

Focus

CLIMATE CHANGE AND DEVELOPMENT EDUCATION: NEW OPPORTUNITIES FOR PARTNERSHIP

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Abstract: Despite different evolutionary paths, development education and environmental education are increasingly finding a common focus in addressing climate change issues. Realising the synergies this offers requires both sets of practitioners to grasp the essential underpinnings of climate science, policy and ethics. This paper presents the principal authoritative sources that development educators should be guided by. Achieving a successful partnership will involve reconsideration of concepts of development as well as of relationships between the developed and developing worlds. The urgency of achieving radical changes in approach is stressed as the time scale for effective global and national actions to tackle climate change diminishes and crucial decisions under the United Nations Framework Convention on Climate Change become imminent.

Key words: Climate change; development education; climate science; climate policy; climate justice.

In his visit to Ireland in 2015, the UN Secretary General Ban Ki Moon emphasised the inseparability of development issues with climate change issues when he said: ‘Ireland has been a champion of efforts to counter hunger, but today one cannot be a leader on hunger without also being a leader in climate change’ (2015). At first sight this might seem an unfamiliar juxtaposition. Traditionally, the roots of hunger and underdevelopment have been ascribed to historical legacies such as colonial exploitation (Rodney, 1981) or environment-related obstacles to food production such as unfavourable soil and climate conditions (Sachs, 2001), or environment-related diseases such as malaria (Bhattacharyya, 2007). To these, other

factors such as illiteracy, agrarian structures, the low division of labour, and poor communications and infrastructure are also frequently added (Kuhnen, 1987). Whatever the balance of causes, though, underdevelopment and environmental conditions have complex inter-relationships and cannot be considered in isolation from each other. Climate change considerations further complicate these linkages and this paper explores the scientific, ethical and policy dimensions this introduces.

Development and environmental education concepts

The evolution of development education and environmental education concepts have enabled a better handle on the nature of the linkages between underdevelopment and environmental conditions to be achieved via a focus on sustainable development (Hogan and Tormey, 2008). The hoped for integration between the two strands, however, has not been smoothly achieved, and development education and environmental education have not coalesced as expected around a core which might be characterised as education for sustainability. Wade (2008) argues that this is partly a consequence of a developed world outlook that lacks the capability of employing a truly holistic perspective on the human and natural worlds. However, the evolution of development education approaches has also been profoundly affected by other factors, most notably the tidal wave of globalisation and neoliberal economics which has swept across the landscape. Reconciling concepts of social and environmental justice with the overwhelmingly dominant economic paradigms associated with global capitalism is proving very difficult. Selby and Kagawa (2011) discuss the risk of what they describe as a 'Faustian bargain'. By situating approaches within the existing economic paradigms in an effort to gain short-term traction with the neoliberal market place agenda, they suggest that development education and education for sustainable development risk losing opportunities to pursue long-term transformative goals based not on a culture of endless growth. Into this complex interplay, the emergence of climate change as an important new dimension can be seen as both a complication, but also a potential unifying ingredient. It can be suggested that a focus on climate justice and environmental sustainability offers a roadmap for

development education to find effective ways of engaging with global decision makers and local development practitioners.

The Secretary-General's contention reflects the growing realisation that any development strategy for the developing world cannot succeed unless the threats posed by climate change can be resolved. There can be, for example, no satisfactory trajectory of development for 160 million Bangladeshis without addressing the impact of their vulnerability to sea level rise. The loss of 20 percent of their land area with an inevitable 1 metre rise in sea level will entail coping with the forced relocation of tens of millions of its people. There can be no development strategy for many low-lying island states of the Pacific and Indian Oceans – countries such as Tuvalu, Kiribati, The Maldives – which face the loss of their entire national territory and the possible extinction of their culture. Similarly, the reliability of water supplies on which development often hinges is increasingly uncertain. How will the burgeoning megacities of South America and Asia expect to sustain their populations as the glaciers in the Andes or Himalayas they depend on for their water supply vanish? Even within smaller communities, such as those in central Africa around the Rwenzori or Kilimanjaro mountains, similar concerns exist.

