

Household Solid Waste Disposal in an Old, Walled-City and A New, Posh Neighbourhood of Bikaner City



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Abstract

In the present urbanizing world, proper disposal and management of municipal or urban solid wastes is an emerging imperative. Constituting a large proportion of these wastes, Household Solid Wastes (HSW) is a big challenge in itself. Being concerned with the complex nature of man and his behaviour, management of HSW requires understanding and application of diverse factors ranging from environmental, economic, socio-cultural, technological, psychological, managerial to politico-administrative. The present study aims to understand the patterns of HSW management in two socio-economically different localities of the desert city of Bikaner, India. Significant differences were observed with regard to occupations, income levels, rates of garbage generation, its collection and disposal, as well as perception of citizens in this regard.

Keywords: Household Solid Waste, Disposal, Bikaner City, Old Walled City, New Posh Neighbourhood.

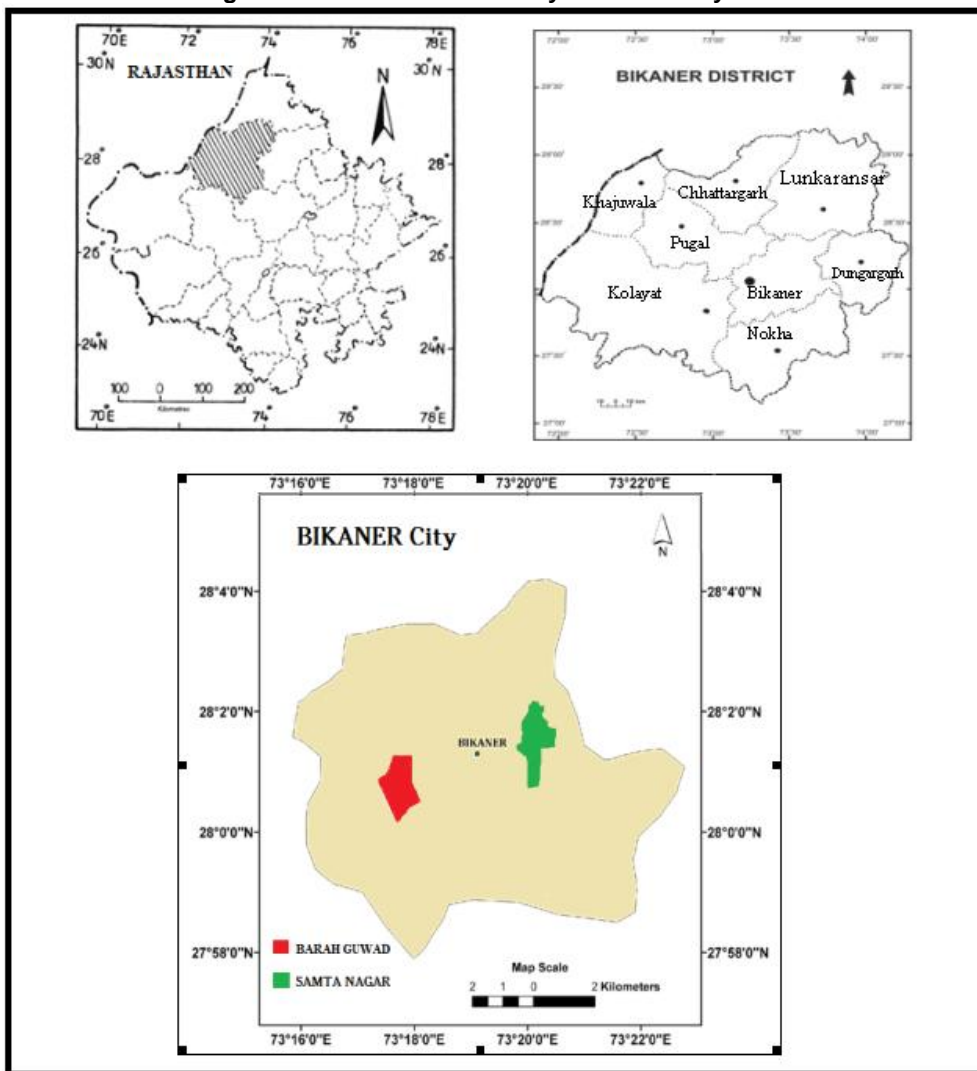
Introduction

Effective disposal and management of solid wastes in the growing cities is a big challenge of the present fast urbanising world. It has emerged as one of the major environmental agenda before the mankind. Solid wastes in towns and cities can emerge from the households, business and commercial establishments, offices as well as the industries. The former three are collectively christened as municipal or urban solid wastes. The present study is related to the household solid wastes only.

