Sustainable Climate Adaptation

The Critical Link between Sustainable Development & Climate Change in the Built Environment

Author

C. J. Walsh B Arch FRIAI MIBCI MIFS MIFireE
Consultant Architect, Fire Engineer & Technical Controller
Sustainable Design International Ltd. - Ireland, Italy & Turkey
Member of CIB e-mail: cjwalsh@sustainable-design.ie

Key Words & Phrases

2009 UNFCCC Copenhagen Climate Summit, Climate Change Politics, Climate Change Adaptation, Sustainable Human & Social Development, New CIB W108 Report.

1. Introduction

Asked directly, at a Dublin meeting[1], about how the relationship between Climate Change and Sustainable Development had been dealt with in the 2007 WMO/UNEP Intergovernmental Panel on Climate Change (IPCC) 4th Assessment Report - where it was mentioned almost as an afterthought - Dr. Rajendra Pachauri, IPCC Chair, replied that he was personally disappointed that something more substantial had not been done to explore this link. He seemed surprised to receive the question.

The 2009 United Nations Framework Convention on Climate Change (UNFCCC) Summit, which was held in Copenhagen from 7th-19th December, was chaotic ... and its outcome was divisive. Since then, it has been particularly noticeable that the IPCC[2], Dr. Pachauri's position within that organization, and the Science of Climate Change itself ... have all been targeted by an increasing number of vocal sceptics in Developed Countries, particularly the U.S.A.[3] [4] If anything is clear, it is that the Politics of Climate Change must now be carefully dissected and analyzed before an effective global response to Climate Change can be properly mobilized and reliably implemented.

Learning from these events, the urgent priority for those organizations/individuals involved in the design, construction, management or operation of the Built Environment ... is to quickly elaborate a Climate Change Strategy which is 'politically' and 'technically' appropriate for the near and long-terms ... while, at the same time, avoiding any short-term roadblocks to progress.

This Paper explores the symbiotic relationship between the concept of Sustainable Human and Social Development and the reality of Climate Change ... a link which is critical to the development of that elusive consensual global response ... and essential for the effective implementation of a Built Environment Climate Change Strategy.

Fortuitously relevant, in these interesting times ... having commenced in June 2008 ... the on-going development of a CIB Working Commission 108 ('Climate Change and the Built Environment') Project will also be outlined, which will result in the publication of the Report: 'Sustainable Climate Change Adaptation in the Built Environment', during 2010.

2. Towards the Accurate Understanding of 'Sustainable Development'

2.1 An Open Baseline Definition & Its Rational Evolution

Turning our attention back to the last quarter of the 20th Century ... not as far back as the Stockholm Declaration of the United Nations Conference on the Human Environment, which met in Sweden, from 5-16th June 1972 ... and, in which document, much of the text in the later 1992 Rio Declaration on Environment & Development can be seen ... but to the 1987 Report of the World Commission on Environment and Development (WCED): 'Our Common Future'[5], which was chaired by Gro Harlem Brundtland (Norway), with Mansour Khalid (Sudan) as Vice-Chair.

This definition of 'Sustainable Development' appears at the beginning of Chapter 2 in the 1987 Report:

> " Sustainable Development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:
> - the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and
> - the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs."

Many people in Developed Countries may only be familiar with the first sentence above. But, in isolation, this renders the concept of 'sustainable development' so vague that it is almost meaningless. And let us be honest with ourselves ... this ambiguous definition has been comprehensively rejected by the Developing and Least Developed Regions of the world ... the concept being viewed as an unaffordable luxury and/or a means of continued domination and control by the 'North', i.e. those same Developed Countries.

Most people in Developed Countries, however, may be surprised by the second, and more important, half of the WCED/Brundtland Definition which adds shape and dimension to that initially vague concept. The 'essential needs' of the world's poor - not their irresponsible 'desires' - must be given priority in all sustainable development strategies. Furthermore, as most of our traditional institutions are inherently inefficient and wasteful of resources, we must choose to re-organize and transform our different societies in order to properly implement the concept. Finally, it must be acknowledged that there are limits to technology ... the belief in some magical techno-solution in 30 or 40 years time must not be allowed to deflect us from taking action today !

