



# SUSTAINABILITY AND SCARCITY

A handbook for green design and construction  
in developing countries

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ROUTLEDGE



# Chapter 1: Green building and the Least Developed Regions

## SUSTAINABILITY AND GREEN BUILDING

Just what does the well-used word 'sustainability' mean, and how does it relate to notions of green building?

In 1986, Robert Repetto, noted economist and Yale University professor, formerly with the World Bank, wrote that 'the core idea of sustainability is that current decisions should not impair the prospects for maintaining or improving future living standards'.<sup>1</sup> This general notion of sustainability has been echoed by numerous analysts as the basis for discussions and strategies regarding sustainability,<sup>2</sup> because it succinctly summarizes the basic situation that we find ourselves in: the way we humans live is damaging that which sustains us, and it is fundamentally unjust to leave our children worse off than we are.

Sustainability is further defined as consisting of three principal dimensions – environmental, economic and social – as expressed by the Development Assistance Committee (DAC) of the Organization for Economic Co-operation and Development (OECD):

sustainable development means integrating the economic, social and environmental objectives of society, in order to maximize human well-being in the present without compromising the ability of future generations to meet their needs.<sup>3</sup>

The German government's agency for assistance to developing countries, Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), refers to sustainable development that is economically viable, socially equitable and ecologically sound. GTZ says that sustainable development means

- Economic growth for more prosperity
- Equal opportunities for rich and poor, North and South, men and women
- Natural resource use for the benefit of present and future generations.<sup>4</sup>

Nancy Alexander, Don Reeves and David Beckmann, in their 1993 discussion paper regarding US foreign aid, apply the sustainability discussion to the developing country context defining four essential and interrelated objectives of sustainable development which encompass and expand on the three dimensions mentioned above:



- expanding economic opportunities (especially for poor people);
- meeting basic human needs (food, clean water, shelter, health care, education and fulfillment of the human spirit);
- protecting and enhancing the environment; and
- promoting pluralism and democratic participation (especially by poor people).<sup>5</sup>

These citations make clear that sustainability is much more than environment and economics, which in simplistic arguments are pitted against each other as if they were mutually exclusive. Without the consideration of cultural and social parameters, efforts towards sustainability are not likely to be successful. Michael M. Cernea maintains that sustainability must be 'socially constructed', suggesting that a sociological perspective provides

First . . . a set of concepts that help explain social action, the relationships among people, their complex forms of social organization, their institutionalized arrangements, and the culture, motives, stimuli, and values that regulate their behavior vis-à-vis one another and natural resources. Second . . . it offers a set of social techniques apt to prompt coordinated social action, inhibit detrimental behavior, foster association, craft alternative social arrangements, and develop social capital.<sup>6</sup>

The cultural and social aspects of sustainability are not as easily recognized or quantified as environmental and economic aspects. Not only is the cultural and social difficult to count, but, from inside a given culture, its characteristics can be invisible to us while from the outside they can be incomprehensible. Rogers, Jalal and Boyd describe the social domain

as a complex set of interacting cultural and institutional systems that vary from one place to another. All have bodies of knowledge for adapting to the physical environment; modes of producing and exchanging goods and services; systems for finding partners, raising children, and inheriting property; arrangements for public decision making and conflict management; bodies of belief and related rituals; and systems of prestige or ranking, and aesthetics. From the outside the complexity and dynamism of these interacting systems are mind boggling.

Viewed from the inside by the people who constitute a society, they fit together in a sensible and seamless way, and individuals' attitudes and behaviours reflect the values and pressures that they have internalized while growing up.<sup>7</sup>

Over and above the addition of social and cultural considerations, poverty must be addressed for sustainability to be attained. Rogers, Jalal and Boyd identify poverty as 'the most significant socioeconomic dimension of sustainable development. As such, development activities that do not address poverty in contexts where poverty and the problems of poverty are endemic would be difficult to characterize as sustainable.'<sup>8</sup> Rogers *et al.* suggest that 'poverty must be reduced by meeting basic needs: health, education, shelter, productive employment, control over common property, and population management'.<sup>9</sup>

Poverty



Figure 1.1  
Sustainability in  
Kathmandu, Nepal,  
involves environmental,  
economic and cultural  
aspects unique to its  
context

While it is unrealistic to expect every proposed project to attempt to resolve or even address all these issues, it is clear that socio-economic aspects – and poverty chief among them – are critical to sustainable development, particularly in the developing countries. Projects in the LDRs that strive for sustainability should therefore include a review of how these various social/cultural dimensions of sustainability could be addressed and incorporated into the project planning, design and implementation.