The quantity of household solid waste (HSW) generated in an area increases with density of houses, households and population; their income levels; consumption pattern and behaviour. The nature of climate, vegetation and kind of agricultural/food products used also affect the waste quantity. The provision of waste collection services by municipality in an area is often seen to be related to the political influence and economic well-being of the residents of the area. Collection and transportation of wastes is also affected by the physical outlay and characteristics of the neighbourhood. The narrow streets in an area, for e.g., preclude the use of large waste collection vehicles and tractors, and use of pick-ups or manual labour becomes necessary. The scenario of solid waste management in an area is deeply related to the awareness, participation and educational level, as well as economic condition, of the residents.

The present study is focused on the characteristics and patterns of household solid waste management in two socio-culturally different neighbourhoods of Bikaner City (28.0229° N, 73.3119° E), a comparatively fast-growing city (Population size in 2011: 6.44 lakh), located in the Thar desert of Rajasthan, India. The first area, Barah Guwad, is situated inside Nathusar Gate, in the old, walled city. It has high settlement and population density, showing unplanned organic growth pattern, with narrow winding streets and few open spaces. The densely settled and built-up area leaves little space for storage of solid wastes, and their daily collection becomes an imperative. The narrow streets here obstruct the plying of big waste collection and transportation vehicles. The households have lived here for centuries, and have comparatively lower education and income levels. The second area is Samata Nagar, situated on Bikaner-Ganganagar road, in front of the Roadways Depot and grain market. It is inhabited by the elite class of the City, having large houses, with mostly in-migrant and nuclear families, lower population density, higher educational and household income levels (Fig. 1).

Fig. 1 : Location of Bikaner City and the Study Areas



Review of Literature

Ogwueleka (2009) looked into municipal solid waste characteristics and management aspects in regard to Nigeria. Common constraints faced in this field were lack of institutional arrangement, insufficient financial resources, absence of bylaws and standards, inflexible work schedules, insufficient information on quantity and composition of waste, and inappropriate technology.

Zhang *et al.* (2010) examined municipal solid waste generation and composition in China, along with an overview of current state of municipal solid waste management. Current waste composition in China is dominated by high organic and moisture content as the proportion of kitchen waste is 60 percent. However, only 2.2 percent of waste is composted, while 91.4 percent is landfilled.

Khaiwal *et al.* (2015) assessed municipal solid waste practices in Chandigarh city, including waste generation, collection, transportation, disposal and treatment. The City has door-to-door waste collection system for transportation to Collection-cum-Transfer stations, called Sehaj Safai Kendras, through public-private stakeholders. From these Kendras,

combustible waste is transported to Refuse Derived Fuel plants.

Fei *et al.* (2016) analysed the recycling paths, material flows and cash flows in Informal Recycling System in Suzhou urban area in China. Recycling system in China is typical in the sense that both formal and informal recycling systems exist simultaneously. Recycling rate in Suzhou urban area was found to be 22 percent in 2013.

Chen *et al.* (2018) reported that nearly 4 million Waste Pickers of China collected 70-80 percent of recyclable municipal solid wastes in informal sector. In Nanjing, China, Waste Pickers account for only 6.8-7.3 percent of entire industrial chain of recycling economy, saving an annual municipal solid waste disposal cost of about 17.6-22.0 million USD.

Choudhury *et al.* (2018) made an assessment of the current trend, scope and challenges for urban solid waste management in the Silchar town of Assam, India. Out of the average daily waste generation of 85 metric tonnes, household waste accounted for 50 percent, market waste for 39

percent, street waste 6 per cent, and other commercial wastes 5 per cent.

Khan (2018) reported that Dehradun has been the hub of major developmental activities since 2000, attracting migration from nearby hilly districts, along with huge growth of industries. The residents generally discard their waste on roads, drains, open ground, sometimes burning them in the open. An integrated solid waste management approach has been recommended by using public-private partnership.

