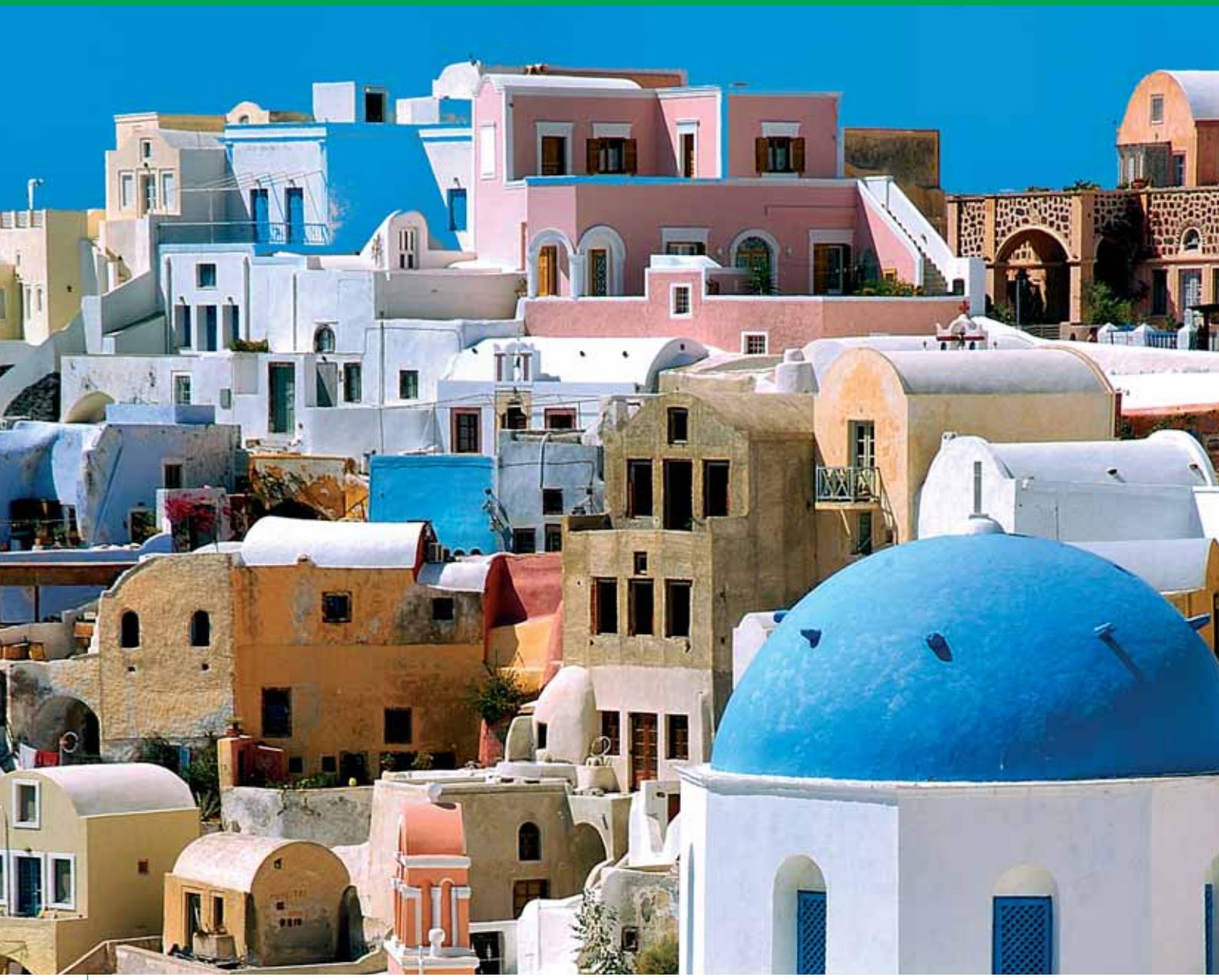
Building
for the environment

Bioclimatic architecture is the latest buzzword in construction. But since antiquity, the Greeks knew how to position settlements and buildings to take full advantage of the sun and air for heating, cooling, and light.