Climate science, climate policy and climate justice have become intertwined and have gained considerable traction in the public consciousness as awareness of the shortening timescales for effective action has become clear. This link has now been recognised by development agencies throughout the world and some agencies, such as Trócaire, have now refocused their activities towards issues of climate justice and climate policy. This does not represent a dereliction on the part of development agencies of their previous emphasis on the eight Millennium Development Goals (currently being reworked into a new set of Sustainable Development Goals for the post-2015 period). Rather it represents a recognition of the bridging role that climate change considerations can provide in addressing them. Development education thus increasingly requires a more holistic perspective, one that moves away from traditional economic paradigms and

especially one that incorporates what is essentially the conjoined challenges of climate change and sustainable development.

Bringing the climate change dimension into development education

A perspective on how climate change issues can be integrated into development education requires three dimensions to be considered: the science, the policy dimensions and the ethical underpinnings.

Grasping the science of climate change

Firstly, the science of climate change must be grasped as far as possible by development educators. This can be difficult, since mostly development educators do not come from a mainstream scientific background and face sometimes contradictory perspectives in the media they encounter. Though the climate sceptic community has dwindled as the global scientific consensus on anthropogenic climate change has become more robust, there are still shrill voices at national and international levels who provide music to the ears of those who seek to procrastinate. However, the Intergovernmental Panel on Climate Change (IPCC, 2013) is unequivocal in its findings for example that, with a certainty level of 95-100 percent, human influence has been the dominant cause of the warming that has occurred over the past fifty years. Indeed their best estimate is that *all* of the warming over that period has been anthropogenically driven. It is now clear also that 2014 was the warmest year yet recorded since instrumental observations became reliable in the nineteenth century (NOAA, 2015), and current indications are that 2015 will surpass this (Thompson, 2015). Anyone younger than thirty years of age has never experienced a month in which the average surface temperature of the Earth was below the average of the entire twentieth century. Many of the changes in the frequency and severity of extreme events such as heatwaves, droughts, intense rainfall and storminess are also likely linked to human influences (IPCC, 2013).

However, irrespective of the solidity of the science, there is still a sizeable proportion of the general public who are in denial. Any report of a

weather or climate event on the internet is still usually followed by a long list of vitriolic, and frequently naive, comments. Overcoming this remains an obstacle for both science educators and development educators. That climate change is a matter of scientific fact, and not belief, has to be tackled by objective evidence-based science such as provided by the IPCC.

Policy implications of the impacts of climate change in particular locations

Secondly, development education has to be able to present an understanding of the likely impacts of climate change as a prerequisite to the development of appropriate policies for both mitigation and adaptation. Quantifying impacts at national and international levels provides policymakers with the ammunition to achieve this (Charlton et al., 2006). This could facilitate how governments and donors prioritise spending on particular sectors of the economy, such as flood protection or renewable energy. Again, the IPCC provides the basic information about key risks and resources, while national studies fine tune the response. In encouraging that response, development education has a role in sensitising residents of developed countries of their responsibilities to limit their own contributions to global climate change, and of their own self interest in doing so. For Ireland, for example, model projections suggest future warming rates similar to the global average with 1-1.5°C warming over the 1961-90 average likely within the next twenty years. Though less confident, we can project winter increases and summer decreases in rainfall for Ireland as being likely to occur, and feed such projections into hydrological, biogeographical and agricultural models to assess likely impacts in these sectors (Coll et al., 2014; Sweeney et al., 2008). Impacts of sea-level increases on vulnerable cities such as Dublin can also be quantified (Flood and Sweeney, 2012). These impacts all have substantial domestic cost implications which reinforce the importance of a shared approach to climate change management being signalled as part of any development education strategy.

For many developing countries, rainfall reliability changes and a significant increase in the frequency of extremes are the crucial aspects and such changes are indeed already occurring in places such as East Africa

(Schreck and Semazzi, 2004). Modelling of such impacts at a global scale suggests key areas where water stress for example is likely to increase, or where sea level rise threatens settlements and infrastructure. Just as with the developed world, informed policies of adaptation can then be developed. Projected sea level rise impacts for example have already led to Kiribati purchasing land in Fiji (2,000 km distant) to provide a potential relocation option should sea-level rise submerge the Pacific Island nation.

