hot homes

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First published in 2006 by
Jacqui Small LLP,
an imprint of Aurum Books,
25 Bedford Avenue, London
WC1B 3AT

Publisher: Jacqui Small
Editorial Manager: Kate John
Designer: Lawrence Morton
Editor: Catherine Rubinstein
Production: Peter Colley

ISBN-10: 1 903221 40 4
ISBN-13: 978 1 903221 40 2

A catalogue record for this book
is available from the British
Library.

2008 2007 2006
10 9 8 7 6 5 4 3 2 1

Printed in Singapore

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controlling the environment

Global warming is coming to us all, despite ongoing debate as to the details of its impact. Add to that the fact that increasing numbers of temperate-dwellers are adopting warm-climate second homes as an escape from modern life, and it becomes essential to adapt to hot living, to do so sustainably and with style.

In a hot land, the aim is both to minimise the impact of the heat and to take advantage of its benefits: to even out its extremes and take shelter from the worst of it, at the same time as using its energy to best effect in terms of power consumption. Throughout the whole process of creating a home, from initial choice of terrain, through selection of specific site and orientation, to choice of materials and even details such as colour, heat is a prime consideration. The challenge can be met through lo-tech and largely passive means – age-old methods of building or ventilating – as much as through modern and interventionist techniques; and along with stemming rising temperatures, it is important not to overlook the value of creating an ambience of cool calm even when the actuality is otherwise.

There is no such thing, however, as an ultimate sustainable or environmentally friendly building system. Each project, each site, each building must be approached on an individual basis: in other words, a holistic approach that looks at all the factors that impact on a site, the occupants, its region, climate, culture and resources, before a strategy is employed. The site will have its own microclimate, affected by surrounding terrain, buildings, elevation, vegetation and so on. Knowing all these factors can help a designer orientate a building to take advantage of them, turning it to catch the sun or wind, or shifting it a few degrees so that tall trees provide shade. According to a build's surroundings and the owner's priorities, choices will be made, for instance to avoid or gain sun.

Aspect not only concerns views, therefore, but an entire quagmire of devices required to set up orientation of a home so it functions successfully both against and with the elements. The aim is to control the environment.

Orientation is the first consideration, since it determines where you build your home and in which direction it faces. Designer Andrzej Zarzycki spent five days with his clients driving around their South African game farm near the Botswana border before deciding where exactly the house should be built (see pages 30–3). They chose the perfect spot: the principal house, a labyrinth of lodges, stands on a hillside overlooking the most exquisite plain for game watching – and directly at the favourite watering hole of local baboon; they also have a penchant for game watching, so now the swimming pool has become the first port of call for the baboon, who frequently join the owners for breakfast! Not so much a mistake as a wise and instinctive decision which possibly indicates that we are closer to nature than we might imagine when it comes to house-building!

The most obvious way to keep a home cool is to prevent it heating up too much in the first place. In any terrain, simple design strategies can be employed to minimise heat gain from the sun by having sufficient shelter from it. Siting a structure in the shade of a hillside or trees, sinking it deep into the ground, or building it with thick walls and insulating materials (such as local stone) can all be effective techniques for keeping cool, and basic siting can be amended with details such as overhanging eaves or foliage. As Frank Lloyd Wright put it, "The physician can bury his mistakes, but the architect can only advise his client to plant vines."

