



Climate Change and Trade: The Challenges for Southern Africa

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**Trade and Climate Change Study in Southern Africa**

**Country Case Study – Zambia**

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### **About the author**

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## **Abbreviations and acronyms**

CDM	Clean Development Mechanism
GDP	gross domestic product
GHG	greenhouse gas
JCTR	Jesuit Centre for Theological Reflection
LDC	least-developed country
MCTI	Ministry of Commerce, Trade and Industry
MDG	Millennium Development Goal
MFNP	Ministry of Finance and National Planning
MTENR	Ministry of Tourism, Environment and Natural Resources
NAPA	National Adaptation Programme of Action
NPE	National Policy on Environment
TOE	tonnes of oil equivalent
UNFCC	UN Framework Convention on Climate Change
ZABS	Zambia Bureau of Standards
ZCSCCN	Zambia Civil Society Climate Change Network
ZMD	Zambia Meteorological Department

## **Responding to climate change through development**

### ***Introduction***

The problem of climate change is fast becoming recognised as being caused by human activity. The extent to which it is caused by human activity varies from country to country because of a range of factors such as the levels of greenhouse gas (GHG) emissions caused by industrialisation, green-industry technology, poverty and environmental regulation. Although human activity has been mentioned as a causal factor, it is not the only one and there are natural causal factors too. The research chose to focus on climate change caused by human activity because it can be responded to by changing the current trends of human behaviour and approach to achieving development. This is because climate change will not only affect the weather, but will also have a significant impact on agriculture, water, energy, forestry, food security, economic growth and poverty. In short, it will affect the broader agenda of development, especially in low-income countries.

Climate change has become a global concern recognised for the anticipated far-reaching socio-economic and development consequences around the world, but more especially on developing and least-developed countries (LDCs). This is even more so with the increasing frequency of floods and droughts happening worldwide. Therefore, this paper pays particular attention to the local context of climate change, trade and the broader agenda of development in Zambia. The purpose of the research is to explore the likely consequences of a new climate change deal for Zambia and suggest potential domestic responses by stakeholders from the private sector, government, NGOs and the donor community.

The current debate of climate change sways to and fro between mitigation and adaptation responses by countries. For most, if not all, LDCs, the debate is mostly centered on adaptation, because they are not significant contributors to climate change, e.g. Zambia contributes less than 1% to global GHG emissions, yet is highly vulnerable to the likely effects of climate change. The main content of this debate views mitigation as a medium- to long-term response for LDCs, while adaptation is the more immediate and short-term response that countries such as Zambia should concentrate on.

On 30 June 2009 President Rupiah Bwezani Banda of the Republic of Zambia launched the National Policy on Environment (NPE). The NPE will be spearheaded by the Ministry of Tourism, Environment and Natural Resources (MTENR) through the Climate Change Facilitation Unit. This body, situated in the MTENR, will be responsible for addressing issues identified as priorities for dealing with climate change in Zambia with the objective of supporting the policies and principles laid out in the NPE. With the increasing strain placed by climate change on cross-cutting development efforts, the message is becoming clearer that the responses need to come from a spectrum of stakeholders in the private sector, government, NGOs and donors if they are to be adequate. The NPE has the objective of enabling the present generation to meet their needs without compromising those of future generations. The overall objective of the policy is to support the government's priority to eradicate poverty and improve the quality of life of the Zambian people. Observations and consultations with key stakeholders led to the conclusion that Zambia's development efforts need improved co-ordination and regulation to be able to respond to the challenge of climate change in a sustainable way.

### ***Observed climate trends in Zambia***

Zambia is a landlocked country bordering on Zimbabwe, Namibia, Angola, the Democratic Republic of the Congo, Tanzania, Malawi and Mozambique. From observations made on the trend of temperature change from 32 meteorological stations in Zambia over a period of the last 30 years, the conclusion is that Zambia is warming. The mean temperatures computed for the agro-ecological regions (called zones in Zambia) for three time periods — November to December, January to February and March to April — indicate that the summer temperature in Zambia is increasing at the rate of about 0.6°C per decade, which is ten times higher than the global or Southern African rate of increase in temperature.<sup>1</sup> The rate of increase is highest in November–December as compared to other periods across all zones.

By using the three different zones, differentiated by variable rainfall and water quality, the impact of climate change is best understood by distinguishing among these zones.

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<sup>1</sup> 'Climate change and African agriculture', Policy Note, 27, August 2006, CEEPA.

### *Zone I*

This region receives less than 800 millimetres of rainfall annually and constitutes 14% of Zambia's total land area.<sup>2</sup> It experiences recurrent drought and floods and the area covers the Southern Province and parts of the Eastern and Western Provinces.<sup>3</sup> This region used to be considered the breadbasket of the nation, but for the last 20 years it has been experiencing low, unpredictable and poorly distributed rainfall.<sup>4</sup>

### *Zone II*

Zone II is the most populous zone with over four million inhabitants<sup>5</sup> accounting for approximately one-third of Zambia's population, which currently stands at 12 million people.

### *Zone IIA*

This area receives 800–1 000 millimetres of rainfall annually and constitutes 28% of the total land area of Zambia, covering the Lusaka, Southern, Central and Eastern Provinces.<sup>6</sup> The soil here is the most fertile in the country.<sup>7</sup>

### *Zone IIB*

This area receives more than 800 millimetres of rainfall annually and comprises 12% of the land area of Zambia.<sup>8</sup>

### *Zone III*

This area, which comprises of Northern, Luapula, and Northwestern Province, receives more than 1 200 millimetres of rainfall per annum and comprises 46% of Zambia.<sup>9</sup>

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<sup>2</sup> Conservation Farming Unit, *Conservation Farming and Conservation Agriculture: Handbook for HOE Farmers in Agro-Ecological Zones I and IIa — Flat Culture*. June 2007, p. 56.

<sup>3</sup> MAC (Ministry of Agriculture and Co-operatives), *National Agriculture Policy 2004–2015*. Lusaka: MAC, October 2004, p. 1.

<sup>4</sup> *Op. cit.*

<sup>5</sup> *Ibid.*

<sup>6</sup> Conservation Farming Unit, *op. cit.*, p. 56.

<sup>7</sup> MAC, *op. cit.*, pp. 1–2.

<sup>8</sup> Conservation Farming Unit, *op. cit.*, p. 56.

<sup>9</sup> MAC, *op. cit.*, p. 2.

