



Distribution and Main Characteristics of Fairy Chimneys in Türkiye

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Abstract

This study provides the first nationwide and systematic assessment of fairy chimneys in Türkiye, documenting 227 localities and analysing their spatial distribution, elevations, cap characteristics, rock types, and climatic conditions. The number of localities increases markedly from coastal areas toward inland regions, with the most extensive occurrences situated within major volcanic provinces such as Central Anatolia, Kırka–Afyon–Isparta, Galatia, and Eastern Anatolia volcanic provinces. Fairy chimneys predominantly occur between 600 and 1,800 m a.s.l., with an average elevation of 1,220 m. Morphologically, 28% of the localities are dominated by capped fairy chimneys, 40% by uncapped forms, and 32% display a mixture of both forms. Stratification, rockfall processes, and the presence of large boulders within the lithological units primarily control the development of caps. These landforms most commonly develop on conglomerate–sandstone–mudstone alternations, ignimbrites, agglomerates, limestones, undifferentiated pyroclastic deposits, tuffs, and volcanic–sedimentary rocks. Mediterranean, semi-arid, and continental climates are the predominant climate types in which these landforms are found. Overall, the findings of this study provide the first comprehensive overview of the spatial and morphological diversity of fairy chimneys in Türkiye, offering a valuable foundation for geoheritage documentation, geoconservation planning, and comparative studies of erosional landform development.

Keywords Fairy chimneys · Climate type · Rock types · Cap properties · Türkiye

Introduction

Fairy chimneys are vertical landforms formed by erosional processes within badland terrains, typically shaped as columns, cylinders, cones, or mushroom-like pillars. These formations, which can reach several tens of meters in height, have inspired mystical stories and various local names worldwide due to their unique appearances and the cultural and geographical contexts of their locations. Similar formations are known globally by different terms such as capped earth pillars, erosion columns, chimney rocks, hoodoos, earth pyramids (Piramidi di Terra), rock columns, Land of Fairies, Devil's Town (Đavolja Varoš), tent rocks, demoiselles coiffées (ladies with hats), des Capucins coiffés, earth forest, sand pillars, pinnacles, stone forest, rock city, and pedestal rocks (Nocita 1986; Hall 1996; Veress et al. 2014;

Valjarević et al. 2015; Migoń et al. 2017; Bouzekraoui et al. 2018; Şaroğlu and Güngör 2019; Duszyński and Migoń 2022; Self et al. 2022; Milevski et al. 2024). In Türkiye, these landforms are generally referred to as “peri bacası” (fairy chimneys), although they are often known locally by myth-based names such as Gelin Kayası (Bridge Rock or Bridal Rock). These metamorphosis-themed folk tales throughout Anatolia reflect the fairy chimneys' symbolic and mythological significance in local culture (Kazancı and Boyraz-Aslan 2025). Owing to their striking visual forms and cultural impact, such landforms have contributed to the establishment of numerous geoparks, national parks, and natural conservation areas worldwide, making them valuable elements of geotourism.

The remarkable morphological diversity of fairy chimneys arises from the complex interplay of numerous factors. Their development is primarily influenced by rock type, stratification characteristics, fracture orientation and density, past and present climatic conditions, terrain slope properties, and drainage density (Degirmenci 1993; Topal and Doyuran 1995, 1998; Aydar et al. 2013; Veress et al. 2014; Sarıkaya et al. 2015; Tanrıku 2016; Migoń et al. 2017; Çiner and

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