CLIMATE FINANCING: AN EMERGING AVENUE FOR THE BANKING SECTOR IN SRI LANKA

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Summary

Climate change poses a major threat to the future wellbeing of the human society. There is clear evidence that it has been triggered and is being sustained by human activities that release carbon dioxide and other greenhouse gases (GHGs) to the earth's atmosphere. Exponential increases in atmospheric concentrations of all GHGs during the last two centuries have led to significant changes in the global climate which include increasing temperatures, increasingly variable rainfall with greater frequency of extreme climatic events such as droughts and floods and rising sea levels. These changes in climate have significant impacts on all sectors of the economy incurring substantial economic losses, thus necessitating urgent action to combat them. Climate financing encompasses all financial mechanisms and channels which provide economic assistance to climate change mitigation (reducing GHG emissions) and adaptation (reducing the magnitude of impacts and risks of climate change and increasing climate resilience) projects, programmes and activities. After an initial description of the scientific basis of climate change, this article first outlines the specific climate change mitigation and adaptation options that have been identified as likely to be effective in combating climate change and limiting future global warming to less than 2°C. It then outlines the climate financing mechanisms and institutions that are currently available, their strengths and limitations and future potential. While climate financing was initially designed by the United Nations Framework Convention for Climate Change (UNFCCC) as a finance flow from developed to developing countries, it is notable that 79% of the total climate finance so far has been raised domestically in the same country in which it has been spent. As such climate financing represents an important future opportunity for the banking sector of Sri Lanka to channel the finances from relevant international, national and private donors/investors and provide the required financial services.

Climate change: the scientific basis and evidence

Climate change is one of the major challenges faced by the global community during the 21st century. It is a major threat to equitable and sustainable development on a global scale.

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Earth's climate has undergone substantial changes in several cycles since its inception about 4 ½ billion years ago. The current phase of climate change started around 1750 with the industrial revolution in Europe. With the invention of the steam engine and the discovery of fossil fuels (e.g. coal, petroleum), mankind learnt to generate and harness power to drive the production of a variety of goods and services through a myriad of large-, medium- and small-scale industries. Increasing use of fossil fuels to generate power to drive industrial processes resulted in the release of substantial quantities of carbon dioxide in to the atmosphere. Since 1750, the atmospheric carbon dioxide concentration (CO_2), which had remained stable at 280 ppm for the preceding 800,000 years, has increased exponentially (Figure 1).

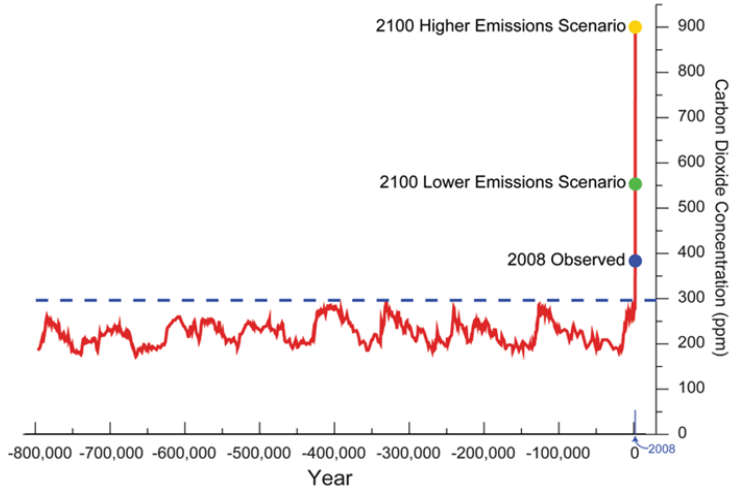

Figure 1. Long-term variation of atmospheric carbon dioxide concentration (CO2) of the earth. Prior to the beginning of the current phase of increase around the year 1750 (as indicated by the arrow), CO_2 had cycled between 200 and 300 ppm for 800,000 years. The current phase of increase is of special significance because it has raised CO_2 beyond the 200-300 ppm range. Future CO_2 in the year 2100 is predicted based on the current ('Business as usual') rate of emissions (Higher Emissions Scenario) and a Lower Emissions Scenario if more environmentally-friendly, less carbon-intensive development pathways are adopted.

In May 2013, CO_2 reached the landmark threshold of 400 ppm and is currently at 408 ppm with an annual increase of around 3-4 ppm. This increase of atmospheric carbon dioxide has had a profound influence on the Earth's climate. The Earth's climate is driven by the solar radiation energy that is received from the sun. In order to maintain its stability the Earth has to emit to the outer space an amount of radiation energy which is equal to the amount of energy that it receives from the sun. Carbon dioxide in the earth's atmosphere has the special property of absorbing part of the outgoing radiation energy from the Earth, thus trapping additional energy within the Earth's atmosphere. While creating an energy imbalance at the top of the Earth's atmosphere, this additional energy which is trapped within warms it leading

