

Original Article

# Some Ecosystem Services of Green Space in Schools in the City of Yamoussoukro (Center, Ivory Coast)

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**Abstract** - The town of Yamoussoukro has a large number of green spaces, in particular the Scientific High School and the Mamie Adjoua High School, which are the only two secondary schools with green spaces. The general objective is to show the importance of green spaces in schools. To achieve this objective, a survey is conducted among the students and staff at these two schools. The results of the survey show that among the reasons for their presence in these spaces, shade, rest, study and waiting for the next lesson were the most cited and had a positive influence on their academic performance. However, the attitudes of the learners and the irregular management of these green spaces do not allow maximum benefit to be derived from them. This study leads to the realisation that green spaces can provide many ecosystem services to learners during their careers in secondary education if they are well managed.

**Keywords** - Ecosystem services, Gestion, Green spaces, Secondary school, Yamoussoukro.

## 1. Introduction

Success at school is a goal for any education system. Several factors contribute to this success. The best known are parental involvement and support, the quality of teaching, access to educational resources and student motivation [1, 2, 3]. However, success at school is often the result of the interaction of several factors rather than a single one. While these factors are of great importance to a student's success, others play a key role through their effect on the student's physical and psychological well-being. According to [4], students' emotional well-being is crucial to promoting success at school. As a result, pupils need to find all the favourable conditions that will enable them to feel good in the environment in which they live, mainly in the school where they spend most of their day [5].

The term 'environment', sometimes considered synonymous with ecosystem or living environment, also takes the form of a cultural whole including the built habitat and the social sphere [6]. In the urban environment, the environment in its ecosystemic or biotope sense is often referred to as a green space, i.e. spaces that have not yet been built on, that are planted with vegetation or trees, wooded or agricultural, managed by a municipality's specialised services and open to the public [7]. They are, therefore, public facilities that represent an investment for the community and

are accessible to the general public. These urban green spaces are ideal places for families to spend time together. They also teach children to respect public spaces, nature and other children [8]. This finding suggests that in schools, the presence of green spaces would be beneficial for learners. The playground and its various facilities, of which the green space is the main element, can already be considered a centrepiece of the school. It is a place to let off steam between two periods of enforced immobility. It is where all the school's pupils gather for special moments during the day. The stops between 10 am and midday work sessions and the afternoon break are warm reunions where the children share, confide in each other, decompress and get some fresh air [5]. In addition, the place of green spaces in schools has become increasingly important since the United Nations Conference on Environment and Development held in Rio in 1992. In its declaration, it confirmed the role of the environment in education and the perspective of sustainable development [9]. Since then, most schools in the world have included green spaces in their management.

In the Ivory Coast, the majority of secondary schools have no green spaces. The few schools that do have them see only the aesthetic aspect and not the other advantages that green spaces can provide for pupils. Despite this, those who do have them tend to neglect them, resulting in a lack of



maintenance that compromises their quality and usefulness. Moreover, few studies have shown the benefits of green spaces in schools. It is against this backdrop that this study has been carried out, with the aim of encouraging the founders and managers of secondary schools to incorporate green spaces. The aim is to show the importance of green spaces in schools in Côte d'Ivoire, taking the case of the town of Yamoussoukro, its political capital. More specifically, the aim is to identify certain services provided by green spaces and to assess the causes of their deterioration in Yamoussoukro's schools.

## 2. Materials and Methods

### 2.1. Study Area

This study was carried out in the town of Yamoussoukro, located in central Côte d'Ivoire, 250 km north-west of Abidjan, the economic capital [10]. Yamoussoukro is a crossroads for roads leading to the towns of Daloa, Bouaké, Oumé, Didievi and Sinfra. The town of Yamoussoukro is located in the Yamoussoukro sub-prefecture (Figure 1). Yamoussoukro is home to prestigious facilities such as the Basilique Notre Dame de la Paix, the Hôtel President, the Foundation, the Institut National Polytechnique Houphouët-Boigny, the Scientific High School and the Mamie Adjoua High School.

Yamoussoukro has a transitional humid tropical climate, with temperatures of up to 30°C [11]. The average inter-annual temperature in the Yamoussoukro region is around 26°C. The average monthly maximum and minimum temperatures are 33.05°C and 19.55°C, respectively. The hottest period of the year in Yamoussoukro is the first quarter (January to March), while the least hot period is the July-August bimester.