Ghosh *et al.* (2019) point out that rising rate of municipal solid waste generation and unscientific disposal in the open dumping sites are responsible for emission of high concentrations of methane in developing countries. Methane emissions from the unengineered landfill sites of Okhla, Bhalswa and Ghazipur in Delhi have been estimated and energy generation potential assessed.

Objectives of Study

The objectives of the study were as follows:-

1. To unravel the patterns of household solid waste generation and collection in an old, walled-city (Barah Guwad), and a new (Samata Nagar) neighbourhood of Bikaner City.
2. To compare the patterns of household solid waste management in the two areas of Bikaner City.

Hypothesis

The study is based on the hypothesis that patterns of municipal solid waste generation and collection vary between two areas of the City with different socio-cultural characteristics.

Methodology & Sources Of Information

The study is based on fieldwork carried in two different socio-cultural areas of Bikaner City. The area inside Nathusar Gate, i.e., Barah Guwad was selected as a representative of the old, walled-city of Bikaner. This part of Bikaner is characterised by densely-settled population with close proximity of houses and very narrow to narrow streets. The area of Samata Nagar was selected as a representative of

the new, posh areas of Bikaner City. It is inhabited by well-to-do households, represented by the industrialists, grain- market brokers and government servants, including those working in the local Agricultural University. The area is less densely settled, with big houses and wider streets.

An equal number of eighty households each were randomly selected from both of the neighbourhoods by using voter lists. The selected households were personally administered schedules, which aimed to generate information about various aspects of the household solid waste management. This information was tabulated and analysed in order to present a comparative picture of the two selected neighbourhoods of the study area.

Results & Discussion

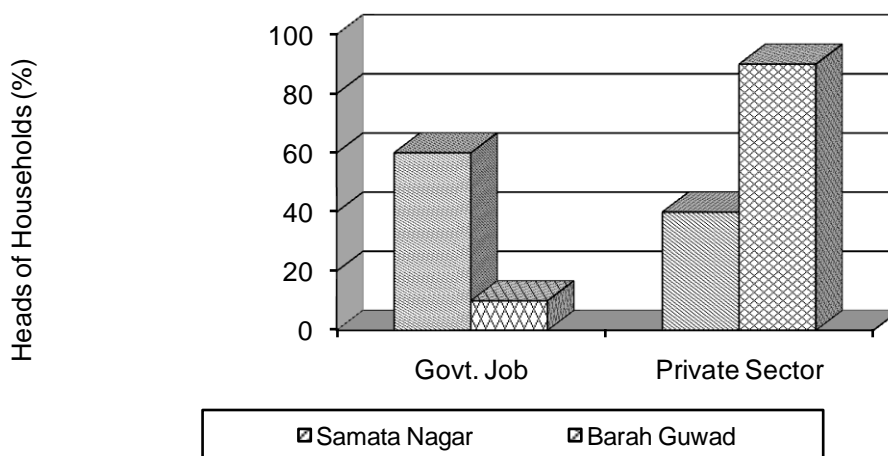
Since quantity and nature of household solid waste is dependent, *inter alia*, on the occupations and income levels of the households, an analysis of the occupational and income pattern of the households was carried out. Three-fifth of the heads of the households surveyed in Samata Nagar area were found to work in government jobs, while those working in government sector were only one-tenth of the total in Barah Guwad area. Most of those in the latter area were found to work in the private sector. Although 40 percent of the respondents in Samata Nagar were also working in the private sector, most of these were self-employed. Their occupations were mostly of the nature of big business, like working as merchants in the grain market, or having industrial enterprises in the Bichchhwal Industrial Area or Khara Industrial Growth Centre (Table 1 and Fig. 2).