It is very clear, therefore, that it was always intended that there would be more than 3 Aspects of Sustainable Development (Environmental, Social and Economic) to be identified and examined ... additionally, for example, Institutional, Political and Legal Aspects. How was it ever possible to bring into existence that ubiquitous and over-simplistic 3-Circle Diagram ??

The 1987 WCED/Brundtland Report continues a little further on ...

> ' The satisfaction of human needs and aspirations is the major objective of development. The essential needs of vast numbers of people in developing countries - for food, clothing, shelter, jobs - are not being met, and beyond their basic needs these people have legitimate aspirations for an improved quality of life. A world in which poverty and inequity are endemic will always be prone to ecological and other crises. Sustainable Development requires meeting the basic needs of all and extending to all the opportunity to satisfy their aspirations for a better life.'

Sustainable Development is the greatest challenge ahead of us in this already troubled 21st Century ... a century which started so tragically ... from 9-11 in New York ... to Bali, Casablanca, Istanbul, Madrid, Sharm-el-Sheikh, London, Kusadasi and Mumbai ... with the wars in Iraq, Afghanistan and Occupied Palestine still unresolved.

Sustainable Development is an intricate, open, dynamic and evolving concept ... and a clear choice must be made by policy-makers and practitioners: decide to pursue the detailed, rational elaboration of this concept ... with the aim of practical and effective implementation ... or of intellectual self-gratification alone.

2.2 Practical & Effective Implementation

In order to make 'real' progress ... how can we establish, agree upon and achieve a wide international consensus on what the 'basic needs of all' are ? And with some precision ? Is there an internationally recognized document, already long in existence, where these 'basic needs' are not only specified for every individual person, but are protected and guaranteed as rights ? Yes, there is ... the 1948 Universal Declaration of Human Rights (UN OHCHR) ... and these needs, therefore, can also be described as being 'responsible'.

Reading through the 1948 UDHR, it is helpful if a distinction is made between human rights and social rights ...

> Social Rights:
> Rights to which an individual person is legally entitled, e.g. the right to free elementary education (Art.26(1), UDHR), but which are only exercised in a social context with other people, and with the active support of a competent legal authority, e.g. a Nation State.
>
> Commentary: In contrast to Human Rights, it is not protection from the State which is desired or achieved, but freedom with the State's help.

Social Rights, as distinguished here, include and extend beyond current understandings of civil, political, economic, social and cultural rights.

This is why, almost a generation after the 1987 WCED/Brundtland Definition of Sustainable Development ... Sustainable Design International, has defined Sustainable Human & Social Development[6] as follows ...

> ' Development which meets the responsible needs, i.e. the Human & Social Rights*, of this generation - without stealing the life and living resources from future generations, especially our children ... and their children ... and the next five generations of children.'
>
> *As defined, in international law, by the 1948 Universal Declaration of Human Rights (UN OHCHR).
>
> Inspired by the Culture of the North American Indigenous Peoples ... this definition also incorporates the concept of '7 Generation Thinking'.

For a sizeable group of vulnerable people in all of our societies, the sole route of 'access' to the human and social rights set down in the 1948 Universal Declaration of Human Rights ... is the 2006 UN Convention on the Rights of Persons with Disabilities, which became an International Legal Instrument on 3rd May 2008 ... just short of 60 years after the UDHR was adopted on 10th December 1948 !

A third International Legal Instrument to be placed at the core of this framework of Rights, i.e. basic & responsible needs ... is the 2001 Universal Declaration on Cultural Diversity (UNESCO) which was adopted in Paris, on 2nd November 2001 ... shortly after the World Trade Center (9-11) Incident in New York, on 11th September 2001.

Paris, at the end of 2001, presented the world with a unique opportunity ...
- to reject outright the theory of the inevitable clash of cultures and civilizations; and
- to reaffirm the unshakable conviction that inter-cultural dialogue is the best guarantee of peace.

The Universal Declaration on Cultural Diversity raises cultural diversity to the level of the common heritage of humanity ... as necessary for our species as biodiversity is for nature ... and makes its defence an ethical imperative which is robustly linked to, and cannot be separated from, respect for the dignity of every individual person.

So ... beginning with this core framework ... it is possible to construct a larger and more elaborate lattice of inter-connected International Rights Instruments which specify, in greater detail, the 'basic needs of all'. This is the foundation of SDI's more practical and robust second-generation definition of Sustainable Human & Social Development.