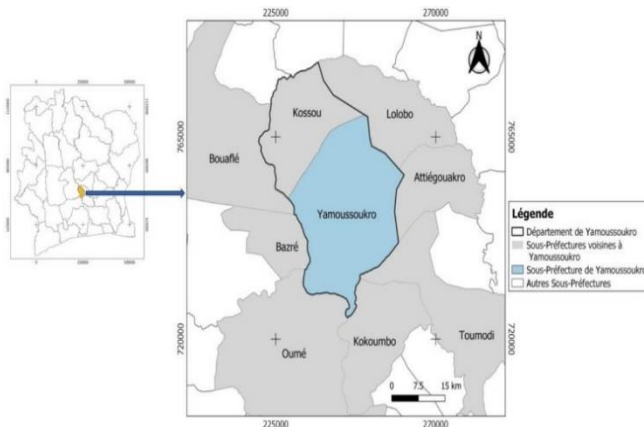


Fig. 1 Location of the Yamoussoukro sub-prefecture in Côte d'Ivoire

## 3. Results and Discussion

### 3.1. Profile of Respondents

In the schools, 207 students were surveyed. Of these, 143 were girls (69%) and 64 were boys (31%) (Table 1). The majority of students surveyed were between the ages of 13

and 16, accounting for 62% of the total. Students in the 11th grade were the most likely to frequent their school's green spaces. Girls outnumbered boys because the Mamie Adjoua High School is an all-girls school, while the Scientific High School is a co-ed school.

Table 1. Summary of the profile of the pupils surveyed

Profile variables		Number of quotes	Percentage (%)
Genre	Female	143	69
	Male	64	31
Age	10-12	50	24
	13-16	128	62
	17-20	27	13
	20 and over	2	1
Classes	6 <sup>e</sup>	2	1
	5 <sup>e</sup>	46	22
	4 <sup>e</sup>	23	11
	3 <sup>e</sup>	2	1
	2 <sup>e</sup>	41	20
	1 <sup>e</sup>	58	28
	T <sup>le</sup>	35	17

### 3.2. Time Spent in Green Spaces by Respondents

The majority of pupils surveyed use these green spaces. This proportion was 95.2% (Figure 2). Among staff (administration, supervisors and teachers), only 46.5% used the green spaces and 53.5% did not. In terms of frequency of use, the respondents use their school's green spaces a few times. This proportion is in the majority compared with those who use them often or always (Figure 3).