## ***The impact of climate change on agriculture, poverty and economic growth in Zambia***

According to a recent International Food Policy Research Institute paper, it is expected that under the worst rainfall scenario, the national poverty rate by 2016 would mean there are almost 650 000 more people living under the poverty line compared to under the normal rainfall scenario.<sup>10</sup> This is enough to offset any reduction in the number of poor people in Zambia, meaning that the absolute number of poor will not decline by 2016. Thus, if Zambia were to experience a 10-year rainfall pattern similar to that of 1984/85–1994/95, then most of the country’s potential reductions in poverty over the next 10 years would be lost, and the number of poor people in Zambia would rise to 7.6 million by 2016 from the currently lower estimate.

Apart from the expected adverse effects on basic food security, climate change is also expected to have large impacts on household incomes and poverty.<sup>11</sup> The rural population is not expected to be the only group affected by this. Although agricultural incomes are not especially important in urban areas, changes in rainfall patterns can affect urban incomes. This is because food consumption is a large share of urban households’ expenditure, especially among the urban poor. Thus, real urban incomes are influenced by changes in agricultural production and prices. As a result, the declines in agricultural production caused by climate variability and the resulting increases in food prices will reduce urban real incomes. In this scenario, it is estimated that just slightly fewer than 650 000 in both the rural and urban areas would be pushed below the poverty threshold.<sup>12</sup>

If Zambia’s rainfall patterns of 2007–16 were to replicate those of the 1985/86–1994/95 period (i.e. the worst rainfall scenario), then the economic losses caused by climate variability would be heavily concentrated in Zones I and IIa1. As shown in table 1 with reference to figure 1, almost 90% of the losses in agricultural gross domestic product (GDP) would take place in these two southern and central zones. Moreover, the effects of the worst rainfall scenario would be especially severe for southern Zone I, where the droughts of the early to mid-1990s were pronounced.<sup>13</sup>

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<sup>10</sup> Thurlow J, Zhu T & X Diao, ‘The impact of climate variability and change on economic growth and poverty in Zambia’, International Food Policy Research Institute Discussion Paper, 00890. ??: Development Strategy and Governance Division, Environment and Production Technology Division, August 2009a.

<sup>11</sup> *Ibid.*

<sup>12</sup> *Ibid.*, p. 33.

<sup>13</sup> *Ibid.*, p. 29.





to absorb the impact at the local level and no significant mitigating measures are taken at the international level.

Table 2 shows the growth and poverty outcomes under a normal rainfall scenario in the period 2007–16. Although an annual growth rate of 6.7% is impressive, the extremely high poverty rate in 2006 means that the country is still unable to meet the first Millennium Development Goal (MDG) of halving the 1992 poverty rate by 2015.<sup>15</sup> It is also interesting to note that the same study highlights that the impact of economic growth in Zambia on poverty is lower than that of other African countries. This once again highlights the extent to which Zambia is vulnerable to food security threats emanating from climate change.

**Table 2: Growth and poverty outcomes, normal rainfall scenario, 2007–2016**

	Average annual growth rate, 2007–16 (%)	Share of total GDP (%)	
		2006	2016
GDP	6.7	100	100
Agriculture	5.7	20.5	18.6
Mining	5.9	10.1	9.4
Manufacturing	7.3	12.1	12.8
Other industries	8.5	8.7	10.3
Services	6.7	48.6	48.9
	Share of total population, 2006 (%)	Poverty head count (%)	
		2006	2016
Poverty head count	100	67.9	52.2
Rural	60.9	77.6	63.0
Urban	39.1	52.8	35.4

Source: Results from the Zambian D Computative General Equilibrium model

### ***The vulnerable and climate change***

Climate change has primarily been a scientific subject that has been and remains both complex and difficult to correlate in terms of cause and effect. Climate change occurs as a result of accumulating GHGs in the atmosphere: ‘The greenhouse effect arises due to the presence of some trace gases,

<sup>15</sup> *ibid.*, p. 22.

notably carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphurhexafluoride.<sup>16</sup> These GHG are responsible for locking in the heat from earth that should be leaving the atmosphere. Thus, climate change caused by human activity occurs through GHG emissions that cause global warming, which in turn creates climate change.

Some of the main causes for these GHG emissions resulting from human activity are:

- industrial processes;
- transportation;
- agricultural land use;
- deforestation;
- power generation; and
- waste management.

Since Zambia is highly vulnerable to the risks that climate change poses, the vulnerable are faced by three aspects of risk: exposure, sensitivity and adaptive capacity.<sup>17</sup> In trying to overcome these risks, the global and national responses to climate change will have a great bearing on the future development of Zambia and the lives of Zambians. Recent observations by social development think tanks in Zambia are that people residing in the rural areas are heavily reliant on Zambia's natural resources to meet their basic needs, ranging from water and sanitation to food security and income generation. Currently, the majority of Zambia's population live in the rural areas in households mostly headed by women and where half the children under five suffer from chronic malnutrition or stunting (a figure that has worsened rather than improved over the last 30 years).<sup>18</sup> This not only means that Zambians themselves greatly depend on the country's natural resources, but women and children are also particularly vulnerable to the adverse effects of climate change.

### **Climate change conventions that Zambia is signatory to**

The first climate change agreement that Zambia was signatory to was the 1992 Rio Conference Convention, which it signed in June that year and ratified in 1993. The objective of this convention

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<sup>16</sup> MTENR (Ministry of Tourism, Environment and Natural Resources), paper presented on May 2009

<sup>17</sup> Thurlow J, Zhu T & X Diao, 'Mapping South African farm sector vulnerability to climate change and variability: A sub-national assessment', International Food Policy Research Institute Discussion Paper, 00885. ???: Environment and Production Technology Division 2008 August 2009b, p. 25.

<sup>18</sup> *Ibid.*

under the UN Framework Convention on Climate Change (UNFCCC) was to essentially stabilise GHG concentrations in the atmosphere to levels that would prevent human-induced interference with the climate system.

The next major agreement Zambia was party to was the Kyoto Protocol, which was negotiated in 1997 under the UNFCCC in order to make legally binding commitments on developed countries to reduce emissions according to specific targets by 2012. Zambia signed the protocol on 5 August 1998 and ratified it on 5 October 2006. As a developing country without significant emissions, Zambia is a non-Annex I party under the protocol and has no emission reduction targets to meet.

With two years to go before the expiry of Kyoto, increasing levels of industrialisation that contribute to increasing GHG emissions and the frequency of drought and flood occurrences have become a cause for concern. In response, the international community has recognised that the Kyoto commitments were not enough and more ambitious measures would need to be undertaken if there is to be any long-lasting solution to guarantee sustainable development. Therefore, ongoing preparations have led to countries preparing for the Copenhagen meeting to be held in Denmark in December 2009 to reach a common agreement on country commitments and responses to address climate change in the international context.

