PUBLIC PARTICIPATION AND VOLUNTEER HELP IN MONITORING PROGRAMS: AN ASSESSMENT

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Abstract. A number of opportunities exist for involving the public in environmental monitoring. This paper outlines some examples where this has been done, evaluates these examples, and then summarizes some of the benefits as well as the disadvantages of this approach.

Case 1. Wildlife Supplied by Hunters

This information was given on request from A.W. Diamond, Coordinator CWS-LRTAP, NWRC, Ottawa.

Inuit hunters who had been contacted previously supplied tissues from carcasses of polar bears which they had shot in the arctic. The tissues were used for determination of heavy metals, essential elements and toxic organic chemicals by the Canadian Wildlife Service. Analysis of the results confirmed the usefulness and suitability of these tissues for monitoring the environmental concentrations and geographic distribution of several chemical elements and compounds in most areas of the Arctic (Norstrom *et al.*, 1986). In another study of metal residues in fish-eating wildlife in Ontario, fur trappers supplied carcasses of mink and otter (Wren and Stokes, 1986). More recently, road-kills were used to study the suitability of grey squirrels as environmental monitors of lead and cadmium (Murray, 1987). Road-kills, contributed by the public, are routinely analyzed for contaminants and stored in the Tissue Bank of the National Wildlife Research Centre.

Case 2: Self Help Program, Ontario Ministry of the Environment

This information was supplied by Murray German, Chief, Water Resources Assessment, Technical Support Section, Ontario Ministry of the Environment, Southeastern Region.

The problem of eutrophication of recreational lakes became a major concern for cottagers in the late 1960's. The Ontario Ministry of the Environment conducted detailed water quality studies in many lakes, but the Ministry did not have the resources to do the continuous monitoring that was needed. This is where the

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cottagers help the Ministry as well as helping themselves, towards the objective of understanding year-to-year changes and assessing long-term trends.

In 1971, the Ministry began a program in which cottage associations were provided with materials and information to establish their own long-term water quality monitoring schemes. Cottagers measured Secchi-disc depths every two weeks and collected water samples for chlorophyll analysis. The samples were analyzed for chlorophyll at the Ministry Laboratory. In the Southeastern Region 27 lakes were continuously sampled for 10 or more years. Approximately 90 to 100 lakes were sampled annually, with a few replacements each year, totalling 150 lakes.

The long-term trends showed that water quality in the recreational lakes had not been deteriorating. Water quality was expected to deteriorate in the 1960's but, in virtually every lake that was monitored, water quality conditions fluctuated within values that were 'normal' seasonal variation.

The cottage associations participating in the program have developed an improved understanding of the methods and parameters involved in water quality monitoring, as well as an improved appreciation for environmental protection. They have provided the Ministry with valuable data in a truly cooperative program.

Case 3: Shoreline Restoration: Quebec and Ontario

Development around lakes can often lead to significant changes in the lake ecosystem. The Quebec Ministry of the Environment has developed a shoreline restoration program involving the participation of citizen's groups or associations that have an interest in protection and restoration of the natural environment. The goal is to re-establish natural vegetation on shorelines. The Ministry provides seeds and plants (free of charge), to be planted by citizens. The program has been operating for nearly 20 yrs in Quebec.

In 1984 this program was extended to Ontario. Here the Ministry of Natural Resources in conjunction with the Ministry of the Environment provides technical information about the plants and planting techniques to cottage associations. The program is designed to restore a band of vegetation of at least 10 m width around the lake. In Ontario the program is conducted by volunteers, with technical guidance from government agencies. While this is not monitoring in the strictest sense, there is an element of monitoring involved since the volunteers keep records of the condition of the vegetation around the shore. The program is another example of spirit of cooperative volunteer programs. The residents of Christie Lake in eastern Ontario not only do the planting for their revegetation but also collect cuttings from the natural vegetation in the area. These cuttings are then rooted in a special nursery established on donated property.

Case 4: Tree Watch Survey, University of Toronto

Scientists at the Institute for Environmental Studies at the University of Toronto have designed a one-page questionnaire (10 questions) concerning tree die-back in various regions of Canada and the United States. The questions address specific symptoms of trees, degree of stress, location of stress on the trees. The participants are also asked to consider the possible causes of the stress that they describe: e.g. could it be road salt, animal damage, etc.?

This questionnaire will be published (hopefully) in Harrowsmith during the summer of 1988. The results of the survey will be published in a subsequent issue of the same journal.

Case 5: 'Watch' Bees Program in British Schools

In England, scientists recently noted a decline in some species of bumblebees in certain areas. The 'watch' program involves collection of information by secondary school children concerning bee distribution, bee diversity, and the plants preferred by bumblebees. The scientists instruct the school teachers who in turn provide instruction to the children. The scientists feel that this type of information may eventually help them in solving the riddle of the bumblebees. It is probable that other factfinding missions may develop as a result of this initiative.

