

Agenda for the World Summit on Sustainable Development

Ron Watermeyer (Vice President IStructE) discusses the issues to be aired at the World Summit on Sustainable Development. It will be held in Johannesburg and will focus on the links between poverty, environment and development

Sustainable development is certainly a 'buzz' word in the media and in the jargon of the day within engineering circles. It feels at times as if every second conference has a theme revolving around some aspect of sustainable development. Issues falling under the banner of 'sustainable development' also appear to be very broad; they range from saving the planet to saving an industry, and from developments that don't compromise 'green' objectives to those that address poverty. Sustainable development appears to the uninitiated to be all things to all people. But is it?

Sustainable development is defined in the Brundtland report (1987) as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'. The interpretation of this definition has, however, broadened and matured since 1987. The protection of the environment is today recognised as but one element of sustainable development. Former Indian Prime Minister Indira Gandhi said almost 30 years ago that poverty was the world's greatest polluter. Sustainable development is now also very much about eradicating poverty.

Dr Ben Ngubane, South Africa's Minister of Arts, Culture and Science, summed it up at a recent UNESCO conference in France, when he pointed out that one of the pre-eminent changes that has taken place is the recognition that sustainable development is a far more embracing and holistic concept than environmental sustainability. Indeed, sustainable development is a way of looking at all the sources and resources that can lead to a higher quality of life for the current generation, without compromising future generations.

The Earth Summit (1992)

The United Nations Conference on Environment and Development (UNCED) took place in Rio de Janeiro, Brazil in 1992. The Earth Summit was convened to address problems of environmental protection and socio-economic development. The assembled leaders signed the Framework

Convention on Climate Change and the Convention on Biological Diversity, endorsed the Rio Declaration and the Forest Principles, and adopted Agenda 21 for achieving sustainable development.

The Commission on Sustainable Development (CSD) was created in December 1992 to ensure follow-up of UNCED and to monitor and report on implementation of the Earth Summit agreements at the local, national, regional and international levels.

Agenda 21 (see box) establishes an agenda for sustainable development in four sections, namely social and economic dimension, conservation and management of resources for development, strengthening the role of major groups, and means of implementation. Objectives, activities and means of implementation are set out for a number of programme areas.

Agenda 21 establishes a conceptual framework for sustainable construction that defines the links between the global concept of sustainable development and the construction sector and enables other agendas on a local level to be compared and co-ordinated. The main challenges of sustainable construction which emerge are listed in Table 1.

CIB response to Agenda 21

The International Council for Research and Innovation (Conseil International du Bâtiment, CIB) has released a report on Agenda 21 on sustainable construction (CIB report publication 237, 1997).

According to this report, 'the understanding or interpretation of sustainability in

Preamble to Agenda 21

'Humanity stands at a defining moment in history. We are confronted with a perpetuation of disparities between and within nations, a worsening of poverty, hunger, ill health and illiteracy, and the continuing deterioration of the ecosystems on which we depend for our well-being. However, integration of environment and development concerns and greater attention to them will lead to the fulfilment of basic needs, improved living standards for all, better protected and managed ecosystems and a safer, more prosperous future. No nation can achieve this on its own; but together we can – in a global partnership for sustainable development.'

Table 1: Main challenges of sustainable construction

1)	Promoting energy efficiency (energy saving measures; extensive retrofit programmes; transport aspects; use of renewable energies)
2)	Reducing use of high-quality drinking water (relying on rainwater/grey water; reducing domestic consumption with water management systems; waterless sanitation systems and use of draught resistant plants)
3)	Selecting materials on environmental performance (use of renewable materials; reduction of the use of natural resources; recycling)
4)	Contributing to a sustainable urban development (efficient use of land; design for a long service life; the longevity of buildings through adaptability and flexibility; convert existing buildings; refurbishment; sustainable management of buildings; prevention of urban decline and reduction of sprawl; contribution to employment creation; cultural heritage preservation.)
5)	Contribution to poverty alleviation
6)	Healthy and safe working environment

building and construction has undergone change over the years. In the beginning, the emphasis was on how to deal with issues of limited resources, especially energy, and on how to reduce the impacts on the natural environment. Also, a decade ago, the emphasis was placed on the more technical issues in construction such as materials, building components, construction technologies and on energy related design concepts. Today, an appreciation of the significance of the non-technical issues is growing and it is realised that these so-called 'soft' issues are at least as crucial for a sustainable development in construction. Economic and social sustainability must be accorded explicit treatment in any definition. More recently also cultural heritage implications of the built environment have come to be regarded as pre-eminent aspects in sustainable construction.'