## **Ways to respond to climate change through development**

### ***MDG 7: 'Ensure environmental sustainability'***

The MDGs are a set of eight mutually reinforcing development goals contained in the 2000 Millennium Declaration. The declaration was signed by 147 heads of state, including the Zambian president, to initiate action to combat the human development deprivations to which the majority of the world population are still exposed.

The most relevant and important MDG in this paper is MDG 7, which is aimed at ensuring environmental sustainability. In Zambia's MDG progress report for 2008 (the third after the 2003 and 2005 publications), it was found that Zambia is unlikely to meet MDG 7 by 2015.<sup>19</sup> This is because since the 2005 MDG progress report, a reassessment of the condition of the vegetation cover has not been carried out in Zambia. The removal of forest and woodland cover in many areas

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<sup>19</sup> MFNP (Ministry of Finance and National Planning), *Zambia Millennium Development Goals Progress Report 2008*. Lusaka: MFNP, 2008, p. 25.

in the country is leading to the shortened flow of seasonal streams and the drying up of formerly permanent rivers. Further findings revealed by the progress report show that in gazetted forest areas, only half of these areas remain intact. This has serious implications for livelihood and climate change security, as these parts of Zambia are expected to suffer from more arid and drier conditions in future.

Furthermore, the MDG progress report found that Zambia continues to experience deforestation due to illegal commercial logging, wood fuel harvesting, uncontrolled fires, and the expansion of agriculture and mining activities in most forests. This will inevitably continue to have a negative impact on forest functions, while extensive use of solid fuels continues to negatively affect forest resources, which in turn affects the forests' ability to provide environmental services. Worse still, the current and estimated shortages in electricity production forecast for the next 10 years cause further concern for the likely increase in forest degradation.

In view of this, the progress report reveals that high poverty levels and the lack of alternative sources of livelihoods in rural areas cause and will continue to cause pressure on land and associated resources, which threatens rural and urban livelihoods more especially now in the context of climate change.<sup>20</sup> The nature of the MDGs means that the sustainable attainment of one goal has to be made with gains in the other goals. For example, as mentioned in the MDG progress report, health issues associated with a large percentage of the population using solid fuels remain a challenge for the achievement of the health-related MDGs, as the use of solid fuels negatively impacts on the health of the population, especially that of females.<sup>21</sup> So again we see the vulnerability of women in Zambia not only with regard to poverty, but more so in the broader context of climate change and the implications it has for the existing poor and potentially poor being able to meet their basic needs. Thus, the attainment of a society where people are more able to live a full human life is based on the complementary nature of the goals. Therefore, the sustainable use of the environment inadvertently has an impact on the health sector, poverty and food security and thus the overall gains sought to be made via the MDGs.

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<sup>20</sup> *Ibid.*, p. 26.

<sup>21</sup> *Ibid.*

## **Water**

Although Zambia is estimated to have slightly under 45% of the water bodies in the Southern African Development Community, the management of and access to the country's water systems by the population does not reflect this. The MDG progress report shows that in Zambia the situation is not getting better. Most recent analysis shows that the proportion of the population without access to good water supplies rose by over 10% from 26% in 1991 to 36.1% in 2006. Although the MDG progress report anticipates that the target in respect of access to an improved water source will mostly be met by 2015, the access to improved sanitation poses a great challenge.<sup>22</sup> Worse still, it has been anticipated that climate change will directly impact on the hydrological cycle and local water resources availability. The changes expected as a result of climate change are the altering of the frequency and intensity of rainfall, as well as the observed increased frequency of extreme weather events (droughts and floods). Due to the extent of human and economic activities that rely on water resources, variations in the availability of water resources due to climate change put more strain on these resources (rivers, lakes, wetlands, dams), affecting a number of human needs and economic activities. These range from drinking water and agriculture to hydropower generation and fisheries. Therefore, the adaptation measures that can be adopted should include improvements and scaling up of water harvesting and storage, improved water management and the utilisation of different available resources (e.g. shallow wells, wetlands, etc.). By using supplementary irrigation, the level of dependency on rain-fed agriculture decreases, thus improving the overall efficiency of water use.<sup>23</sup>

## **Irrigation**

Zambia has a total of 75 million hectares of land, of which 42 million hectares are considered suitable for agriculture production, but currently only 10.5 million hectares are being used. The National Adaptation Programme of Action (NAPA) research findings show that climate change is set to increase food insecurity in Zones I and II in Zambia. Since the late 1980s these regions have tended to experience the late onset and earlier withdrawal of rains and more frequent droughts. The most notable impact, however, is that floods have become even more widespread.

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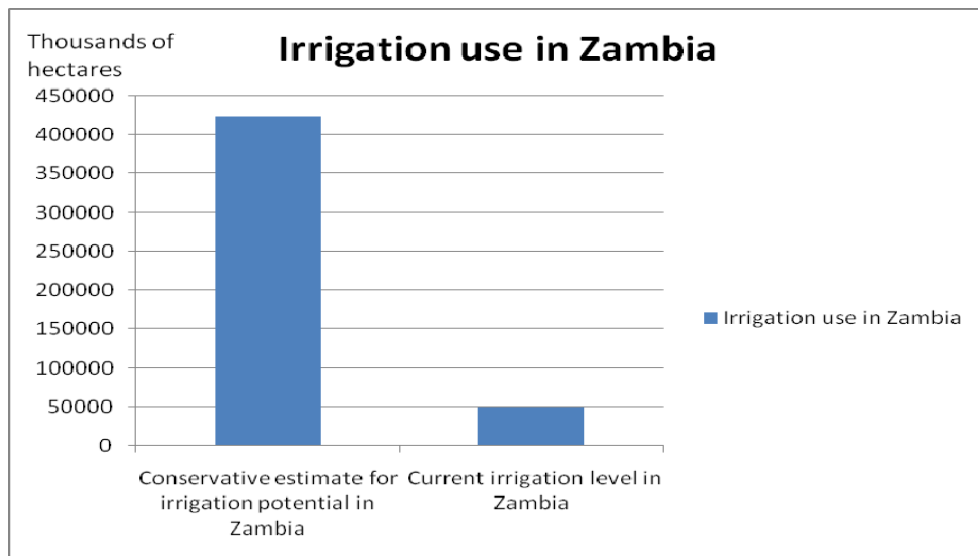
<sup>22</sup> *Ibid.*, p. 28.

<sup>23</sup> ZCSCCN (Zambia Civil Society Climate Change Network), '2010 budget submission: Response to the draft 2010–2012 Medium-term Expenditure Framework and 2010 Budget', submitted to MFNP, September 2009, p. 3.