For development educators the balance between mitigation and adaptation is important to stress. Mitigation seeks to avoid projected future climate scenarios by reductions in greenhouse gas emissions. Adaptation anticipates that some change is inevitable and seeks to prepare communities to cope better with expected impacts e.g. by water storage technologies or crop changes. Carbon dioxide has a residence time in the atmosphere of around a century, meaning that the impacts felt today are attributable to the cumulative emissions of the past century. This implicates the developed world as a primary cause of the impacts currently being felt in the developing world. Developing countries are thus not the primary agents of their own climate change woes. This is the basis of the current calls for a 'loss and damage' mechanism at international negotiations and also for the application of the Principle of Common But Differentiated Responsibility discussed later in this paper. Global mitigation efforts are therefore essential to ensure basic requirements such as food and water are available for the next generation and to ensure future global sustainability. In this context the IPCC *4th Assessment Report* (2007) painted a scenario of an 80-95 percent reduction in greenhouse gas emissions for developed countries by 2050 as being required to have a reasonable chance of the planet avoiding 2°C of warming. For developing countries however, especially the poorest, substantial mitigation is not feasible since their emissions are so low. Adaptation is however urgent since many of the adverse impacts of climate change are now inevitable. Adaptation is thus proportionately much more important for development educators to address e.g. coping with water shortages, crop substitution, civil protection etc.

Integrating concepts of climate justice

Thirdly, development education must recognise that climate change issues are ultimately framed within a set of well-established ethical and moral principles expressed by common global agreements and UN frameworks for cooperative action. Indeed, where the science has failed to convince the public, and the economic arguments regarding impacts have failed to sway the policy makers, ethical considerations offer an important avenue of opportunity to remind individuals and especially decision makers of their responsibilities to take actions based on the 'common good'. A number of guiding principles are relevant here to development education.

The Precautionary Principle, widely used since its incorporation in the Rio Declaration of 1992, states that where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. Uncertainty will always exist when dealing with a chaotic and complex system such as the atmosphere. Models of future climate conditions will never be perfect and the underlying socio-economic drivers of such models will always be problematical. Future population, energy, transport systems, food, industrial infrastructure, pollution, technology will never be forecast with certainty. Yet these are necessary inputs to projections of future climate change scenarios. Equally, a complete understanding of the workings of the climate system will always limit the ability of climate models to project future conditions with absolute certainty. But it is important not to allow uncertainty to be an excuse for inaction and development educators should stress the signals the best science is giving. It is important not to make the same mistakes with climate, for example, as were made regarding the smoking/health link where action was long delayed due to the erroneous promotion of uncertainty arguments.

Development education must also consider the Principle of Common but Differentiated Responsibility. This is based around considerations of equity and any form of development education must emphasise equity principles. The principle is closely related to the concept of

climate justice which argues that the global South is entitled to the resources and technology to make a transition to a low carbon economy on the basis that developed countries bear most culpability for the present problem. For example, Ireland emits more greenhouse gases in a given year than the 400 million poorest people on the planet. While both Ireland and the 400 million poorest people have a common responsibility to protect and preserve their common resource – the atmosphere – the scale of effort appropriate is obviously very different. Developed countries have the economic and technological capacity to do much more than their counterparts in the developing world. Common but Differentiated Responsibilities reflects the general acceptance by developed countries of their greater historical contribution to the accumulation of greenhouse gas emissions, in addition to their relatively greater resource capacity to develop and take remedial action. This is the mechanism whereby the sharing out of the remaining carbon budget among nations should be made. However, national self-interest intervenes to subvert this principle and many countries resist subscribing to any international agreement that they consider inconsistent with their specific national interests (McKibben and Wilcoxon, 2002). As a consequence, the polluter frequently does not pay.

The Polluter Pays Principle argues that the utilisation cost of the atmosphere must be paid for proportionately by those who pollute it. All sectors of society should bear appropriate costs. Access to the atmosphere should not be on the basis of the power of vested interest groups or narrowly defined national self-interest. Burdening the remainder of society with costs in terms of additional fines, impact costs or disproportionate changes in their quality of life is not acceptable from a moral perspective. However the principle is a long way from being operationalised. Policy frequently exhibits a disconnect between the short term interests of the polluter and the long term interest of the community. For example, globally, consumer subsidies for fossil fuels are estimated at around \$548bn, while subsidies for renewable energy are approximately \$121bn (IEA, 2015).