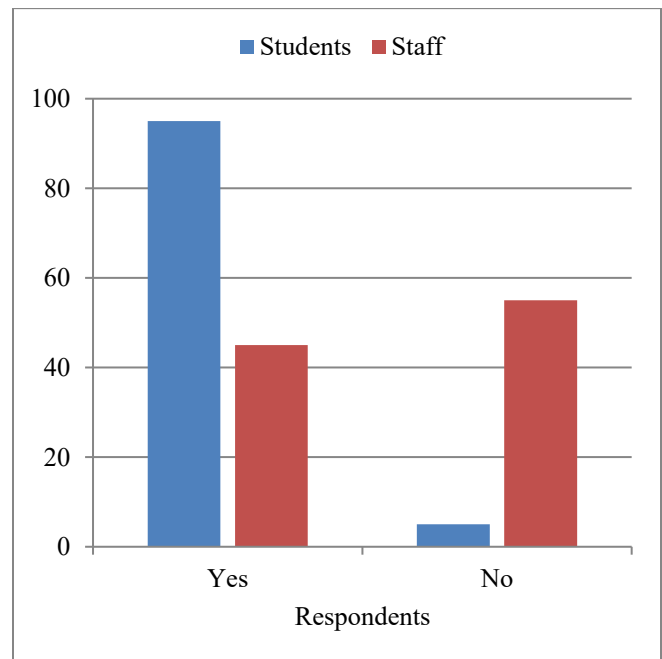


Fig. 2 Distribution of respondents by frequency of use

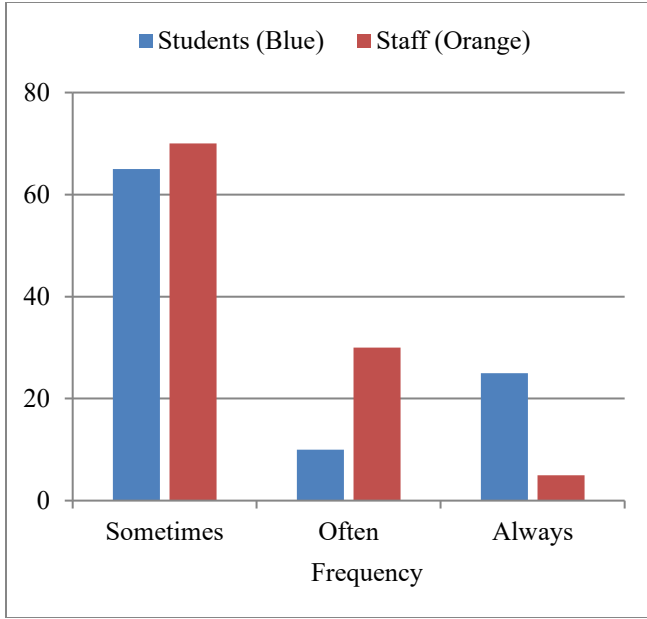


Fig. 3 Distribution of respondents by frequency of use

### 3.3. Reasons for student attendance and aspects of green spaces appreciated by staff

Regardless of the type of respondents, i.e., students and staff (supervisors, administrators, and teachers), all agree that green spaces are important in schools. The main reason students use them is for shade, with a ratio of 25.8% (Figure 4). Next is “waiting for the next lesson,” with a rate of 22.3%. Green spaces used as a place of entertainment are the least cited, with a ratio of 14.3%. For administrative and teaching staff, shade (56.7%) is the most appreciated feature. The least appreciated feature is tranquility, with a rate of 3% (Figure 5). The most frequently cited reason, “shade,” can be explained by the fact that, due to its geographical location, the city of Yamoussoukro is subject to very high temperatures. This result is consistent with other findings, such as those reported by [12] in Yamoussoukro, [13] in Abidjan, and [14] in Lomé, which showed that the main reason for visiting green spaces is the shade provided by trees. Thus, when they are not in classrooms or offices, respondents sit under trees to enjoy their shade when the sun appears in the sky. This shade is highly prized in dry, hot regions such as Chad, for example [15].

Furthermore, the temperature differences between highly mineralized areas and nearby areas with vegetation (parks, urban woodlands, grassy areas) vary between 5° and 12° C [16, 17]. As a result, the shade provided by trees allows students to wait for their next class, rest, and chat with their classmates. Furthermore, in hot regions, the shade provided by a large tree adds value to a house or plot of land [18]. It should also be noted that many students said that the shade provided by trees helps them study and learn their lessons better. Indeed, scientific studies have shown a link between

the presence of green spaces and brain activity. According to [19], the presence of trees increases nervous system activity.