to the widely-known phenomenon 'Global Warming'. This phenomenon is also called the 'Greenhouse Effect' because a similar process takes place in a fully-closed greenhouse where the glass roof lets the incoming solar radiation in, but traps part of the outgoing radiation within, thus keeping the greenhouse warm even during a winter. Thus, carbon dioxide is called a greenhouse gas (GHG). The Earth's atmosphere contains several other GHGs, which include water vapour, methane, nitrous oxides, ozone and halocarbons[e.g. chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF6)]. Concentrations of all these GHGs have increased since the industrial revolution due to human activities and have thus contributed to Global Warming. There is clear evidence that air temperatures have increased steadily at the global level (Figure 2). Despite being a very small part of the Earth, these global-scale increases in air temperature have been replicated in Sri Lanka as well (Figure 3). Analysis of long-term temperature records in several locations of Sri Lanka by De Costa (2008) has shown that the rates of warming in many of the analysed locations have been greater than the global average rate of warming.

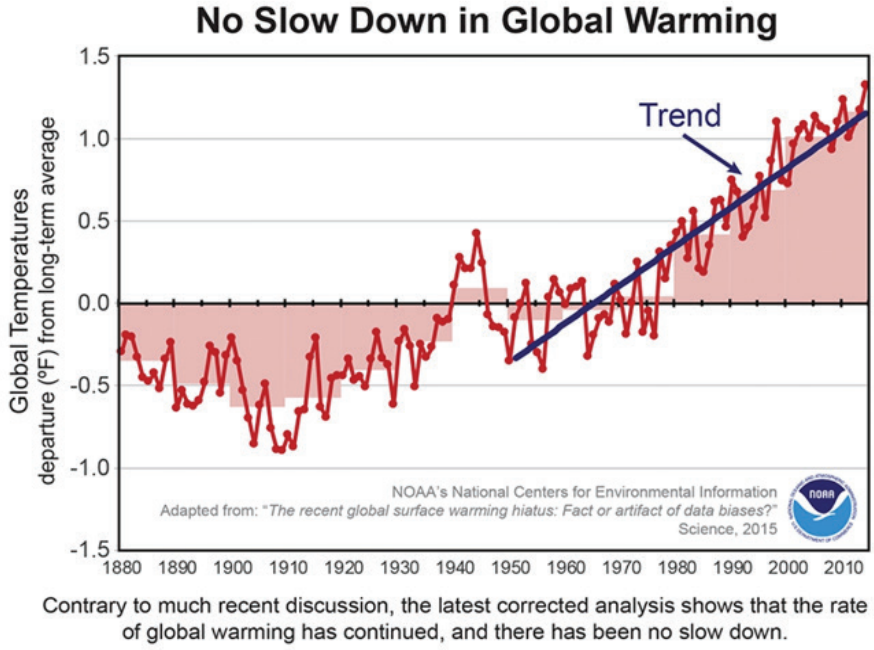

Figure 2. Global-scale increase in air temperature during the last century. Global average temperature departure (termed 'temperature anomaly') is calculated relative to the long-term average during the 1961-1990 period. Temperature anomaly is given in degrees Fahrenheit, which can be converted to degrees Centigrade by dividing by 1.8.

Increasing air temperatures have triggered a series of atmospheric processes by changing its patterns of air and water vapour circulation, thus causing changes in rainfall patterns leading to high intensity rainfall and floods in some parts of the world while causing droughts in others.

For example, in Sri Lanka, annual rainfall has shown clear decreases in key locations such as NuwaraEliya and Kandy (Figure 4). Increased air temperatures have melted large quantities of land and sea ice leading to rising sea levels and swollen rivers causing submergence of vulnerable areas and countries. Increased frequency of extreme climatic events such as tornadoes, cyclones, hurricanes, floods, storm surges and severe droughts have been linked to GHG-induced global warming although conclusive evidence for a cause-and-effect relationship is insufficient.'Climate change' as is widely perceived includes the whole gamut of the above-mentioned changes in the atmosphere, land and oceans. As such climate change has substantial impacts on almost all facets and activities of the human society. These include adverse impacts on agriculture, on both crop production and animal husbandry leading to reduced food security, adverse impacts on human settlements due to climate change-related extreme events, adverse impacts on human health by promoting the proliferation and transmission of diseases-causing agents and adverse impacts on natural ecosystems such as forests, natural landscapes,fresh water bodies and biodiversity.