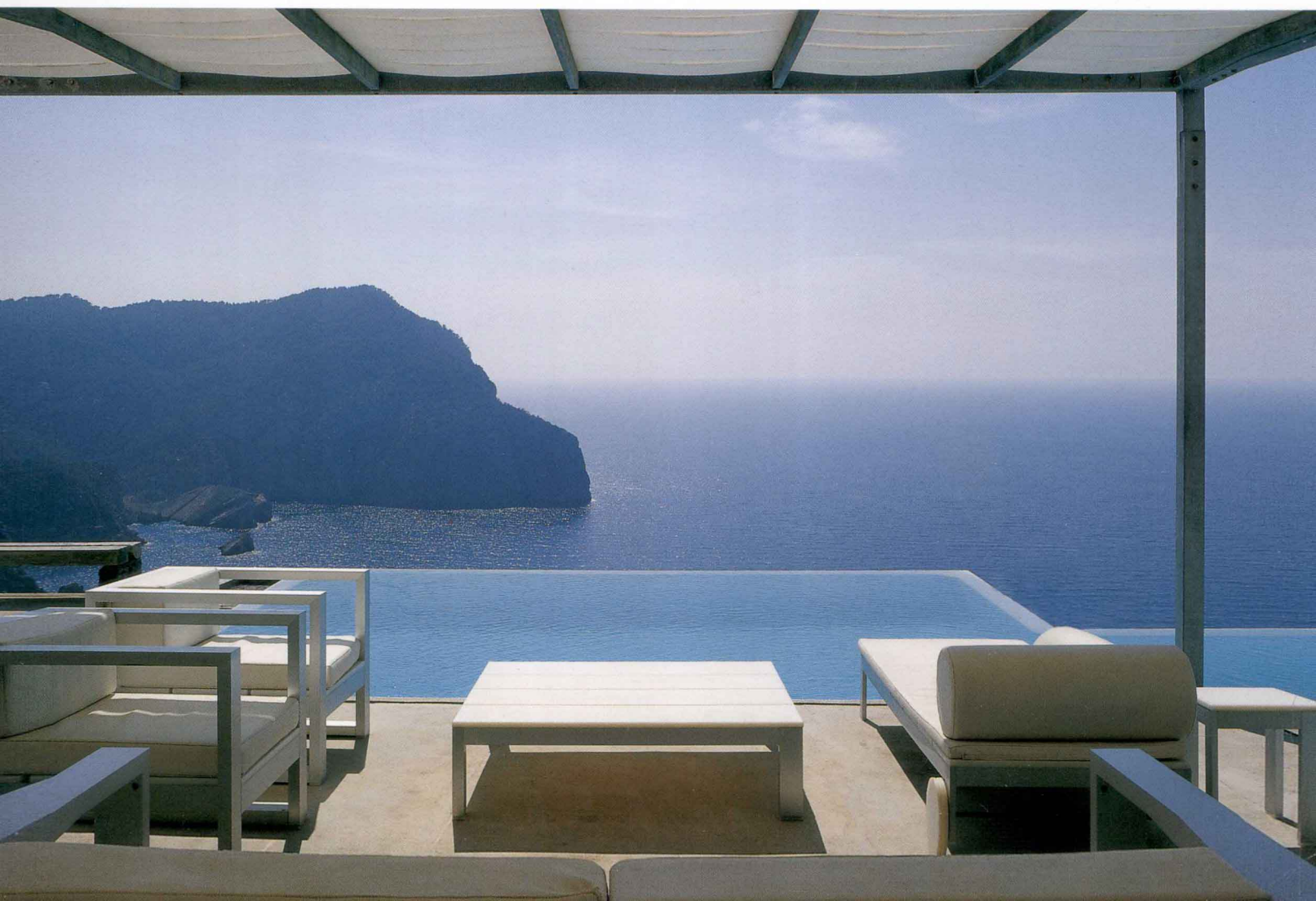
Size and positioning of windows is also fundamental. Very few of the houses covered in this book have windows of similar size all the way round the perimeter walls. While in temperate climes we may crave sun, in hot homes we are mostly trying to keep it out, or at least control it. Sometimes large picture windows are used only on the side of the house where there is the least direct sun – preferably along with the best view, or the waterside if there is water – with tiny windows, mere slits, in the sunniest wall, in order to keep out the fierce summer light and heat. In the environs of dusty Marrakech, however, we found the home of architect Karim El Achak (see pages 54–9) positioned to have large southerly windows so that the sun is present in the wintertime, and for the view of the Atlas Mountains. South-facing in California or the Mediterranean, for instance, may be too hot, but where the summer sun is directly overhead, nearer the equator, as El Achak points out, it does not enter the house at all. In such cases it may actually be late-afternoon sun from the west that provides the most solar heat gain. The point is there is no single correct approach; it is important to weigh up all factors and choose your priorities.