The World Bank's *World development report 2000/2001* identifies the following three keys to overcoming poverty: *return*

- security from violence, hunger and physical deprivation;
- opportunities for health, education and decent employment; and
- empowerment in both personal and public decision-making.<sup>10</sup>

These studies underline the importance of strategies of reducing poverty and providing sustainable livelihoods to the goals of sustainability. More broadly, the social dimensions of sustainability refer to the need for equity. Another World Bank Study, *Building a sustainable future: The Africa region environment strategy* of 2002 states its aims as follows:

- make the transition to sustainable economic development through improving environmental and natural resource management;
- empower communities and individuals to make a sustainable living based on the natural resource endowments of the region and to take responsibility for managing them;
- reduce the burden of diseases and poor health by improving the quality of the environment in which people live;



- reduce the vulnerability of people and economies of the region to natural disasters and severe climatic events;
- manage and conserve the unique biological diversity of the region for themselves, their future generations, and the world; and
- establish an enabling environment and build the capacity to achieve these objectives and maintain them over the long term.<sup>11</sup>

In the light of such sustainability goals, project designers (designers in the broadest sense) must consider their task in its larger context to examine how it fits into its social/cultural context and what role it could conceivably play in addressing such challenges.

Broad and Cavanagh, in their review of development directions over time, maintain that, based on evaluation of past experiences, 'development strategies will not succeed and endure unless they incorporate ecological sustainability, equity, and participation, as well as effectiveness in raising material living standards'<sup>12</sup> Dr Paul Farmer, of Partners in Health, identifies equity as the key issue to address in their work in Haiti, Rwanda and elsewhere: equal access for everybody to health care and to opportunity.<sup>13</sup>

It is important to appreciate the key role of labour and opportunities for livelihoods in developing countries as a critical component of sustainability. It is part of a broader understanding of what sustainability is in the LDRs, where unemployment and underemployment are so consistently high. Robert Chambers and G.R. Conway note that

a livelihood is environmentally sustainable when it maintains or enhances the local and global assets on which livelihoods depend, and has net beneficial effects on other livelihoods . . . and which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and . . . provide opportunities for the next generation.<sup>14</sup>

Serageldin and Steer claim that 'the entire mainstream paradigm of development has been expanded to include investment in human resources as an essential, possibly the most essential, ingredient of development strategy'.<sup>15</sup>

This broader and deeper idea of sustainability encourages us not just to do no harm but to ensure that our activities and the results of our activities should be of net benefit to our surroundings and to the world. A net positive result is what is to be expected, certainly not just minimizing the damage we cause.

So a building that we erect in a given context should be beneficial to its surroundings and to the users and inhabitants of the area. It should give back! How do we do that? We look at what defines sustainability and ensure that our building takes every opportunity to maximize it.

The act of building a project is already by definition of economic benefit to someone: some people are getting paid to build it. But we want to take care to maximize the potential benefit to those who most need it and to do this in such a way as to be of long-term and self-sustaining benefit. So, for example, instead



Figure 1.2  
Construction workers  
prepare formwork  
and rebar for the  
reinforced concrete  
slab in Antananarivo,  
Madagascar

boost  
local  
economy

of hiring builders and craftspeople from outside the area, we can make an effort to hire locally, and if the skilled workers are not available locally, we can include as part of the project a training component under which skilled tradespeople take on a local apprentice to learn their craft, which can continue to benefit the community well after the construction phase has been completed.

Similarly, other dimensions of the proposed project can be studied to see what opportunities they can offer for addressing these sustainability objectives. For example, can utilities infrastructure for a project be of use to the surrounding community? Are there long-term employment opportunities associated with a given project?

## SUSTAINABLE DEVELOPMENT IN THE LDRS

### *Characteristics of LDRs*

Among the factors that typically differ from least to more developed regions is the strength of central authority and the amount of resources available to it. A result of this is that in some LDRs services such as utilities, security or health care are not delivered, or are not delivered consistently across the territory, and cannot be realistically expected. Hence, independence of centrally-provided services such as utilities is very important for sustainability in the LDR context. Examples would be the use of small-scale autonomous power sources and having independent sources of water and sanitation. Keeping it local and keeping it simple in order to make it sustainable and accountable to local inhabitants is important.

One significant defining characteristic of LDRs is that they are typically societies in rapid transition from traditional and colonial cultures, with their

LDR:  
in rapid  
trans



corresponding worldviews and values, to modern interconnected globalizing societies. The transition is fraught with contradictions and conflicts between new and old values and understandings.