Improved irrigation use would provide for the development and sustainability of a wide range of agriculture activities. This is because it would enable planting of crops during the winter season and during droughts. This could improve the prospects of adapting to climate change and increasing food security through improving agriculture potential during droughts or as a result of poor rainfall patterns.

Yet, current estimates show that with Zambia's irrigation potential of 423 000 hectares, only 50 000 hectares are irrigated. Due to poor infrastructure for water collection and the fact that Zambia's agriculture sector is overwhelmingly dependent on rainfall irrigation (where estimates show less than 5% of arable land is under irrigation), the likely impact of climate change on food security and agricultural production will be severe without climate change resilience.

**Figure 2: Irrigation use in Zambia**



Source: MAC, *op. cit.*

### **Energy sector**

The production process in more than 79% of manufacturing firms is entirely dependent on electrical energy, while a further 52% of them consider electricity accessibility to be a problem and another

18% consider this problem to be a serious one.<sup>24</sup> In Zambia, energy usage has continued to rise. In 2004 energy use in all sectors of the economy was estimated at 13.338 million tonnes of oil equivalent (TOE). This was up from 10.8 million TOE in 2003, 4.7 million TOE in 2000 and 4.4 million TOE in 1990. The per capita energy use in 2004 was estimated at 117 kilograms oil equivalent. Growth in economic activity, especially in the mining and industrial sectors, is driving up demand for energy.<sup>25</sup> Worse still, the poor in Zambia still primarily rely on wood fuels for energy, thus making it important to introduce alternative sources of energy that will help reduce the levels of vulnerability of the poor. This is because they are at a high risk of exposure to further vulnerability with the impact of climate change. Their poverty makes them incredibly sensitive to sudden changes in environmental conditions, because of the extent to which they rely on natural resources for meeting their basic needs. Therefore, it is extremely important to develop the adaptive measures for both the poor and industry in particular by providing alternative sources of energy. This will further lead to the sustainability of the environment and of rural livelihoods by reducing the level of pressure and reliance on natural resources.

Therefore, the time has come to aggressively embark on purposefully directing resources towards the underutilised potentials of solar energy and hydropower generation as alternative sources of energy. This is because the Zambezi River basin and other micro-watersheds can assist Zambia to meet the ever-increasing demand for energy. The existing dams in the Zambezi River basin are connected to the Southern African Power Pool, whose installed capacity is 51,000 megawatts (51 gigawatts), 78% of which is utilised in South Africa. Developing new small dams for mini-grids will go a long way in providing hydro energy to the country.<sup>26</sup> However, hydropower is not the only alternative source of energy; there is also the vast, untapped potential of solar energy. The important thing is for deliberate action to be taken by stakeholders among government, donors and civil society to initiate the process of seriously pursuing alternative sources of energy.

### ***Fisheries***

The fisheries sector in Zambia accounts for about 3.8% of GDP, which is now at risk, since Zambia recently experienced the killer fungal fish disease epizootic ulcerative syndrome. The disease struck the Zambezi early in 2009, killing large numbers of fish in the Zambezi River valley and significantly

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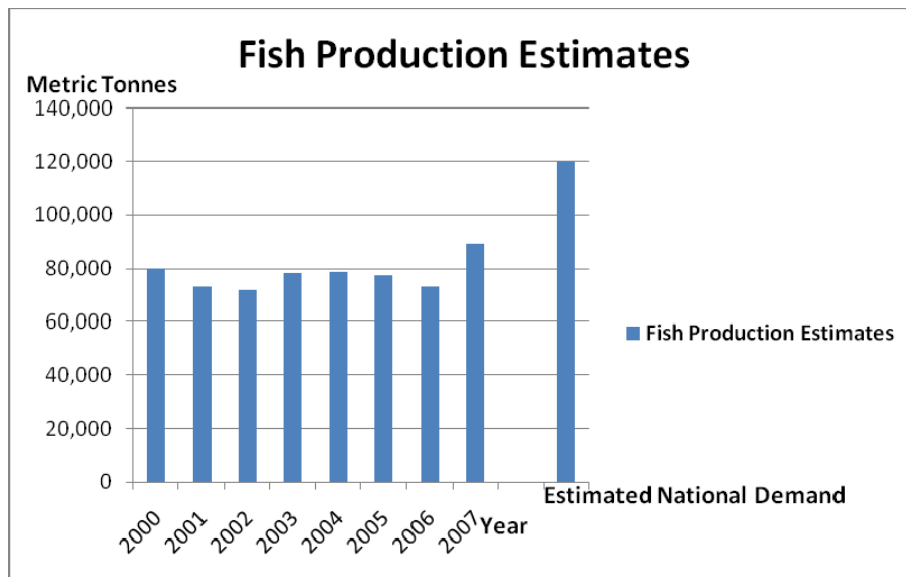
<sup>24</sup> Mbuta SW, *Ministry of Commerce, Trade and Industry: Manufacturing Survey 2000–2001*. Lusaka: MCTI, June 2007, p. 47.

<sup>25</sup> MFNP, *op. cit.*, p. 26.

<sup>26</sup> ZCSCCN, *op. cit.*, p. 3.

reducing fish stocks. Although the cause is not yet known, there is a belief that the incurable fungal disease has been caused by warming waters. Some scientists conclude that the warming of the waters can be attributed to the increase in GHG gases in the atmosphere, resulting in global warming and climate to change. The outbreak of this disease can only be likened to the experiences in Asia where fish populations were decimated by the same disease. For Zambia, it is feared that as many as 20 varieties of fish may be susceptible, including tilapia, a staple food in the Zambezi basin.

**Figure 3: Zambian fish production estimates, 2000–07**



Source: Computed from NALEIC statistics, August 2009

With Zambia already falling short on fish production to meet national demand (see figure 3), the risks posed by climate change further jeopardises the livelihoods and food security of the poor and increases their overall vulnerability. This is because the sector currently directly and indirectly provides an income for more than 350 000 people.

With the onset of acute climate change resulting from the failure to curb GHG emissions, it is believed that prolonged and recurrent droughts will invariably result in reduced water levels, thus affecting fish habitats. Fisheries at higher level elevations are likely to be adversely affected by the lower availability of oxygen due to the rise in surface temperatures. In the plains, the timing and amount of precipitation could also affect the migration of species from the rivers to the floodplains



for spawning, dispersal and growth.<sup>27</sup> Therefore, it becomes even more important to manage the water systems well and assure the availability of fish for human consumption for nutrition and income. The development of and additional investment in aquaculture are the main interventions that can be adopted to address this.

