided information for determining the strengths and weaknesses of alternative strategies and for choosing among them. In the case of the development of the nature trail, an experiment was designed to test the relative effectiveness of media alternatives. For the school program, the multitude of student environmental education activities implemented by other organizations were reviewed for possible inclusion in the park program.

The process evaluation provided ongoing information about each program while it was being implemented. From the information collected, decisions were made about additional training for staff, new procedures, schedule changes, and resource acquisition. For example, for the school program, additional activities were introduced for the students, new supplies were purchased, and the format of the publication was modified (Jacobson 1986).

The product evaluation provided information for deciding whether to continue, modify, or terminate the programs. The outcomes were compared with the objectives, secondary effects were determined, and, in the case of the media experiment, alternative programs were assessed on the basis of variables such as cost effectiveness. The final decision about whether the program was worth the investment depended on the goals of the park administration. A number of evaluative techniques were used to assess program outcomes. These included attitude and knowledge tests and survey data collection. Each method was selected on the basis of the assessment of needs and was tested to ensure accuracy. The test instruments developed to evaluate the outcomes of the school and village programs recorded improved scores after exposure to the programs, thus providing evidence that the programs were achieving their objectives.

Determining secondary and unexpected outcomes was useful for making decisions about each program's future. The results of the mass media program indicated little causal change in park visitation rates. However, the study revealed secondary effects suggesting that the program may be a useful means for reaching politicians and the business community. By returning to a context evaluation, new goals and objectives could be selected and the program modified to fulfill different needs for a newly targeted audience.

For all of the programs, the comprehensive evaluation model was used as a guide for collecting information for program assessment and modification. The model proved to be both valid and useful in this park system context (Richardson and Pugh 1981). The principles proposed in the model helped to ensure internal validity (Ambry 1972; Stufflebeam et al. 1971). The emphasis on process data as well as product data helped to provide a means to judge whether the information obtained was an accurate depiction of the phenomenon studied. The circumstances under which the data were collected were minutely described, and aberrations in the program environment could be noted and judged.

The model permitted the use of whatever product evaluation techniques were most germane to the problem. Several methods were used to determine program effectiveness, such as before-and-after tests and survey instruments. The inherent internal validity of those techniques was maintained and reported in the product evaluations. Experiential information, such as interviews and testimonies, was also used in the evaluation. Although such types of data can be inconsistent, the techniques often encompass information needs that conventional methods do not measure (Passineau 1975; Stufflebeam et al. 1971). Thus the programs were developed using the most reliable techniques available for the purpose. The collection of information from a variety of sources also helped to maintain objectivity.

External validity refers to the generalizability of the evaluation. A variety of programs for a wide range of park audiences were developed. The comprehensive format of the model helped maximize the effectiveness of those programs. Although many needs, goals, and opportunities differ from park to park, the CIPP format is broad enough to provide guidelines for any park system. Unlike traditional evaluation that presents only product information, information was provided about the programs from inception to completion, making it possible to determine under which conditions the results of a particular program might be generalized. Given the diversity of cultures, politics, economics, and resources in developing countries, this information is critical.

Finally, the evaluation was useful. It was relevant, efficient, and easy to follow. The continual context evaluation provided information in direct response to planning needs, ensuring that the data collected were relevant and of adequate scope. The input, process, and product evaluations guided the recognition of what information was required, the relative importance of that information, and the range of alternative strategies that could be used. The feedback supplied along the way ensured that timely decisions about program developments could be made.

The major problem with the model's general nature was a lack of specificity in prescribing methods for product evaluation. It left the development of appropriate test instruments and other techniques up to the evaluator. Experimental methods or statistical analysis needed for some product evaluation may be impossible in some park systems because of limited research experience, money, or time. However, as noted earlier, other outcome evaluation techniques, such as observations
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