The question is: what is the relevance and importance of traditional practices and beliefs to present-day inhabitants? Do some of these practices and beliefs contradict what a modernizing culture seeks or believes? One traditional Malagasy belief held that the birth of twins was a sign of evil, and one of the twins was killed at birth to avoid bad luck for the family. This is an extreme example, but it illustrates the point that traditional beliefs and practices are not simply to be respected and replicated wholesale; they are to be evaluated and understood for what they mean and bring to the present society in question.

*trad beliefs  
evaluated!*

Another aspect of traditional beliefs and practices is the extent to which emphasizing them would serve to undermine the nation-building efforts that try to de-emphasize tribal identities and seek a national identity. Tanzanian President Nyerere made great strides in establishing a Tanzanian national identity by making Swahili the national language and emphasizing the shared responsibilities of national citizenship. In many LDRs there remain significant and deep-rooted tensions between tribes that persist below the surface and occasionally explode into violence.

### ***Sustainability in the LDRs***

How is sustainability in the LDRs different from that in more economically developed regions? There are significantly different issues that must be addressed in the LDR context. As outlined in the first section of this chapter, for any intervention to succeed, endemic poverty must be tackled. The same goes for issues of security, energy, labour and water availability. Another factor is a bias towards the urban. The world is indeed urbanizing and has been moving in that direction for quite some time, but half the world's population still lives in rural areas. And a rural context is different, with constraints and opportunities not found in the urban setting. Another issue in the LDRs is that the framework of infrastructure and utilities is perhaps not there, or not consistently there across a given country. That's why appropriate development is not patronizing, but something which has a chance of working.

Here is a list of characteristics of sustainability in the developing-country context, divided into environmental, economic and social/cultural issues. These need to be addressed for projects to move effectively in the direction of sustainability.

#### ■ **Environmental**

- Deforestation
- Loss of habitat
- Loss of arable land
- Water availability and conservation
- Renewable energy production
- Energy use

- Promoting and protecting native vegetation
- Reducing pollution
- Responsiveness to climate
- Environmental stewardship

- **Economic**

- Promoting local labour
- Developing sustainable livelihoods
- Transferring technology and skills
- Using locally available building materials
- Promoting regional economy
- Reducing poverty
- Developing transport options and efficiency
- Access to credit via loans and microloans
- Minimizing and facilitating building maintenance

- **Social and cultural**

- Building on, reflecting and strengthening local and regional cultures
- Understanding and building on traditional and colonial history
- Reflecting social practices and values
- Strengthening community
- Enhancing security
- Promoting equity and social justice
- Providing access to education and training
- Improving health
- Participation in decision-making

How do these issues then find expression in the built environment? How specifically can they be addressed through building?

### ***Appropriate and intermediate technology***

Before the now well-worn term ‘sustainability’ came into ubiquitous use, other concepts had wide currency in development work in less economically developed countries, and they embodied many of the same goals as sustainability. Chief among them were appropriate technology and intermediate technology. Major proponents were Fritz Schumacher and the Intermediate Technology Development Group (ITDG), started in 1966 and now known as Practical Action. Schumacher’s classic book, *Small is Beautiful*, pointed to a more humane way of thinking of economics and a more human-scale approach to development based on technologies that corresponded to the skills and needs of the people being served.<sup>16</sup>

Up to that point, aid policies were by and large based on attempts to transfer to developing countries the large-scale and capital-intensive technologies of the more developed countries. This was a reflection of the ‘stages of development’ school of thought, as expressed by the noted economist and US presidential adviser Walt Rostow, who posited that all societies go through the same stages



of economic development. Development aid thus consisted of helping less developed nations along the path to modernity and industrialization as it is found in the Western economies.<sup>17</sup> This strategy led to many failures and so-called 'white elephants' that were inappropriate to the context in which they were inserted. The ITDG argued for a shift to intermediate technologies that would be appropriate to the technical level and economic context of the target country, and so would be more likely to be beneficial. Instead of re-inventing the wheel, ITDG tried to promote existing technologies that were efficient and labour-intensive but that had fallen into disuse in favour of more modern and energy-intensive technologies.<sup>18</sup> ITDG identified its aims as:

Intermediate  
Technology  
Development  
Group  
Practical  
Action

- promoting the systematic assembly and documentation of all data relating to intermediate techniques and technologies;
- drawing attention to them by publishing information about them, promoting the concept of intermediate technology and advertising the group's services;
- offering advice and assistance to overseas projects in order to demonstrate the practical use of intermediate technologies in helping poor people to help themselves.<sup>19</sup>