Sunlight is of course our friend as well as our enemy – we just have to know when to say "no" and shut it out or live in penumbra. In some cases we may choose to use solar power to drive heating and even cooling systems, either by passive means such as solar windows (see page 135) or by more active methods, most typically solar panels (although these can be expensive), and this too will affect siting of windows.

Windows are also fundamental to ventilation, especially essential in humid heat. Air conditioning is not the obvious answer it may seem, since it generates greenhouse gases; systems with the highest emissions are beginning to be restricted by building regulations in the EU and USA, and are likely to be further constrained in the future. Our natural cooling systems are water and air, and there are many ways to use them. Aside from positioning openings so that they encourage through draughts, some deceptively simple cooling systems have evolved over time, and there is much to be learned from indigenous or vernacular architecture, a valuable basis for "green" design, within the tropics and in other parts of the world.

The traditional Malay house and the Ibans' longhouses of Southeast Asia are good examples. Both are wooden structures set on posts, with steep roofs and high ceilings, designs that mean good ventilation and cooling of interior spaces. Being up on stilts allows ventilation beneath the buildings, keeps living spaces above the flood line and limits the possibility of invasion

aspect is key to siting a hot home; a minor adjustment to orientation can make a huge difference.
RIGHT, TOP The concrete back of the property in Plettenberg Bay in South Africa (see pages 70–3): note the lack of windows on this north-facing, i.e. sunny, side. The house is orientated towards the beach and the upper section is pivoted over the lower to take maximum advantage of the view.
RIGHT, BOTTOM To build on a hill looking out to sea may mean waiting for the right piece of real estate to become available. There is no second-best. The Na Xemena house in Ibiza (see pages 86–91) has an unprecedented view, and the hills and water allow natural cooling of the interior and exterior spaces. There is in fact a property just beneath, which is not overlooked due to clever orientation.

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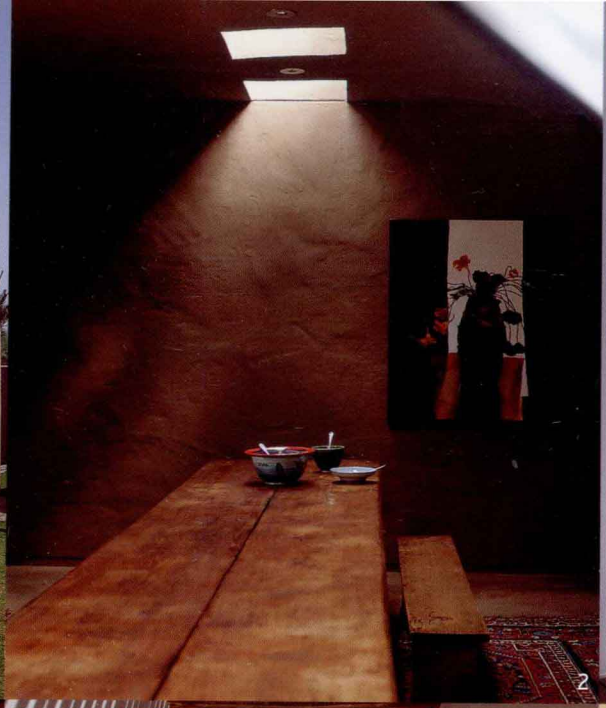
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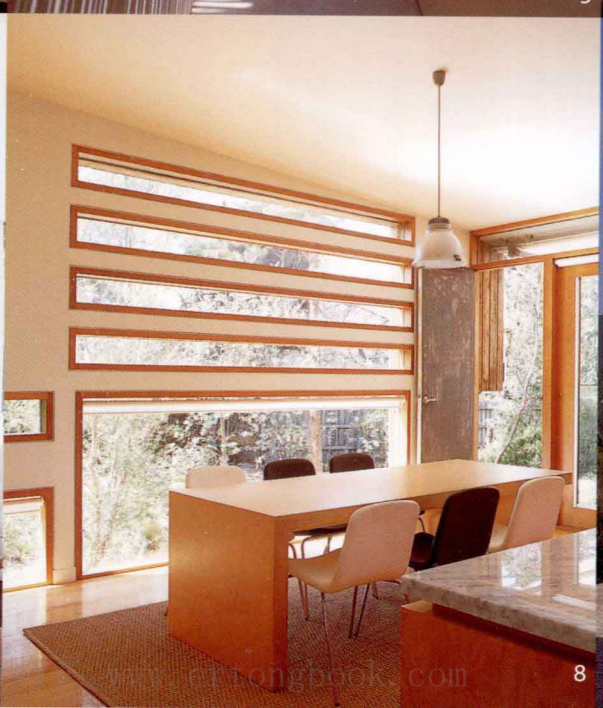
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by predators. The materials tend to be lightweight and therefore do not retain heat. Recently these traditional designs have been reinterpreted in more contemporary designs that utilise passive energy strategies.

