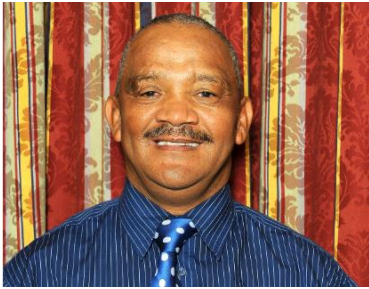




CONTENTS

FOREWORD BY THE EXECUTIVE MAYOR.....	2
1 INTRODUCTION AND BACKGROUND	3
2 DEFINING THE TERM “ADAPTATION”	4
3 BERGRIVIER MUNICIPALITY IN CONTEXT	4
3.1 ESTABLISHMENT.....	4
3.2 GEOGRAPHICAL OVERVIEW	5
3.3 CONSTITUTIONAL MANDATE	5
3.4 STRATEGIC DIRECTION	7
3.5 DEMOGRAPHIC AND SOCIO ECONOMIC OVERVIEW	8
3.6 CLIMATIC CONDITIONS AND TRENDS	10
4 STRATEGIC PARTNERSHIPS	13
4.1 WESTERN CAPE DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND DEVELOPMENT PLANNING (CLIMATE CHANGE SUB DIRECTORATE)	13
4.2 COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH AND THE UNIVERSITY OF CAPE TOWN	13
4.3 CLIMATE SYSTEM ANALYSIS GROUP	14
4.4 AFRICAN CLIMATE AND DEVELOPMENT INITIATIVE	15
4.5 COMMUNITY PARTNERSHIPS.....	15
5 CLIMATE ADAPTATION PROCESS / METHODOLOGY.....	15
5.1 INITIAL ENGAGEMENT.....	16
5.2 WORKSHOP 1 – ADAPTATION PROCESS, VULNERABILITY, CLIMATE HISTORY.....	16
5.3 WORKSHOP 2 – CLIMATE VULNERABILITY AND IMPACTS	19
5.4 WORKSHOP 3 – IDENTIFYING CLIMATE ADAPTATION OPTIONS.....	20
6 CLIMATE ADAPTATION OBJECTIVES AND INTERVENTIONS	21
6.1 OBJECTIVES	21
6.2 INTERVENTIONS	22
6.2.1 MAINSTREAMING OF CLIMATE CHANGE ADAPTATION INTO MUNICIPAL GOVERNANCE	22
6.2.2 CLIMATE RESILIENT LOW COST HOUSING	24
6.2.3 STORMWATER MANAGEMENT.....	26
6.2.4 CONSERVATION OF NATURAL RESOURCES.....	28
6.2.5 AGRICULTURE	31
7 CONCLUSION.....	32
TABLES AND FIGURES.....	33
ACCRONYMS AND ABBREVIATIONS	34



FOREWORD BY THE EXECUTIVE MAYOR

Bergrivier Municipality is privileged and proud to present this Climate Change Adaptation Plan, which is a direct result of our participation in the Provincial Department of Environmental Affairs and Development Planning's Municipal Support Programme for climate change.

Our Strategic Manager, Mrs Tracey Stone, acted as climate change champion working together with a highly skilled working group comprising various role players from the Western Cape Department of Environmental Affairs and Development Planning, CSIR, University of Cape Town, African Climate Change Development Initiative (ACDI), NGO's, Municipal Officials and most importantly our Community.

At Bergrivier Municipality we strongly believe in sustainable partnerships and we welcome the opportunity to be able to work together with all our stakeholders towards a more sustainable future. This plan came together through the access that we were given to a highly skilled working group and we are thankful for the interest shown in our area. I would like to compliment the working group for the work done and thank them on behalf of all the inhabitants of our area for their contribution. This plan will assist us to be more responsive to changes in our climate and provide us with better information to base our long term planning on.

Many of the initiatives have already been included in our five year Integrated Development Plan which was approved on 28 May 2013 and revised annually. We believe in our future and want to start doing the right things right, so that we can leave a lasting legacy for future generations.