These ideas have had broad resonance in development thinking, as they pointed a way forward that was based on the conditions on the ground and was not simply an imitation of the most economically developed countries. They have influenced a generation of development thinking, seeking solutions that fit with the given context and target population. They continue today in the construction sector, underpinning efforts at developing regionally appropriate and cost-effective building techniques using locally available materials, such as bamboo, as seen in the work of the South American architects, Simón Vélez and Juvenal Baracco.<sup>20</sup>

### ***Understanding cultural and social aspects***

How do architects/designers approach the challenge of understanding the cultural and social underpinnings of the context in which we are called to design? Man and Environment Research (MER) studies address the issue of the appropriate response to social and cultural design parameters. Amos Rapoport, in his work in MER research, calls attention to the importance of distinguishing core from peripheral elements of a culture in seeking to design successful buildings for that culture.<sup>21</sup> Which are the underlying values that are central to the culture being served? Which aspects of a culture can change while leaving intact the defining structure? Historically, the dwelling was sometimes the only structure that traditional cultures built, and they were built in ways and with materials developed over millennia that acquired meaning and significance for that culture. Some types of traditional Malagasy houses are all built with the entry door facing the same direction, corresponding to the direction from which evil and benign spirits were believed to emanate. Each of the four interior corners of the one-room dwelling were designated for particular members of the family, including one for the ancestors. Figure 1.3 shows a typical Malagasy coastal house.



Figure 1.3  
Traditional coastal  
dwelling in Madagascar  
oriented to the cardinal  
points

As Rogers, Jalal and Boyd have noted above, architects/designers working within their own cultures have already internalized the values and beliefs that undergird their society, and they work within those unspoken parameters without reflection. However, working within a different and foreign context requires critical perception skills. This points to the importance of the architect/designer as a participant-observer in the context of a given project. It takes time and listening, living and working with a given culture and group of cultures to begin to have an understanding of essential characteristics and how existing traditions interface with modernizing influences. The architect/designer called upon to design for another culture has to be careful to not simply mimic traditional forms without understanding why they exist and what aspirations the inhabitants have for their lives and culture.

Thatched roofs are a good example of something that looks like a great idea: made of local and renewable materials, built by local craftspeople and possessing good thermal qualities. But they also afford an excellent habitat for vermin, insects and bats, burn easily (a particular risk if people cook indoors and over open fires or with kerosene burners) and require maintenance or replacement more often than industrialized alternatives. It is understandable that inhabitants would hope for something healthier, longer-lasting and safer for their families. The continued or renewed use of thatch would require these issues to be successfully addressed to make it a more viable alternative than lightweight, long-lasting (though hot) galvanized iron sheets.

The architect/designer as participant-observer must listen and look carefully to understand how a culture's aspirations, values and way of life can be supported and enhanced by a building. S/he must be attentive to how the users view their





Figure 1.4  
Contemporary use of  
thatched roofing in  
Malawi

traditions and their traditional buildings and what expectations they have about a new addition to their built environment. One characteristic of new buildings that I designed in Tanzania that I initially resisted, because it had no precedent that I could see in traditional buildings, was multi-storey structures. The people that I was designing for saw a two-storey building as a sign of modernity and also an opportunity for a different experience: to stand on an upper-level veranda four metres above the ground and survey the landscape. The task of the architect/designer is to gather and sift through all the available information and come up with a building design that the users will embrace as embodying their lifestyle and aspirations.

How, then, do we get something built in a culture that is other than our own? How do we come to an understanding of how buildings get designed and built in a different culture and setting? Howard Davis's concept of *building culture*, previously cited, is extremely helpful in understanding the way buildings are built in LDRs. An awareness of the building culture helps us to understand how things come to be built as they do, and what can be expected when striving for innovation, as in the promotion of green building in the LDRs.

The concept of building culture also helps explain why buildings continue to be built today in certain ways. While basic colonial building materials are similar in various countries, there are significant differences in the building techniques, based on how buildings were built in the colonizer's home country and how these were adopted to local conditions. These differences continue to be seen in the ways buildings are built today. For example, roof trusses are more common in Tanzania than in Madagascar.

Figure 1.5  
The two stories of this  
hospital in Marangu,  
Tanzania connote  
modernity to its users



Figure 1.6  
Roof trusses are more  
commonly used in  
Tanzania than in  
Madagascar



In Madagascar the use of parallel gable masonry walls – both interior and exterior – makes roof trusses and rafters unnecessary in some smaller buildings, since bigger purlins can span laterally between the tops of the gable walls. The preferred location for septic tanks is an interesting difference. In French colonial building the septic tank is located as close to the source of waste as possible, so that the waste travels the shortest distance. The preferred location of the septic tank is just outside the wall against which the toilet is located: for example, under the floor of an interior courtyard. In British colonial building, however, the septic





Figure 1.7  
In-swing casement  
windows are commonly  
used in Madagascar

tank is located at a distance of 20 feet (6.1 m), 30 feet (9.1 m) or 40 feet (12.2 m) from the source of waste. Light switches in Madagascar are located 36 inches (91 cm) off the floor, and down is off, up is on; in Tanzania they are 48 inches (122 cm) off the floor and down is on, up is off. In Tanzania casement windows open out, while in Madagascar they open to the inside with a thick sill piece to shed water to the exterior when they are closed.