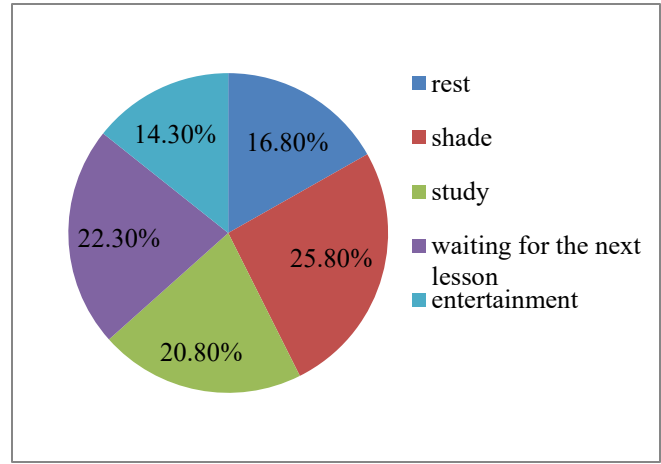


Fig. 4 Distribution of respondents according to reasons for using green spaces

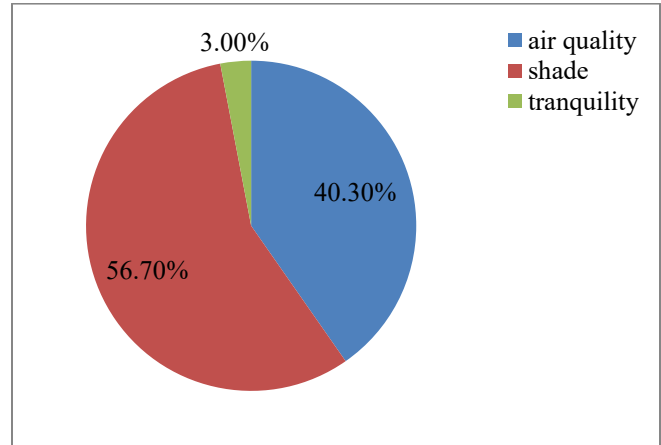


Fig. 5 Breakdown of elements appreciated in green spaces according to respondents

### 3.4. Knowledge of the Roles Played By Trees

According to the majority of students surveyed, trees provide shade (28.7%). Next came the role of purifying the air (25.3%), providing freshness (13.9%) and supplying medicines (10.7%). The other roles played, according to the pupils, are less than 10%, the least cited being water purification (2.6%) (Figure 6). Among the roles of trees known to students is air purification. Through photosynthesis, plants absorb harmful particles from the air and release oxygen.

Trees also create a microclimate through their shade in summer [20, 21], and this microclimate is very important in regions where the urban climate tends to be warming. Another function that green spaces play, according to respondents, is beautification. According to, green spaces contribute to and promote the beautification of cities, particularly in a well-built landscape.

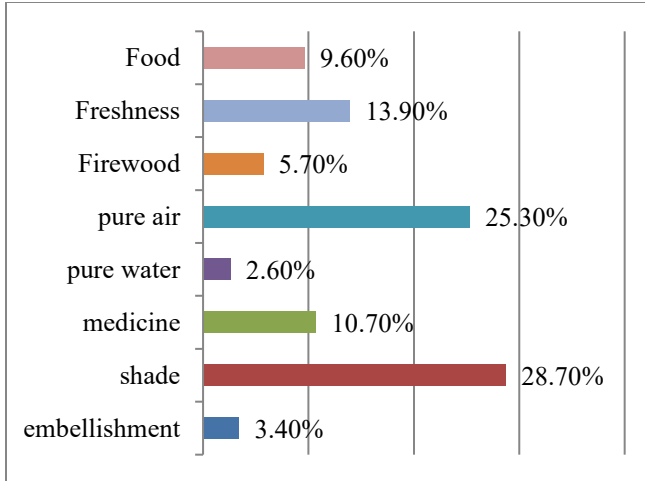


Fig. 6 Distribution of tree roles according to respondents

### 3.5. Pupils' Attitudes to Green Spaces

Most of the pupils surveyed said they and their classmates produce rubbish in green spaces. This proportion was 44.6% (Figure 7). This was followed by urine (30.3%). Those who said that pupils were involved in maintenance were the least numerous, with a proportion of 16.2%.

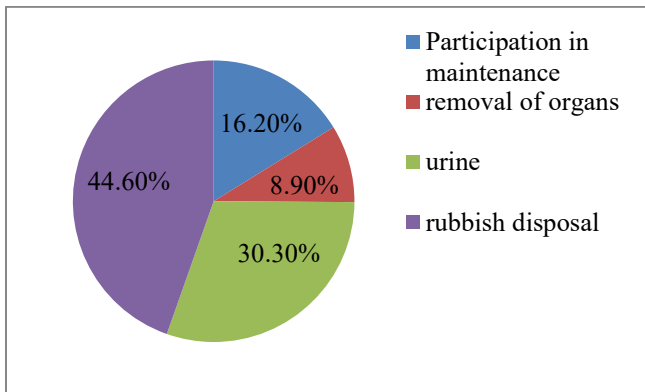


Fig. 7 Pupils' behaviour in green spaces, according to respondents

### 3.6. Problems Linked to the Presence of Green Spaces in Schools

The majority of pupils and staff surveyed said that green spaces are dirty (30.3%). The second biggest problem was the presence of reptiles, insects, etc., in green spaces (27%). The least cited problem was the threat (11.3%) posed by trees to infrastructure (Figure 8). The main problem identified is the mess caused by trees through falling branches, dead leaves, etc. Leaves, branches, and seeds that fall from trees create a mess and give green spaces an unattractive appearance. The second problem identified is the presence of reptiles, insects, etc. Although not frequent, incidents (27.9% of respondents) have been reported when visiting the school's green spaces. These involve the presence of reptiles, particularly snakes and scorpions, which coexist with the students. Among the staff surveyed, some even claimed that a few students had