The hard work will start now with all local role players and sectors implementing the recommendations made in this plan. Let us all work together towards making this a reality. The future is ours to shape! Bergrivier Municipality is on board and we invite all our partners to do the same.

CLR EB MANUEL
EXECUTIVE MAYOR

1 INTRODUCTION AND BACKGROUND

This document constitutes the Climate Change Adaption Plan of the Bergrivier Municipality which was developed in partnership with the Climate Change Sub Directorate of the Western Cape Department of Environmental Affairs and Development Planning as part of their Municipal Support Programme (MSP).

There are two generally accepted responses to climate change namely; mitigation whereby the causes of climate change are reduced through measures such as renewable energy and energy efficiency and adaptation whereby strategies are developed to adapt to the impact of climate change and reduce climate vulnerability. The approaches are NOT mutually exclusive and both are needed. This Climate Change Adaptation Plan should therefore be seen as a first step in the process of a holistic response to climate change.

The exact magnitude of climate change within Bergrivier Municipality is largely unknown, but it is reasonably foreseeable that the following climatic changes will occur:

- Higher temperatures (hotter)
- More intense rainfall and more frequent storm events
- Longer dry periods between rainfall events
- Increased intensity of winds
- Shifts in seasonality
- Sea level rises

The effective implementation of the National Climate Change Response Policy (NCCRP) is dependent on the combined efforts of provincial and local governments¹. In fulfilment of this the Western Cape Climate Change Response Strategy (WCCCRS) (2008) is currently under review to bring it in line with the more recent NCCRP. In so doing, it commits to assisting and supporting local municipalities in the development of sustainable energy plans, climate change adaptation plans, and implementation frameworks². A Municipal Support Programme (MSP) was therefore initiated, and a letter of invitation to express interest in taking part in WCG's Climate Change Sub-Directorate's Municipal Support Programme was sent from the Minister: Environmental Affairs and Local Government's office to all municipalities in the province in May 2012. Twelve municipalities responded positively to both the development of Sustainable Energy Plans and Climate Adaptation Plans. Eight municipalities were selected, four per programme.

Bergrivier was one of the municipalities selected for the development of a draft climate adaptation plan. The plans core elements need to be mainstreamed into key municipal documents such as the Integrated Development Plan (IDP), the Spatial Development Framework (SDF), and the Disaster Management Plan (DMP).

¹ Section 10.2.6 National Climate Change Response Policy

² Section 9.2.2. Draft Western Cape Climate Response Strategy

The MSP is not approached as a discrete once-off engagement, but rather as an on-going series of partnerships between national, provincial, and local government, NGO's, CBO's and special interest groups, scientists, specialists and the private sector. It is envisaged that in this way capacity can be developed amongst all involved, knowledge co-produced and shared, and valuable experience developed around successful climate adaptation. It is hoped that this model will assist in the relatively low cost, rapid roll out of climate adaptation mainstreaming in local municipalities across the province.

2 DEFINING THE TERM "ADAPTATION"

Many people use the Intergovernmental Panel on Climate Change (IPCC) definition of adaptation:

"Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation" (IPCC TAR, 2001).

Moser and Ekstrom's (2010) definition of adaptation is also useful:

"Adaptation involves changes in social-ecological systems in response to actual and expected impacts of climate change in the context of interacting non-climatic changes. Adaptation strategies and actions can range from short-term coping to longer-term, deeper transformations, aim to meet more than climate change goals alone, and may or may not succeed in moderating harm or exploiting beneficial opportunities."

These definitions recognise that adaptation to climate change takes place in a complex context where climate variability and change is only one of many stressors that require response. It also acknowledges that some adaptive responses help deal with current variability and others may be more transformative and sustainable; yet there is no defined separation between the two and they can, and in fact in many circumstances should, be linked.

Much research on climate change adaptation is based on the assumption that all sectors and actors want and need to adapt to climate change. However, it is very important to understand the broader development context and urgent priorities first, in order to determine where climate impacts and potential responses might fit in.