The report presents a detailed overview of the concepts, issues and challenges of sustainable development and sustainable construction, and poses certain challenges to the construction industry. Fig 1 illustrates how the approach to construction has shifted from considering only time, cost and quality factors, to the inclusion of resources, emissions and biodiversity, and thereafter to global issues relating to social equity and cultural issues, economic constraints and environmental quality.

Fig 2 illustrates the linkages between concerns regarding resource consumption and the demand for sustainable development within the confines of social, cultural and economic issues.

These two figures succinctly present a concise summary of CIB's response to Agenda 21.

The CIB, however, recognises that different regions have a different understanding of sustainable development. This

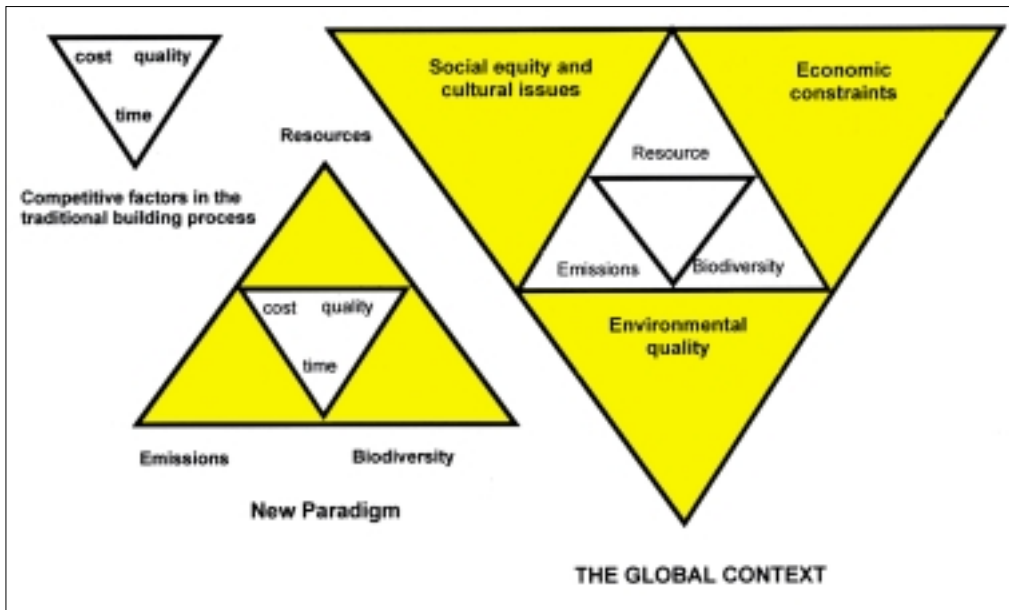


Fig 1. The new approach to sustainable construction, in the global context

Fig 2. Issues and challenges of sustainable construction (CIB 1997)

Identified issues include the need for a new model for development; urbanisation and rural development; sustainability in housing; education; innovation in building materials and methods; modernising the traditional; gender equity; finance and procurement; and governance and management.

EU's response to Agenda 21
The working group on Sustainable Construction (Competitiveness of the Construction Industry) appointed by the

EU Commission (2001) reports that the purpose of the work is to develop strategies and recommendations aimed at promoting the concept of sustainable construction in the European context. In the first instance, before addressing further issues, priority will be given to developing strategies for environmentally friendly construction materials, energy efficiency in buildings and construction and demolition waste management.

The working group for sustainable building points up eight primary sustainability issues affecting the construction sector:

1. Environmentally friendly construction materials
2. Energy efficiency in buildings
3. Construction and demolition waste management
4. Water conservation
5. Health in buildings
6. Building related transport aspects
7. Urban sustainability
8. Sustainable architecture

Sustainable development issues

A recent proposal for an ISO standard on general principles for sustainable buildings (2001) provides some useful insights into current thinking in this field. This proposal suggests that a green building is a building that provides the specified building performance requirements while minimising disturbance to and improving the functioning of local, regional, and

is understandable as there are marked differences in the issues and challenges facing such regions, and in the impact that the construction industry has on the economy, environment and society. Furthermore, the barriers to sustainable construction presented by cultures and traditional practices vary widely. Sustainability, particularly in developing countries, is also affected by factors such as political stability, non-transparent governance, economic growth and redistribution of wealth, meaningful integration and participation in the global economy; meaningful political and economic co-operation among developing countries, the impact of HIV/AIDS, other diseases, natural disasters and warfare and political instability.