In the Middle East, the ancient cooling towers known as *badgir* in Persian are still to be found in Iran, and are still cool inside when it is 38°C (100°F) outside. The simplest towers are rectangular, containing shafts with two to four shelves: the upper shelves catch incoming hot air and redirect it out again, while the lower ones recirculate cool air from inside. Air is cooled further by passing over a pool of water. The region's traditional skills with engineering are also evident in irrigation systems based on natural underground water channels; found from Morocco to Central Asia, they are called *karez* in the Xinjiang region of western China and *qanats* in Persia, where they originated. With skills like these, it is not surprising that by the 13th century the Islamic garden, for all its arid location, from the Alhambra in Spain to the Taj Mahal in India, was such a stunning success. Water featured heavily, as did canopies of fruit trees that restricted re-radiation losses from the ground, trapping cool air that could be circulated through the house – another form of natural cooling.

Water can be a friend to cool any home by way of a pool, a water feature, or a vista of sea or lake. Although I am a firm believer that a pool is useless if you live in the UK, it is an absolute necessity in a warm climate, should water not be entirely scarce. Not only does it refresh all through the day – a quick dip is all it takes – but the mere presence of water is a tonic. A lake can bring a breeze, gentle or otherwise, and the ocean brings zest of life (and negative ions to boot) and the most delightful sounds too. Water heats up much more slowly than air, so it remains cooler when the surrounding air is hot. It enables vegetation to grow, which in turn gives us shade and, together with the water, increases rates of evaporation. This is part of the reason that rural areas are cooler than urban ones: heat is lost in evaporation from streams and rivers and transpiration from trees (another reason is that concrete retains heat). Water can also be used to store heat.

light draws people, as it does flowers, but our need for light must be balanced with keeping cool. **LEFT, 1** In Marrakech small windows help keep the light out. **2** In dark shade in Johannesburg, a dining table comes to life with light streaming from deep ceiling recesses. **3** In Ibiza, a shaft of light is directed by a ceiling skylight in a double-height room; although bright, it is gentle. **4** Old and new architecture can coexist without apology, light bringing both to life. In Provence the light dances through a basket arbour. **5** "There are frequently links between the ecology of a building ... and the poetic dimensions of architecture – such as the fleeting effect of shadow patterns.... Perhaps one should define them under the heading of 'lifting the spirits'", says Sir Norman Foster. Seth Stein in South Africa creates extraordinary pattern, with echoes of arbours. **6** Tall slit windows throw light onto an interior wall in North Africa for reflected light; the room remains cool. **7** White reflects light and helps spread it evenly. **8** Light, air and sunshine were the new ideals in the Neues Bauen movement of the 1920s. Thirty years later, glass buildings became a reality, with air conditioning to regulate internal climate. **9** The rear of this house, a series of *fincas*, has small windows; its opposite side has window walls facing out to sea. **RIGHT** Nature, when manipulated, can find the best solutions to harsh sunlight, and vines and creepers will meld a home into its environment.