### ***Manufacturing sector***

The manufacturing base in Zambia is currently narrow, primarily concentrating on food processing and catering for the domestic market.<sup>28</sup> Despite this, the sector grew at an annual average of 4.1% in the period 2006–08.<sup>29</sup> Even with signs of recovery in the international economy after the 2008/09 economic crisis, the view is that the onset of other crises would slow growth in the manufacturing sector in the coming years.<sup>30</sup>

For Zambia to effectively respond to the challenges of climate change while still being able to develop, the wider impact of climate change on the economy must be understood. The availability of key infrastructure and resources such as water, energy and raw materials plays a key role in the cost structure and productivity of manufacturing firms.<sup>31</sup> There needs to be an early response, ensuring that the manufacturing sector is also able to adapt to the likely onset of further constraints to competitiveness and growth.

In the most recent manufacturing survey conducted by the Ministry of Commerce, Trade and Industry (MCTI),<sup>32</sup> some of the challenges for the growth of the manufacturing sector highlighted were:

- inadequate improvements in the technology of the production process;
- the lack of continuous development of new products and improvement to old ones;
- the lack of improvement in the packaging quality of products;
- the lack of growth in engineering and technical skills;

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<sup>27</sup> *Ibid.*, p. 2.

<sup>28</sup> MFNP (Ministry of Finance and National Planning), *2010–2012, Medium-term Expenditure Framework and Budget 2010*, Green Paper. Lusaka: MFNP, August 2009a, p. 12.

<sup>29</sup> MFNP (Ministry of Finance and National Planning), *Economic Report 2008*. Lusaka: MFNP, February 2009b, p. 9.

<sup>30</sup> *Ibid.*, p. 21.

<sup>31</sup> Mbuta SW, *op. cit.*, p. 46.

<sup>32</sup> Mbuta SW, *op. cit.*

- inadequate conformity to standards (quality and environmental);
- the inability to develop new marketing techniques on a continuous basis;
- the non-responsiveness of organisational modes necessary for the acquisition of new capabilities; and
- the lack of flexibility in the pricing of goods.<sup>33</sup>

From the challenges highlighted, the important role that the transfer of technology can play in adapting to the challenges of climate change is quite clear, as is the improvement of environmental regulation and product standard enforcement. There needs to be an improvement in the sector that will ensure the sustainable use of local natural resources and at least reduce further harmful strains on the environment.

Overall, this sector is not only important for the development of an industrial base for Zambia, but also for the diversification of the economy. Although in the past deliberate efforts have been made to diversify the economy, they have not always met with notable success. The process looked at has mostly been value addition in order to move away from the dominant copper and cobalt mining that accounts for about 70% of export earnings. This is why the MCTI has more recently embarked on using multi-facility economic zones to achieve this by demarcating areas across the country with particular incentives that range from tax breaks to specially attuned infrastructure. In essence, a similar model was used in China.

### ***Environmental standards and production***

In the manufacturing survey, findings revealed that only 20% of the products from the manufacturing sector were certified by the Zambia Bureau of Standards (ZABS). The survey further sought to assess the product standards in the manufacturing sector by the number of firms adhering to ISO 9000. To this effect, statistics reveal that only 16% of the manufacturing firms had products that were ISO 9000 compliant.<sup>34</sup>

The leading subsectors that were ZABS approved were the food, beverages and tobacco sector, followed by the textiles, clothing and leather; chemicals; rubber and plastics; and basic metal products subsectors. The least compliant were the 'other manufactures' and wood and wood products subsectors. Some of the reasons for not certifying the products were as follows:

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<sup>33</sup> *Ibid.*, p. 7.

<sup>34</sup> *Ibid.*, p. 40.

- There was a general lack of awareness of the existence and functions of the ZABS.
- Since the ZABS is an enforcement agency, people rather expect to be visited by agency staff, and since that did not happen, this was cited as the reason for not certifying the products.
- Some firms asserted that the best certification was one done by the market. If the product is acceptable to customers, by implication it is certified. Therefore, they did not consider the role of the ZABS to be of relevance.<sup>35</sup>

This essentially illustrates that the Zambian economy is poorly regulated and that the country is vulnerable to pollution-emitting firms. If firms can easily produce without adequate regulation of the quality or standards of goods, Zambia could face unsustainable internal exploitation of natural resources; and even more so in the event of increasing liberalisation where there would be an absence of adequately strong regulating authorities, but more firms producing.

### ***Liberalisation and environmental regulation***

Since the occurrence of economic liberalisation and restructuring as a conditionality of the World Bank and the International Monetary Fund, Zambia has seen a reduction of absolute poverty to 64% of Zambians living in poverty as of 2006, down from 71% in 1991. Despite this reduction, Zambia is still one of the poorest countries in the world, ranked 164<sup>th</sup> out of 179 countries on the UN's 2008 Human Development Index.

There have been arguments that more open trade will increase the availability and lower the cost of climate-friendly goods and services. Torras and Boyce examined the available evidence on international variations in seven indicators of air and water quality. They found that the degree of inequality in incomes, as well as inequalities in levels of literacy, political rights and civil liberties, had a substantial impact on the quality of environmental protection in low-income countries. Countries that had a more equitable distribution of income and achieved greater equality in literacy, political rights and civil liberties tended to have better environmental quality.<sup>36</sup> This evidence suggests that increases in income from trade opening may not translate into environmental improvements if the economic benefits are not shared more equitably among the population.

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<sup>35</sup> *Ibid.*, p. 39.

<sup>36</sup> WTO (World Trade Organisation) & UNEP (United Nations Environment Programme), *Trade and Climate Change, 2009*, report. ??: WTO & UNEP, p. 51.

This is true for Zambia, where inequality is embedded in the Zambian national economic system: the 2006 local conditions monitoring survey shows that 50% of the population only earns 15% of total national income, while 10% of the population earns 48%. A 2005 World Bank study also concludes that during the 1990s countries with rapid economic growth and trade liberalisation achieved absolute poverty reduction, but experienced increased inequality. For example, as the MDG progress report highlights, there are still cases of illegal commercial logging, wood fuel harvesting and other activities that have had negative impact on forests functions.<sup>37</sup> Yet one finds that it is the poor who primarily rely on their immediate environment for natural resources to meet their basic needs.

This is important to note, because these findings suggest that the issue of environmental regulation needs to be tackled by addressing inequality in society. With the country faced by this level of inequality, the poor tend not to have the same level of literacy, political rights and civil liberties as the wealthy. This means that those who are in an informed position to bring about change are in the minority and they tend to see the process of addressing the degradation of the environment and climate change only in terms of its long-term implications rather than its immediate effects. This is understandable, because it is the poor who primarily rely on natural resources for the livelihoods and it is the rich who can afford to adapt due to their level of wealth, which reduces their level of vulnerability in the short to medium term. When this inequality gap is reduced, individuals will be faced with a similar level of risk to climate change, meaning there will be a greater desire to act. Therefore, it is vital that deliberate efforts be made to reduce the gap between rich and poor in order to enable equitable sustainability.

