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**Vernacular Architecture for a Changing Planet**  
Edited by Sandra Piesik

**Thames & Hudson**



# HABITAT

## Vernacular Architecture for a Changing Planet

Edited By **Sandra Piesik**

Climate change is the biggest challenge facing our planet. There has never been a more important time to understand how to make the best use of local natural resources and to produce buildings that do not rely on stripping the environment or transporting materials across the globe.

The culmination of years of specialist research, this once-in-a-generation publication gathers together an international team of over one hundred leading experts across a diverse range of disciplines to examine what the traditions of vernacular architecture and its regional craftspeople around the world can teach us about creating a more sustainable future. Organized by the five major climate zones, covering polar, temperate, tropical, desert and continental, and more than eighty countries worldwide, it reveals how people and cultures have adapted to their environment to make the best use of indigenous materials and construction techniques, and stresses the importance of preserving disappearing craftsmanship and local knowledge before it is too late.

Including contextual essays on issues ranging from climatology, to anthropology and economics; detailed reference section; specially commissioned maps and infographics; and a wealth of illustrations, this landmark publication is a celebration of humankind's resilience and ingenuity in a rapidly changing world, and an invaluable resource document for the future generation who will shape our built environment.

With c. 1,000 illustrations.

'We live in an era when planners, governments and even United Nations organizations are re-evaluating the importance of not just vernacular design and architecture but also the use of traditional and indigenous materials in contemporary structures. That is why this volume is such a welcome contribution to our awareness of the current state of vernacular architecture, and a timely reminder of how, in future, we ignore its significance at our cost.'

**André Singer, Royal Anthropological Institute**

'This book celebrates the value, the beauty and the collective ingenuity of vernacular architecture. The relationships between societies and the structures that they build are laid bare for their complexity and their fragility.'

**Jim Coleman and Henry Fletcher, BuroHappold Engineering**

'A sustainable future must take into account the entire multifaceted treasury of traditional wisdom. This impressive collection of the lessons to be learned from vernacular architecture includes every climate zone and multiple ecosystems. We are taken for a fascinating trip across the richness of local knowledge about materials and construction techniques developed over thousands of generations.'