been bitten by snakes at their school and at other schools with green spaces outside Yamoussoukro. The fact that green spaces are refuges for animals was noted. Another issue that was raised was the presence of people outside the school, particularly undesirable individuals who appeared suspicious. With this in mind, 7% of those surveyed stated that building a fence would prevent undesirable individuals from disturbing the peace of the students and allow them to feel safe.

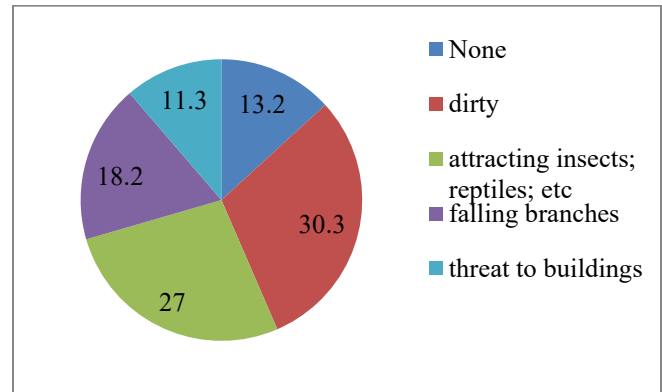


Fig. 8 Problems linked to the presence of green spaces in schools

### 3.7. Wishes and Suggestions for Trees to Enrich Green Spaces

Most of the pupils questioned wanted more trees in the green spaces. This proportion of pupils was 97.1%. Only 2.9% did not. The types of plants they would like to see in their green spaces are for embellishment (29.6%), shade (27.8%), food (24.9%) and medicinal purposes (17.7%) (Figure 9).

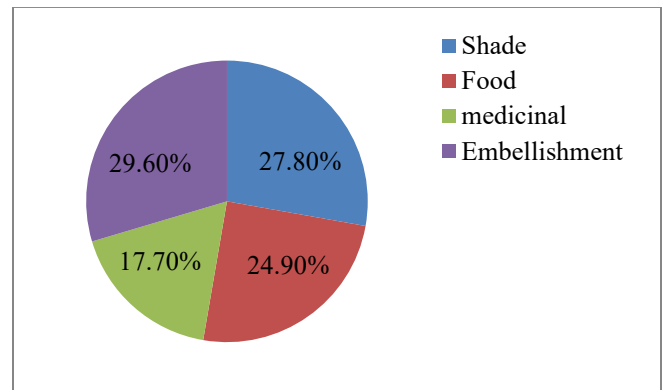


Fig. 9 Species desired for enriching green spaces, according to the students surveyed

### 3.8. Management of Green Spaces

Most of the staff surveyed said that green spaces were managed by a school maintenance service. The proportion of staff who said this was 57.1%. Next, we have maintenance carried out by a special external service (20.4%) and 10.2% say that their maintenance is done by the pupils themselves.

Meanwhile, 12.2% of respondents said that maintenance rarely took place (Figure 10). Even if maintenance is carried out according to the students surveyed, by a specialized service or other, it must be noted that it is not regular and often even absent, as indicated by 14% of respondents. This result is similar to that of [12] in the green spaces of

Yamoussoukro, where they state that the lack of maintenance makes it impossible to appreciate the value of green spaces due to a lack of financial resources, according to administrative staff. The wandering of domestic animals was also reported.