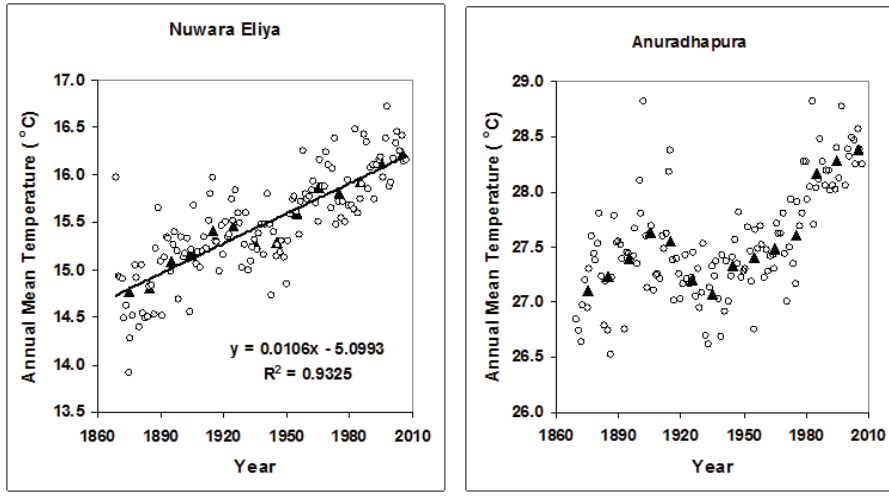

Figure 3. Long-term variation patterns of air temperature in selected locations of Sri Lanka.

Source: De Costa (2008).

Sources of greenhouse gases (GHGs)

As increased emissions of GHGs are the principal cause of climate change, identification of their sources is essential to combat climate change and its impacts. Burning of fossil fuels (e.g. coal, petroleum, natural gas etc.) in a wide range of activities such as transportation,power generation and industrial processes (e.g. cement production) is the major source of carbon dioxide, followed by deforestation and biomass burning. On the other hand, increasing forest cover through reforestation and increased vegetation cover via agriculture and natural vegetation

absorbs about 40% of the carbon dioxide emitted to the atmosphere. Landfills, wetlands, rice paddies with standing water and ruminant animals (e.g. cattle, buffalo, sheep and goat) are major sources of methane while biomass burning also makes a contribution. Use of nitrogen fertilizers in agriculture is the prime source of nitrous oxide emissions while combustion of fossil fuels also contributes to its emissions. Halocarbons are man-made GHGs and are used mainly in refrigeration. While the use of CFCs has been phased out by the Montreal Protocol, other halocarbon GHGs containing fluorine (F) are still in use in refrigerators and a variety of other consumer products. Global GHG emissions in terms of the respective gases and from different sectors are shown in Figure 5.

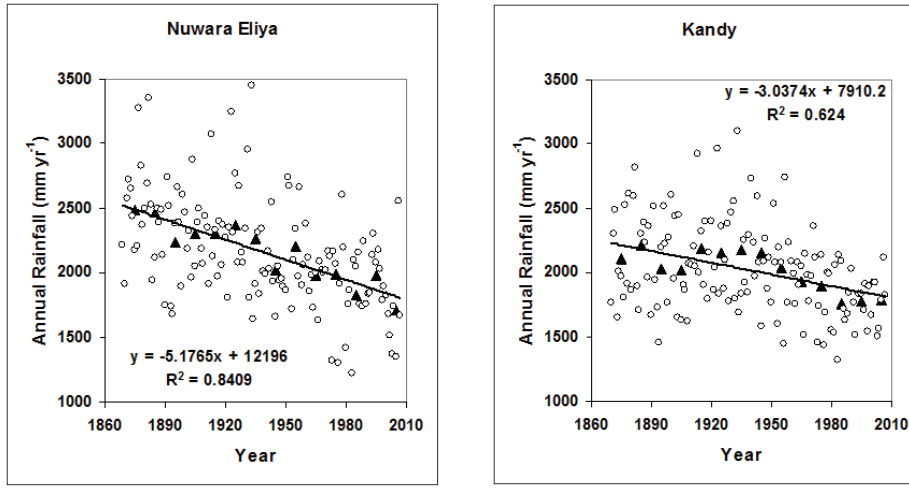

Figure 4. Long-term variation of annual rainfall in selected locations of Sri Lanka.

Source: De Costa (2008).

Climate change mitigation and adaptation

All actions and activities to combat climate change can be classified in to two broad categories, namely mitigation and adaptation. Climate change mitigation includes all human interventions to reduce the sources or enhance the sinks (i.e. stores) of greenhouse gases. Adaptation to climate change includes all measures taken to reduce the impacts of climate change and thereby decrease climate sensitivity and increase climate resilience. As such, mitigation and adaptation are complementary strategies. The degree of success in mitigation activities will determine the time available for developing effective adaptation strategies. While adaptation strategies can minimize the adverse impacts of climate change, there are upper limits to effective adaptation, especially in a future scenario of increasing rate and magnitude of climate change. It is worth noting that even with maximum possible adaptation, unless effective new mitigation strategies and measures are put in place, global warming by the end of the 21st century will have severe and irreversible impacts on almost all sectors of the economy and the society at

large, both globally and locally. Furthermore, delaying the implementation of new mitigation measures will increase the costs and technological challenges that are likely to be encountered in the future. Integrated and co-ordinated implementation of mitigation and adaptation measures while linking them with wider societal aspirations and objectives will be the strategy that is most likely to bring success. Effective implementation of mitigation and adaptation strategies needs the synergistic integration of institutional networks and governancemechanisms along with innovations and investments in environmentally sound technologies and infrastructure, sustainable livelihoods and behavioural and lifestyle choices.