Table 1 : Occupational Structure of the Surveyed People in Study Areas of Bikaner City

Occupation	Samata Nagar	Barah Guwad
Government Job	48 (60%)	08 (10%)
Private Sector	32 (40%)	72 (90%)
Total Households	80	80

Source : Field Survey, 2018

Fig. 2 : Occupational Pattern Amongst Households



Higher economic status of the households in Samata Nagar area is reflected in the Table 2 and Fig. 3. Here, about 70 percent of the respondents were reportedly having average monthly household

income of rupees 30000 or more. About 45 percent respondents were having average household monthly income of greater than rupees 40000 per month. In the Barah Guwad area, one-fourth of the respondents

were having average household income below Rs 20,000 per month, while 70 percent of the households reportedly had average monthly income below 30000 per month. In this manner, households in Samata

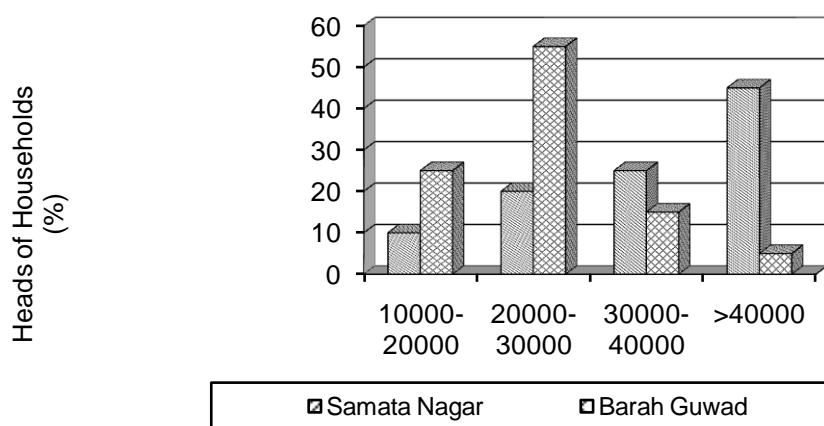
Nagar area were found to enjoy significantly higher economic status than those living in Barah Guwad neighbourhood.

Table 2 : Distribution of Income Amongst Surveyed People of Samata Nagar and Barah Guwad, Bikaner
(Heads of Households)

Average Household Income (Rs./Month)	Samata Nagar	Barah Guwad
10000-20000	08 (10%)	20 (25%)
20000-30000	16 (20%)	44 (55%)
30000-40000	20 (25%)	12 (15%)
>40000	36 (45%)	04 (05%)
Total Households	80	80
Mean Income	35,500	25,000

Source : Field Survey, 2018

Fig. 3 : Average Monthly Household Income (Rs.)



When we consider average daily household solid waste generation rate, we find that 55 percent of the households in Samata Nagar area generated an average of upto 0.5 kilogram per day. Those generating an average of 1 kilogram or more waste everyday were more than a third of the total households. On the other hand, households with

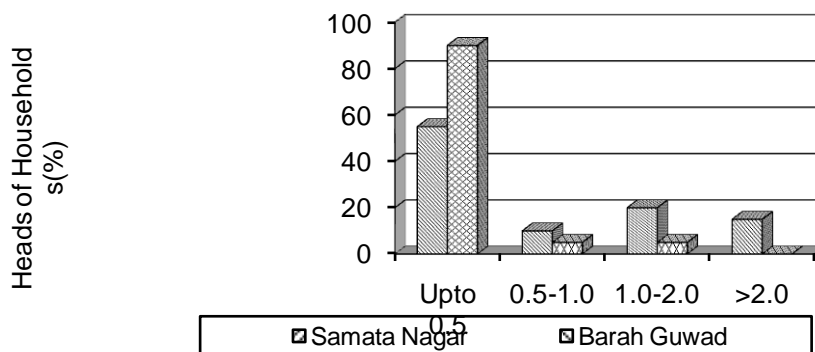
average daily waste generation of upto 0.5 kg were 90 per cent in Barah Guwad area. The reason for higher average household solid waste generation in Samata Nagar would seem to be linked to their higher average income levels, which enable them to adopt a more consumption-oriented behaviour, resulting into greater average generation of wastes (Table 3 and Fig. 4).

Table 3 : Average Daily Household Garbage Production in Study Area of Bikaner City
(Heads of Households)

Household Garbage (Kg/day)	Samata Nagar	Barah Guwad
Upto 0.5	44 (55%)	72 (90%)
0.5 to 1.0	08 (10%)	04 (05%)
1.0 to 2.0	16 (20%)	04 (05%)
> 2.0	12 (15%)	-
Total Households	80	80

Source : Field Survey, 2018

Fig. 4 : Average Household Garbage Generation (kg/day)