**Tomasz Chruszczow, the Subsidiary Body for Implementation of the UN Framework Convention on Climate Change**

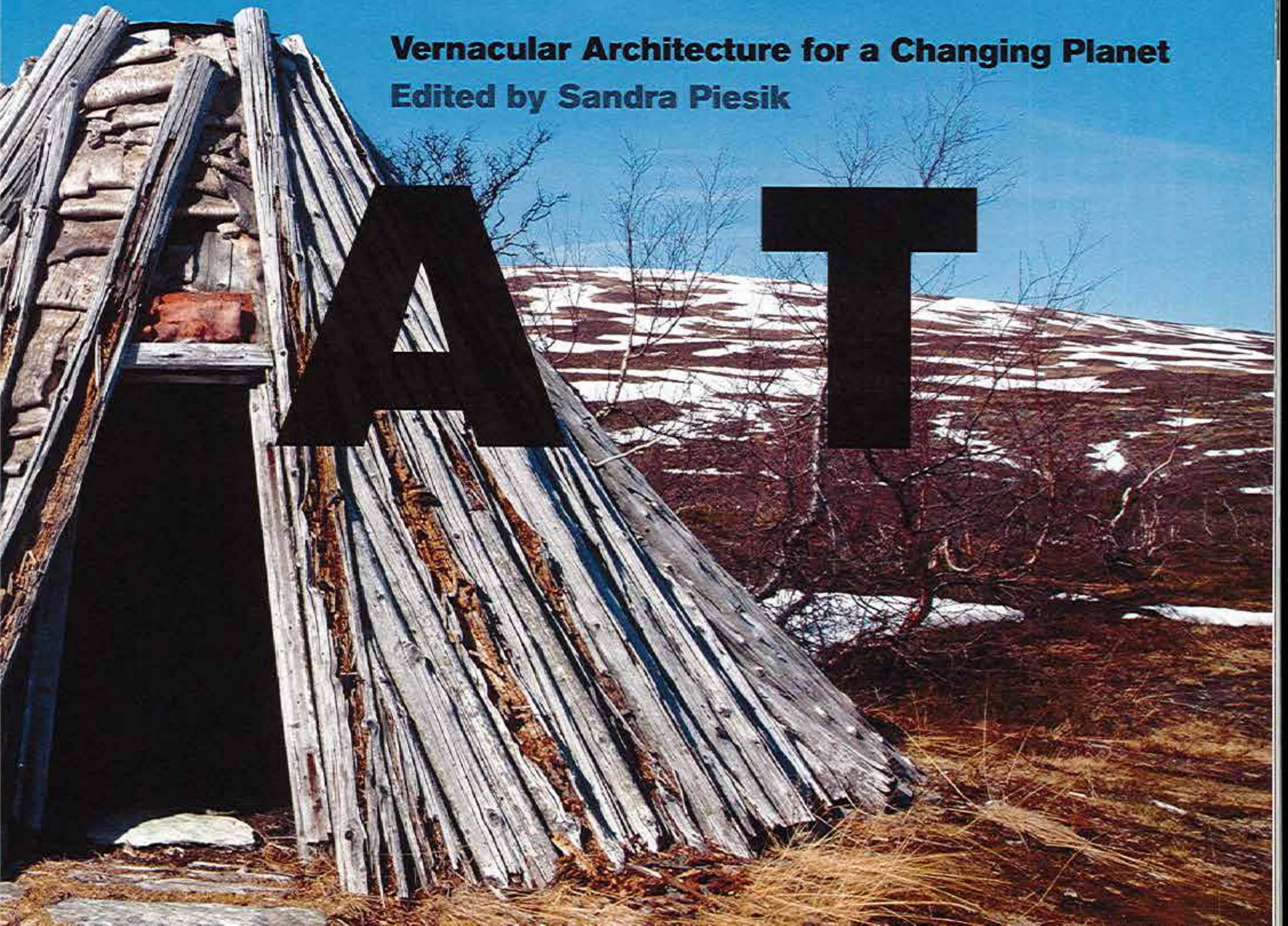


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Page 4-5 Indigenous solutions to climates globally (clockwise from top left): Banco village of mud homes on Niger River bank, Mopti Region, Mali; favelas of Rio de Janeiro, Brazil; timber and thatch home and restaurant in coastal Crawl Cay, Bocas del Toro region, Panama; earthen and timber Sámi home in Abisko National Park, Lapland, Sweden.

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Page 8-9 Climatic variations across the planet shape the landscapes and materiality of local habitats (clockwise from top left): view of houses and fields from Highway 35, Saskatchewan, Canada; circular Tulou structures of South China; Shali fortresses of earthen bricks, Siwa Oasis, Egypt; Lake Village of Ganvie, Benin, Africa.

