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In 1909 Sweden passed legislation establishing its first nine national parks. They were intended to be undisturbed natural settings managed in similar fashion to USA national parks. Despite the fact that both park agencies deem one of their fundamental purposes as scientific, science in the parks means something quite different in Sweden than it does in the United States.

Abisko NP, situated adjacent to Lake Torne, is an international biosphere reserve. Here, within a nature reserve adjacent to the park, lies Abisko Research Station, established in 1903. Since 1935 it has been administered by the Royal Swedish Academy of Sciences. Hosting often as many as 80 scientists in the summer, it has become an internationally known Arctic research station, where investigations from many disciplines – especially bioscience and geoscience – are conducted. The commonest research topics are plant ecology and meteorology (Sonesson 1991). Equipped with workrooms, geo- and radio-laboratories, computer and drawing rooms, and greenhouse facilities, the station is open to visiting scientists (Royal Swedish Academy of Sciences 1985).

Abisko is only one of the many sites where environmental research is conducted in Sweden. Research within parks has not for the most part been driven by park administrators. Decisions about types and scope of research within parks have been generated by the investigating official, often from one of the Swedish universities, sometimes even from abroad.

By 1990 the Swedish Environmental Protection Board, under whose jurisdiction the national parks fall, realized the need for a systematic inquiry into the types of research that have been conducted in the parks. All published materials now are being collected and accounted for, their scientific integrity evaluated, and research methods assessed. Results will be noted and a corresponding data base will be created. In addition, both a geomorphological and a vegetation map are desired for each park. The "Documentation of Sweden's national parks," a report proposed by the national park administrative staff, will include baseline information on geology, flora, fauna, and other resources within specific parks (Bergqvist, 1990).

The 1983 (and most recent) literature collection for studies done within the parks has several hundred project entries including topics in geology, glaciology, meteorology, botany, zoology, limnology, ornithology, and entomology (Naturvårdsverket 1983). Most of the projects are pure science based, as opposed to applied science or resource management oriented. Much of the research has provided important baseline data on park resources. The limitations of current and past research rest with the absence of projects that define resource problems and their proposed solution.

In an attempt to integrate and direct science in the parks, a research plan for the parks is being funded by the Environmental Protection Board. Written by university staff, this plan will describe proposed research needed to provide further information on park resources.

Despite the Environmental Board's interest in systematizing research in parks, most environmental

work done in Sweden is not earmarked for park sites. To understand why this is so, it is important to note three conditions that exist in Sweden and reduce the need for establishing large research project within parks.

First, Sweden has a long tradition of "every man's right" when it comes to land (Naturvårdsverket 1982). Because of this, research sites can be set up as easily on private and company lands as on government owned lands.

Secondly, Sweden has a population of only about 8.3 million. For a country of 450,000 square km, about the size of California, Sweden is rather sparsely populated. In the far north, populations can be as low as 2 to 3 persons per square km. When seeking a naturally vegetated landscape where sites could be stationed, a researcher has a wide range of choices.

A third consideration is that Sweden's goals for nature protection include maintenance of landscapes sculptured by human use. Farmlands, pasture lands, burial mounds, and Laplander reindeer grazing traditions are as important as wilderness where protection is concerned. Human impacts on landscape are not always considered a negative attribute. Although uses are limited and often regulated, the general focus of nature research is not on monitoring normal and anticipated human impacts to the land. The major threat to natural resources generally is stated to be the forestry and agricultural industries. Where these activities prevail, there is direct and significant impact on biotopes (Larsson 1990, p. 8).

Although there currently is no integrated research program for parks, a large and cohesive environmental research effort has been pulsing in Sweden since 1967. At that time, one of the most comprehensive environmental programs, monitoring and assessing the effects of acid rain deposition, began. The national government reacted immediately to scientific findings about adverse impacts of acid rain. Rather than waiting for large funding or national guidelines, monitoring began shortly after the problem was first discovered in the late 1960s.

Swedish scientists are particularly interested in the critical load concept, hoping to discover how much pollution the environment can tolerate. With 80 to 90 percent of acid deposition coming from other countries, the need to investigate this building problem has pushed research on it to the fore. Liming of lakes is a common procedure, used to rehabilitate the affected aquatic environment. However, liming does not take place in national parks, since national standards require that parks be kept in their natural condition and maintained as baseline reference areas (Thornelof 1991). Thus the parks suffer greater cumulative impacts.

Global warming studies also are important in Sweden, although funded to a tune of only about one sixth the amount of the acid rain program. Sweden relies a great deal on data supplied by other countries. Some modeling work has been done on the probable species composition of Swedish forests after increased global warming. Changes in the patterns of mountain birch and incidents of insect defoliation also have been investigated. Cooperative research for global warming is ongoing, even on Svalbard Island north of Norway.

Outstanding wetlands, botanical resources, wildlife, and geological formations are as important as parks to Sweden's concept of nature protection. To-

gether the parks and reserves protect approximately 5 percent of Sweden's land base. The current parks comprise about 627,000 ha as compared with nearly 2 million ha of nature properties.

The National Environmental Protection Board has primary jurisdiction over environmental programs throughout the country, whether within parks, reserves, or other public or privately owned lands. The Board provides funds for such programs, then distributes them to local county boards (24 of them) for local research and monitoring. Requests can be made by the local county boards for establishment of new nature reserves and subsequent funding for inventory and management. Furthermore, science stipendiums are awarded yearly by the National Board for research as well as applied projects that enhance nature conservation efforts.

This year, management of the Swedish national parks was transferred from the National Environmental Protection Board to local county environmental agencies. The local offices are staffed with science professionals. Together they handle a variety of resource management projects for parks, reserves, bird sanctuaries, and other protected natural sites. County personnel grant and regulate permits for research on these sites. In addition, these environmental offices work with landowners as well as with the forestry agency, writing up agreements, discussing use restrictions, and designing rehab projects.

The holistic approach to science related to nature conservation in Sweden functions well for a country of its size and population. Visitor numbers are relatively low in parks, which means that most internal resource problems are incurred through permitted land uses. External threats, however, have been measured and are of immediate concern to Swedish environmental managers. To pinpoint impacts, baseline data gathered over an extended time, are critical to Sweden's approach to science. International conferences, agreements, and shared research also are important ingredients used to address protection of natural resources.

Edwards has been living in Sweden and learning about its natural parks and reserves for the past two years.

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