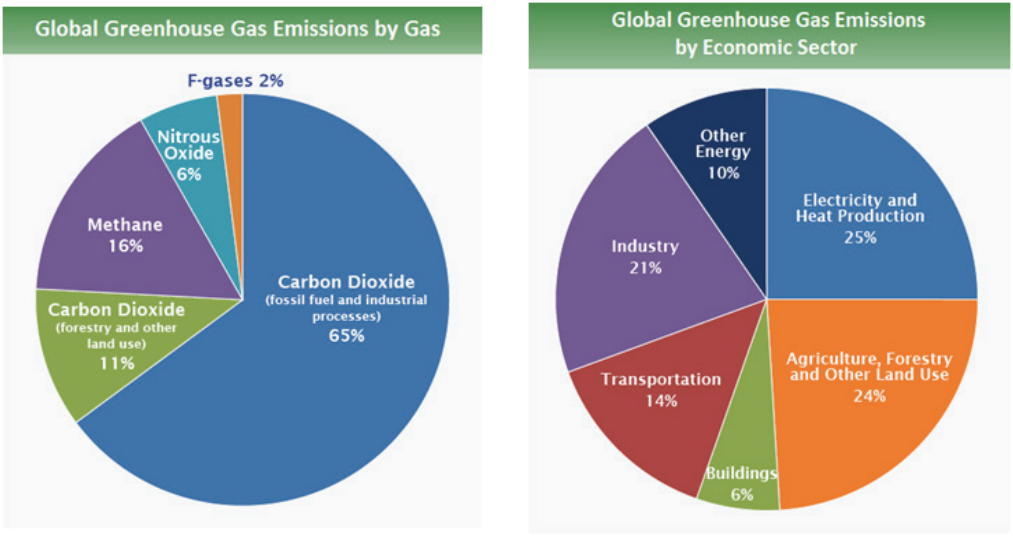

Figure 5. Global greenhouse gas emissions in terms of gases and economic sectors

Source: IPCC (2014).

Strategies and measures for climate change mitigation

Currently, all climate change mitigation pathways are focused towards limiting future global warming below 2°C below the pre-industrial levels. This requires substantial reductions in the emissions of carbon dioxide and other GHGs during the next few decades and near zero emissions by the end of this century. This poses substantial technological and socio-economic challenges, involving considerable investment in terms of finances for R and D and technology transfer. Key policy initiatives at national and international levels could play a significant role in promoting the adoption of mitigation and adaptation measures.

The banking sector can play a crucial role in channelling financial support for these mitigation and adaptation measures. Appropriate financial support schemes could be negotiated with relevant governmental and international agencies in a way which would

benefit the banking sector financially while providing financial support to achieve national mitigation and adaptation targets. Because of the increasing importance and urgency of implementing climate change mitigation and adaptation measures, climate financing has the potential to be an increasing source of revenue to the banking sector.

Some of the key mitigation strategies that are available in different sectors are given in Table 1.

Table 1. Key climate change mitigation measures available in different sectors

Sector	Key climate change mitigation options	Relevant policy initiatives
Energy supply	Improved supply of energy and distribution efficiency Fuel switching from fossil fuels (e.g. coal) to cleaner energy sources (e.g. natural gas and nuclear power) Increasing the contribution from renewable energy sources (hydropower, solar, wind, tidal wave, geothermal and bioenergy) Early applications of carbon dioxide capture and storage (CCS) Fossil energy with CCS Methane (CH_4) leakage prevention, capture or treatment	Reduction of fossil fuel subsidies; Taxes or carbon charges on fossil fuels Feed-in tariffs for renewable energy technologies Renewable energy obligations Producer subsidies

Sector	Key climate change mitigation options	Relevant policy initiatives
Transport	Promotion of more fuel-efficient vehicles, hybrid vehicles, cleaner diesel vehicles and biofuels Reduction of carbon intensity of fuel, Reduction of energy intensity of transport Compact urban form and improved transport infrastructure, Land-use and transport planning	Mandatory fuel economy; biofuel blending and CO_2 standards for road transport Taxes on vehicle purchase, registration, use and motor fuels; road and parking pricing
	Modal shifts from road transport to rail and public transport systems Promotion of non-motorised transport (cycling, walking) Journey reduction and avoidance Second generation biofuels Higher efficiency aircraft Advanced electric and hybrid vehicles with more powerful and reliable batteries	Influence mobility needs through land-use regulations and infrastructure planning; investment in attractive public transport facilities and non-motorised forms of transport