The Principle of Intergenerational Equity argues that we ‘hold the natural and cultural environment of the Earth in common both with other members of the present generation and with other generations, past and future’ (Weiss, 1990). The question of what legacy we bequeath to the next generation in terms of a climate-change damaged earth is central to this principle. The awareness that climate change will adversely affect even the present generation of children has sharpened the focus on this aspect. In what may turn out to be a significant legal interpretation of this principle, eight petitioners, some as young as thirteen years, successfully prosecuted the Department of Ecology in Washington State in the US in June 2015. The judgement ordered the defendants to consider and act within two weeks on state-wide reductions in CO₂ emissions based on the best available science concerning climate change. A similar verdict was delivered as a result of litigation in the Netherlands (Lin, 2015). The lesson is clear for countries such as Ireland. The cost of delayed or ineffective action on climate change in Ireland will accrue to today’s Irish children and their descendants. Equally, the relevance for potential class actions based on the Principle of Intergenerational Equity for children in the developing world is clear.

Exploiting the synergies between climatologists and development educators

Climatologists and development educators occupy separate ‘silos’. Improved communication between them is essential and mutually beneficial, especially for aiding contingency planning in the area of disaster management. Forecasting of extreme events such as cyclone landfalls, intense rainfall events, storm surges etc. have obvious benefits in terms of minimising civilian casualties in countries where the poor and marginalised often occupy the known vulnerable locations. For medium-term issues, interaction is also highly beneficial. For example, knowledge of a developing El Niño event in the Pacific enables farmers to plant more appropriate crops. In northern Peru, two of the main crops, rice and cotton are highly sensitive to the rainfall regime. Rice does well in wet conditions while cotton can cope well with drier weather. A reliable forecast of wet El Niño conditions can thus be used to advise farmers to grow more rice that season while a forecast of dry

La Niña conditions would produce advice to grow more cotton instead. Similarly, Sahelian rainfall forecasts have been used to provide farmers in Senegal with adaptive strategies (Ndiaye et al., 2012). Obvious advantages also exist for advance stockpiling of food aid where an unfavourable rainfall forecast is provided. There is no good reason why the implementation of weather and climate adaptation strategies by on-the-ground development practitioners should not be part of the development education curriculum.

Development education must seek to further improve this two way interaction. Development educators bring to the table a skill set of sensitivity and understanding of culture and social considerations which scientists generally lack. The Irish Aid-supported Transformative Engagement Network brought together academics from Maynooth University with their counterparts in three universities in Zambia and Malawi to explore opportunities for transformative change around issues of climate and food security. Working from individual village communities in some of the poorest parts of the world, this has led to fundamental reframing at both an academic and village-level of how climate change adaptation should proceed. It has exemplified the need for development educators to reconcile indigenous knowledge, such as taboos and traditional religious practices, and developed world 'science' (Murphy et al., 2015) in approaching climate change adaptation. Essentially it has emphasised the need for the two communities of climate science and development education to deepen their interaction.

Many similar examples of mutual benefit could be given and it is interesting that perhaps the most obvious area of collaboration thus far has come in the area of disaster management. In 2012 the IPCC produced a special report on how integrating expertise in climate science, disaster risk management, and adaptation could help better manage the risks of extreme events and disasters associated with climate change (IPCC, 2012). This was the first such bringing together of the two communities at a global scale, involving 220 authors, 62 countries and 18,611 review comments.

In guiding development educators through the science/policy/ethics maze associated with climate change it is important that authoritative sources be signposted. This extends beyond the confines of science to incorporate a multidisciplinary research and learning agenda at a global scale. Some primary starting points are offered below.

The Intergovernmental Panel for Climate Change

The IPCC is the authoritative voice of climate science. It was established in 1988 by the United Nations Environment Programme and the World Meteorological Organisation as a partnership between climate scientists and governments to supply an objective perspective of the current state of knowledge regarding climate change and its likely impacts. It is important to stress that the IPCC neither carries out any research itself, nor does it make any policy recommendations to governments regarding what needs to be done to address problems in their own jurisdiction. This is a very different approach to that traditionally employed in development education where policy intervention is more overt. The hands-off principle of the IPCC has enabled it to produce authoritative assessment reports every five or six years for a quarter of a century. These constitute the most extensively reviewed publications ever produced on the planet. Every line in such reports is scrutinised by thousands of scientists across the world and final versions sanctioned by government representatives of the 195 member countries at a large plenary meeting. As is traditional with UN bodies, unanimity is required meaning that the Assessment Reports tend to be expressed in conservative, qualified language. Every Irish government has signed its assent to each of the five assessment reports produced since 1990.