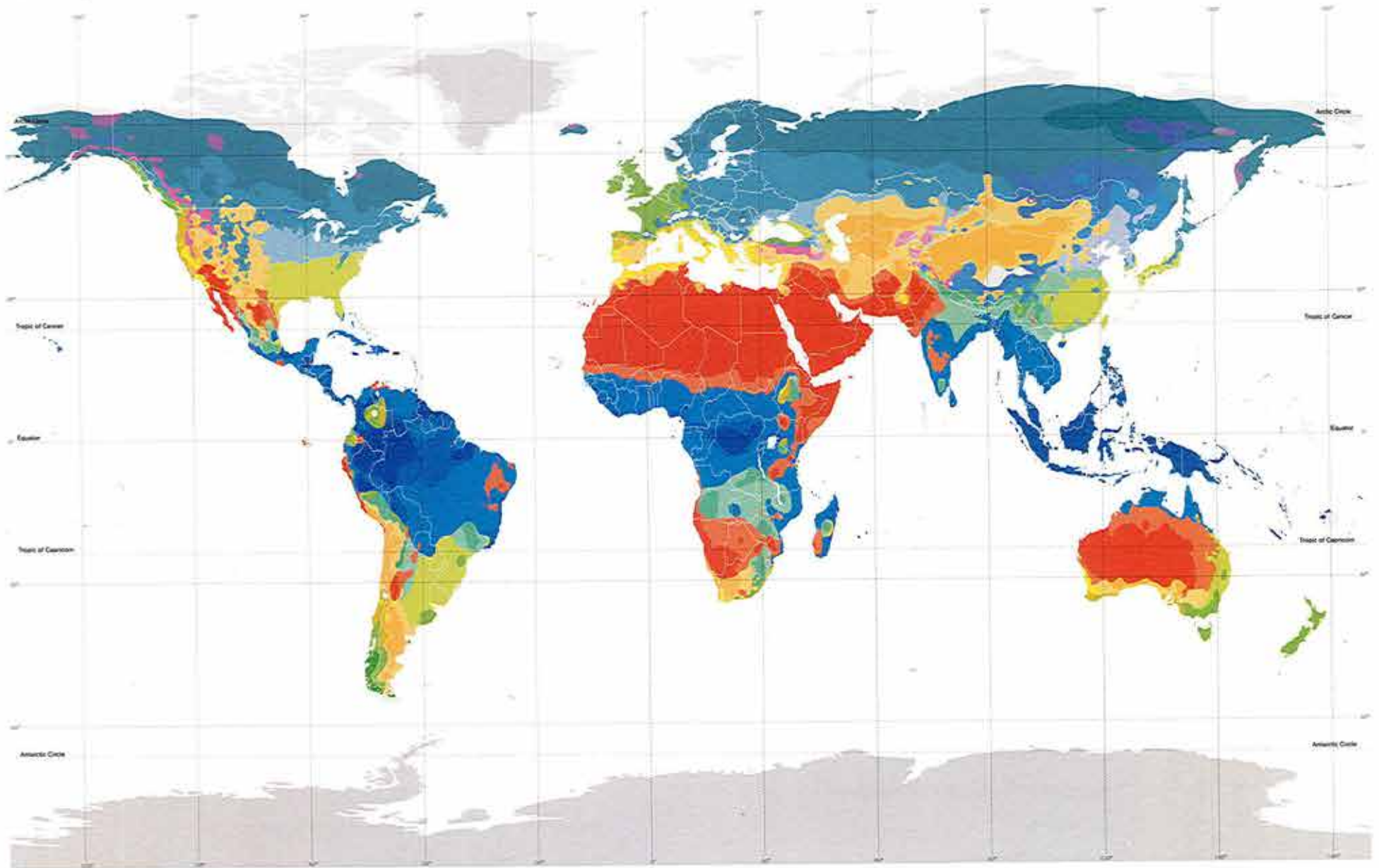
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# How This Book Works

## Köppen-Geiger Map

Equirectangular projection. Scale 1: 70 000 000



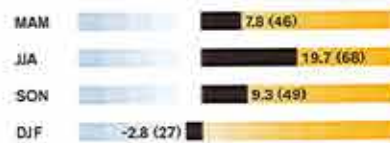
Climate has an enormous influence on both the materials available in a region, and the type of building constructed to ensure adequate shelter. The regionally specific content of *Habitat: Vernacular Architecture for a Changing Planet* is therefore structured in five parts according to the zones established by the Köppen-Geiger system: tropical, dry, temperate, continental and polar.

Within the larger climatic framework of chapters, each region/country entry includes a focused locator map to show the geography of the area discussed, as well as the specific climatic subregions it encompasses.

Entries are also accompanied by two comparative scale bars that chart the Average Temperature and the corresponding Average Rainfall for each season (MAM: March–May; JJA: June–August; SON: September–November; DJF: December–February). The increase or decrease in temperature and rainfall illustrates a meaningful representation of the main climate characteristics of each region and is predominantly based on thirty-year climate normals collated from 1961 to 1990. Note that climate normals for large geographic areas are not included as they cannot give an accurate overview of temperature and rainfall.



### Seasonal average temperatures °C (F)



### Seasonal average rainfall mm (in.)



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# Syria's Villages of Earthen Domes

Saverio Mecca and Letizia Dipasquale

## Geography/Climate

The region south and east of Aleppo, from the Euphrates to Salamiya, has been inhabited since Neolithic times by both sedentary and nomadic peoples, who have alternately dominated the area.