The CIB acknowledges that its 1997 report on Agenda 21 suffers from an understandable bias towards the issues, challenges and solutions of the developed world as its contributors were largely from developed countries. The CIB, in order to address this, has commissioned a special *Agenda 21 for Sustainable Construction in Developing Countries* as part of the Action Plan for the implementation of the overall CIB Agenda 21 on Sustainable Construction, and to further the CIB's proactive approach on sustainable construction. The objectives of this work are:

- to identify the key issues and challenges facing sustainable construction in the developing world, as well as the major barriers to practicing sustainable construction;
- to identify a research agenda that focuses on possible responses to the challenges and needs of the developing world;
- to guide international investment in research and development in the developing countries;
- to stimulate debate and encourage the exchange of learning on sustainable construction within the developing world, thus drawing the developing world into the international debate as an equal partner.

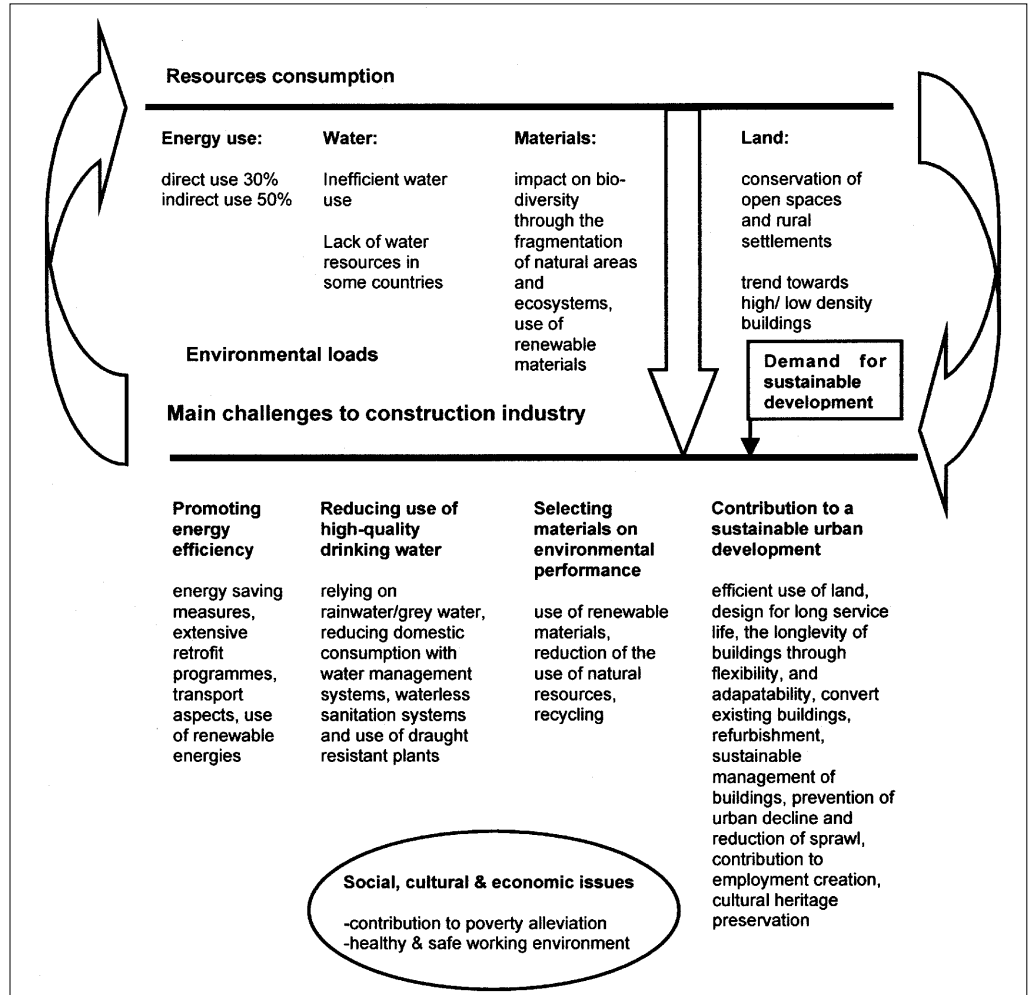


Table 2: Considerations for the management of resources

Consideration	Description	Examples
non-renewable resource	a resource that exists in a fixed amount in various places in the earth's crust and that cannot be replenished on a human time scale	iron ore, portland cement, copper, aluminum, coal, and oil
perpetual resource	a resource that is virtually inexhaustible on a human time scale	solar energy, tidal energy, and wind energy
renewable resource	a resource that is grown, naturally replenished, or cleansed, at a rate which exceeds depletion of the useable supply of that resource	trees in forests, grasses in grasslands, and fertile soil

global ecosystems, both during and after its construction and specified service life. A sustainable building is a building that incorporates green building principles and also maintains or improves the quality of life and harmonises with the climate, tradition, culture and the environment in the region.

The concept of resource management is also introduced, namely, the earth has a limited carrying capacity. Sustainable development must balance current use of the earth's renewable, non-renewable, and perpetual resources in order to preserve these resources for future use (see Table 2).

This proposal suggests that there are three separate basic measures to change conventional building practices into more sustainable practices. These are outlined in Table 3.

The IStructE's approach

The Institution of Structural Engineers responded to initiatives flowing out of the

Rio conference in 1992 by publishing a report on *Building for a sustainable future: Construction without depletion* to guide structural engineers and other construction professionals in the process of sustainable development around the world.

This report points out that development is very much concerned with upgrading, adaption and reuse of the building stock. Structural engineers in the creation and management of buildings can participate by:

- understanding the effects of structural engineering decisions on global warming, acid rain, ozone generation and resource depletion.
- seeking an appropriate location for the development
- choosing a built form and orientation that contribute to environmental economies and future adaptability, flexibility of use and reuse.
- selecting structural materials and systems with low embodied energy and

easy reuse.

- selecting construction methods that minimise the effects of construction and deconstruction in terms of land take, waste and pollution.

Green building challenge – environmental performance indicators for buildings