### ***Technology transfer***

There is a universal standard practice that almost all machine tools should be written off and disposed of every five years. The ability to practise this standard indicates the investment capability of firms. To this effect, it has been observed that 34% of Zambian manufacturing firms possessed machinery that was not more than five years old, while the 66% who formed the majority had machinery that was older than five years. In 45% of cases, machinery was more than 10 years old. This provided a strong indicator that semi-obsolete machinery technology<sup>38</sup> and a poor investment capability exist in Zambia. Table 3 shows the intention of firms interviewed to upgrade their technology.

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<sup>37</sup> MFNP, 2008, *op. cit.*

<sup>38</sup> WTO & UNEP, *op. cit.*, p. 39.

**Table 3: Distribution by propensity to upgrade technology (%), by sector<sup>a</sup>**

<b>Sector</b>	<b>Yes</b>	<b>No</b>	<b>Not stated</b>
Food, beverages & tobacco	57	42	1
Textiles, cloth & leather	56	41	2
Wood & wood products	79	21	0
Paper & paper products	63	38	0
Chemicals, rubber & plastics	67	33	0
Non-metal mineral products	100	0	0
Basic metal products	46	54	0
Fabricated metal products	58	42	0
Other manufacturers	13	88	0
<b>Weighted total</b>	<b>60</b>	<b>40</b>	<b>1</b>

<sup>a</sup> Rows do not necessarily total 100% due to rounding.

Among the 60% that expressed their intention to upgrade their technology, the motive for 40% of them was to improve the quality of their products, while for 41%, the motive was to increase production. The improvement of technology in 19% of the manufacturing firms was to support introduction of new products.<sup>39</sup> It is interesting to observe that no company wanted to upgrade technology in the interests of the environment. Bottom-line profit still appears to be the driving force of the sector. Therefore, deliberate initiatives need to be undertaken by government, business associations and other stakeholders to introduce incentives for green profit. There is telling evidence that there is a greater desire to upgrade technology than there is not to (see table 3). Therefore, this is the time to tap into this desire and essentially start pushing the manufacturing industry into producing environmentally friendly products without reducing its competitiveness. This should not only be applied to the domestic industry, but also to foreign direct investment if the country is to both develop industries and protect the environment.

### ***Mining***

With the recent discovery of uranium, oil, copper and gold in the Northwestern Province of Zambia, it is expected to become the new mining capital of Zambia. There are concerns, however, because this is one of the two provinces that lie in Zone III, which has been found to be fairly resilient to

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<sup>39</sup> *ibid.*

climate changes.<sup>40</sup> Because of this, the preservation and sustainable use of resources in this province are important for the overall environmental sustainability of Zambia.

This is where transfer of technology can play a particularly important role by minimising the impact of climate change on the overall environment. There have been instances where the transfer of technology was a great help to Zambia in reducing the consumption of ozone-depleting chlorofluorocarbons. Zambian chlorofluorocarbons consumption has reduced from approximately 30 tonnes in 1996 to approximately 10 tonnes in 2003, surpassing the reduction target of 28.1 tonnes. Levels of ozone-depleting substances remained at the same levels in 2004. This significant reduction has been possible with assistance from the international community through the transfer of ozone-friendly technologies to local industry, particularly in mining operations through the Copperbelt Environment Project.<sup>41</sup>

However, the transfer of technology alone will not be sufficient. This is because when there is growth in a particular area, especially with regard to mining, there is often migration of people in search of employment and additional economic activities. This inevitably puts further strain on the province and poses a greater threat to the natural resources available if the process is not well managed .

Therefore, the Ministry of Local Government and Housing will need to step in and make extra efforts to regulate the development of the province. This is to ensure processes such as small and medium-sized enterprise growth in the province are properly managed, because, as it stands, approximately 73% of such enterprises conduct their businesses in unauthorised premises.<sup>42</sup> Worse still, the MDG progress report mentions the issue of unplanned and illegal urban settlements, which make the provision of water and sanitation facilities difficult.<sup>43</sup> With the Northwestern Province, as the source of several national rivers, an important source of water resources for power generation, it becomes imperative to manage the growth of this province with great care to ensure that the capacity of the province is kept within manageable limits in the best interest of long-term sustainability for Zambia.

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<sup>40</sup> Thurlow J, Zhu T & X Diao, 2009a, *op. cit.*, p. 38.

<sup>41</sup> MFNP, 2008, *op. cit.*, p. 26.

<sup>42</sup> MCTI (Ministry of Commerce, Trade and Industry), *Small and Medium Enterprises Survey 2003–2004*. Lusaka: MCTI, June 2007, p. 33.

<sup>43</sup> MFNP, 2008, *op. cit.*, p. 29.

### ***Scaling up support for the Zambia Meteorological Department (ZMD)***

Estimates consider 90% of the natural disasters in Zambia to be weather related, hence the importance of an early warning system that can significantly reduce the impact of extreme weather events such as drought, floods and cyclones. In Zambia, the provision of meteorological information to support early warning for disaster preparedness is the most fundamental aspect of the public weather services provided by the ZMD.

The development of suitable adaptation strategies in the country is dependent on the availability of climate information. Diffusing the concept of adaptation throughout the country is undermined by large uncertainties regarding and gaps in knowledge of climate change information on a national and local level. Thus far, efforts to promote early warning systems have not paid much dividends because of inadequately equipped meteorological stations; a limited capacity to cater for effective adaptation support at the national, district and local community levels; and a lack of effective distribution mechanisms to disseminate forecasts to relevant stakeholders. The most challenging task for the ZMD is to disseminate early warning information to communities in the remote areas where communications facilities and infrastructure are poor or literally non-existent. This situation can only be improved by stakeholders addressing problems with regard to weather monitoring and prediction, and data dissemination and communication.

### **Zambia's response to climate change thus far**

#### ***National Policy on Environment***

Through the efforts of the MTENR, the NPE has been created. The policy is designed to create a comprehensive umbrella framework for effective natural resources and environmental conservation so that development efforts do not undermine the integrity of the environment and its ecosystems. The NPE makes provisions that are relevant to addressing climate change.

#### ***National Adaptation Programme of Action***

Government has also developed the NAPA to identify and prioritise the country's most vulnerable sectors and formulate adaptation projects to deal with the identified vulnerabilities. The NAPA makes recommendations to deal with pressing adaptation priorities in agriculture and food security, natural resources, energy and water, and human health. This programme is currently under

implementation and so far one project in the agricultural sector is in the inception phase, which will address adaptation activities in drought- and flood-prone areas in parts of the Southern, Western and Eastern Provinces.