It's very difficult to appreciate these differences without being immersed in the building culture in question, because textbooks are not written about such topics. For the architect tasked with designing successful and appropriate additions to the built environment, it is critical to have an appreciation and understanding of such aspects of the local building culture so that s/he is not swimming upstream needlessly.

All in all, owing to the similarities in the industrial materials and building techniques used in various LDRs, the similarities between agricultural-exports-based economies, and their colonial experiences with respect to the built environment, there is more that unites them than divides them for the purposes of defining green building in the LDRs.

## CONSTRUCTION IN THE LDRS

As in the more developed economies, the construction industry represents a large and important segment of the economy of the least developed regions. In addition to the percentage of the labour force regularly employed in the construction sector there – up to 10% – the industry is also a large employer of occasional and unskilled labour. A lot of building in the LDRs is done in the informal economy, which makes the actual percentage of the labour force employed on construction significantly higher, and very difficult to quantify. Add to that the number of workers involved in upstream sectors, notably producing and selling building

materials, and downstream, those who work and dwell in the buildings created, and you have a large percentage of the labour force involved directly and indirectly, formally and informally with the construction industry. The importance of the construction sector in developing countries creates a potential opportunity for green building practices to have a significant impact on the environment there.

What characterizes building activities in the LDRs? To begin with, there is a limited range of materials based on available techniques, labour and raw materials and the availability of imported manufactured materials. In the economy of the LDRs there is a range of types and quality of building construction going on at any given moment. Building activities in the LDRs can be generally divided into three broad categories.

At the bottom of the cost range is the lowest-cost construction that people build for themselves for their shelter or livelihood without professional hired inputs, such as building contractors or architects and engineers, and without seeking official approval (see Figure 1.8).<sup>22</sup>

These people are building with the lowest-cost, if not free, components available in their context. They build with what comes to hand and in the manner to which they have been exposed. (Howard Davis, in his research on building culture in India, has described the manner and type of construction of this sector of the building economy.<sup>23</sup>) These low-cost self-built structures, which are also the closest to the traditional forms of construction, are the self-built shelters one finds in shanty towns around the major cities as well as the traditional dwellings one finds upcountry in the rural areas.<sup>24</sup>

The traditional self-built dwelling type has been developed over centuries and millennia using the materials at hand and in response to climate and culture. Usually every family unit acts as a builder, with some community members having

Vernacular



Figure 1.8  
Self-built housing in  
rural Tanzania continues  
building traditions  
developed over millennia



a particular skill: for example, those who thatch well. Such traditional building is usually not part of the formal money economy. It requires regular upkeep until it's left to go back to the earth.

Urban self-built housing is characterized by a lack of availability to legal title for land. This leads to squatting on underused or marginal land. The extreme poverty of the inhabitants – at least for initial rural-to-urban migrants – leads to extensive use of found materials. The lack of land tenure keeps investment to a minimum, since it may be taken or destroyed at any time by the government or those who have some legal ownership of the land, and there is typically no utility or formal transport infrastructure, since the settlement is illegal. There is some specialization in the erection of such housing, because some trades (such as electrical, plumbing or masonry) require specialized knowledge for which inhabitants can trade or pay in cash.

At the high end of the cost range are the buildings that the economically and politically advantaged build for their shelter or livelihood. This privileged sector has access to building materials and techniques that are not commonly available or are too costly for middle- and lower-income people to afford. This sector looks beyond national borders for models of what and how to build. This highest range of building includes large corporate and sometimes government office buildings, hotels and other large institutional structures (such as universities and hospitals) and residences for the country's political and economic elite. Here one finds glass-skinned corporate office buildings. In the main cities of the LDRs, this glass skin is often only that: a skin installed on the outside of the more common building materials of reinforced concrete and concrete block. It thus gives the appearance of the internationally recognizable glass box or tower that connotes modernity and wealth (see Figure 1.9).