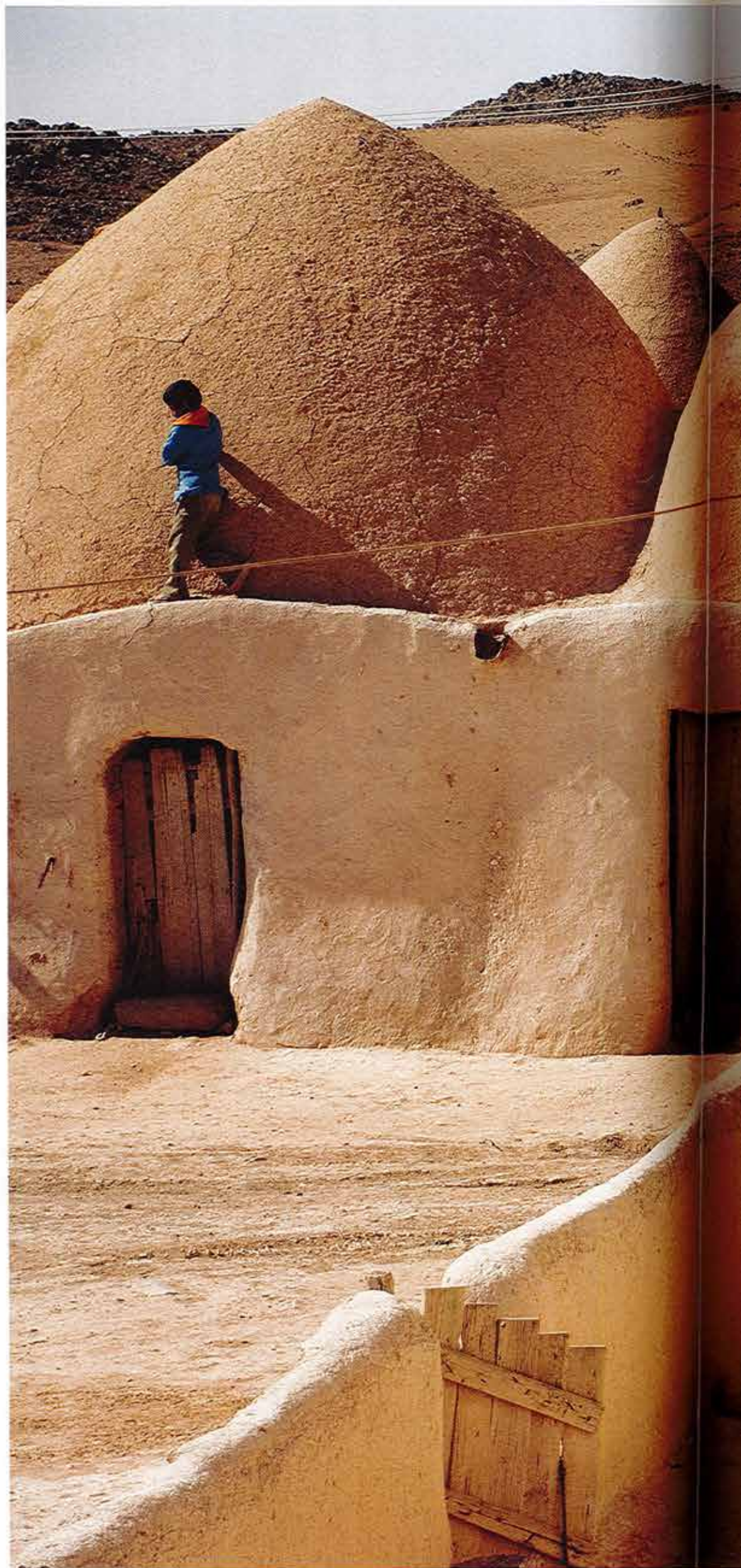
The so-called 'arid margins' region corresponds to the limits of Syria's steppe zone, whose extent can be estimated as covering 55 per cent of the country's territory. The diversity of habitats, in relation to the uses of the land for agriculture and stockbreeding, are linked to the dry climate and soil of the area. In these arid margins can be found a population 'mosaic' comprising varied cultural groups: Ismailis, Alawites and Christians; Kurdish or Circassian refugees; and tribal nomads. Despite this cultural and social diversity, great homogeneity exists in the architectural and building culture, based on an adaptive approach to the available materials: clay, earth, limestone and basalt – or even materials recovered from previous settlements of the Byzantine era.