### ***Formulation of national UNFCCC communications***

As required under the UNFCCC, countries are expected to report their emission levels from time to time in order to determine their contribution to the global problem of GHG emissions. Government completed the first report in 2004 and the second one is under preparation. The first report indicated that the country's emission levels were relatively low compared with other countries, although the transportation and forestry sectors indicated potential for increased emissions.

### ***Facilitating the implementation of the Clean Development Mechanism (CDM)***

The CDM is a flexible mechanism under the Kyoto Protocol according to which specific projects are developed to contribute to the reduction of GHGs, on the one hand, while contributing to the related fund, on the other. Thus far, Zambia has established its Designated National Authority to facilitate CDM projects. According to the MTENR, several projects have already been reviewed, with one having been approved and awaiting registration with the CDM Executive Board.

### ***Scoping study on the economic impacts of climate change in Zambia***

With the financial support of the UN Development Programme, the MTENR commissioned a scoping study on the economic impacts of climate change in Zambia in 2008. The aim of the study was to help recommended a suitable methodology to assess the economic impacts of climate change in Zambia to enable government to quantify climate change and improve planning.

### **What more does Zambia need to do?**

The clear issue that has been emerging in the build-up to Copenhagen is what strategies countries need to adopt to, firstly, mitigate the effects of climate change and, secondly, adapt to the effects of climate change. The former places greater emphasis on ways to limit the emissions of GHGs to reduce the contribution of human activities to climate change, while the latter looks at how countries can absorb the impact of climate change with minimal adverse effects. Since Zambia is not considered a significant emitter of GHGs, its primary area of focus is adaptation, although this does



not mean that the country should not begin undertaking mitigating measures through policy and regulation.

### ***Adaptation at the national level***

Based on average trends, if Zambia experiences continued climate variability over the next few years, it is expected that it will cost the country approximately \$4.3 billion in foregone GDP over 10 years.<sup>44</sup> As a low-income country already struggling with poverty, this is a further blow to potential revenues that could enable the country to become more self-sustaining by reducing its reliance on donors for infrastructure and development projects. The only way to do this is by further investing in areas that can ensure adaptation to the negative effects of climate change in order to minimise its effects.

### ***Budgeting for climate change***

In 2009 the Zambia Civil Society Climate Change Network (ZCSCCN) took the opportunity to review the proposed budget in the context of how it was addressing climate change in the key development sectors. This submission was in response to the request by the Ministry of Finance and National Planning (MFNP) from civil society to provide comments/inputs to the 2010–12 Medium Term Expenditure Framework and 2010 Budget. This is a progressive step indicating that the government is serious about addressing climate change based on scientific findings. Table 4 indicates planned expenditures on key programmatic areas related to climate change.

Of course, if low-income countries like Zambia opt to be reactionary, the cost of climate change will be greater. This is because treating the symptoms is often more expensive than treating the cause. Therefore, domestic measures should also be undertaken to offset the overall impact of climate change.

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<sup>44</sup> Thurlow J, Zhu T & X Diao, 2009a, *op. cit.*, p. 22.

**Table 4: Budget expenditures on key programmatic areas related to climate change, 2007–09 (ZMK millions)**

Sector	2007	%	2008	%	2009	%	3-year avg. (%)
<b>1. Agriculture</b>	33,167,404,623	100	219,51,431,981	100	15,058,459,592	100	
1.1 Crop diversification	91,080,000	0.27	25,000,000	0.1	0	0.00	
1.2 Water resource development for irrigation	957,500,000	2.89	2,000,000,000	9.11	734,646,600	4.88	
1.3 Smallholder irrigation schemes	845,000,000	2.55	1,950,000,000	8.88	4,960,000,000	32.9	
1.4 Informal irrigation development	100,000,000	0.30	400,000,000	1.82	0	0.00	
1.5 Conservation farming	230,682,000	0.70	0	0.00	870,000,000	5.78	
1.6 Agro-forestry promotion	30,232,000	0.09	0	0.00	0	0.00	
<i>Sub-total</i>	<i>2,254,494,000</i>	<i>6.80</i>	<i>4,375,000,000</i>	<i>19.93</i>	<i>6,564,646,600</i>	<i>43.59</i>	<i>23.44</i>
<b>2. Fisheries</b>	7,539,666,056	100	8,683,966,826	100	4,954,056,322	100	
2.1 Aquaculture development	868,000,000	11.51	42,000,000	0.48	0	0.00	
<i>Subtotal</i>	<i>868,000,000</i>	<i>11.51</i>	<i>42,000,000</i>	<i>0.48</i>	<i>0</i>	<i>0.00</i>	<i>4.00</i>
<b>3. Environment &amp; natural resources</b>	35,462,503,172	100	20,521,228,678	100	33,139,493,973	100	
3.1 Education & public awareness	247,756,459	0.70	18,132,4008	0.88	266,226,600	0.80	
3.2 Co-ordination of implementation of projects/programmes	602,515,073	1.70	718,373,415	3.50	340,271,236	1.03	
3.3 District community environment & natural resource	0	0.00	0	0.00	619,896,384	1.87	

management support							
<i>Subtotal</i>	<i>850,271,532</i>	<i>2.40</i>	<i>899,697,423</i>	<i>4.38</i>	<i>1,226,394,220</i>	<i>3.70</i>	<i>3.49</i>
<b>4. Forestry</b>	<b>15,177,727,813</b>	<b>100</b>	<b>8,877,206,826</b>	<b>100</b>	<b>6,606,546,943</b>	<b>100</b>	
4.1 Strengthening community-based forest management	0	0.00	1,168,000,000	13.16	74,000,000	1.12	
4.2 Agro-forestry & afforestation	0	0.00	10,000,000	0.11	0	0.00	
4.3 Protection & management of catchment forests	0	0.00	0	0.00	0	0.00	
<i>Subtotal</i>	<i>0</i>	<i>0.00</i>	<i>1,178,000,000</i>	<i>13.27</i>	<i>74,000,000</i>	<i>1.12</i>	<i>4.80</i>
<b>5. Energy</b>	<b>5,720,176,005</b>	<b>100</b>	<b>5,550,679,605</b>	<b>100</b>	<b>4,787,799,425</b>	<b>100</b>	
5.1 Biofuels	635,000,000	11.10	340,885,000	6.14	427,108,264	8.92	
5.2 Energy efficiency & conservation	420,000,000	7.34	820,000,000	14.77	393,474,450	8.22	
5.3 Renewable & alternative energy development & promotion	1,540,000,000	26.92	1,201,540,000	21.65	1,067,869,804	22.30	
<i>Subtotal</i>	<i>2,595,000,000</i>	<i>45.37</i>	<i>2,362,425,000</i>	<i>42.56</i>	<i>1,888,452,518</i>	<i>39.44</i>	<i>42.46</i>
<b>6. Water</b>	<b>16,676,707,003</b>	<b>100</b>	<b>21,670,453,280</b>	<b>100</b>	<b>20,075,794,735</b>	<b>100</b>	
6.1 Water resources development for productive use & infrastructure development	10,662,466,561	63.94	11,285,298,650	52.08	9,976,217,601	49.69	
6.2 Water resource management & information systems	1,311,310,000	7.86	3,507,899,034	16.19	1,836,455,768	9.15	
<i>Subtotal</i>	<i>11,973,776,561</i>	<i>71.80</i>	<i>14,793,197,684</i>	<i>68.26</i>	<i>11,812,673,369</i>	<i>58.84</i>	<i>66.30</i>