Discussion and Comments

Before critically examining the scientific merits and disadvantages of the approaches described here, it seems important to address the social, educational, and economic aspects of volunteer involvement in environmental monitoring. There is no question that an essentially untapped pool of skill and/or enthusiasm exists in a number of sectors of the public. Not only the various types of citizen groups such as amateur naturalists, ornithologists, anglers and hunters, and cottagers can be called upon to the participate in observing and recording information. Groups or classes of youngsters in schools or youth groups or clubs also represent potentional volunteers. Volunteer assistants develop a sense of being involved personally in a particular problem and that is an obvious social benefit. The problem can change from a 'them' and 'us' situation (e.g. in the case of pollution) to a sense of cooperation resulting in a replacement of frustration by satisfaction and understanding.

The educational component is equally important. In the example of the water quality monitoring program, the cottagers have developed an improved understanding of the water quality conditions in their lakes. Public meetings have reinforced the sense of involvement as well as the instructional component. In the tree die-back example, which is still in the future as far as results are concerned, it will be possible to extract information concerning attitudes. For example, how many people are sufficiently concerned about our forests to participate in the questionnaire? From

what geographical region and educational level do the respondants come? On the scientific side, it is possible that the respondants may pinpoint areas of tree die-back that the scientists have not yet examined.

There were individual examples at a very informal level, during the planning and execution of the mink and otter study, when the trappers' observations were of considerable value to the scientists. One should not underestimate the 'wisdom' of age and the potential value of anecdotal information, especially of an historical nature. It is well known that for a number of the more insidious current environmental problems, lack of historical information hinders the interpretation of current data particularly in terms of trends. A few hours spent in conversation with an 'elder' can be remarkably rewarding for the scientist, in addition to providing the social benefit for the non-scientists, discussed above.

Clearly there are also financial benefits for the environmental agencies and researchers. Volunteers are usually working without pay, or for very nominal fees. They can produce information quite quickly, and since the volunteer work is usually outside normal business hours, helpers can make observations at odd hours, early in the morning or at night. This may represent a significant advantage for some biological phenomena. The feasibility and cost of using paid professional help for such observations could be prohibitive. Volunteers can also cover geographical areas that are not accessible to the usually small technical staff associated with many research and monitoring programs.

There are some disadvantages and these dictate the scope and level at which one should contemplate involving volunteers in monitoring programs. Reliability has to be questioned in two aspects. The first concerns the level of commitment, particularly in terms of long term studies. While there has been an excellent degree of commitment in some cases, the fact remains that volunteers are just that, and the scientist has no control over other factors which might curtail an activity, and has no right to make demands upon the volunteers. Generally speaking, the experiences recorded have been extremely positive, with a high degree of commitment and reliability, but it is a potential problem. The second type of reliability, and one which opponents of the concept tend to emphasize most frequently, has to do with the quality of the data produced, and the extent to which quality assurance/quality control can be asserted. Clearly in planning studies and surveys, the scientist or manager must have a realistic perception of the skills and abilities of the volunteers. These will vary from amateur naturalists who may be considered experts in their own fields, to young untrained and perhaps over-enthusiastic school children.

Objectivity can be difficult to achieve. For example, certain citizens' groups that are formed in a climate of activism, may feel compelled to dramatize or 'expose' a problem, and this clearly can invalidate the findings. The most important message to be gleaned from these potentially serious disadvantages is that studies, surveys, and data collection which use volunteer help are no different in terms of the principles of scientific design than any other study. The methods should be appropriate to the skills and equipment available, as well as to the questions that are being addressed.

The data should be verified by 'spot' checking wherever possible, and the standards for quality control should be set at the initiation of the project. Large sample sizes are recommended in order to compensate for individual biases.

However, as we have shown, the information which can be collected falls into several categories, including:

(a) Opinions, from questionnaires for the most part,
(b) objective factual information, e.g. in the tree survey, people are asked 'do symptoms include...' followed by specific description,
(c) measurements, such as the secchi disc values, and
(d) collections of samples, such as the carcasses, as well as (not mentioned here) samples of hay from farmers (for protein analysis) or soils (for pesticides).

The relative importance of long-term commitment and scientific data quality varies with the type of activity. Questionnaires do not require long-term activity, and carcass collection has minimal scientific requirements. The lake monitoring has requirements in both areas. Therefore, the investigator must have a clear goal in mind when selecting an approach, taking into account the interests and skills of the volunteers.

In conclusion, based on past experience and review of the experience of others, the authors of this paper consider that with the proper caution and appropriate design, the use of volunteer involvement in monitoring schemes should be given a great deal of attention and support.

References

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