Between these two economic extremes lies the majority of building projects erected within existing building cultures inherited from the colonial period. Along with the European colonizers came their buildings that housed their needs – administrative buildings, schools, hospitals, warehouses, houses – which were built using techniques adapted from the colonizers' industrialized country of origin. These rectangular structures made extensive use of reinforced concrete, brick, stone, tile and then metal roofs, glass and dimensional lumber. Later they included electricity and plumbing, as these technologies became available. Examples of buildings from this middle tier are school buildings, local hospitals, clinics, warehouses, hotels, restaurants, small office and commercial buildings, and middle- to upper-middle-class houses.

The colonists and their subjects adapted these new building types and their construction to the specific developing-country context. These adaptations concerned the climate, available materials, building types and social and cultural forces at work in the colonial setting (see Figure 1.10).

The limited construction budget for such mid-range building projects necessitated maximizing the use of available materials and techniques in order to be affordable for the client and maintainable over time.



Figure 1.9  
High-end buildings in  
Kathmandu, Nepal,  
emulate a global glass-  
skinned aesthetic

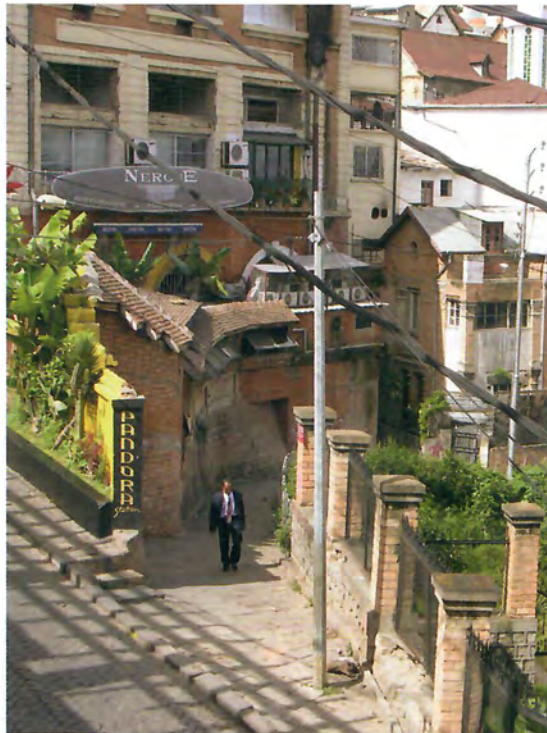


Figure 1.10  
Antananarivo,  
Madagascar, largely  
consists of buildings  
made from commonly  
available building  
materials using colonial-  
era construction  
techniques



In the post-colonial period the building culture of the former colonies continued to follow the same colonial pattern, since there was no intention of, or advantage in, going back to pre-colonial models. Modernity was firmly associated with the colonial model of building construction.

It is at this in-between level where green building has the likeliest chance of taking root. The self-built buildings are already sustainable in numerous respects, such as the use of recycled material, the minimization of waste and use of local materials, but poverty and lack of land tenure will limit what can be done. And sustainability is not very likely at the level of the global building model, because wealth and the wealthy will still privilege status and symbol over sustainability, until sustainability itself becomes a status symbol or a means to wealth.

Such privileging of wealth and status seems to apply in the case of a small and interesting sector of building in developing countries associated with ecolodges and ecotourism. Built of local traditional materials and in traditional forms, sometimes at considerable cost, these buildings offer paying visitors the opportunity to appreciate the ecology of a place and seek to educate them about the local culture and way of life, while minimizing their environmental impact on the place.<sup>25</sup> While these goals are laudable, and the results can be positive for the area concerned, this sector is marginal to the bulk of building activity in an LDR.

Howard Davis and his idea of 'building culture' is most useful in understanding the built environment and its creation and maintenance in a given context. It is of great help in understanding the underpinnings and what gave rise to a given built environment, and how innovation is in large measure a continuation of the traditional.<sup>26</sup> It in fact has to be so, in order to be successfully adopted. This is important when we are talking about the adoption and propagation of sustainability concepts in the building industry. The colonial power is historically the most important reference for the creation of the 'modern' built environment. Any new ideas have to be understood within that context if they are to have a chance to take hold and be adopted.

Unfortunately, very little research has been done about the important sector of the economy that is the built environment in LDRs. Jill Wells's 1986 book on the construction industry in developing countries, based on her experiences and research in Tanzania, is one of very few, but it addresses the structural and economic aspects of the construction industry more than its product.<sup>27</sup> There are archives of colonial-era documents waiting to be sifted through for clues as to how colonial building developed.

## APPLICABILITY OF FIRST-WORLD GREEN BUILDING CONCEPTS

As mentioned in the Introduction, this book builds on the good work previously done in the development of green building rating systems as tools to evaluate how green or sustainable a given building is in relation to other buildings.