Green Building Challenge (GBC) is an on-going international process focusing on the development and testing of a new system of assessing the environmental performance of buildings. It was marked by an international conference in October 1998, called GBC '98. The second international conference took place in Maastricht in 2000. GBC is an international partnership of 14 countries. Natural Resources Canada is providing a secretariat function, while a committee of participants, called the International Framework Committee (IFC) co-ordinates the technical process. GBC is also co-operating with relevant working groups of the International Energy Agency and the Conseil International du Bâtiment (CIB) in developing the program.

The process has involved the development of a framework designed to assess the energy and environmental performance of buildings. The system has been developed with a core component reflecting global issues, but can be modified by national teams to reflect energy, environmental and other priorities in specific

Table 3: Basic measures to change conventional building practices into more sustainable practices

Consideration	Measures to change conventional building practices	Comments
Eco-efficient design and construction	<p>Energy efficiency – minimise energy consumption for maintaining the indoor environment by reducing dependence upon heating, ventilating and air-conditioning systems and artificial lighting during the daytime</p> <p>Durability – prolong service life by creating more durable buildings and by improving the ability to change and adapt buildings to changing user needs</p> <p>Reuse – the eventual consumption of the building through deconstruction should be taken into account in the design</p> <p>Preserve structures whenever possible and consider rehabilitation and re-use wherever possible</p> <p>Reuse materials to reduce landfilled materials and save natural resources</p> <p>Toxicity – implement precautionary principle in design choices, both in terms of the end-product material and the manufacturing process</p> <p>Improve the urban environment – plant vegetation and form green networks, minimise emission and discharge systems etc</p> <p>Materials selection – select materials that minimise consumption of natural resources during all phases of the material or products life cycle</p> <p>Optimise use of space to reduce overall building size – simplify building geometry to avoid wasted space</p>	<p>Design and construction of sustainable buildings should be based on the realisation of the arrival of the era when:</p> <ul style="list-style-type: none"> • fossil fuels and natural resources cannot be consumed freely • wastes cannot be dumped freely • great impacts of building materials on human health emerge • local ecosystems must be preserved • local societies must be cherished
Eco-efficient operations	<p>Promote operations that:</p> <ul style="list-style-type: none"> • make efficient use of energy • make efficient use of water both quantitatively and qualitatively; • make efficient use of materials and minimise wastes, and re-collect materials that have significant influences on the environment • keep buildings healthy by appropriate and intensive maintenance management. 	Consideration should be given to the indirect impacts of design and siting
Collaboration, dissemination, management and continual improvement	<ul style="list-style-type: none"> • Promote the participation of users and occupants in various decision making processes • Give status to the process of 'pre-design' during which an 'environmental review' and an 'environmental brief' are used to established common understanding of the environmental impacts of buildings • Promote development of elemental technologies as well as planning techniques • Give status to the process of post-design during which designers and constructors make continual commitment to promote sustainability through the whole-life cycle of a structure. • Improve procurement systems to promote full cost accounting based upon life cycle and serviceability 	The principles of sustainable building should be applied to both existing and future buildings. It is essential to change the process relating to building construction including promoting greater interaction between design and assessment