3 BERGRIVIER MUNICIPALITY IN CONTEXT

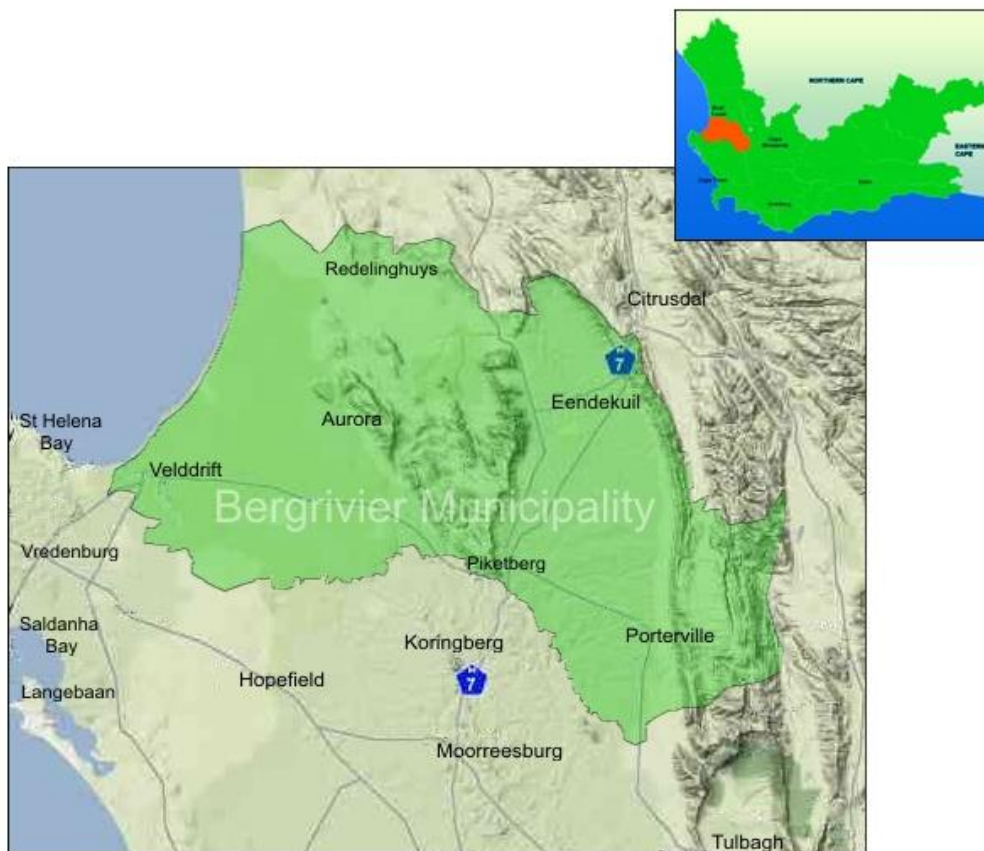
3.1 ESTABLISHMENT

Bergrivier Municipality was established in 2000 as a Local Municipality through the amalgamation of Velddrif Municipality, Porterville Municipality and Piketberg Municipality. Bergrivier Municipality has a Mayoral Executive System combined with a Ward Participatory System in terms of Section 12 of the Municipal Structures Act, Act 117 of 1998.

3.2 GEOGRAPHICAL OVERVIEW

Bergrivier Municipality is situated in the West Coast District of the Western Cape Province. The Municipality covers a geographic area of approximately 4407.04 km² and is geographically diverse. It includes 9 urban settlements, approximately 40 kilometres of coastline and a vast rural area. The main urban settlements that constitute the Municipality are: Piketberg which is the administrative seat, Porterville, Velddrift (which includes Port Owen, Laaiplek and Noordhoek), Dwarskersbos, Eendekuil, Aurora, Redelinghuys, Goedverwacht and Wittewater. The latter two towns are Moravian settlements on private land. The Municipality is demarcated into 7 wards in terms of the Municipal Demarcation Act, Act 27 of 1998.