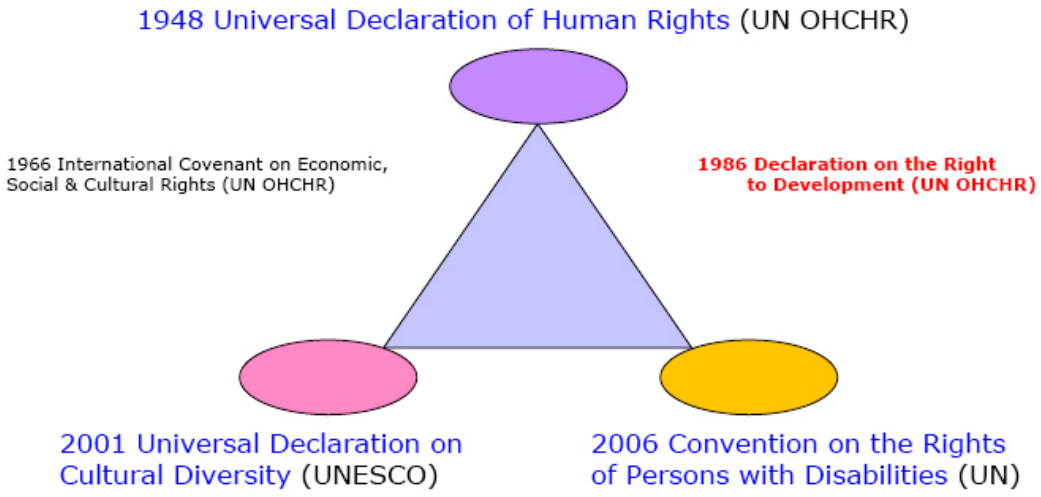

Figure 1 - Core of an Elaborate International Rights Framework

Very quickly ... we can next move to roll out the full 'Sustainability' Agenda (not the far more limited and feeble 'Green' Agenda) ... commencing the serious task of transforming our Human Environment (including the built, virtual, social and economic environments ...) ... by closely monitoring and gradually improving 'real' Sustainability Performance using a Monitoring, Reporting & Verification Toolkit which currently comprises:

- Sustainability Impact Assessment (SIA);
- Qualitative & Quantitative Sectoral Performance Indicators;
- Benchmarking & Target Setting;
- Stringent Performance Evaluation;
- Independent Verification & Accurate Reporting.

We can also now confidently develop a 'Sustainability' Strategy concerning Climate Change, including Extremes and Variability, which is suited to and appropriate for the Built Environment, i.e. anywhere there is, or has been, a man-made or wrought (worked) intervention by humans in the natural environment, e.g. cities, towns, villages, rural settlements, services, transport systems, roads, bridges, tunnels, and cultivated lands, lakes, rivers, coasts, seas, etc ... including the Virtual Environment ... for the near-term (up to 2035) and the long-term (up to and beyond 2100)[7].

3. Climate Change Politics - From 2007 Bali Consensus to a Divisive Copenhagen in 2009

The UNFCCC Climate Summit held in Bali, Indonesia, from 3rd-15th December 2007 ... resulted in a strong global consensus in favour of immediate and concerted action on climate change ... and a sharply worded document, the Bali Action Plan[8] - key parts of which state ...

> ' The Conference of the Parties,
>
> Resolving to urgently enhance implementation of the Convention in order to achieve its ultimate objective in full accordance with its principles and commitments;
> Reaffirming that economic and social development and poverty eradication are global priorities;
> ...
> Recognizing that deep cuts in global emissions will be required to achieve the ultimate objective of the Convention and emphasizing the urgency to address climate change as indicated in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change;
>
> 1. Decides to launch a comprehensive process to enable the full, effective and sustained implementation of the Convention through long-term cooperative action, now, up to and beyond 2012, in order to reach an agreed outcome and adopt a decision at its fifteenth session, by addressing ...
> (a) A shared vision for long-term co-operative action, including a long-term global goal for emission reductions ... in accordance with the provisions and principles of the Convention, in particular the principle of common but differentiated responsibilities and respective capabilities;
> (b) Enhanced national/international action on mitigation of climate change ...
> (c) Enhanced action on adaptation ...
> (d) Enhanced action on technology development and transfer to support action on mitigation and adaptation ...
> (e) Enhanced action on the provision of financial resources and investment to support action on mitigation and adaptation and technology cooperation ... '