Building or adapting a home in a humid environment differs vastly from building in an arid one. Water can become the enemy when rot sets in if incorrect materials have been used. Local and indigenous ones are always best, built by nature to cope – look for hardwoods such as teak (a tip for updating a bathroom in any climate) and porous stone (so as not to slip).

A seminal building that truly represents well-thought-out orientation, not just for the choice of waterside position but also its structure, which takes advantage of such a position, thus the vision of the building itself, is the Sydney Opera House. Following a competition in 1956, the project was built by the Danish Jorn Utzon between 1957 and 1973. Utzon said in 2004, "In the construction process, we study the sources of human wellbeing more than anyone else.... The partner is thus in the broad sense *the place*. On land it's about a site and some surroundings – it may be a forest or a plain, with the wind conditions and the light that the place happens to offer, but at all events it's a partner that you have to relate to."

Two other successful waterside buildings that appeal to me enormously are Frank Gehry's titanium-tiled Guggenheim Museum in Bilbao, built in the city's docklands, and the earlier Malaparte house built by Groupe 7 on the Italian island of Capri. Like the Opera House, Bilbao is a gateway building, and Gehry struggled with its scale. It is a museum, I know, and huge, and self-confessedly metaphorical, but it feels completely human – a successful, "living" waterside development which, despite its dizzying undulating form, enhances the environment as well as protecting from it.

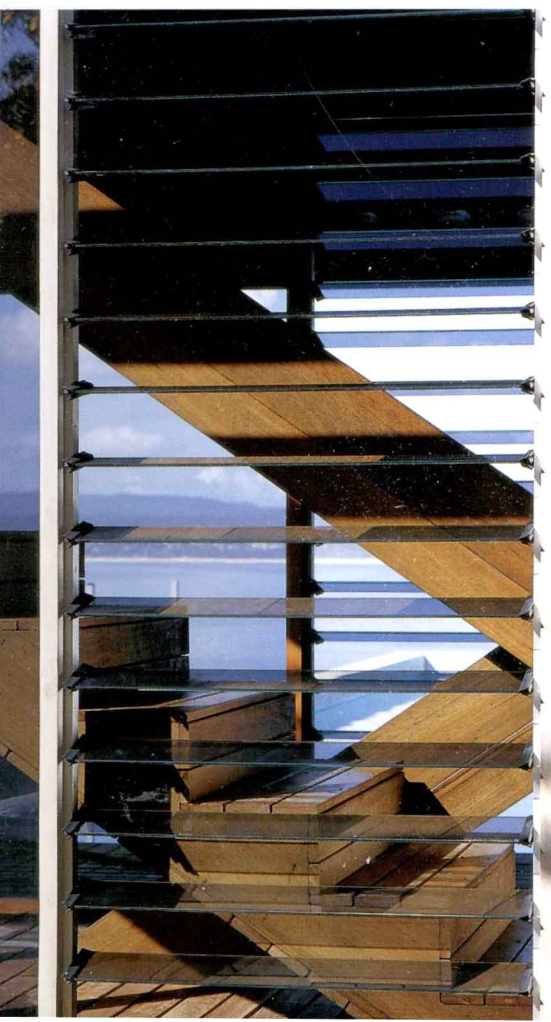
Casa Malaparte, built for writer Curzio Malaparte in the late 1930s, is a very friendly house on a steep cliff over water and was the first to incorporate the picture window – a picture-frame window where the view becomes the art. It does not follow any of the island's building manners, does nothing to camouflage itself, but nevertheless you cannot imagine any other place where it could have been built. Strong and marked lines, bulks added one upon another in a modular way, emphasise the rationalist origin of the architectural concept the building is based upon. A blueprint for modern waterside living, Malaparte used to be open to the public but now has a tenant – so as much as I urge you to visit both Bilbao and Sydney, I am afraid Malaparte will have to elude you, apart from in books.

