ASSESSING THE IMPACT OF ENVIRONMENTAL VOLUNTEERING PROGRAMS ON CONSERVATION

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Abstract
Environmental volunteering programs have emerged as vital contributors to conservation within protected areas worldwide. While research has extensively explored volunteering in social and healthcare sectors, environmental volunteering still needs to be studied. This paper assesses the significance of environmental volunteering programs, with a focus on the National Volunteering Program (PNV) at Chapada dos Veadeiros National Park (PNCV), Goiás, and similar programs in the United States. We used data collected from September to November 2016 to analyze costs, volunteer engagement, and the generated value. Our investigation reveals the efficient coverage of investment costs by volunteer services, highlighting the importance of volunteer contributions in achieving conservation goals. The discussion delves into the impact and effectiveness of these programs, unveiling their capacity to deliver tangible outcomes such as trail construction and restoration and foster long-term sustainable practices. Ultimately, our findings emphasize the integral role of environmental volunteering in driving positive change for conservation efforts in both countries.

Keywords: Conservation programs. Cost-effectiveness. Volunteers in parks.

Area of Knowledge: Forest Engineering

Introduction

Volunteers in natural areas worldwide have played a key role in protected areas in many countries. (SLOANE; PRÖBSTL-HAIDER, 2019; SILVEIRA JÚNIOR *et al*., 2019). According to Kwiatkowski, Hjalager and Liburd (2020), environmental volunteering is an altruistic initiative carried out freely and without profit expectations. It involves direct tasks for environmental improvement and conservation of natural resources, serving as a personal and social transformation strategy toward a more just, responsible, and environmentally committed society (FIGURE 1).

Although there is a significant amount of research on volunteering in social and healthcare fields, there is a lack of exploration into the realm of environmental volunteering (SILVEIRA JÚNIOR *et al*., 2019; MCGINLAY *et al.,* 2023; GANZEVOORT; VAN DEN BORN, 2023). Volunteering has become increasingly popular, especially in developed countries. The National Park Service in the United States of America (USA) is a prominent example of volunteer work in action.

The study aimed to assess the significance of environmental volunteering programs in the USA and Brazil. It utilized available literature and data collected between September 20th and November 13th, 2016, from Chapada dos Veadeiros National Park (PNCV) volunteer activities for the National Volunteering Program (PNV) of Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio) (FIGURE 2).

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Figure 1 – Examples of environmental volunteering activities in Chapada dos Veadeiros National Park (PNCV).

a) Monitoring of visitation impacts on trails, b) Trail maintenance (camouflage), c) Firefighting, d) ICMBio Brigade fire beaters, e) 20-Liter tanks.
Source: authors (2016).

Figure 2 – Visitor center at Chapada dos Veadeiros National Park (PNCV) in 2016.

a) Park entrance, b) Exhibition room, c) Auditorium, d) Counter.
Source: authors (2016).

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Methodology

Firstly, we listed the most significant costs of ICMBio National Volunteer Program in PNCV between September and November 2016 (TABLE 1).

Table 1 – Chapada dos Veadeiros National Park (PNCV) volunteer-related costs between September and November 2016.

Items	Cost Sep-Nov (R$)	Cost/month (R$)
Electricity	1,051.23	350.41
Gas cylinder	225	75
Food allowance	900	300
Fuel (diesel)	438.06	146.02
Driver's salary	3,600	1,200
Total	6,214.29	2,071.43

Source: authors (2017).

During the given timeframe, we converted the invested amount of R$6,214.29 to US$1,912.09 (Table 2), using an average conversion rate of 3.25 R$/US$. In the year 2016, PNCV recorded around 13,000 hours of volunteer work (ICMBIO, 2017) (FIGURE 3). Then, we calculated the average volunteer work hours per month, resulting in a value of 1,083.34 (1).

Figure 3 - Average monthly volunteer work hours at Chapada dos Veadeiros National Park in 2016.

$$\frac{13{,}000 \text{ work hours}}{12 \text{ months}} = \frac{1{,}083.34 \text{ work hours}}{\text{month}} \quad (1)$$

Source: authors (2017).

We considered a conservative value of minimum wage (R$937.00) in 2016 for the services provided by a volunteer (FIGURE 4). In three months, this service equates to R$2,811.00/volunteer (2) or R$3.86/hour (3), as the volunteer's workday in PNCV encompasses 8 hours. With the average hours worked per month calculated earlier as 1,083.34 (2), the value derived from the hours contributed by volunteers in PNCV amounts to R$4,181.69/month (4) or R$12,545.07 for the three considered months.