Just a few weeks later, on 12th February 2008, in New York ... Ambassador John Ashe, Permanent Representative of Antigua & Barbuda to the United Nations, delivered an important Statement ... on behalf of the Group of 77 & China (comprising 130 countries) ... at the Thematic Debate of the U.N. General Assembly: 'Addressing Climate Change - The United Nations and the World at Work'. Fully reflecting and supporting the Bali Action Plan, this Statement clearly set out the Climate Change Priorities for the Developing and Least Developed Countries, including the Small Island Developing States (SIDS). It included the following important extract ...

' Climate Change as a Sustainable Development Challenge

5. Mr. President, the Group of 77 and China is of the view that discussions on climate change should be placed within the proper context of sustainable development. It is imperative that our discussion reinforces the promotion of sustainable development ...
6. We must not lose sight of the fact that climate change is a sustainable development challenge. As such we should adhere steadfastly to the Rio principles, in particular the principle of common but differentiated responsibilities. We must take fully into account that poverty eradication, economic and social development are the paramount priorities of developing countries ...
7. Mr. President, urgent action is needed now to fully implement the commitments under the Convention and the Kyoto Protocol, especially commitments on financing for adaptation, technology transfer and capacity building, if we are to make progress towards the achievement of the sustainable development goals of developing countries ...
8. Urgent action is particularly needed on commitments, as climate change threatens the livelihoods of the very poor and vulnerable developing countries, in particular Africa, the Least Developed Countries, the Land-Locked Least Developed Countries, Small Island Developing States, and disaster prone developing countries. The G77 and China is of the view that while addressing the challenge of climate, the most affected countries and most vulnerable countries should be given adequate attention and support.
9. Developed countries Parties must take the lead in addressing the implementation gap, since the extent to which developing countries Parties can effectively respond to the challenge depends on the effective implementation by developed country Parties of their commitments relating to financing and technology transfer.'

The Developed Countries, i.e. those listed in Annex I of the 1992 UN Framework Convention on Climate Change, did not listen to the words of John Ashe. This helps to explain the fracture of the 2007 Bali Consensus at Copenhagen, in December 2009 ... the sharp division between the 'have's' and the 'have-not's' of our small planet.

Within Developed Countries ... there may be a certain comfort, at an intellectual level, in linking Sustainable Development and Climate Change. However, in vulnerable Developing Countries this link is critical ... where poverty eradication, and economic and social development are paramount priorities. All are 'responsible needs' which are specified and supported by International Law. Yet, the Developed Countries persist in disregarding their legal obligations under Articles 2.3 and 3.14 of the 1997 UNFCCC Kyoto Protocol ... and, more importantly, evading their historical responsibility for causing the problem of Anthropogenic Climate Change in the first place.

Closer to home, in the European Union Member States[9], far too much emphasis is being placed on fully exploiting the various 'flexibility mechanisms' within the UNFCCC Process ... rather than on direct and proper compliance with their individual Kyoto Mitigation Commitments[10]. There is little or no interest in Adaptation. Meanwhile, the reality shown by the latest analysis of observations from the World Meteorological Organization's Global Atmosphere Watch (GAW) Programme[11] is that the globally averaged mixing ratios of carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) reached new highs in 2008 with CO_2 at 385.2 parts per million, CH_4 at 1797 parts per billion (ppb) and N_2O at 321.8 ppb ... higher than those in pre-industrial times (before 1750) by 38%, 157% and 19%, respectively !

4. To Mitigate or Adapt ? - Urgently Prioritizing a Strategy for the Built Environment

Before the official announcement of the independent InterAcademy Council (IAC) Review of the WMO/UNEP Intergovernmental Panel on Climate Change (IPCC) ... clear indications had been given, at recent meetings in Dublin[12] [13], that serious question marks hovered over the IPCC, its 2007 4th Assessment Report, Dr. Pachauri's position within the IPCC ... the actions of many of the Non-Governmental Organizations (NGO's) who were at Copenhagen ... and the Science of Climate Change itself (refer, for example, to revelations following the hacking of e-mails and other data from a server in the University of East Anglia's Climate Research Unit in England, and the irregularities/errors in the IPCC's 4th Assessment Report).