countries and regions.

Conclusions

It must be recognised that 20% of the world's population live on less than US\$1 per day while 47% live on less than US\$2 per day (World Bank, 2001); the gap between the rich and poorer nations is widening; and the minority of the global population controls a greater proportion of the world's economic and natural resources. Accordingly, sustainable development for the majority of developing countries becomes meaningful when it is underpinned by objectives which relate to stimulating economic growth including the creation of jobs, achieving social progress and stability, and promoting the sustainable utilisation of natural resources as opposed to a strict protectionist stance. There is little doubt that the Johannesburg Summit will not have to face and deal with these issues.

Making the transition to sustainable development is not an event, but a process that must be sustained by promoting education, public awareness and training to achieve sustainable development. Sustainable construction should bring about the required performance with least unfavourable or the most favourable ecological, economic as well as social and cultural impact both in local and regional as well as in global level.

Section 24 of the Bill of Rights contained in the Constitution of the Republic of South

Looking ahead to the World Summit

The World Summit on Sustainable Development will take place in September 2002 in Johannesburg, South Africa. Mohammed Valli Moosa, the South African Minister of Environmental Affairs and Tourism, in a recent public address points out that 'Johannesburg 2002 should be about people, Planet and prosperity..

'The Johannesburg summit is about sustainable development. It is also about the protection of the environment, as one element of sustainable development..'

'In the preamble to the Earth Summit, held in 1992, the context of the development constraints that the world was facing at that time was summarised as a call to the realisation of the interaction that exists between the economy, social structures and the environment. This context has not changed, we still live in a world where the disparity between rich and poor continually increases, bringing us to the realisation that we, as custodians of the future generations, have to assure ourselves of a safer, more prosperous future in which we deal with the environment and development issues in a balanced manner..'

'The World departed from Rio de Janeiro with the Agenda 21 as a mandate of sustainable development and the underlying message of that mandate was simple – "without better care of the environment development will be undermined and reciprocally without accelerated economic and social development of poor countries, environmental policies would fail"...

'The 2002 summit should focus on the identification of the accomplishments and areas where further efforts are needed to implement Agenda 21 and other outcomes of Rio and focus on action-orientated decisions in areas where future efforts are needed to implement Agenda 21, address within the framework of Agenda 21, new challenges and opportunities, and find renewed political commitment and support for sustainable development. Central to that is for us to ensure a balance between economic development, social development and environmental protection as independent and mutually reinforcing components for sustainable development..'

'Fortunately there is an emerging consensus that the primary focus of the Summit should be on: poverty; development; and the environment'. Some of the themes that are already emerging which will shape the broad direction of the Summit includes, the inter linkages between poverty, environment and development; financing mechanisms; technology transfer; trade and the environment; water; energy; environmental health and land degradation, these issues are key to the developing world and paramount for the strengthening of the broad statements declared in 1992.'

Africa (Act 108 of 1996) accurately describes the global political thinking for the environment, namely, everyone has the right to an environment that is not harmful to their health or well-being; and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable

development and use of natural resources while promoting justifiable economic and social development.

Law makers can capture the desires of the world's population. Engineers and other built environment professionals are, however, required to transform words into reality. The construction industry stands challenged to make the difference.

• Useful websites: www.greenbuilding.ca
www.csir.co.za/akani/2001/july/03.html 