One key finding of the 5th *Assessment Report* (AR5) is particularly relevant to engaging those concerned with development education. This relates to the strong link established between cumulative emissions of greenhouse gases and the consequent global temperature rise. It is now clear that a global warming of just under 1°C has accompanied a cumulative emission of approximately 515 Gt of carbon (1Gt is 10⁹ tonnes) since the industrial revolution commenced. To have a reasonable chance of avoiding

2°C of warming, cumulative emissions of 900 Gt would be the maximum permitted. Thus there are only 275 Gt of carbon for future generations to burn (IPCC, 2013). Currently the annual emission rate is approximately 10 Gt of carbon and rising, meaning we have approximately two decades before the window of opportunity closes, effectively for the foreseeable future. This realisation brings a sharp focus to all of the principles discussed above, especially that of Intergenerational Equity and Common but Differentiated Responsibility.

The United Nations Framework Convention on Climate Change

The United Nations Framework Convention on Climate Change (UNFCCC) was one of three Conventions adopted at the Rio Earth Summit of 1992. The other two Conventions related to halting biodiversity losses and combating desertification. In both of these, progress has been significantly less than hoped for. In both, the failure to address climate change over the past twenty-five years is also implicated. Biodiversity and desertification cannot be halted without firstly tackling climate change. This objective was expressed in the UNFCCC as: ‘stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system’ (UNFCCC, 1992). There is a subtle distinction in the definitions of climate change used in the IPCC reports and the UNFCCC. The former includes natural and anthropogenic causes while the UNFCCC is concerned only with anthropogenic aspects. In addition, for a long time the definition of ‘dangerous’ was not clarified by either the scientific or policy communities. The IPCC was reluctant to specify a value since it might be seen as policy prescriptive. Many policymakers were reluctant to expose themselves to possible legal actions if their actions did not match policy objectives. However the EU Council (Heads of Government) in 2005 effectively designated dangerous climate change to be a warming of the planet by more than 2°C above pre-industrial levels, and such a figure was endorsed by the UNFCCC at subsequent Conference of the Parties (COP) meetings.

The UNFCCC remains the only global agreement addressing the problem of climate change and is best known among the public for its annual COP meeting which takes place at the end of the year. The twenty-first such meeting (COP21) is scheduled for Paris in November/December at which a global agreement to limit greenhouse gas emissions to a safe level is hoped for; to take effect from 2020. As preparation for this, each country is required to submit its Intended Nationally Determined Contribution, essentially a pledge regarding what level of ambition they can offer to keep warming below 2°C. The EU and its member states are committed to a binding target of an at least 40 percent domestic reduction in greenhouse gas emissions by 2030 compared to 1990. If successful this would be the first international agreement to include both the developing countries and the developed countries in a shared strategy. While a second commitment period for the Kyoto Protocol will exist in the run up to 2020, entailing reductions of 18 percent on 1990 levels, this will only involve a smaller number of nations and less than 15 percent of global emissions.

Laudato Si

One of the most influential statements on the need to integrate climate change and development education has come from the Papal Encyclical *Laudato Si* (Pope Francis, 2015). This calls for an ethical and economic revolution to prevent catastrophic climate change and growing inequality. Climate change is not simply an economic issue, it is argued, but one with immense moral and ethical dimensions, especially as they relate to the developing world.

The encyclical explores the interconnections between climate change and poverty from an ethical and moral perspective, in addition to a theological perspective. In particular, the importance of ‘integral ecology’ is emphasised. It is argued that combating poverty (and by implication tackling development issues) demands an integrated strategy which includes the protection of nature. Considerations of intergenerational equity and of what is termed ‘the common good’ are seen as an essential building bricks to grow human solidarity towards the protection of the natural world. In what is an

endorsement of the environmental movement from the world's oldest and largest international organisation, the encyclical calls for urgent and far reaching cuts in greenhouse gas emissions to be agreed at the Paris COP and stresses the need for an internationally supervised agreement to ensure national and local efforts deliver on their commitments. The failings of political leadership are emphasised and praise for the work of non-governmental organisations and civil society groups in holding politicians, paralysed by vested interest groups into inaction, is offered.