In order to evaluate the applicability of ideas from the more economically developed world to green building in the LDR context, we look at green building

rating systems in use in the economically more developed countries. These strive to embody sustainability concepts and group them and their application by their area of impact, such as site issues, materials used, energy use, water and interior environment. A first step in evaluating their applicability to the LDR context is to identify the assumptions that underpin the systems, including understandings and definitions of sustainability.

The green building rating systems are built on a number of assumptions that, while valid for the developed-country context for which they were created, are markedly less so in the LDRs. Among these assumptions are:

- the availability of an uninterrupted and stable electric power supply;
- the prolific use of electric power generally, and especially for climate control;
- the availability of a wide range of building materials;
- that a tight building envelope will reduce need for climate control and thus electricity;
- that building programme activities occur inside a building's conditioned envelope;
- the usefulness of commissioning a building's mechanical systems;
- the availability of professional consultants to do such commissioning;
- the availability of skilled labour to maintain complex building systems;
- the availability of financial resources to pay for ongoing maintenance of a building and its systems; and
- security from theft.

The assumption of abundant supply and prolific use of continuous electrical power underpins most of the criteria and, in particular, those related to HVAC systems, controls and monitoring. Together with the energy assumption comes a corollary that all interior spaces will be heated and/or cooled mechanically. However, in many of the LDRs the simplicity of available building technology and systems is a good and necessary fit with the generally mild climates often found there. Between the two extremes of mechanically cooled space on the one hand and mechanically heated space on the other, one finds a broad range of climatic conditions that buildings can respond to by passive means, such as orientation, vegetation, roof overhangs, and wall openings. The ubiquitous ceiling fans of many LDRs serve as a means of cooling that is relatively passive compared to the complex HVAC systems used in the more economically developed countries. The fact that a building can function well with little or no electrical power is something to note and emulate.

Another assumption is that a wide range of building material choice is available. But in the LDRs, owing to their relatively small economies, there is limited choice of building materials. Available materials are generally of three types: traditional building materials, such as wood and thatch; those that are a legacy of the colonial period, such as brick, reinforced concrete, corrugated iron sheets and roofing tiles; and those from a globalizing economy, such as aluminium store-fronts and glass curtain walls. If materials are selected outside this relatively limited range, the cost of purchase, installation and maintenance increases astronomically,



since they have to be sourced from outside, and transport and import costs will add to their total cost.

Related to the assumptions about energy availability and use is that concerning the building envelope. It is true that a tight building envelope will reduce heating and cooling load in areas of climatic extremes, but it makes buildings harder to ventilate naturally in moderate climates and pushes them towards mechanical means of ventilation rather than such natural means as properly located openings, shading vegetation and the like. Related to this is the assumption that most of a building's activities occur within the building envelope. But when the climate is mild and people traditionally live out of doors a good deal of the time, activities such as cooking and other food preparation, laundry, and gatherings of various kinds occur outdoors – either open to the sky or on a veranda or other covered area – thus blurring the lines between inside and outside. Consequently the issue of indoor air quality, which commands a lot of attention in green building rating systems, is not as critical in the LDRs. The joining of components of the building envelope – walls, doors, windows and roof – is more porous and allows for significant air exchange between outdoors and indoors.

Another assumption concerns the usefulness of formal commissioning of a building's systems. If a building's most complicated system is the ceiling fan or hot-water heater, then commissioning, while important to verify the proper functioning of installed systems, is less complex than it is in buildings with complicated mechanical and control systems. And, in addition, the availability of the relevant professionals to undertake the commissioning of complex building systems is not a given in the LDRs.

Other assumptions underlying green building rating systems are that skilled labour is available to install and maintain complex building systems, and that the client can pay for on-going operation and maintenance of the building and



Figure 1.11  
Covered outdoor  
classroom space in  
Malawi

lack of  
skilled  
labour for  
maintenance

its systems. In the LDRs the relative poverty and lack of economic development, coupled with their small economies, limit the availability of a labour pool skilled in installing and maintaining complex building systems. Furthermore, local institutions – schools, for example – operate with barely enough money to exist. Teachers at times go without salary; classrooms lack furniture and the most rudimentary teaching materials. This type of institution has no capacity to employ skilled labour to regularly maintain a mechanical system. For this kind of context, a different model of what is considered sustainable has to be imagined.

A final assumption taken for granted in more economically developed countries is that of state-provided security in the form of a police force, whose existence and presence acts as a deterrent to thieves. This is in no way a given in many of the LDRs, where its absence or limited presence necessitates a design response in buildings to provide some of the needed security from theft.

What characterizes building in more economically developed countries?