Even on an island with the sublime beauty of Santorini, the village of Oia stuns the visitor. The labyrinthine settlement, which locals say is the jewel in Santorini's crown, balances on the island's northern tip, seemingly floating over the caldera like a white apparition trapped between sea and sky. Strolling Oia's narrow lanes, one is struck by the harmony between the natural and human-made landscape. But it's not the handful of mansions that combine the island's trademark vaulted roofs with neoclassical influences that draw the eye. It's the the *skafta* or *hyposkafta*, small dwellings dug into the pumice cliffs that create the settlement's beauty.

These small, simple seamen's homes evolved as a result of habit and necessity. The low-ceilinged quarters with their small windows and tight, steep stairs are not unlike ships' quarters. These "caves" commonly featured a front room where the family convened and small bedchambers in the rear. Doors and windows on the facade were small to minimize heat loss; porthole-sized windows were also built into interior partitions to ventilate the bedrooms. Because locals dug these dwellings where the rock was softest, the facades were usually set at odd angles from each other.

Santorini's distinctive architecture evolved as a result of the volcano. With no timber on the island but plenty of stone, its inhabitants dug homes into the cliffs and used mortar made from volcanic soil to fashion interior walls and facades. Because it was difficult to dig too deep into the rock, even small homes were often built in staggered, split levels. These cave-like huts, which have proved virtually quake-proof too, are a prime example of what's known today as bioclimatic architecture.

Simply put, bioclimatic architecture is buildings designed to exploit environmental factors in order to maximize energy efficiency. Although a combination of rising fuel prices, which push up the cost of heating and cooling a building, and increased environmental awareness have placed bioclimatic design at the forefront of architectural trends, for centuries, before central heating and air conditioning were invented or widely available, homes were built according to bioclimatic principles. Just look at any traditional Greek settlement, from the Late Minoan settlement of Gournia on eastern Crete and the eighth-century-B.C. settlement of Ancient Kameiros on Rhodes (just two examples) to modern-day villages and towns like Stemnitsa in the Peloponnese and Metsovo in the western Epirus region, you'll find that both individual buildings as well as the settlement itself are built to take advantage of the two main elements of bioclimatic design: location and orientation. Beware though: when comparing architectural styles, for example, this may be hard to detect as the vernacular architecture of Santorini differs wildly from the narrow, two-story stone houses of the Peloponnese's mountain villages. The reason is simple: the fundamental principle of bioclimatic architecture is that it takes advantage of the *local* climate. Even in a sprawling city like Athens, when you're looking at bioclimatic design, what works in one district or area might not yield the same results in a different part of town. Good bioclimatic design can mean differences as great as ten degrees between temperatures on the sidewalk and inside the building–something desirable in both cold and hot climates.

As part of its environmental policy, the European Union has adopted bioclimatic architecture. Aside from the benefits to the family budget of improving energy efficiency, the "savings" for the environment are considerable as emissions from heating and cooling systems add to the so-called greenhouse effect. According to Greece's Center for Renewable Energy Sources, in Greece, buildings account for nearly forty per cent of total energy consumption. Any savings in this area thus has a significant impact.

To bring Greek law in line with European Community directives, the government has updated the General Building Code and other regulations to provide incentives for homeowners to introduce bioclimatic elements into their houses and incorporate them into new buildings. A new law passed in late 2008 outlines these requirements, which

A bioclimatic elementary school in the Paleo Faliro suburb of Athens.

apply to both new construction and renovations or improvements, especially for larger properties. While many architects and environmentalists lament that the new law does not include sufficient incentives for homeowners to embrace bioclimatic design, it is a first step.

Under the new law, buildings or properties with an area greater than one thousand square meters must obtain the new Certificate of Energy Efficiency. Certification will be valid for a maximum of ten years and must be renewed when it expires. Although specifications for energy efficiency in new and renovated buildings are expected to be finalized by June (and issued in a Ministerial Decree), being certified for energy efficiency is a dual process, involving both a physical inspection of the building and analysis of data concerning energy use, such as heating and electricity bills. The inspection is expected to include on-the-spot, random readings of power use, emissions from central heating systems, and temperatures. As in other European Union countries, the specifications are likely to include a parallel classification system that ranks a building according to its current energy use as well as its maximum energy efficiency.

