

# Environmental impacts along informal trails and recreation sites at well-established Swedish nature play areas

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## Introduction

Nature play areas (NPAs) are an increasingly popular technique to combat “nature deficit disorder,” or, the substantial reduction in time spent by children in nature. Such areas began being regularly built in the U.S. and the U.K. less than ten years ago. In contrast, NPAs have been commonly included in Swedish schoolyards for decades.

NPAs have the potential to positively affect our children’s health and environmental sustainability. Studies have suggested play improves self-esteem, motor function, and classroom behavior, while decreases anxiety, depression and attention disorders. Meanwhile, time spent in nature when young has been correlated with environmentally-aligned attitudes and behaviors when older.

Despite these benefits, NPAs are often located in protected natural areas, and their managers must balance recreation activities with their associated environmental impacts. The existing literature on visitor impacts to protected natural areas provides little information on youth-related resource impacts or their management (Vander Stoep and Gramann, 1987; Turner, 2001; Hockett, et al., 2010; Browning, et al., 2012). As more NPAs are developed and opened in the U.S. and U.K., land managers will need to know more about how the unstructured play activities of children affect natural conditions and what techniques are available to avoid or minimize such impacts. Best management strategies for U.S. and U.K. NPAs are currently being developed by trial and error.

This study provides the first dataset on what environmental impacts occur at well-established, Swedish NPAs and how they are sustainably managed. In addition, it includes a preliminary investigation of informal trail creation during children’s play and whether different schools incur different levels of environmental impacts. It is complemented by an earlier study in newly-established U.S. NPAs.

## Methods

Six schools with NPAs were surveyed during the month of June 2012. Another six will be surveyed in July, and will be added to the dataset and analysis presented at the 6<sup>th</sup> MMV Conference in August. Schools were located near or in Uppsala and Stockholm, Sweden, and NPAs were largely mixed hardwood-softwood forests in publically-owned forestland. Each had been operated for at least ten years, sized over 0.5 hectares, and visited by children 100,000 to 400,000 hours annually. Survey methods were adapted from previous recreation ecology studies (Wood, Lawson and Marion, 2006).

At each NPA, ecological impacts were measured. First, child-created informal trail segments were measured. Their overall conditions and average widths were individually as-

essed on a scale from one-to-four. Manager-created formal trails were not measured, because they were visited more often by non-child than child visitors. Next, recreation sites were identified as formal (FS) or informal (IS), based on whether they were manager-created or child-created. Sites were also labeled as “concentrated” if they displayed a sum total of <25% ground vegetation and organic litter cover. Site size was measured using the variable radial transect method, and percentage cover of different ground cover classes were recorded. Conditions at adjacent, ecologically-similar undisturbed sites were also recorded as controls. Multiplying size by percentage difference from site minus control provided estimates of vegetation loss, and organic litter and bare soil exposure. In addition, trees and shrubs over 2.5 cm DBH were counted, measured, and assessed for damage and root exposure.

Finally, informal interviews with school administrators and outdoor classroom teachers were conducted. Open-ended questions were asked about the school, its curricula, and the NPA. Based on these interviews, schools were categorized as “traditional schools” or “nature schools” depending on whether or not their curricula focused on teaching environmental literacy and empathy. Simultaneously, play was observed and resource impacts were qualitatively noted if children were using the site during visits.

## Results

### *Informal trails precursors of recreation sites*

Expansive recreation sites dominated NPAs, and surveying of individual trail segments was difficult. Remnants of informal, interweaving trail networks within concentrated recreation sites were ubiquitous. Correspondingly, only 122 segments were surveyed, and they had a mean condition class of two, or “trail obvious; vegetation cover lost and/or organic litter pulverized in primary use areas.” Average width was category two-of-four, or 0.33-0.66m. Several examples of NPA layouts are shown in Figure 1.

### *Impacts greater at traditional schools*

Aerial extent and intensity of impacts were greatest at FS and IS in traditional school NPAs. Impacts included vegetation trampling, soil exposure and loss, tree and shrub bark and branch damage, and tree root exposure. On average, traditional schools had one FS of size 1547m<sup>2</sup> and four IS of size 792m<sup>2</sup> while nature schools had four FS of size 416m<sup>2</sup> and one IS of size 148m<sup>2</sup>. Aerial loss of vegetation per site was 680m<sup>2</sup> vs. 212m<sup>2</sup> at nature school sites. Average number of damaged trees was 43% (FS) and 31% (IS) at traditional schools compared to 15% (FS) and 21% (IS) at nature schools. Mean number of stumps was nine



Figure 1. Layouts of NPAs

vs. four. Only mean root exposure was greater at nature schools: 28% vs. 22%.

## Discussion

Interweaving trail networks seemed to grow in number and extent until they were indistinguishable from one another. This implied sequence of informal trails networks growing into concentrated recreation sites denuded of ground vegetation suggests trail creation from play should be thoughtfully considered during management. Reinforcing informal trails and developing formal trails with appropriate design and construction may provide long-term NPA sustainability (Leung and Marion, 1999). Ongoing management actions to harden and stabilize both formal and informal

trails may also be effective in minimizing resource impacts, and informal trails that are unnecessary or particularly susceptible to impacts can be closed and rehabilitated. Further research on the transition from informal trails into recreation sites is needed.

How and what curricula are taught to children may also be a major factor of NPA sustainability. One major difference in the curricula of nature vs. traditional schools was the teaching of nature ethics vs. outdoor behavior rules. Observations of curricula delivery and focus groups with children about environmental behavior at the two school types is needed to further investigate these differences.

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