Sector	Key climate change mitigation options	Relevant policy initiatives
Buildings	Efficient lighting and day-lighting More efficient electrical appliances and heating and cooling devices Improved cook stoves, improved insulation Passive and active solar design for heating and cooling Alternative refrigeration fluids, recovery and recycling of fluorinated gases Integrated design of commercial buildings including technologies, such as intelligent meters that provide feedback and control Solar photovoltaics integrated in buildings	Appliance standards and labelling Building codes and certification Demand-side management programmes Public sector leadership programmes, including procurement Incentives for energy service companies (ESCOs)
	Reduction of greenhouse gas emissions intensity by fuel switching, Renewable Energy System (RES) incorporation and green roofs Retrofits of existing buildings, Exemplary buildings with efficient equipment Behavioural changes to reduce energy demand	

Sector	Key climate change mitigation options	Relevant policy initiatives
Industry	More efficient end-use electrical equipment Heat and power recovery Material recycling and substitution Control of non-CO_2 gas emissions A wide array of process-specific technologies Advanced energy efficiency CCS for cement, ammonia, and iron manufacture; Inert electrodes for aluminium manufacture	Provision of benchmark information; Performance standards; Subsidies; Tax credits Tradable permits Voluntary agreements
Agriculture	Improved crop and grazing land management to increase soil carbon storage Restoration of cultivated peaty soils and degraded lands	

Sector	Key climate change mitigation options	Relevant policy initiatives
	Improved rice cultivation techniques and livestock and manure management to reduce methane (CH_4) emissions Improved nitrogen fertiliser application techniques to reduce nitrous oxide (N_2O) emissions Dedicated energy crops to replace fossil fuel use Improved energy efficiency in crop and animal production and post-harvest processing Improvement of crop yields Crop-animal-bioenergy integrated systems with closed energy cycles Reduced losses in the food supply chain and Changes in human diets	Financial incentives and regulations for improved land management Maintaining soil carbon content Efficient use of fertilisers and irrigation
Forestry	Afforestation; reforestation; forest management; reduced deforestation and forest degradation Harvested wood product management Use of forestry products for bioenergy to replace fossil fuel use Reduced demand for wood and forestry products	Financial incentives (national and international) to increase forest area, to reduce deforestation and forest degradation and to maintain and manage forests Land-use regulation and enforcement

Sector	Key climate change mitigation options	Relevant policy initiatives
	Tree species improvement to increase biomass productivity and carbon sequestration Improved remote sensing technologies for analysis of vegetation/soil carbon sequestration potential and mapping land-use change	
Waste management	Landfill methane (CH_4) recovery Waste incineration with energy recovery Composting of organic waste Controlled wastewater treatment Recycling and waste minimisation Biocovers and biofilters to optimise methane (CH_4) oxidation	Financial incentives for improved waste and wastewater management Renewable energy incentives or obligations Waste management regulations
Human settlements and infrastructure	Compact development and infrastructure Increased accessibility Mixed land use	

Sources: IPCC (2007 and 2014)

Strategies and measures for climate change adaptation

Historically, adaptation to climate change has received less attention than mitigation in international climate change policy formulation, action planning and financial support. However, adoption of adaptation strategies to climate change cannot be avoided as mitigation measures, even if effectively implemented, needs time to take effect and stabilize the climate system. The principal objective of all adaptation strategies and measures is to reduce the adverse impacts of climate change and thereby reduce the vulnerability of sectors and systems to climate change and reduce the associated risks. Vulnerability to climate change is influenced and exacerbated by other non-climatic factors such as poverty, unequal access to technology and resources, food insecurity, economic consequences of globalization, internal and trans-national conflicts and diseases such as chronic kidney disease and HIV/AIDS.

Adaptation measures are available in almost all sectors, but their economic viability and effectiveness vary widely depending on the specific circumstances. With increasing rate and magnitude of climate change as the present century progresses, the effectiveness of many adaptation measures is likely to decrease, thus requiring higher levels of adaptation strategies. A range of available adaptation strategies and required policy initiatives to support them are given in Table 2.

Table 2. Strategies and measures available for adaptation to climate change and reduce vulnerability and risks

Sector	Key climate change adaptation options	Relevant policy initiatives
Water	Expanded rainwater harvesting Water storage and conservation techniques Water re-use and desalination Water-use and irrigation efficiency	National water policies and integrated water resources management Water-related hazard management
Agriculture	Development of new heat- and drought-tolerant crop varieties Adjustment of planting dates and crop variety; Crop relocation Improved land management, e.g. erosion control and soil protection through tree planting	RandD policies and Institutional reform Land tenure and land reform Training and capacity building Crop insurance and financial incentives, e.g. subsidies and tax credits

Sector	Key climate change adaptation options	Relevant policy initiatives
Infrastructure/ Settlement (including coastal zones)	Relocation Seawalls and storm surge barriers Dune reinforcement Land acquisition and creation of marshlands/wetlands as buffers against sea level rise and flooding Protection of existing natural barriers	Standards and regulations that integrate climate change considerations into design Land-use policies Building codes Insurance
Human health	Heat-health action plans and emergency medical services Improved climate-sensitive disease surveillance and control Safe water and improved sanitation	Public health policies that recognise climate risk Strengthened health services Regional and international cooperation
Tourism	Diversification of tourism attractions and revenues Promoting eco-tourism Shifting ski slopes to higher altitudes and glaciers Artificial snow-making	Integrated planning (e.g. carrying capacity; linkages with other sectors) Financial incentives, e.g. subsidies and tax credits
Transport	Realignment/relocation Design standards and planning for roads, rail and other infrastructure to cope with warming and drainage	Integrating climate change considerations into national transport policy Investment in RandD for special situations, e.g. forest fires, permafrost areas
Energy	Strengthening of overhead transmission and distribution infrastructure; underground cabling for utilities Energy efficiency Use of renewable sources and reduced dependence on single sources of energy	National energy policies, regulations, and fiscal and financial incentives to encourage use of alternative sources Incorporating climate change in design standards

Source: IPCC (2007).

