

Architecture: The Fourth R

Future Architecture



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'Systems thinking' sums up the new attitude we require, and it will have a huge impact on future planning and architecture.'

These essays by Sunand Prasad were originally broadcast over five consecutive nights in October 2010, as part of the BBC Radio 3 series 'The Essay'.

The series was produced by Lizz Pearson for Wise Buddah

Sustainability had barely entered the language when, in 1995, the London Borough of Barking and Dagenham had a new idea for celebrating the Millennium. They won lottery funding for a nature centre that would be a living demonstration of sustainable design. Penoyre & Prasad were appointed as architects and fifteen years later the Millennium Centre at Eastbrookend Country Park and Chase Nature Reserve continues to live up to its low energy and low carbon promise. It also both entertains and informs the borough's schoolchildren and other visitors about climate change and the effective use of resources – sustainability, free of hairshirts and guilt trips.

Climate change – it's the biggest known risk to human society and to most living species. Despite healthy doubt and some unhealthy denial, governments around the world accept that the main cause of climate change is the emission of greenhouse gases through human activity. What hasn't yet sunk in is that the very things we need to do to reduce the risk will, at the same time, hugely improve our wellbeing and quality of life.

At the Copenhagen Climate Conference in December 2009, countries drew back from a meaningful global agreement on climate change. They feared committing to the

necessary scale of reductions in greenhouse gas emissions in case this would damage their economies. Such a mistake. If governments and local authorities, corporations and organisations, businesses and individuals, become determined to stop relying on fossil fuels, then the economic as well as environmental and social benefits will be huge. Such a commitment would not only trigger technological innovation, but would, I think, also bring about an amazing era of original thinking to find good alternatives to some of our economic, cultural and political practices that – more obviously than ever – aren't working so well. Not that everything has to be new and different, as some enthusiasts will have it. We'll go on doing most of the things we do now; we'll also re-adopt some habits lost to the past; but there will be some things to give up and new things to learn.

This new era and its ways of thinking will be radical, but no more so than that heralded by the Industrial Revolution – the arrival of the railways in the 1830s, for example. There is nothing to fear about the transition to a low or zero carbon future – I know because I have lived very happily in a carbon neutral community. I don't want to return to its way of life, let alone advocate it to anyone else. But it was a satisfying existence on many levels, and

though materially of a lower standard than most people could accept today, I think we can learn much from it.

The place in which I grew up was the village of Sevagram at the geographical centre of India, founded in the late 1930s by Mahatma Gandhi as his base, where some of his ideas about India's future society would be tried out. Many of these ideas, such as the rejection of urbanisation, were hopelessly out of step with the way in which the world was bound to develop; but others were ahead of their time, such as the extension of the principle of non-violence to the natural system, so that our activities, while changing this system, also maintained its balance. James Lovelock's idea of Gaia – the earth-system conceived as a living organism – would later capture this beautifully.

The only fossil fuel we burnt was for buses, trains and paraffin lamps. The crops and gardens we grew and the trees we planted absorbed more CO₂ than was produced by burning diesel, coal and paraffin.

Life was fitted to the rhythm of the days and the seasons. People were in bed by 9 or 10 pm and up by 4 or 5 in the morning. Farmers going to their fields at dawn, ready to till, had enough light from the stars and moon for their journey,

except during the monsoon (but this more than made up for the inconvenience by readying the earth for fresh growth). My school started at 7 am. In the heat of the summer everything stopped between noon and 3 pm. The three or four hot months of summer were the only time of uncomfortable temperatures. In our two-room house with its wide verandahs, we would close the shutters during the summers at noon, hanging on to the morning's lingering coolness, shutting out the outside air which would soon reach 45°C. During the one- or two-hour long siesta, a screen of vetiver root would be hung on the door facing the prevailing wind, with water dripped onto it via a trough at the pelmet. The hot loo – as the summer wind is called – blowing through the screen would turn into a fragrant cool breeze. To keep cool on summer nights we slept under the open sky, which absorbs much of the heat the body radiates and reflects none back. In the sometimes cold winter nights, and during the rains, we slept inside. We used the house dynamically, so to speak.

But this was no rural backwater, sentimental about the past. Later on we had methane digesters using animal waste to produce gas, and experimental solar cookers to try and replace the smoky traditional chimneyless stoves. Self-sufficiency was a key watchword.

At the same time we were well connected to the rest of the world and there was a rich cultural and sporting life.

In the late 1980s I studied the architecture and urban form of the cities of the hot and dry North Indian plain. Traditionally the residents of the courtyard houses or havelis that make up most of the built fabric used their houses in the same dynamic way. They had a more commercially sophisticated way of life, but the energy use in homes was minimal. Things changed with the advent of air conditioning – no longer did you have to move around the house in different seasons, seeking out comfort; it was there at the press of a button. Soon the previous way of life came to be associated with backwardness. Also considered backward now was the dense, close-packed built form of the old cities, with their narrow shady lanes ameliorating the heat, playing a key part in creating comfort without energy use or carbon emissions.

Around the world, air conditioning has been to dwellings as the motor car is to travel – a potent symbol of modernity. It means liberation from the constraints of nature, and asserts the human right to perfect air. Offices, hotels and restaurants tell us that they are ‘air conditioned’

as if it’s a quality benchmark. I once stayed with friends in Detroit. With night-time air temperatures in the upper 20s, they would have the AC set cold enough to be able to sleep under cosy blankets.