## Construction Techniques

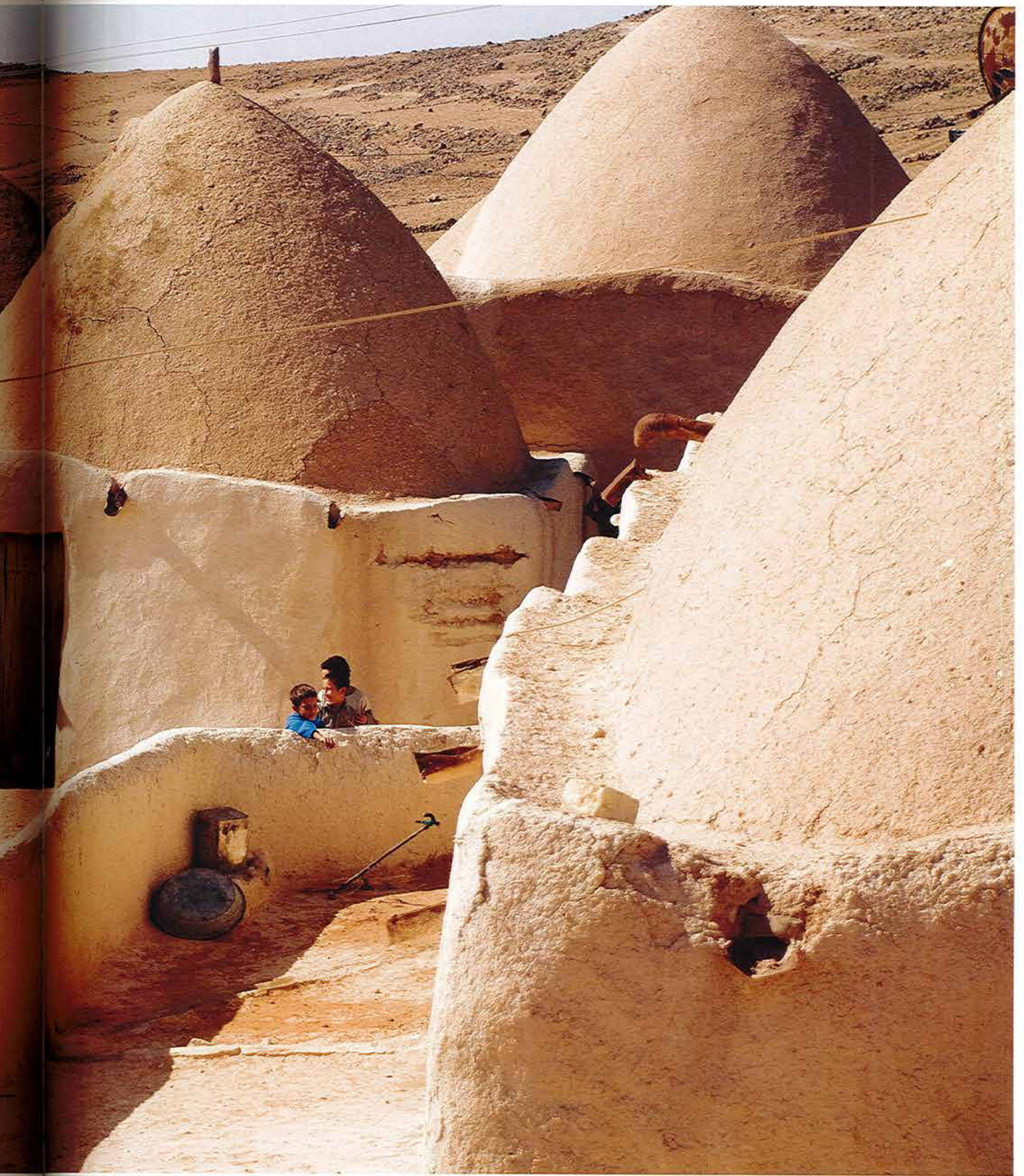
Vaulting technology appears to have been quickly mastered in the ancient Near East. Domed roofing started in Tell Halaf c. 5100 BCE, and has been in use for centuries in traditional Syrian rural architecture. The earthen-domed house evolved over time, stemming from a willingness to apply and develop the most appropriate solutions to meet human needs in relation to the available environmental resources.

Earthen domes are superior to flat roofs because their shapes are cheaper to build in a region scarce in timber. They better resist rain leakage and they expose less surface to the summer sun, reducing solar radiation and achieving generally good climatic conditions in their interior spaces.