The Copenhagen Accord[14] was a political agreement between a small number of Heads of State, Heads of Government, Ministers, and Heads of Delegation - Brazil, South Africa, India and China (BASIC) and the USA - who attended the Copenhagen Climate Change Summit, which concluded on Saturday, 19th December 2009. At the time of writing, many countries have made voluntary submissions, i.e. they are not legally binding, to Appendices I and II of the Accord.

A general overview[15] of the submissions made by Developed Countries, however, reveals the following about the voluntary emissions targets being undertaken ...

- they are highly conditional on the performance of other countries;
- they are very disappointing, being far below what is required to cap the planetary temperature rise at 1.5 degrees Celsius; and
- there is no consistent emission base year ... varying from 1990 and 1992, up to 2000 and 2005.

This is very far from being a signal of serious intent from Developed Countries ... and is not ... in any way, shape or manner ... an acceptance of historical responsibilities. It would be reasonable, therefore, to surmise that the process of achieving a global, legally binding, consensus agreement on greenhouse gas (GHG) emission reduction targets will be long and difficult. The Climate Change Mitigation Agenda is, to put it mildly, fraught with problems ... and has an unclear future in the short term.

On the other hand, anyone involved in the design, construction, management or operation of the Built Environment must think 'long-term' ... the minimum life cycle for a sustainable building should be at least 100 years. Today in Dublin, buildings which are 250 or 350 years old still look remarkably good, and are well capable of fulfilling an important function within the social and economic environments of the city. 'Politically' and 'technically', therefore, it would be more appropriate for the built environment if we were concerned with the long-term Adaptation Agenda ... rather than a problematic, short-term Mitigation Agenda. But, in terms of a building, is there really a clear difference between measures undertaken for the purpose of mitigation and those undertaken for adaptation ? For example, measures to incrementally improve energy efficiency and conserve energy, in accordance with short-term legally binding targets, will serve to mitigate CO_2 emissions ... but the same measures will also serve to adapt the building to rapidly dwindling supplies of climate-damaging fossil fuels. The long-term perspective will exert pressure for more radical actions in the short-term. But, should we not already be undertaking these sorts of measures as part of the Mainstream Sustainability Agenda ... in order to increase building durability and prolong life cycle ?

Generally ... Climate Change Adaptation[16] encompasses urgent and immediate short, near and long-term actions at local, national, regional and international levels to reduce

the vulnerability and strengthen the resilience of the Human Environment, including ecological and social systems, institutions and economic sectors ... to present and future adverse effects of climate change and the impacts of response measure implementation ... in order to minimize the local threats to life, human health, livelihoods, food security, assets, amenities, ecosystems and sustainable development.

More specifically ... Built Environment Climate Change Adaptation[17] means reliably implementing policies, practices, projects and institutional reforms in the Built Environment ... with the aim of reducing the adverse impacts and/or realizing the benefits directly/indirectly associated with climate change, including variability and extremes ... in a manner which is compatible with Sustainable Human and Social Development.

Climate Change Adaptation is one of the most important drivers for Sustainable Design !

5. How 'Sustainable' are Built Environment Adaptation Projects ?

In Ireland, it has been proposed ... as an Adaptation Project[18] which will cost approximately €600 million, devour many material resources and have an adverse environmental impact ... to divert water from the Shannon, a large river in the mid-west of the country ... to Dublin, the capital city, which is located over 100 kilometres away on the east coast ... in order to deal with the expected shortage of water which will be caused, among 'other relevant factors', by future climate change.