During the last decade, international agencies, governments and local administrative bodies have become increasingly aware and knowledgeable about possible climate change adaptation options. This has come about partly due to the increased frequency of extreme climatic events such as floods, droughts and wind storms, which are perceived as being linked to climate

change. With this increased awareness and sensitivity to climate-related disasters, different, but overlapping, approaches have been adopted to introduce climate change adaptation measures. These approaches, which can be implemented simultaneously, are shown in Table 3.

Table 3. Overlapping approaches for introducing climate change adaptation measures

Overlapping approaches	Key aims and objectives	Examples
Transformation of attitudes and behaviours	Attitude and behavioural change in different spheres	**Personal:** Individual and collective assumptions, beliefs, values and worldviews on climate-change and its implication
		Political: Political, social, cultural and ecological decisions and actions consistent with reducing vulnerability and risk and supporting adaptation, mitigation and sustainable development
		Practical: Social and technical innovations, behavioural shifts, or institutional and managerial changes that produce substantial shifts in outcomes
	Social transformations	Educational options: Awareness raising and integrating into education; Gender equity in education; Extension services; Sharing indigenous, traditional and local knowledge; Participatory action research and social learning; Knowledge-sharing and learning platforms
		Informational options: Hazard and vulnerability mapping; Early warning and response systems; Systematic monitoring and remote sensing; Climate services; Use of indigenous climate observations; Participatory scenario development; Integrated assessments

Overlapping approaches	Key aims and objectives	Examples
		Behavioural options: Household preparation and evacuation planning; Migration; Soil and water conservation; Storm drain clearance; Livelihood diversification; Changed cropping, livestock and aquaculture practices; Reliance on social networks
Adaptation including incremental and transformational adjustments	Institutional transformations and adaptations	**National and government policies and programs:** National and regional adaptation plans including mainstreaming; Sub-national and local adaptation plans; Economic diversification; Urban upgrading programs; Municipal water management programs; Disaster planning and preparedness; Integrated water resource management; Integrated coastal zone management; Ecosystem-based management; Community-based adaptation
		Laws and regulations: Land zoning laws; Building standards and practices; Easements; Water regulations and agreements; Laws to support disaster risk reduction; Laws to encourage insurance purchasing; Defined property rights and land tenure security; Protected areas; Fishing quotas; Patent pools and technology transfer
		Economic options: Financial incentives; Insurance; Catastrophe bonds; Payments for ecosystem services; Pricing water to encourage universal provision and careful use; Microfinance; Disaster contingency funds; Cash transfers; Public-private partnerships

Overlapping approaches	Key aims and objectives	Examples
	Physical and structural adaptations	**Engineered and built-environment options:** Sea walls and coastal protection structures; Flood levees; Water storage; Improved drainage; Flood and cyclone shelters; Building codes and practices; Storm and wastewater management; Transport and road infrastructure improvements; Floating houses; Power plant and electricity grid adjustments
		Technological options: New crop and animal varieties; Indigenous, traditional and local knowledge, technologies and methods; Efficient irrigation; Water-saving technologies; Desalinisation; Conservation agriculture; Food storage and preservation facilities; Hazard and vulnerability mapping and monitoring; Early warning systems; Building insulation; Mechanical and passive cooling; Technology development, transfer and diffusion
		Ecosystem-based options: Ecological restoration; Soil conservation; Afforestation and reforestation; Mangrove conservation and replanting; Green infrastructure (e.g., shade trees, green roofs); Controlling overfishing; Fisheries co-management; Assisted species migration and dispersal; Ecological corridors; Seed banks, gene banks and other ex situ conservation; Community-based natural resource management
		Services: Social safety nets and social protection; Food banks and distribution of food surplus; Municipal services including water and sanitation; Vaccination programs; Essential public health services; Enhanced emergency medical services