Once the system is in place for large properties, planners expect new provisions to be introduced to the building code so that bioclimatic design becomes the norm rather than the exception. Already, many people buying or building new homes are looking at bioclimatic principles as the savings are worth the slightly higher costs often associated with bioclimatic design.

When considering a home's energy efficiency, the first thing you need to be aware of is the local climate. In mountain areas, where temperatures are cooler, heating has more weight, while in warmer, southern climates with longer hot periods cooling is the bigger energy drain. A large, sunny room may sound idyllic in a realtor's description but if the house is located in an area with long, hot summers, extended exposure to the sun can significantly increase cooling bills. Room size is also a factor as large, open spaces are also harder to heat or cool–something to consider when looking at a home.

Incorporating bioclimatic design principles into a new home is relatively easy. But there are also a number of things that can be done to improve the energy efficiency of any home. Cooling bills in summer can be substantially reduced by adding shade–a tree or thick leafy plants in a garden or just outside the house or a particularly hot room can help reduce indoor temperatures. An expansive room that is hard to heat can easily be divided into smaller areas with simple partitions or pieces of furniture, while considering different building materials that take advantage of new technology when making even small home improvements can yield impressive results. One architect suggests following a simple rule, whether building or buying: observe the surroundings and pay special attention to how existing houses are oriented or built–especially older dwellings that did not have the advantages of modern heating and cooling systems.

A man of vision

In the 1930s, as Athens continued to expand, city planners decided to use a large tract along Leoforos Alexandras to create the capital's largest park. Named Pedio tou Areos, after the Paris's Champs de Mars, it once housed the cavalry barracks. Today, after slipping into decline and neglect, the park is being renovated in hopes it can reclaim its former role in the city's life. The project is being directed by Alexandros Tombazis, perhaps Greece's preeminent contemporary architect–a champion of bioclimatic architecture and a realist infused with the optimistic thought that nothing is irreversible, not even the concrete mass that Athens has become. **Petros Birbilis** spoke with Tombazis about architecture and its role.

Born in India to Greek parents, Alexandros Tombazis's earliest memories and images were not from Greece but initially India and at the age of five, when the family moved there, from England. India's vibrant colors and liveliness contrasted with the more severe London landscape and the keep-a-stiff-upper-lip attitude of the English. But Greece was always and later became home. He studied in Greece and made his career here, broadening his professional horizons next to mentors like the celebrated architect Konstantinos Doxiades. Tombazis stood out from early on, participating and winning distinctions in more than 110 national and international competitions. He built a prestigious practice (his office now employs a staff of sixty) and made a name as a pioneer of modern bioclimatic architecture.

"People have to large degree become more aware of the planet's problems. Steps have been made since the days of the Hippies, who were the first to believe in [bioclimatic architecture] but there is still a lot to be done."

A man of vision as well as conviction, he has designed everything, from churches and museums to industrial complexes, schools, and hospitals in Greece and abroad. But which is his favorite.

"Every building is of special interest. But those with a social or spiritual dimension are certainly a greater challenge for an architect. Designing an office complex for a company is different to designing a school, a hospital, a museum or a place of worship. The architect, along with everything he envisions as an artist, is also a technician who is called upon to solve problems."

Tombazis has designed buildings that grace places like Dubai, Romania, Cyprus, Ukraine, even Tirana. So how does he incorporate local cultural and aesthetic elements into his designs?

"Regardless of his origin or experience, the architect has to analyze, interpret, and in the end assimilate the elements of the space in which he is called upon to intervene. If one of these elements is foreign to its environment, then he must work harder."

As an example, he cites the differences in Aegean island architecture and the vernacular architecture of mountain villages on the Greek mainland and how their respective aesthetic values compare with buildings in Athens.

"The vernacular architecture of each place is enormously important. First of all because it is that place's his-

Architectural designs for improvements to pedio toy Areos Park.