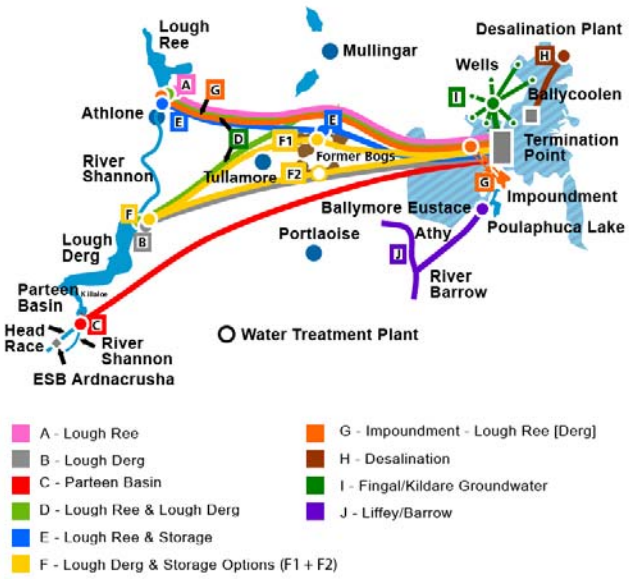

Figure 2 - Proposed Dublin City Region Water Supply Project

But ... just how 'sustainable' is this Adaptation Project, if the following 'other relevant factors' are considered ?

i) Since the 1960's ... a dysfunctional and corrupt Spatial Planning System in the Dublin City Region has actively encouraged an uncontrolled, urban and suburban horizontal sprawl to take place. Today, this pattern of development remains unchecked.

ii) At this time, there are still no residential water charges in Dublin. The concept of water conservation is, therefore, almost unknown among householders.
iii) There are enormous un-intended losses, i.e. leaks, from the public potable water distribution system ... approximately 40% even in the good times, and recently, well in excess of 60% following the National Snow Emergency in Ireland.
iv) Water supplied to houses in the Dublin City Region is not yet metered. There is no urgency, therefore, in locating and repairing water leaks which occur between the private property boundary of a house and the house itself.
v) There are no requirements in Ireland's National Building Regulations to harvest any rainwater in any buildings, or on any hard surfaces in the vicinity of those buildings.
vi) In 2005-2006, at the height of the Celtic Tiger Economic Boom ... the existing foul and storm water drainage infrastructure in the City Region[19] was already stretched to keep pace with the 'wild' demands for new development land. Overloading of the existing systems was evident from a marked deterioration in water quality, increased risks of flooding and pollution, and concerns that the drainage system and sewage treatment plants had insufficient capacity to cater for future development.
vii) Sustainability Impact Assessment (SIA) ...

> ' a continual evaluation and optimization assessment - informing initial decision-making, or design, and shaping activity/product/service realization, useful life and termination, or final disposal - of the interrelated positive and negative social, economic, environmental, institutional, political and legal impacts on balanced and equitable implementation of Sustainable Human & Social Development '

... is not yet a standard procedure, at any level, within national, regional and local Authorities Having Jurisdiction (AHJ's). If it were, the most glaring flaw in this project would rapidly be identified. There is no comprehension at all, in the minds of Dublin City's decision-makers, that water is a very valuable, but limited, resource !

6. CIB W108 Report: 'Sustainable Climate Change Adaptation in the Built Environment'

Timely, directly relevant and urgently needed ... the purpose of this Report is to stimulate thought and discussion, within the global Built Environment research, innovation and design communities, on these and other issues connected to an effective, 'politically' and 'technically' appropriate sectoral response to the real threat of Climate Change. The project itself was initiated at a Nantes (France) Meeting of Working Commission 108: 'Climate Change & the Built Environment', held in June 2008.

The Report will comprise 2 Parts:
a) I - International Synthesis on Sustainable Climate Change Adaptation;
b) II - National Perspectives on Sustainable Climate Change Adaptation (at the time of writing, involving approximately 10-12 countries).

The National Perspectives will contain information on the following ...

- meteorological data, and local climate-related hazards;
- proposed/implemented climate change mitigation and adaptation measures;
- relationship & coherency between mitigation and adaptation measures;
- monitoring of built environment adaptation performance;
- necessary improvements to spatial planning/design/construction approaches;
- the role of specific actors, e.g. insurance, research, design professions, industry;
- national institutional arrangements, and legislation ;
- protection of vulnerable social groups.

CIB Project WebPage: www.cjwalsh.ie/cib-w108-climate-change-the-built-environment

7. Conclusions

The Link between the reality of Climate Change in the Built Environment and the implementation of Sustainable Human and Social Development, as properly understood to be rooted in International Law, is complex and synergetic ... and critical for ...