Overlapping approaches	Key aims and objectives	Examples
Vulnerability and Exposure Reduction	Spatial or land-use planning	Provisioning of adequate housing, infrastructure and services; Managing development in flood prone and other high risk areas; Urban planning and upgrading programs; Land zoning laws; Easements; Protected areas
	Ecosystem management	Maintaining wetlands and urban green spaces; Coastal afforestation; Watershed and reservoir management; Reduction of other stressors on ecosystems and of habitat fragmentation; Maintenance of genetic diversity; Manipulation of disturbance regimes; Community-based natural resource management
	Disaster risk management	Early warning systems; Hazard and vulnerability mapping; Diversifying water resources; Improved drainage; Flood and cyclone shelters; Building codes and practices; Storm and wastewater management; Transport and road infrastructure improvements
	Livelihood security	Income, asset and livelihood diversification; Improved infrastructure; Access to technology and decision-making fora; Increased decision-making power; Changed cropping, livestock and aquaculture practices; Reliance on social networks
	Poverty alleviation	Improved access to and control of local resources; Land tenure; Disaster risk reduction; Social safety nets and social protection; Insurance schemes
	Human development	Improved access to education, nutrition, health facilities, energy, safe housing and settlement structures, and social support structures; Reduced gender inequality andmarginalization in other forms

Source: IPCC (2014).

Climate financing

Climate financing refers to the financial support provided by international, regional and national bodies for climate change mitigation and adaptation measures, projects and programmes. It has been a central element in international climate change agreements since 1992. Finances may be drawn from international donors and from local public and private sources. Large-scale and long-term investments are required to bring about the GHG emission reductions of the required magnitude within the required timeframe and also to implement effective adaptation measures that will reduce climate vulnerability and increase resilience in all sectors.

The international body which acts as the focal point in formulating the policies and mechanisms of climate financing is the United Nations Framework Convention for Climate Change (UNFCCC). The UNFCCC acts on the principle that all countries bear common responsibility for climate change mitigation and adaptation. However, the UNFCCC recognizes the wide disparity between the developed and developing countries in terms of their respective financial and infrastructural capabilities to finance mitigation and adaptation activities. Therefore, it operates on the principle of common, but differentiated responsibility where developed countries (called 'Annex II Parties') are expected to provide funding for mitigation and adaptation activities in the developing countries. At the 2009 climate change summit in Copenhagen, the developed countries pledged US$ 100 billion per year from 2020 onwards. To initiate the mechanism, 'fast-start' climate finance of up to $ 30 billion was pledged until the end of 2012. Even though this initial pledge of US$ 30 billion has been fulfilled, at present, it is unclear whether the developed countries would be able to fulfil their US$ 100 per year commitment from 2020 onwards.

For climate financing to be successful and sustainable, the following basic requirements have to be fulfilled: (a) A clear assessment of the financial need/s of the developing country; (b) An assurance to the developing country that financing will continue without interruption and that the relevant agencies will allow un-hindered utilization of approved climate finances for the specific purposes that they were requested; (c) An assurance to the developed countries that the developing country has the capacity to utilize the released climate finances in a meaningful and effective manner; (d) Transparency in the way climate finances are utilized in implementing mitigation and adaptation activities; (e) An effective mechanism for monitoring, verification and reporting on the use of climate finances in order to build trust between the developed and developing countries. In order to ensure that the above requirements are met, the UNFCC has established a Standing Committee on Finance, which consists of twenty members, with ten members each from developed and developing countries. The Standing Committee meets atleast twice-a-year and reports to the Conference of Parties (COP), which consists of representatives from all member countries of the UNFCCC.

To operationalize climate financing, the UNFCC has established a Climate Finance Data Portal, which consists of three modules. The first module, which iscalled the 'National

Communication Module', includes information provided by the donor countries on the provision of financial resources. The second module, the 'Fast-start Finance Module' includes finances provided by the developed countries to fulfil their initial commitment of US$ 30 billion during the period from 2010 to 2012. The third module is operated jointly by the Secretariat of the UNFCC and the Secretariat of the Global Environmental Facility (GEF) and contains information about the climate finance flows of the GEF, which is one of the operating bodies of the climate finance mechanisms. The Climate Finance Data Portal also contains information about projects and programmes of the 'Adaptation Fund', which was established under the Kyoto Protocol to finance specific climate change adaptation activities in developing countries that are Parties to the Kyoto Protocol.

Notable facts about the current status of climate financing on the global scale

Global investment to combat climate change reached a record high in 2015 with US$ 437 billion, which was mainly driven by investments in renewable energy in China, US and Japan (Buchner et al., 2017). However, this dropped to US$383 in 2016 because of decreasing technology costs and lower deployment is some countries. Furthermore, the 2015-16 average of US$ 410 in climate financing is only about 50% of total investment on fossil fuels in 2016 at US$ 825. While the overall share of the public sector in climate financing has remained steady, the contribution from the private sector has been increasing steadily, especially in the solar and wind power supplies. When averaged over 2015 and 2016, the private sector provided 66% (US$ 270 billion) of the average total climate finance investment of US$410, with the public sector share at 34% (US$ 140 billion).Project developers have made the largest contribution (61%) to private sector climate financing, which also includes investments from **commercial financial institutions such as banks,** corporate sources, institutional investors and private equity, venture capital and infrastructure funds. Notably, the share of the commercial financial institutions in climate financing has been increasing during recent years, which signals a maturing technology market in sector such as solar energy. On the public sector investment in climate financing, the development finance institutions have been the dominant contributors at 89%.