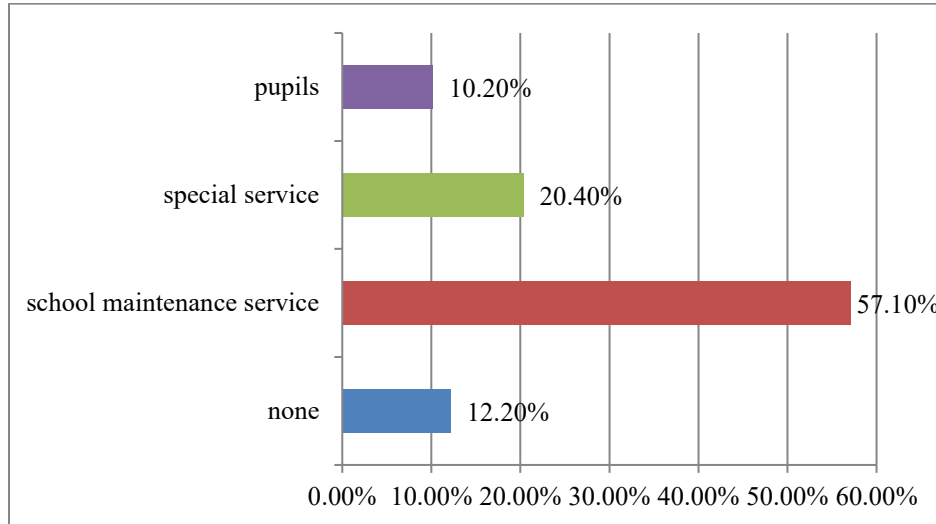


Fig. 10 Breakdown of opinions on who manages green spaces

### 3.9. Influence of Green Spaces on School Performance

According to the majority of staff surveyed, i.e. 83.7% of respondents, the presence of green spaces in schools positively influences student performance (Figure 11). In the same vein, 32.6% of respondents said that they held practical lessons in the middle of their school's green spaces, while 67.4% said the opposite (Figure 12).

Several studies have also shown that regular contact with green spaces leads to increased attention and discipline in children at school [22, 23, 24]. With this in mind, the majority of staff surveyed stated that green spaces have an influence on academic performance, given all the benefits they can bring (tranquility, silence, noise reduction, etc.).

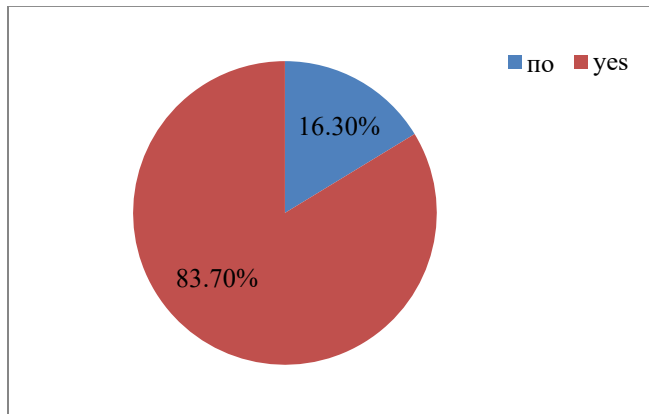


Fig. 11 Distribution of opinions on the influence that the presence of green spaces could have on student by staff

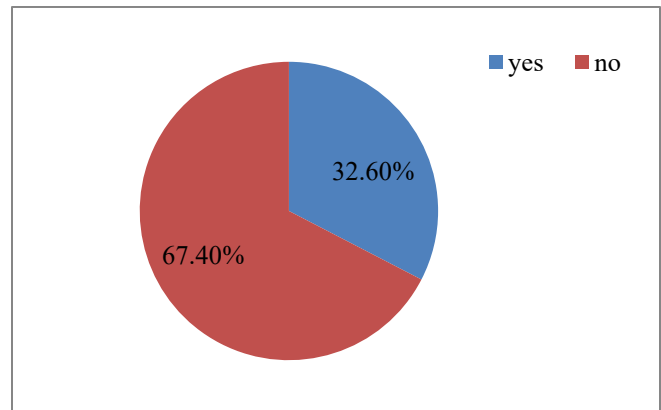


Fig. 12 Distribution of opinions on the use of green spaces in practical lessons with pupils, according to staff

## 4. Conclusion

The survey of pupils and staff on green spaces in Yamoussoukro schools showed they are useful. Over 95% of those surveyed appreciated the shade provided by the trees in the green spaces. They also provide other services, such as a place to rest (16.8% of respondents) and to wait for the next lesson (22.3%). Thus, according to the respondents, their presence has a positive influence on pupils' academic performance, as they use these spaces to learn their lessons better (20.8%). Despite the perceived benefits, pupils admit that they contribute to the deterioration of these green spaces by adopting bad attitudes towards them, producing waste (44.6% of respondents) and urinating (30.3%). Although some schools maintain these green spaces, their management remains highly irregular.



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