- Developing Countries ... the paramount priorities of which have been clearly stated to be: 'poverty eradication, and economic and social development' ... responsible needs specified, as rights, under International Law ;
- Developed Countries ... acknowledging their historical responsibilities and recognizing the rights of Developing Countries ... will be key components in any future, legally binding, consensus global agreement on the GHG emission reduction targets required to cap the planetary temperature rise at 1.5 degrees Celsius.

This Link is essential. To be successful, National Adaptation Strategies, Programmes and Projects must be informed, in a meaningful way, by the concept of Sustainable Human and Social Development ... and, prior to implementation, filtered through the lens of a comprehensive Sustainability Impact Assessment (SIA).

8. Notes & Information Sources

[1] **'Carbon Day' at the Institute of International & European Affairs (IIEA) in Dublin. 2007.**
The title of Dr. Rajendra Pachauri's Keynote Address, on 1st June 2007, was 'Assessment of Climate Change: How Should Human Society respond ?', where he outlined the findings of the IPCC's 4th Assessment Report, published in May 2007. This question was posed by CJ Walsh, Sustainable Design International, during the Question & Answer Session which followed.

[2] **'Ban Announces Independent Review of UN-Backed Climate Body' - United Nations News Service. March, 2010.**
At a UN Press Conference (2010-03-10) ... Secretary-General Ban Ki-moon and the IPCC Chair, Dr. Pachauri, announced that the IPCC will undergo an independent and comprehensive review by the InterAcademy Council (IAC), a multi-national organization of the world's science academies. Based on an article by the UN News Service and an IAC Press Release - both dated 10th March 2010.

[3] **Pew Research Center for the People & the Press Survey of Public Attitudes to Global Warming in the U.S.A. May, 2008.**
Conducted from 23rd-27th March 2008, the results of this survey were based on telephone interviews with 1,502 national adults, aged 18 years and older. Maximum margin of sampling error is ±3 percentage points.

[4] **Gallup Poll on Public Attitudes to Global Warming in the U.S.A. 2009.**
Conducted from 5th-8th March 2009, the results of this survey were based on telephone interviews with 1,012 national adults, aged 18 years and older. Maximum margin of sampling error is ±3 percentage points.

[5] **'Our Common Future' - Report of the World Commission on Environment and Development (WCED). 1987.**
The actual Report is annexed to a Note by the Secretary-General of the United Nations on the transmission of the World Commission on Environment and Development's 1987 Report: 'Our Common Future' to the United Nations General Assembly. Document No. A/42/427 - dated 4th August 1987.

[6] **'Rio de Janeiro Declaration on Sustainable Social Development, Disability & Ageing'. 2004.**
Adopted at the Conference: 'Designing for the 21st Century III', which was held in Rio de Janeiro, Brazil, from 7th-12th December 2004 ... and organized by Adaptive Environments in Boston (USA) & Centro de Vida Independente do Rio de Janeiro (CVIRio). The Declaration, drafted by CJ Walsh, Sustainable Design International ... can be accessed and downloaded at: http://www.sustainable-design.eu/sustain/documents.htm#rio-social

[7] **'Towards New Scenarios for Analysis of Emissions, Climate Change, Impacts, and Response Strategies'. 2008.**
Intergovernmental Panel on Climate Change (IPCC) Report on an Expert Group Meeting, held in Noordwijkerhout, The Netherlands, from 19th-21st September 2007. Technical Summary. IPCC, Geneva. 2008. This Report, part of the extensive preparatory process for the IPCC's 5th Assessment Report (2013-2014), is the culmination of the combined efforts of the New Scenarios Steering Committee, an author team composed primarily of members of the research community, and numerous other meeting participants and external reviewers who provided extensive comments during the expert review process.

[8] **'Bali Action Plan'. 2007.**
Decision No. 1/CP.13 of the United Nations Framework Convention on Climate Change, Conference of the Parties (COP) 13, held in Bali, Indonesia, from 3rd-15th December 2007. Document No. FCCC/CP/2007/6/Add.1 - dated 14th March 2008. Pages 3-7.

[9] **EuroBarometer Survey of Europeans' Attitudes to Climate Change. 2009.**
Conducted from 28th August-17th September 2009, the results of this Special Survey No. 322 were based on face-to-face interviews with 26,719 adults, aged 15 years and older, in all 27 European Union Member States. Maximum margin of sampling error is ±3.1 percentage points. Published in November 2009.