These three examples all make use of platforms or levels. Aspect involves volume and cannot be thought of in a rectilinear manner. Platforms are used to pull people through buildings, whether public or private, and create fluidity. As air has to circulate, so do people to make the best of a hot home. In Ibiza and North Africa we came across houses built as *enfilades* of boxes, either linked by a common hallway or built in the manner of Versailles, one box flowing from another over changing levels. In the south of France the house height had to be contained by local building restrictions, so the plan shows a leisurely incline upwards using subtle platforms. In other schemes, spaces were hollowed out to provide escape from the elements. Spatial continuity minimises the sense of enclosure.

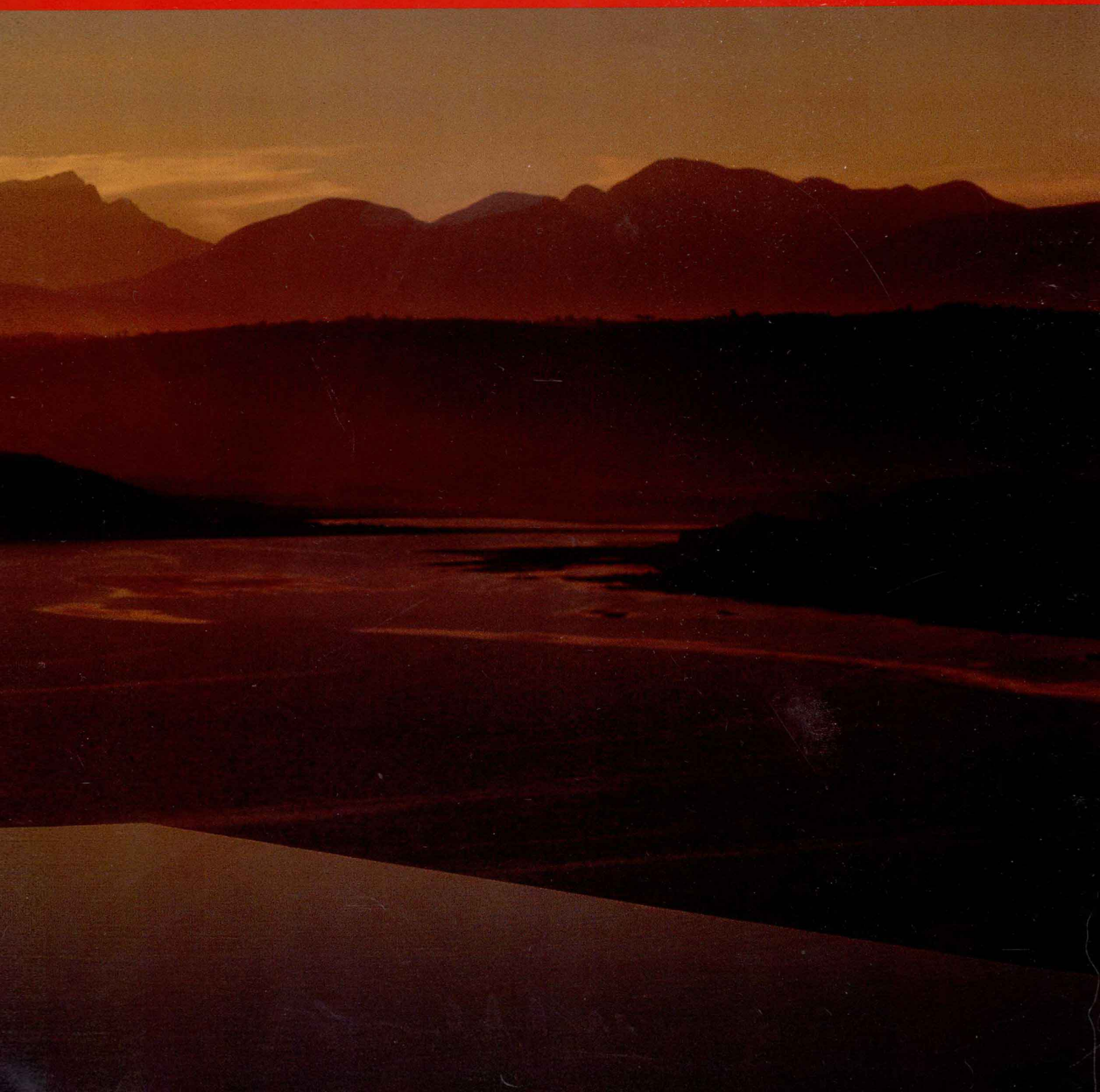
air & water are our natural cooling systems. **BELOW** Water takes longer to change temperature, either upward or downward, than land does, so water is cooler than land by day and warmer by night. Air temperature is influenced by the land or water beneath it, and this difference in temperature, and consequently pressure, results in breezes: from water to land by day and from land to water by night. This is Merimbula on Australia's Sapphire Coast: architect Clinton Murray likes louvres, which assist air flow. **OPPOSITE** Vertical air circulation occurs when air heats up. Its molecules spread out and it becomes less dense than surrounding unheated air; it therefore rises, transferring its heat to a cooler region and allowing cool air to take its place – this is heat transfer by convection. Fans, seen here in a double-height room (good for convection) in Provence by Andrzej Zarzycki, also encourage air flow.

