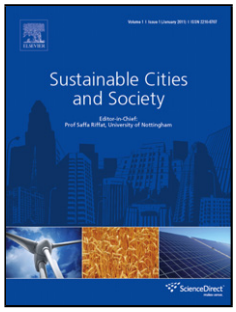

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Green roof evolution through exemplars: Germinal prototypes to modern variants

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Highlights

- Origin and historical development of green roofs is the basis for modern application
- 43 cases from different parts of the world and different periods provide prototypes
- Sod roof was invented in antiquity catering to harsh climate and resource deficiency
- New materials and technology in the 1960s revamped greenroof design and efficiency
- Selected exemplars in recent times germinate continual innovation to promote adoption

ABSTRACT

This paper evaluated a knowledge gap regarding the origin and historical development of green roofs as an evolving human invention. Forty-three cases from different parts of the world, marked by innovative and unique features, were chosen as pioneering exemplars. They were organized into five time periods, namely Antiquity, Medieval, Early Modern, Late Modern, and Recent. The lineage in antiquity was initially expressed through monumental aristocratic and religious structures. Vernacular sod roofs were developed serendipitously in response to harsh environments and lack of durable building materials. Their utilitarian trait allowed continual use in modern times. Medieval Europe witnessed refined Renaissance landscape design with some established as terrace gardens. Modern reinforced concrete generated many buildings with flat roofs amenable to greening. A revised roofing technology in Germany permitted flourishing of spontaneous vegetation, inspiring conscious installation of modernized green roofs. Technological revamping of materials and skills since the 1960s has primed and popularized green roof applications. Despite the new advances, the core principles and practice of ancient green roofs have remained. Continual innovations in