**Opposite** Domed structures in Syria form the strongest possible structure that can be built with the readily available materials of clay, earth, limestone and basalt. The superior waterproofing and reduced radiation of this building type ensures its widespread use.









The corbelled dome is realized by laying earthen bricks according to a continuous helicoidal spiral, tapered and often tilted towards the centre. The mason would lay the bricks, perched on the ring of the dome, in an anti-clockwise direction in order to favour the use of his right hand. This allowed the construction process to proceed more efficiently, without any scaffolding or need to adjust the bricks.

Generally, the base thickness of Syrian earthen domes depends on the single adobe-brick dimension, between 350 and 500 mm (14 and 20 in); it is slimmer at the top, between 150 and 200 mm (6 and 8 in).

### Building Plan/Form

The distribution and use of the spaces in this housing type correspond somewhat to those of nomadic camps, and the shape of the dome could be seen as symbolically evoking the tent.

The house's basic element is a double unit made up of two square cells, with an internal length of about 4 m (13 ft) each side, each cell covered by a dome and communicating through an arch called a *qantara*, or a *nhit* if made with stones.

The different heights of the dwellings' perimeter walls may help to distinguish more clearly two main types in the vernacular landscape of the domed villages of Syria. Firstly, there are the so-called domes of the Sultanya or 'Sultan dome' – *Qubba Sultanya* – with a perimeter base that rises up to the height of the door lintel, creating a wall spanned by the dome roof. Secondly, there are simple domes with a very low base. Between the two are other variants that alter according to the height of the perimeter base. Both complete pointed domes and truncated domes have been found – the latter where the availability of wooden branches has cut short the construction of the dome and diverted it into a flat roof.

A typical living unit (or *dar*) was based on the combination of several earthen-dome cells or blocks, which are arranged around a central courtyard, creating

a sheltered and enclosed space. The elements of a basic earthen house may comprise one or more main rooms about 4 m (13 ft) square with various functions (living, sleeping or for visitors), a kitchen, a bath (*hammam*), a store, a stable, a toilet, and fences, a garden and a small store for hens and pigeons; as well as an earthen traditional bakery (*tannur*), a stage (*mastaba*) and a well.

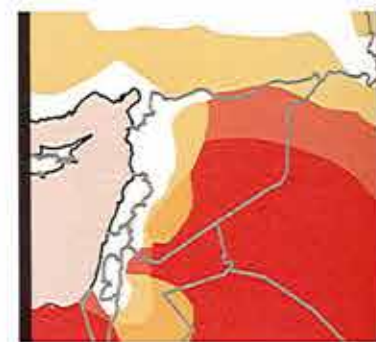
The earthen-dome villages of northern Syria display several main urban-morphology types. Spontaneous villages have no shaped streets, squares or precise, limited urban spaces. Semi-regular villages have a general public space, semi-private spaces, main streets and more narrow streets (*zuqaq*), as well as a mosque. Regular villages have a principal square, small squares (semi-private space), perimeter roads, interior main streets and *zuqaq*, a mosque, and an open market or bazaar.

### Contemporary Applications

The conservation of the region's corbelled-dome buildings has always been part of a natural process, developed over the decades by the population of northeastern Syria. They have passed on the knowledge associated with this type of building construction from generation to generation, ensuring regular maintenance in order to prolong the buildings' useful life.

The cultural and architectural heritage of northern Syrian villages is nowadays subject to natural and sociopolitical threats. The endemically difficult conditions in the area due to its harsh climate, scarcity of resources and isolation have grown worse because of the conflict affecting the country since 2011.

The use of earthen corbelled domes may be seen as an affordable and appropriate solution in a future reconstruction process following the enormous damage suffered by Syria and its built heritage. From functional, constructive and climatic aspects, corbelled domes represent an excellent architectural solution, which could also assist the development of local economies.



#### Seasonal average temperatures °C (F)

MAM	16.4 (61)
JJA	28 (82)
SON	19.2 (66)
DJF	7.2 (45)

#### Seasonal average rainfall mm (in.)

MAM	33 (1.3)
JJA	1 (0)
SON	176 (6.9)
DJF	61 (2.4)

Below Symbolically evoking a tent, domed housing settlements are arranged with a correlation to nomadic camps. Typically, living units are composed of a cluster of domed structures, with a shared, protective central courtyard.