Another notable and encouraging feature has been that during the last two years, 79% of the total climate finance has been raised domestically in the same country in which it has been spent. This is a highly promising trend and **emphasizes the need for strong national policies to encourage domestically-raised climate financing and institutional frameworks and regulatory mechanisms for climate financing activities.**

Renewable energy sector, especially solar and wind, has been the major recipient of climate financing so far. As a result, the renewable energy sector is on track to meet its stipulated GHG emission reduction targets in order to avoid dangerous climate change (i.e. to keep future warming below 2oC relative to the pre-industrial temperatures). However, other sectors remain severely under-funded by the existing climate financing instruments. It is estimated that about US$ 1 trillion per year is required in terms of climate financing to meet the GHG emission

reduction targets from other sectors, which include, electricity, industrial energy efficiency, agriculture, water, buildings, curbing deforestation and adaptation to climate change. However, increasing energy efficiency has attracted the highest share of public sector climate financing in 2016 by overtaking the investment in renewable energy.

Major issues and limitations of the existing climate financing mechanisms

A major issue for the developed countries which have pledged contributions to climate financing has been the clear identification of projects which qualify for climate financing. This is because many of the climate change adaptation activities such as better education and health care, access to safe drinking water, preparedness for natural disasters, availability of disaster relief and microfinance are linked to the general development objectives of a developing country. Therefore, on some occasions, it has been difficult to distinguish between climate finance, especially for climate change adaptation activities, and development aid.

The Global Environmental Facility (GEF) has been the major instrument through which most of the climate financing has been done so far, either directly or through the dedicated funds that it administers (e.g. the Least Developed Country Fund and the Special Climate Change Fund). However, the developing countries have been critical of the operating mechanism of the GEF which is perceived to be dominated by developed countries. As a result, alternative institutional arrangements have been established during recent years. The Green Climate Fund (GCF) will be one of the major channels through which climate finance will be administered in the future. The Amazon Fund, which is sponsored by Norway, is another alternative source of climate finance. The developing countries have been lobbying for direct access to climate financing without going through international institutions such as the World Bank and the United Nations Development Programme (UNDP), which impose many rules and conditions on the financial assistance that is channelled through them. **For direct access to climate finance, many developing countries have established special national funds for direct access to climate finance from the GCF. In this scenario, the banking sector in Sri Lanka can play a significant role in acting as the instrument through which the secured funds are disbursed to interested parties.**

However, the establishment of special national bodies and establishing trust and gaining confidence of the international agencies such as the UNFCCC with regard to financial probity and transparency has been difficult and slow for developing countries such as Sri Lanka. Therefore, still the climate financing channels are dominated by bilateral aid agencies and international development agencies such as the World Bank and UNDP, which have set up their own climate financing mechanisms. The 'Climate Investment Fund' set up by the World Bank is one such example. The Adaptation Fund (mentioned earlier) is identified as the only other climate financing channel (besides GEF), which is independent from international development finance institutions. However, revenue of the Adaptation Fund has decreased during the last few years since the collapse of the international carbon price as the Adaptation Fund is financed through a levy on international carbon market transactions.

Encouraging trends for the future of climate financing

Several encouraging trends in the current climate financing landscape, which augur well for the future, have been identified by Buchner et al.(2017). Firstly, the Paris Agreement at the Global Climate Conference in 2015 has specifically identified the need for greater climate financing, thus giving it greater legitimacy and legal validity. Article 2.1c of the Paris Agreement includes the long-term aspiration to "make finance flows consistent with a pathway towards low GHG emissions and climate-resilient development". Such recognition in international agreements provide impetus for national governments and relevant agencies to focus their efforts to engage financial system actors (e.g. banks) in order to ensure that financing is provided to developmental pathways which are consistent with the objective of keeping global warming below 2oC relative to the pre-industrial temperatures. Secondly, investors are encouraged to embed low-carbon and climate resilient business practices with special tools, investment criteria and frameworks to assist them. Thirdly, efforts to 'green' the existing financial flows are beginning to be successful. Specifically, improvements are needed in integrating climate resilience in to public investment decisions, channelling finance from high-carbon to low-carbon activities and ensuring that national development finance institutions adopt best practices. Fourthly, new investment opportunities that are tailored towards large institutional investors and asset managers (who make up less than 1% of the current climate finance flows) are being developed by the Global Innovation Lab for Climate Finance. These are focused on investment opportunities for this group of investors in the areas of energy efficiency, water, land use, insurance and climate change adaptation.

Concluding remarks

The above account clearly shows that climate financing will certainly be an expanding activity in the near- and medium-term future. Its share in the overall development finance landscape is highly likely to increase along with continuously increasing involvement of international and regional donors, national governments and private investors. As such climate financing represents a huge opportunity for the banking sector in Sri Lanka to capitalize by providing the required financial services.

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