More specifically related to development educators, the encyclical also calls for education systems to raise awareness of the gravity of today's cultural and ecological crisis. This is where the importance of what is termed integral ecology, the need to educate individuals to understand the interconnections between the social and environmental, is stressed. Such a holistic perspective is not currently the dominant paradigm in either ecology or development education, and as such, offers a useful insight for both.

Development education therefore needs to move away from an economically based, consumerist emphasis, where Gross National Product (GNP) is the measure of a developing nation's worth, to a more holistic environmental-based vision with a more enlightened vision of what 'development' actually means. A key consideration therefore for the developed world is the need to facilitate a development trajectory that will enable the developing world to realise a different sustainable future and not repeat the unsustainable trajectory of the developed world.

Developing country perspectives on climate change: Paris and beyond

In the forthcoming international agreement, the mitigation efforts of the least developed countries cannot be expected to match those from the developed countries. The bulk of the efforts from the global South will centre on adaptation. This requires a technology transfer from the global North which is ultimately of mutual benefit. However it also requires a sustained financial

transfer. This has proven to be one of the key sticking points in the international negotiations.

Climate finance for developing countries

Climate finance for developing countries will increasingly be relevant to development education programmes. Seen as additional to existing supports, the magnitude of the anticipated flows has considerable potential to synergise development strategies. A long term commitment to make available \$100bn a year to developing countries by 2020 from a variety of sources has been agreed to support financial, technological and capacity-building actions. What has become known as the Green Climate Fund is expected to become the principal multilateral financing mechanism to support climate mitigation and adaptation in developing countries. To date, pledges amounting to over \$10bn have been made over a four-year period with actual provision of finances from developed countries falling considerably short of the projected total commitment.

Although \$100bn may seem an extremely large sum to envisage transferring to aid climate change adaptation, it represents a relatively modest global effort, probably insufficient to achieve the objectives sought. To place the total amount in context, the International Energy Agency (IEA, 015) estimated that consumer subsidies for fossil fuels in 2014 amounted to US\$510bn, five times the envisaged Green Climate Fund, and four times the equivalent subsidies for renewable energy. A commitment to fully funding the Green Climate Fund will be a central demand of developing countries at COP21 in Paris.

Loss and Damage

What is likely to become one of the most significant decisions relating to developing country financing of adaptation came from COP16 (Cancún). This was a commitment to address the costs of damage associated with climate change. In a sense this was a practical implementation of the 'polluter pays' principle whereby loss and damage in the most vulnerable developing countries would entail financial reparations being made by

developed countries. Recommendations as to what the next steps should be are scheduled for 2016, though more concrete actions are likely to be part of any agreement in Paris.

Conclusions

It is increasingly clear that development issues cannot be resolved in isolation from tackling climate change, and vice versa. Development education must therefore adjust to this reality by integrating this interdependence into a central position in curricular development. This will require development educators grappling with climate science and enhancing their awareness of impacts and policy responses.

It is clear that climate mitigation and adaptation considerations will provide the parameters within which future development strategies will increasingly be set. The legitimate clamour for climate justice emanating from the developing world will only get stronger as the inequalities of the current global economic system become starker and as climate change impacts worsen. Development educators must therefore also realise the importance of recognising and addressing the incompatibilities of national policies in their own developed countries which worsen the climate burden of developing countries. Several principles can be invoked to guide appropriate responses, but these must first overcome powerful short term vested interests.

It is important that development education is informed by authoritative sources, and this will require networking with a wider range of professional expertise than hitherto. Many examples exist where on-the-ground success stories arise from such collaboration. Development is also intimately tied up to 'integral ecology' and must promote a view of the world which does not over-emphasise development as being measured solely by material economic criteria. A broader global consensus based on planetary boundaries and global stewardship will be required (Rockström et al., 2009). Nonetheless, the developed world will ultimately have to recognise that its long term interests lie in facing up to its historic responsibilities for inducing adverse climate change impacts in the developing world. As such,

considerable financial transfers will be required to assist sustainable development in the global South. While some progress towards progressing this can be expected at meetings such as the Paris COP21, fundamental decisions will ultimately have to be made at other international bodies such as the World Trade Organisation. The comments of the UN Secretary-General quoted at the commencement of this paper may well turn out to be prophetic as population growth and food insecurity telescope the time scales for adverse climate change dislocation into matters of years rather than decades, with all the consequences this brings for accentuating the social, economic and political problems of the developing world.

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