Figure 4 – Average monthly volunteer work hours value at Chapada dos Veadeiros National Park in 2016.

$$\frac{\text{R\$ } 937.00}{\text{month}} \times 3 = \frac{\text{R\$ } 2{,}811.00}{3 \text{ months (Sep - Nov)}} \quad (2)$$

$$\frac{\text{R\$ } 2{,}811.00}{91 \text{ days (Sep - Nov)}} = \frac{\text{R\$ } 30.89}{\text{day}}$$

$$\frac{\text{R\$ } 30.89}{8 \text{ hours (workday)}} = \frac{\text{R\$ } 3.86}{\text{hour}} \quad (3)$$

$$\frac{\text{R\$ } 3.86}{\text{hour}} \times \frac{1{,}083.34 \text{ work hours}}{\text{month}} \quad (1) = \frac{\text{R\$ } 4{,}181.69}{\text{month}} \quad (4)$$

Source: authors (2017).

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During the specified period, we converted the value of volunteer hours contributed to PNCV from R$12,545.07 to US$3,860.02 (Table 2) using an average conversion rate of 3.25 R$/US$.

Finally, we calculated an *a-value* for each program by dividing the volunteer-contributed work hours by the invested value in the volunteering program, indicating how many times the generated value covered program expenses in a given period (TABLE 2). By doing so, we did not aim to show that volunteering programs could generate profits or replace staff shortages in protected areas but rather to illustrate their effectiveness and significance in environmental conservation. This pertains to the outcomes of different undertakings, like trail installation, maintenance, and monitoring, provision of visitor equipment, wildlife monitoring, ecosystem restoration, protected area guiding, environmental education, and fire control. The objective of these activities is not solely for short-term gains but also for long-term self-sustainability anchored on the social and economic advantages of conserving natural resources. Investing in the program cost is an investment in participatory socio-management.

Results

The *a-values* indicated that the investment costs of all environmental volunteering programs were covered by volunteer services, except for the Volunteers for Outdoor Colorado (VOC) program, where volunteer work covered 90% of the invested value (TABLE 2).

Table 2 - Quantitative assessment of environmental volunteering programs in the USA and Brazil.

Country	Program	Period	Number of volunteers	Work hours	Invested Value (US$)	Work hours Value (US$)	*a-value*
USA	VIP[1]	2013	245,000	6,714,725	2,760,000	148,664,012	53.86
	VOC[2]	2016	5,352	36,773	1,066,000	954,627	0.90
	Trail Construction[2]	2016	152	2,426	9,400	68,928	7.33
	Post-Flood Trail Repair[2]	2016	56	1,118	6,400	31,304	4.89
Brazil	ICMBio (PNCV)[3]	Sep-Nov 2016	9	1,083.34	1,912.09*	3,860.02*	2.02

[1]Volunteers in Parks, [2]Volunteers for Outdoor Colorado, *Values converted from BRL to USD.
Source: [1]Niccolini (2015), [2]VOC (2016), [3]authors (2016).

As mentioned earlier, the *a-value* for PNCV between September and November 2016 is the division of the estimated value of volunteer work hours (US$3,860.02) by the invested value in the program (US$1,912.09), resulting in an *a-value* = 2.02. It means the value of volunteer hours is twice that of the PNV program cost in the unit in the referred period.

Discussion

Investigating environmental volunteering programs in the United States and Brazil revealed compelling insights into their contributions and effectiveness. The *a-values*, which gauge the cost coverage of volunteer services, indicated an impressive trend across programs (KOBORI *et al.,* 2015). Notably, all programs, except VOC, saw their investment costs adequately covered by the dedication of volunteers. In the case of the VOC program, volunteers still managed to cover a substantial 90% of the invested value, underscoring their significant role in cost mitigation and program sustainability (BRUYERE; RAPPE, 2007).

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The quantitative assessment (Table 2) underscores the substantial efforts of volunteers. For instance, Volunteers in Parks in the USA witnessed an astounding 245,000 volunteers contributing over 6.7 million work hours, translating to an *a-value* of 53.86 (NICCOLINI, 2015; SHINBROT *et al*., 2023). Similarly, Trail Construction and Post-Flood Trail Repair VOC subprograms showcased the efficiency of volunteer engagement with *a-values* of 7.33 and 4.89, respectively (BELTRONE, 2019).

In Brazil, the ICMBio (PNCV) program also displayed promising results, with a calculated *a-value* of 2.02, indicating the value of volunteer hours was twice the program's estimated costs, affirming the program's efficient use of resources.

Conclusion

Our findings collectively demonstrate the effectiveness of environmental volunteering programs as critical mechanisms for achieving conservation goals. Volunteers' dedication significantly contributes to completing various tasks, such as trail construction and repair, wildlife monitoring, and environmental education but also indicates a strong commitment to promoting sustainable practices. Volunteers become integral partners in conservation efforts by covering or substantially mitigating program costs, fostering a sense of shared responsibility for protecting natural resources. These results emphasize the dual benefits of environmental volunteering: achieving tangible conservation outcomes while fostering a sense of stewardship and community social engagement.

In summary, the results underscore the pivotal role of environmental volunteering programs in the United States and Brazil, shedding light on their economic efficiency, effectiveness, and capacity to drive positive change in conservation efforts.

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