[10] **Annual European Community Greenhouse Gas Inventory 1990-2007 & Inventory Report 2009 (Submission to the UNFCCC Secretariat).**
European Environment Agency (EEA) Technical Report No.4 of 2009. Published by the Office for Official Publications of the European Communities. Luxembourg. 2009.

[11] **WMO Greenhouse Gas Bulletin No.5. 2009.**
The fifth in a series of bulletins, dated 23rd November 2009, from the World Meteorological Organization's Global Atmosphere Watch (GAW) Programme ... which shows the levels of the six specified Kyoto Greenhouse Gases in the atmosphere using global observations during 2008. Prepared and distributed by the Secretariat of the World Meteorological Organization (WMO), in cooperation with the World Data Centre for Greenhouse Gases at the Japan Meteorological Agency and the GAW Scientific Advisory Group for Greenhouse Gases, with the assistance of the NOAA Earth System Research Laboratory.

[12] **'The Future of International Climate Change Negotiations Post-Copenhagen'. Seminar at the Institute of International & European Affairs (IIEA) in Dublin. 2010.**
Having attended the 2009 Copenhagen Climate Summit ... Monsieur Brice Lalonde, Chair of the Sustainable Development Roundtable for the Organization for Economic Co-Operation and Development (OECD) and former French Minister

for Environment ... and Ms. Fiona Harvey, London Financial Times Environmental Editor ... presented personal perspectives on the future direction of international climate change negotiations. The IIEA Seminar was held on Thursday, 18th February 2010.

[13] **'The Politics of Climate Change'. Keynote Address at the Institute of International & European Affairs (IIEA) in Dublin. 2010.**
In his Keynote Address, Lord Anthony Giddens (GB) discussed the political complexities of combating Climate Change. This IIEA event was held on Tuesday, 23rd February 2010.

[14] **Copenhagen Climate Change Accord. 2009.**
A political agreement between a small number of Heads of State, Heads of Government, Ministers, and Heads of Delegation attending the Copenhagen Climate Change Summit, which concluded on Saturday, 19th December 2009. The Accord ... outside the framework of the 1992 Convention and the legally binding 1997 Kyoto Protocol ... was noted by, but was not an official decision of, UNFCCC COP 15. No official document reference number.

[15] **Submissions made by Developed Countries (Convention Annex I Parties) to Appendix I of the 2009 Copenhagen Accord. Mid-March 2010.**
The information from each country, or group of countries, concerns their quantified economy-wide greenhouse gas emission targets for 2020. Submissions can be accessed and downloaded at: http://unfccc.int/home/items/5264.php

[16] **Definition of 'Climate Change Adaptation'.**
This definition is adapted from those provided in Non-Paper No.53, dated 2009-11-06, of the Contact Group on Enhanced Action on Adaptation and Its Means of Implementation ... which was presented to a meeting in Barcelona (resumed seventh session), from 2nd-6th November 2009, of the Ad-Hoc Working Group on Long-Term Co-Operative Action under the 1992 United Nations Framework Convention on Climate Change.

[17] **Definition of 'Built Environment Climate Change Adaptation'.**
This definition is adapted from those provided in European Environment Agency (EEA) Technical Report No.13 of 2007: 'Climate Change - The Cost of Inaction and the Cost of Adaptation' ... and earlier EEA documents. Published by the Office for Official Publications of the European Communities. Luxembourg.

[18] **Inter-Basin Water Transfer Project from Lough Ree, on the River Shannon, to Dublin City, Ireland.**
Described as a 'pilot climate change adaptation project' on the UNFCCC's WebSite Database relating to the Nairobi Work Programme ... information concerning this Project can be accessed and downloaded at: http://www.watersupplyproject-dublinregion.ie

[19] **Greater Dublin Strategic Drainage Study, Ireland.**
Commenced in mid-2001, the purpose of this Study was to carry out a strategic analysis of the existing foul and surface water systems in the Dublin City Region. The Study can be accessed and downloaded at: http://www.dublincity.ie/WaterWasteEnvironment/WasteWater/Drainage/GreaterDublinStrategicDrainageStudy/Pages/RegionalDrainagePolicies-OverallPolicyDocument.aspx