The pattern of household solid waste disposal in the two areas is represented in Table 4. In Samata Nagar locality, cent percent households claim that their household garbage was stored on the designated roadside sites for later collection and final disposal. In Barah Guwad area, only three-fifth of the households reported of this systematic waste storage and collection pattern, while the remaining two-fifth reported that household wastes in their area were just thrown on the roadside edges, because there are hardly any open spaces for throwing or dumping of waste in the locality

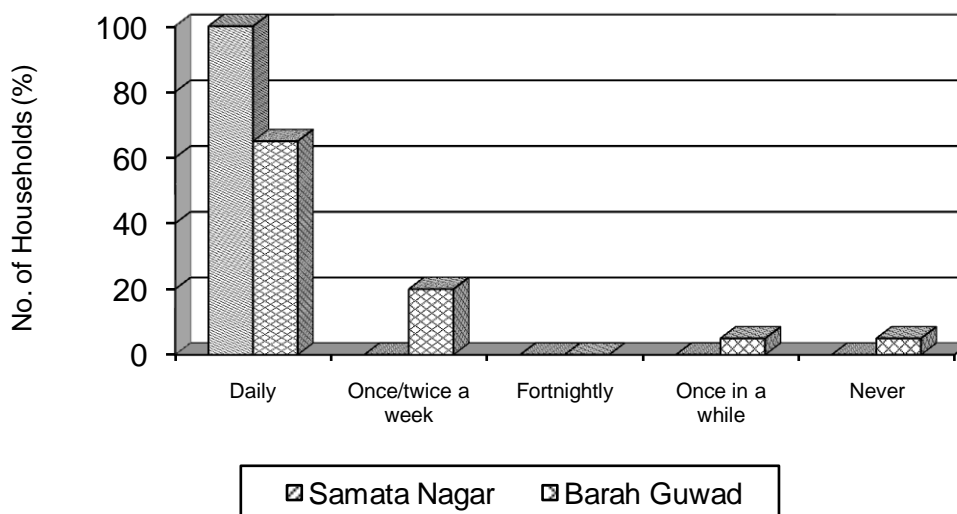
Table 4 : Patterns of Household Solid Waste Disposal

Disposal Pattern	(No. of Households)	
	Samata Nagar	Barah Guwad
Burning of waste	-	-
Throwing on Road Edge	-	32 (40%)
Roadside deposition for later collection	80 (100%)	48 (60%)
Total Households	80	80

Source : Field Survey, 2018

In regard to the regularity of waste collection services in the two study areas of Bikaner City, it was

Fig. 5 : Frequency of Household Waste Collection



reported by all households that there was daily collection of household solid wastes from Samta Nagar area. In the walled-city area of Barah Guwad, only two- thirds of households claimed to receive daily waste removal services. One-fourth reported that their houses received such services only once or twice a week. Furthermore, 5 per cent of households complained that they received waste removal services once in a while only. Another five per cent households denied receiving any such waste removal and collection services in their areas (Table 5 and Fig. 5).

Table 5 : Collection Frequency of Household Solid Wastes in Samata Nagar and Barah Guwad, Bikaner City

Collection Frequency	(No. of Households)	
	Samata Nagar	Barah Guwad
Daily	80 (100%)	52 (65%)
Once/twice a week	-	20 (25%)
Fortnightly	-	-
Once in a while	-	04 (05%)
Never	-	04 (05%)
Total Households	80	80

Source : Field Survey, 2018

Information about the nature of waste removal services providers was also gathered. In all, only 60 percent of the surveyed households in Samata Nagar area agreed to be provided with waste removal services by the Municipal Corporation of Bikaner. The remaining 40 percent of the households reported that they received their waste removal services from private or NGO sector. In contrast, 95 percent residents of older, walled-city area of Barah Guwad told that they received garbage collection services from only the Municipal Corporation of Bikaner. Only 5 percent households reportedly received waste removal services from private or NGO sector. The difference in waste removal service provision would reflect greater economic power and influence of Samata Nagar residents (Table 6).