In the British Isles, warmed by the Gulf Stream, blessed by a temperate climate, we can almost eliminate energy use to maintain comfort in dwellings. Near zero energy heating is achievable even in the cold Scandinavian climate, because each of us happens to be an 80 watt heater. With sufficient insulation and control of cold air, a home can be warmed just by its occupants. For the appliances and hot water, just top up with a small amount of energy from low carbon sources such as domestic solar panels, or a green electricity grid, and we can make our homes carbon neutral. Our problem is money, not technology. The hot regions of the world have the bigger problem I have described – cooling, which is harder to achieve with low energy use. Most developing countries are in these regions, and their populations want to enjoy our levels of comfort and convenience, threatening a giant increase in energy use and carbon emissions on top of those of transport and industry. But the problem is not just theirs, it’s ours too; for the world has just the one atmosphere, shared

The 1997 Millennium Centre at Eastbrookend Country Park is still living up to its low energy and low carbon promise.



today by 6 billion people. By 2050 that will be 9 billion. So long as we in the West go on being the largest emitters of CO₂, leave aside our responsibility for most of the stuff that's already up there, we are in no position to preach emission control to developing countries. Even though it is little needed in our temperate climate, we use a lot of air conditioning in offices and shops. Three things have conspired to cause this waste: the fashion for glass box buildings which trap the sun's warmth even when it is unwanted; the large amount of heat given off by computers and other modern office equipment; and the need to keep out the polluted air of our car dependent cities. As UK summers approach Marseilles temperatures, in a few decades the problem will become worse. A big part of the solution will come from new environmental technologies, but we also need to adapt out lifestyles a little, changing our ways of using buildings to suit the seasons – something they do in the houses of Marseilles, no less than in my first home.

In Sevagram, the residents behaved as part of a whole system that included the elements, the houses, the animals and the people – making basic changes to ensure comfort with limited resources. In Detroit, my friends used their larger resources – the electricity for the air con – to become independent of the elements and

the house itself to achieve thermal comfort. Current settings for air-conditioned offices are commonly just 18°C; if we set them to 26°C and allow workers to wear light, loose clothing rather than business suits, that would halve the energy use. And in the winter, what hardship is it for most of us to turn down the thermostat and to wear extra layers, as they used to just a generation ago?

'Systems thinking' sums up the new attitude we require, and it will have a huge impact on future planning and architecture. The result will not so much be whizz-bang futuristic design, though I am looking forward to some of that, but subtler and deeper changes that alter people's relationship to buildings, infrastructure, technology and resources.

The simple premise of systems thinking is that the actions of any part of a closed system – such as the earth's biosphere – impact on other parts. To allow the system to function sustainably, we have to account for these impacts. For example, we talk of throwing things away; but where is 'away'? People have begun to realise that there is really no 'away' and our attitudes to recycling and waste management are slowly shifting. System thinking is even helping to reduce carbon emissions from meat production, through carefully managed free-range herds –

again combining traditional methods and the latest science.

The four-poster beds of old created a pool of body-warmed air within their curtains and canopy. Imagine turning that on its head in a warm climate. Instead of cooling a whole room or building at night, just cool a bed-sized enclosure, perhaps a sunken area because cold air drops to the bottom. Imagine a house where such beds are programmed to be automatically readied in the evening. A building management system – a development of the IT that already exists – could constantly monitor and manipulate the home systems to take away the tedious business of opening and closing shutters, switching lights on or off or making sure the appliances on standby are switched off. Homes will also use the fact that they are linked to each other through the national grid. In that way we can manage the demand for energy to make the most of the available capacity.

By 2016, all new houses built in the UK will have to be zero carbon under the building regulations; other buildings soon afterwards. Despite confusion about what zero carbon means, this target is basically achievable. But we only add 1% each year to our total building stock. Three-quarters of the UK building stock of 2050 already exists. Its use accounts for

over a third of our carbon emissions, and is consequently both the biggest challenge and the greatest opportunity in tackling climate change. To be able to fund its refurbishment we have to realise economies of scale and the mutual benefits to householders in renovating a whole area at the same time – thinking systematically about the impact of transport and the possibility of local energy generation, for example. In the long term, a national retrofit will pay for itself through the energy savings it generates and the jobs it creates.

Such a programme will be another trigger for innovation in new products, services and methods of finance. What also really interests me is that making almost all of our buildings energy efficient will involve every one of us in some way. And that is a cultural project as much as a technical one. So much of ourselves and our culture has evolved to adapt to the climate and the natural environment. We could see this need to adapt as a yoke from which modern technology can liberate us. Or we can see the phenomenal power of science and technology as a key to profoundly understanding, using and, most importantly, learning from the natural environment. A thread of spider's silk long enough to girdle the earth would weigh less than half a kilogram.

It has a better strength:weight ratio than the Kevlar fibre used in bullet-proof vests; but compared to Kevlar it is made at virtually zero energy and resource cost. How does nature do it?

I argued in an earlier essay that the point of studying the architecture of the past was not for imitation but for the high standards it sets us for the present and future. I love and admire much historical architecture, but nature sets a tougher and more exciting challenge for future architecture. Global warming is a warning; but it is even more a call to be inspired by nature and its systems, of which we are a part.

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Sunand was President of the RIBA (Royal Institute of British Architects) from 2007 to 2009, where he was responsible for a number of projects designed to focus the energies of the profession upon the need to address climate change.

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