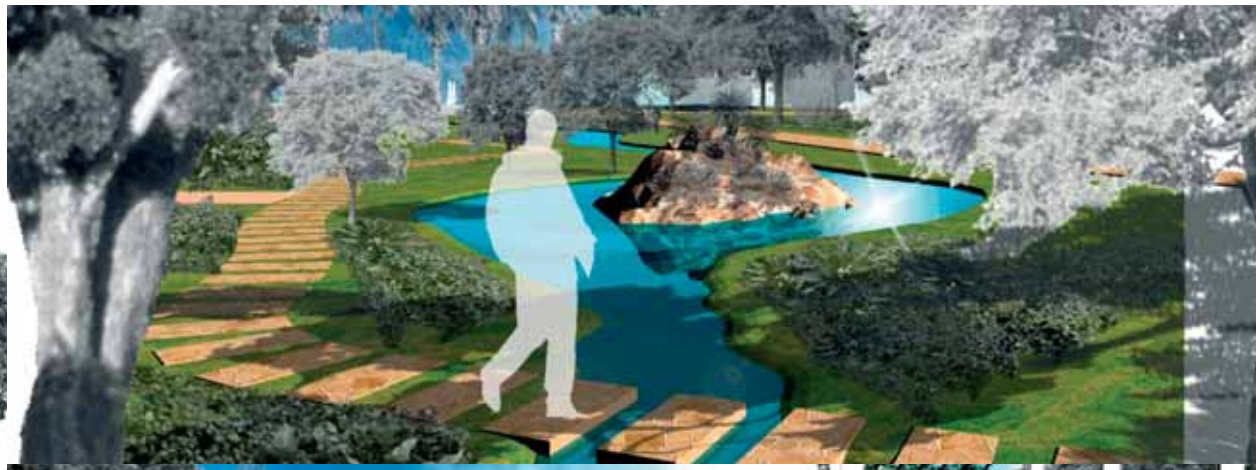
tory, its culture, it has emerged from the daily life of that place, in times when resources were limited. When you have such restrictions you're forced to produce the desired result with the minimum. This forces you to use your brain and the result is usually less random. This is the boundless beauty of traditional architecture, Greek or not."

Elaborating, Tombazis says he believes craftsmen everywhere have worked carefully, with skill and wisdom. "Today, internationally, the field is dominated by architecture 'stars'–architects who design monumental buildings in which smugness and a desire to impress are evident." But he adds that this is not necessarily a disease of our times, pointing to the Renaissance architects who had a clear need for self-promotion. The difference, he notes, is that "there were stricter rules then. Today almost anything is acceptable so what prevails is impressiveness."

Tombazis hasn't just lived outside Greece but has designed buildings for cities abroad. How does he rate the Greek capital, a city that is often described as having deep problems in terms of both aesthetics and planning.

"Every city is problematic. The problems Athens has stem from our greed. Generally speaking, however, I'd say it is improving. That's something that happens when a city doesn't have huge population growth so that it is better able to deal with its problems. Nothing is irreversible. It's just that some problems need more time. And more education. What I mean is the lack of respect for public spaces–that this space is not just mine, but belongs to everyone. Every city is the reflection of its residents."

He adds that the most "human-friendly" cities are usually those that are either very small or very old. "Brasilia is



a very interesting case. Although it has been scholastically designed, it's hard to say that it's a beautiful city because it's a new city. What's good usually becomes better when it matures, and what's bad is lost. Generally, anything designed for the short-term lacks organic development so it's hard for it to have the quality of something that's older. In any case, in older cities, it's usually what has been historically their center that gathers the positive elements and not its anonymous environs."

Athens often seems a hodge-podge of different architectural styles, which creates an image of confusion. This, he says, is a sign of these confused times–and this is reflected in the city. A new project he has been assigned is to revamp Pedio tou Areos, a sprawling park where the challenge will be to show continuity. It's a large project with a tight deadline–500 days.

"The park will be an upgraded version [of what it is today]. Greener, better laid out, better cared for. We approach it as if it were a 'live' building, not just a park with plants and trees."

His commission runs against the recent trend in Athens to commission foreign architects to design important public projects like the Olympic Stadium and the New Acropolis Museum. As a Greek architect who has had numerous foreign commissions, does Tombazis think locals or foreigners are better equipped to design for a city. "It doesn't matter whether you're Greek or foreign. What matters is knowledge and experience."

Tombazis believes architecture is a social art. But is there a point where it becomes anti-social? Yes, he says–when you "create to promote yourself, ignoring the user and, by extension, the city."