Table 6 : Garbage Collection Service Providers in the Study Area

Service Provider	(No. of Households)	
	Samata Nagar	Barah Guwad
Municipal Corporation	48 (60%)	76 (95%)
Private/NGO	32 (40%)	04 (05%)
Self Service	-	-
Total Households	80	80

Source : Field Survey, 2018

An enquiry about the assessment of the present garbage management system in their respective areas revealed that about one-third residents of Samata Nagar found it disappointing, 55 per cent were satisfied with the present status of garbage management in their area, even as the remaining 10 per cent households reported their

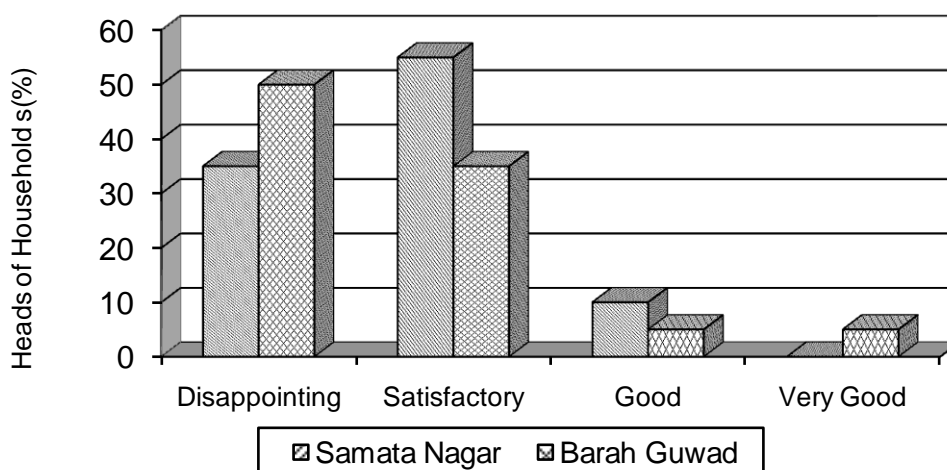
garbage management system to be good. On the other hand, in Barah Guwad locality, 15 per cent households viewed present garbage management system to be good or very good, about one-third were satisfied, while half of the residents surveyed found their present system to be disappointing (Table 7 and Fig. 6).

Table 7 : Assessment of Present Garbage Management System in the Study Area

Assessment Category	Samata Nagar	Barah Guwad
Disappointing	28 (35%)	40 (50%)
Satisfactory	44 (55%)	28 (35%)
Good	08 (10%)	04 (05%)
Very Good	-	08 (10%)
Total Households	80	80

Source : Field Survey, 2018

Fig. 6 : Perception Towards Present Waste Management in Bikaner



A query was made about the ascription of responsibility for improving the present garbage management status in the two study areas of Bikaner City. In Samata Nagar area, 15 percent of the households felt that it was the responsibility of the citizens, 35 percent felt it to be the sole responsibility of the Municipal Corporation, while the remaining one-half of the residents perceived that it was a shared responsibility and the present status can only be improved with the co-operation of all concerned. Only one-fifth of the surveyed households in the interior, walled-city area of Barah Guwad ascribe the responsibility of improving the present conditions to Municipal Corporation, while 80 percent of the households felt that the situation can only be improved with active co-operation of all the concerned parties (Table 8).

Table 8 : Responsibility for Improving Garbage Management in the Study Area

Responsible Agency	Samata Nagar	Barah Guwad
Citizens	12 (15%)	-
Municipal Corporation	28 (35%)	16 (20%)
All Concerned	40 (50%)	64 (80%)
Total Households	80	80

Source : Field Survey, 2018

Conclusion

This comparative study showed that the people of Samata Nagar area had better education as reflected in their greater share in government jobs than in Barah Guwad area of old, walled-city of Bikaner. The economic status of the Samata Nagar

residents was better than those of Barah Guwad area. Those in the private sector also had greater income levels in Samta Nagar because such households were linked with big business or industrial production. All this was reflected in the better economic status of the Samata Nagar households.

The present study indicates greater generation of household waste in area with better occupational and economic status that is Samta Nagar. These influential people had more regular waste removal services than in the old city area of Bharah Guwad. Due to their better economic conditions and paying capabilities, residents of Samta Nagar also availed services of private or NGO sector. In regard to garbage collection in their respective areas, therefore, more people were disappointed with the present conditions in Bharah Guwad than in Samta Nagar locality. The study would then seem to confirm the concept that people of areas with better socio-economic conditions seem to manage, and enjoy, better and more regular waste removal services. More associative studies on the factors affecting waste disposal and management in communities living in variable physical, social and economic conditions will highlight the processes behind observable patterns.

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