<b>7. DMMU (Resettlement Department)</b>	2,339,754,645	100	3,317,220,323	100	3,340,248,820	100	
7.1 Scheme infrastructure development (water supply improvement in face of droughts)	242,000,000	10.34	1,033,359,351	31.15	876,549,735	26.24	
7.2 Human settlements (for vulnerable persons in face of floods)	0	0.00	142,728,817	4.30	179,431,633	5.37	
<i>Subtotal</i>	<i>242,000,000</i>	<i>10.34</i>	<i>1,176,088,168</i>	<i>35.45</i>	<i>1,055,981,368</i>	<i>31.61</i>	<i>25.80</i>

Source: ZCSCCN, *op. cit.*, pp. 5–6

The ZCSCCN also identified sectors, programmes, the proposed budget increases and the justifications for this in a budget submission to the MFNP. This is a progressive step for diffusing an integrated response to climate change in Zambia. It will be important for these submissions to be called for by the MFNP and made on an annual basis and for them to be taken on board in the budget process.

Table 5 indicates the proposed increases in budgetary allocations for 2010.

**Table 5: Proposed increases in budgetary allocations, 2010**

<b>Sector</b>	<b>Programmes</b>	<b>Proposed % increase</b>	<b>Justification</b>
<b>Agriculture</b>	Crop diversification	5	Crop diversification provides insurance against crop failure in the event of climate change impacts, thereby assuring food security. This is an important element of climate change adaptation.
	Water resource development for irrigation	10	Water infrastructure development such as dams, weirs, boreholes and water harvesting facilities is important to mitigate the impacts of climate change in the face of drought.
	Smallholder irrigation schemes	10	Smallholder irrigation schemes help wean small-scale farmers from dependency on rain-fed agriculture, thereby protecting their investments.
	Informal irrigation development	5	This involves improved water management and utilisation of resources such as dams, wetlands and shallow wells without compromising the ecological integrity of these resources. This is critical to adaptation against climate change impacts.
	Conservation farming	10	This is important for soil fertility and water management and assists farmers by spending less on fertiliser inputs.
	Agro-forestry promotion	10	This is important for soil fertility and water management and assists farmers through reduced expenditures on fertiliser inputs and retaining moisture in the soil.
<b>Fisheries</b>	Aquaculture development	15	This is important to ensure adequate fish-breeding stocks and fish availability for human consumption in the face of climate change impacts due to droughts.

<b>Sector</b>	<b>Programmes</b>	<b>Proposed % increase</b>	<b>Justification</b>
<b>Environment &amp; natural resources</b>	Education & public awareness	19	Lack of knowledge and public awareness about climate change impacts on the environment, the economy and livelihoods and is a key hindrance to the adoption of climate change adaptation and mitigation measures.
	Co-ordination of implementation of projects/ programmes	18	Effective co-ordination of the implementation of environmental and natural resource management projects/programmes is key to assuring synergy and optimal response to climate change impacts.
	District community environment & natural resource management support	20	Support for districts and communities where most environmental resources occur is important to ensuring environmental conservation on a large scale.
<b>Forestry</b>	Strengthening community-based forest management	20	Community involvement in forest management with benefits accruing to community levels is important towards biodiversity conservation in the long term.
	Agro-forestry and afforestation	12	Agro-forestry and afforestation activities are important for soil stabilisation, carbon sequestration and energy provision.
	Protection & management of catchment forests	12	This is critical in protecting water systems to improve environmental flows, e.g. water for hydropower generation and domestic consumption, protection of fish habitat, biodiversity conservation, etc.
<b>Energy</b>	Biofuels development	9	Biofuels such as biogas recovered from waste fills are important in mitigating the impacts of climate change.
	Energy efficiency & conservation	16	Technological options to efficiently utilise bio-energy (e.g. charcoal, firewood) are critical in ensuring reduced forest degradation. Efficient energy use also reduces humanity's ecological footprint on the environment.
	Renewable & alternative energy development & promotion	25	Renewable energy sources such as solar energy minimise the ecological footprint on the environment and have the greatest potential for the scaling up of energy supplies at minimal cost, especially in rural areas of Zambia.

<b>Water</b>	Water resources development for productive use & infrastructure development	40	This includes construction of water retention infrastructures, construction of boreholes, promotion of water harvesting technologies, efficient use of water resources — all important for climate change adaptation, especially in drought-prone areas.
	Water resource management & information systems	10	Development of early warning systems and information dissemination on climatic variations are key to climate change adaptation.
<b>DMMU (Resettlement Department)</b>	Scheme infrastructure development (water supply improvement in the face of droughts)	20	An anticipatory and much more proactive approach is contemplated whereby people living in drought-prone areas are assisted with water supply infrastructure, e.g. boreholes.
	Human settlements (for vulnerable people in the face of floods)	28	For communities living in flood-prone areas, proactive measures should include pre-identification of settlements on higher ground and actual resettlement of people in those areas.

Source: ZCSCCN, *op. cit.*, pp. 8–9

## Conclusion

In view of human activity as a contribution to the cause of climate change, the words of Saint Ignatius, the founding father of the Jesuit order, are timely. In his principles of the Ignatian Spiritual Exercises, he spoke of *'tantum, quantum'*, which basically means: 'People must make use of all things in the universe insofar as they help them to attain their end, and in the same way they ought to withdraw from them insofar as they hinder them from it.'<sup>45</sup> In the same way that society has pursued development, so too have the currently applied means to achieve this been a hindrance, as shown by climate change. The time has come to begin taking measures to withdraw from some of the current means of development and find alternative sustainable ways of achieving the same end.

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<sup>45</sup> Interview with Superior General Father Peter Kolvenbach, JCTR.