For nomadic populations space is rarely a problem, but water is imperative. The Rendille, for example, are African nomadic pastoralists whose movements are dictated by the need for forage and water for their camels – they live in the desert between the Ndoto mountains of Kenya and Lake Turkana. On finding water, Rendille women construct their home, a *min*, which has been carried in kit form by camel. This bent-pole and stick framework with sisal panels forms a kind of whelk shape: two-thirds of a hemisphere with an inclined front, not unlike the some of our super-sized family tents. At the rear, a couple of animal hides are hung for shade, although they can be removed if the interior becomes too stifling. On plan, the *min* departs from the circle, being wider at the front than the rear. It is a delightful architectural shape. Although it quivers (it is lightweight, for transportation) in the fierce winds that come off Lake Turkana, this waterside structure is nevertheless sturdy and successful as shelter against heat and dust as well as wind. So sensitive are the Rendille to the environment, they take care not to overgraze land or pollute water. We should take heed on many counts. The structure not only behaves well in the elements, but is positioned directionally and aerodynamic in form. Despite ranting daylight temperatures in such regions, it is the lake that provides the most problematic condition: the wind. It seems ironic that the Rendille spend their lives seeking water, yet water becomes their enemy.

I believe that building cannot be looked at in isolation, and the core of this book explores living in a hot climate by terrain. Whether we aspire to hot-house living or have it coming to us through global warming, it is better to be prepared and see how the professionals do it, to look to the world.



terrain



Different terrains demand different approaches to building, in terms

Even in ancient times, humans understood the need for effective shelter and, on a lighter note, enjoyed a bit of a view. Whether now we choose to live waterside, hillside or in the open prairie should still depend less on whim, if we are conscientious builders, and more on the potential effect of the elements and our response to them – although the notion of "aspect" can include our basic instinct for beauty: the view.

The climatic variables that affect human comfort are not only temperature (which depends on heat radiated from the sun and from our surroundings) but also humidity (water-vapour content of the air; in its most tangible form it becomes rain) and wind. Whether we feel too hot, too cold or "just right" depends on the combination of these factors. Of course the fundamental influence over them is latitude – the nearer the equator we are, the closer and more directly overhead is the sun, and the higher the temperature – but conditions are also affected by altitude, topography and winds.

In other words, the details of a site's position and its surrounding terrain have quite an impact on its climatic character. A hilltop, for instance, will be cooler than the local norm – temperature decreases with altitude (hence snow on mountain-tops even in hot regions) – as well as being more exposed to chill winds. Against these cooling