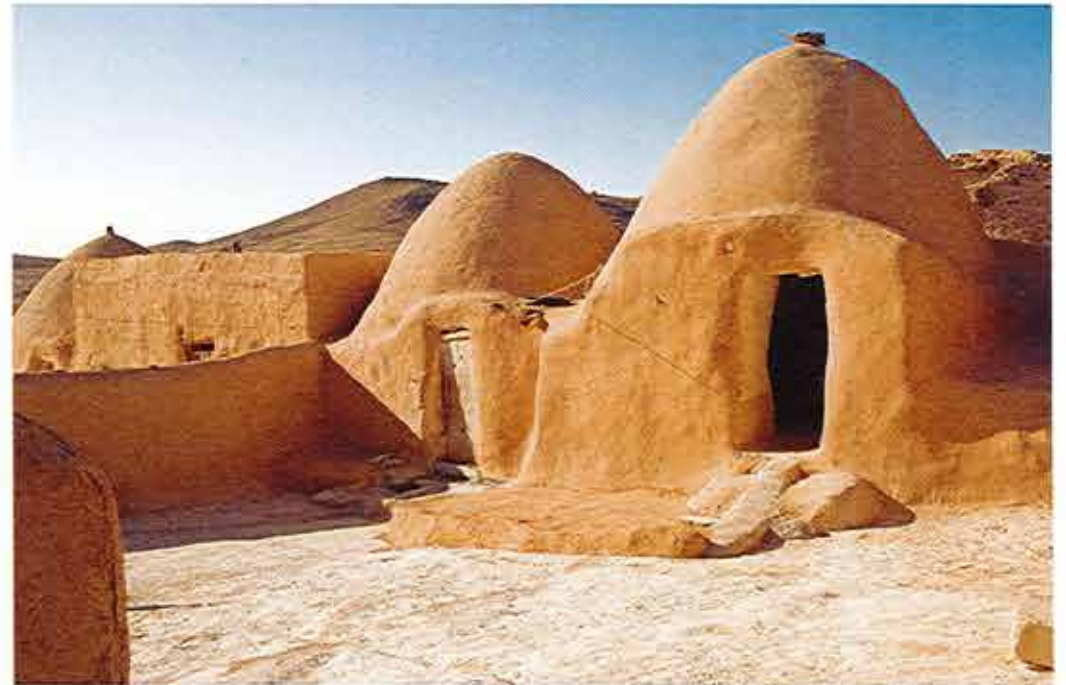
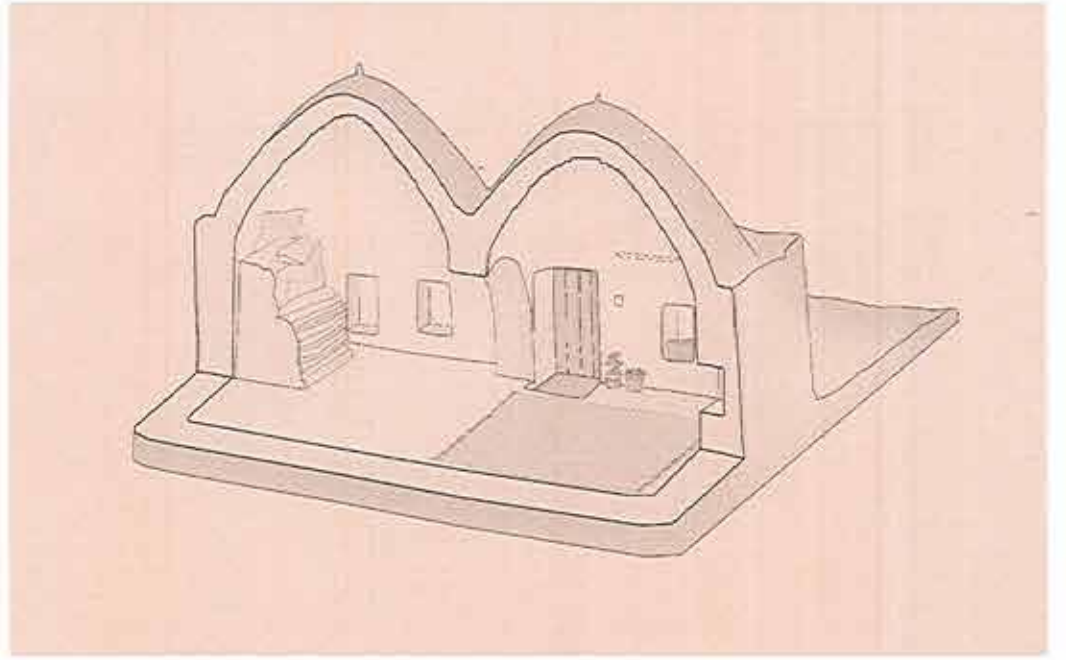
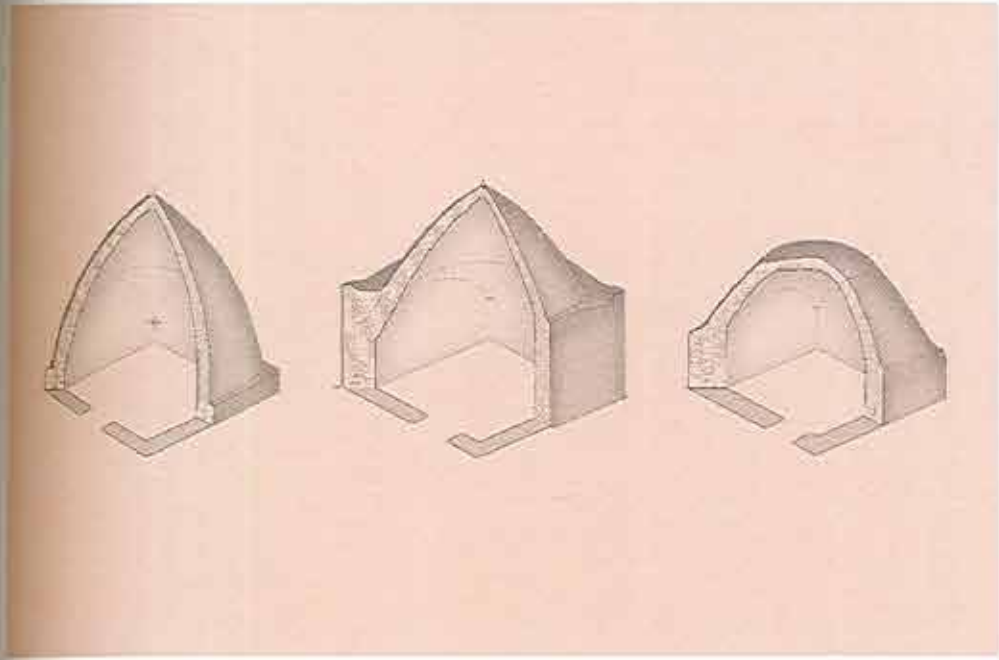
Opposite top left Varied heights of cells are determined by their construction logic: Sultan domes are the tallest, formed of four walls capped by a dome; lower domes are built up directly from ground level.

Opposite top right The basic unit of domed houses or *dar* is formed of two cells linked by an arched doorway.

Opposite middle and bottom The basic two-cell typology of Syrian domes provides living and sleeping spaces. Often, they are expanded to include a larger settlement with separate corbelled structures. These are used for cooking, bathing and storage, as well as baking and housing animals.









**Dr Sandra Piesik** is an architect and a researcher specializing in technology development and transfer. She has worked extensively in the Middle East on projects that reconnect traditional knowledge systems with modern applications, and has led successful research, development and deployment studies on the adaptation of date palm leaf architecture for modern use, which resulted in an award-winning project endorsed by the UNCCD and the book *Arish: Palm-Leaf Architecture*, also published by Thames & Hudson. As the founder of several multidisciplinary research groups and consortia, she is actively engaged in addressing global climate change. She was co-creator of the Urban and Rural Resilience Programme for desert regions and participated in the COP22 UN Climate Change Conference in Marrakech.

#### **Other titles of interest**

##### **Arish: Palm-Leaf Architecture**

Sandra Piesik  
With 295 illustrations

##### **Architecture in Wood**

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ISBN 978-0-500-34324-1  
  
9 780500 343241