- High energy use,
- high level of waste,
- wide range of available products to use in buildings,
- skilled and specialized construction labour force,
- continuous and stable electrical supply,
- available security (through government agency supplemented by private efforts).

In the context of the most industrialized countries, green building is generally about reducing energy and resource use to a minimum so as to conserve rapidly depleting resources and to curb CO<sub>2</sub> emissions. While this is of global importance, the energy and resource use situation in LDRs is quite different from that in more economically developed countries. In many developing country contexts the changes brought on by the Industrial Revolution, particularly since the nineteenth century, have not yet been widely felt. Energy and resource use is, correspondingly, quite modest. A significant portion of energy use in the US context is related to heating, ventilating and cooling systems. In many LDRs doors and windows fulfil these functions, with ceiling fans being typically the highest-technology mechanical device used. Air-conditioning is found in the LDRs in the form of split systems with a wall-mounted air-handling unit and remote condenser, but this is more prevalent in buildings such as government offices and tourist hotels in the urban areas, which are not our focus here.

In such a context, it is difficult to make the case for reduced energy and resource use when the use is already so small. What does green building mean in a developing country context where many buildings have limited electricity and running water and are already built mostly of locally available materials? What does it mean in a place where recycling is a fact of daily life simply because of the inhabitants' poverty? Are they already green? In many respects, buildings and the built environment in many LDRs are indeed far greener than those of more economically developed countries.



The next chapter introduces main building issues that define sustainability and green building in the LDR context and need to be addressed for a successful and sustainable building project.

## NOTES

- 1 Repetto (1986): 15–16.
- 2 Former German president Willy Brandt included in the Brandt Commission report a definition of sustainability that still rings true today and is widely cited as a starting point that all can agree on. See Independent Commission on International Development Issues (1980), *North–South: A programme for survival*, London: Pan Books.
- 3 OECD (2001): 11.
- 4 Deutsche Gesellschaft für Technische Zusammenarbeit (2005): 2.
- 5 Alexander *et al.* (1993): 1–2.
- 6 Cernea (1994): 7.
- 7 Rogers *et al.* (2008): 218.
- 8 *Ibid.*, p. 219.
- 9 *Ibid.*, p. 51.
- 10 World Bank (2001): pp. 7–8.
- 11 World Bank (2002): 18.
- 12 Broad and Cavanagh (2009): 34.
- 13 Farmer, Paul (2009), public lecture on the work of Partners in Health at Virginia Tech, March 2009.
- 14 Chambers and Conway (1992): 7.
- 15 World Bank (2002): 31.
- 16 Schumacher, E.F. (1973), *Small is beautiful: Economics as if people mattered*, New York: Harper & Row.
- 17 Rostow, Walt (1973), *The Stages of economic growth: A Non-Communist manifesto*, New York: Cambridge University Press.
- 18 Practical Action, 'About Us', [http://practicalaction.org/about\\_us?id=history](http://practicalaction.org/about_us?id=history). (retrieved 29 September 2009).
- 19 *Ibid.*
- 20 Rodriguez-Camilloni (2009): 1243–52.
- 21 Rapoport (1983): 256.
- 22 There is a rich literature focusing on vernacular traditional dwellings throughout the world. One of the classics is Bernard Rudofsky (1964), *Architecture without architects*, New York: Doubleday. Others include: A. Dudley Gardner and Val Brinkerhoff (2000), *Architecture of the ancient ones*, Salt Lake City: Gibbs Smith Publisher; and John S. Taylor (1997), *A Shelter sketchbook: Timeless building solutions*, White River Junction VT: Chelsea Green Publishing Company. For vernacular building in Madagascar, see Jean-Louis Acquier and Ranaivo Harijaona (1997), *Architectures de Madagascar*, Nancy: Berger-Levrault.
- 23 Davis (2003): 37–42.
- 24 The architect and planner, John F. C. Turner, has contributed much to the understanding of urban self-built housing in Latin America, much of which is applicable to such housing in urban centres of Africa. Among his influential works are *Freedom to build: Dweller control of the housing process* (1972), New York: Macmillan, and *Housing by people: Towards autonomy in building environments* (1976) London: Marion Boyars.
- 25 More information about this sector can be obtained in Donald E. Hawkins, Megan Epler Wood and Sam Bittman (eds) (1995), *The Ecolodge sourcebook*, North Bennington

- VT: Ecotourism Society; and Kreg Lindberg and Donald E. Hawkins (eds) (1993 and 1998), *Ecotourism: A Guide for planners and managers*, 2 vols, North Bennington VT: Ecotourism Society.
- 26 Davis (2003): 274.
- 27 Wells (1986).

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