FIGURE 1: MAP OF BERGRIVIER MUNICIPALITY



3.3 CONSTITUTIONAL MANDATE

The Municipalities mandate is set out in Chapter 7 of the Constitution (1996) and Section 152 (1) sets out the objectives of local government namely:

- ≈ To provide democratic and accountable government to the community;
- ≈ To ensure the sustainable provision of services to the community;
- ≈ To promote social and economic development;
- ≈ To promote a safe and healthy environment;
- ≈ To encourage communities and community organisations to get involved in local government matters.

The Constitution places a developmental duty on Municipalities, and requires them to structure and manage their administration, budgeting and planning processes in a manner that gives priority to the basic needs of the community whilst promoting social and economic development. Municipalities must also adhere to the principles of cooperative government and intergovernmental relations as set out in Sections 40 and 41 of the Constitution, and participate in National and Provincial Development Programmes (Section 153).

The functions of municipalities are set out Schedules 4B and 5B of the Constitution and Section 84 of the Municipal Structures Act regulates the division of these functions between the District and Local Municipality. The following table indicates the functions that Bergrivier Municipality is authorised to perform.

TABLE 1: POWERS AND FUNCTIONS OF THE MUNICIPALITY

SCHEDULE 4 B	SCHEDULE 5B
≈ Air pollution	≈ Beaches and amusement facilities
≈ Building regulations	≈ Billboards and the display of advertisements in public places
≈ Child care facilities	≈ Cemeteries, funeral parlours and crematoria
≈ Electricity reticulation	≈ Cleansing
≈ Fire fighting services	≈ Control of public nuisances
≈ Local tourism	≈ Control of undertakings that sell liquor to the public
≈ Municipal planning	≈ Facilities for the accommodation, care and burial of animals
≈ Municipal public transport	≈ Fencing and fences
≈ Municipal public works	≈ Licensing of dogs
≈ Pontoons, ferries, jetties, piers and harbours, excluding the regulation of international and national shipping and matters related thereto	≈ Local amenities
≈ Storm water management	≈ Local sport facilities
≈ Trading regulations	≈ Markets
≈ Water and sanitation	≈ Municipal abattoirs
	≈ Municipal parks and recreation
	≈ Municipal roads
	≈ Noise pollution
	≈ Pounds
	≈ Public places
	≈ Refuse removal, refuse dumps and solid waste disposal
	≈ Street trading
	≈ Street lighting
	≈ Traffic and parking

As can be seen from the above, climate change is not a municipal function per se, but rather an integrating factor that must be mainstreamed into all activities and functions of the Municipality.

3.4 STRATEGIC DIRECTION

The Municipalities strategic direction is set out in its Integrated Development Plan (IDP). Integrated development planning is a legislated process whereby the Municipality prepares a five-year strategic plan which is known as the IDP. The IDP is the principle strategic planning document of the Municipality, and all planning and development, as well as decisions relating to planning, and development in the Municipality must be based on the IDP. Bergrivier Municipality approved a five year 3rd generation Integrated Development Plan (IDP) for the 2012/13 – 2016/17 financial years on 24 May 2012. And the first revision of this IDP (2013/14) was approved on 28 May 2013. The IDP sets the Municipality's vision and mission which are as follows:

VISION

We strive towards a satisfied community through sustainable service delivery.

MISSION

To create an effectively governed administration that is committed to sustainable development of the municipal area and the delivery of services that are responsive to the unique needs of the Bergrivier Community.

The IDP also sets out the goals and strategic objectives of the Municipality, the most important in this context being Goal 6 and Strategic Objective 8.

TABLE 2: GOALS AND STRATEGIC OBJECTIVES OF THE MUNICIPALITY

GOALS	STRATEGIC OBJECTIVES
1. A financially viable and sustainable Municipality	1 To budget strategically, grow and diversify our revenue and ensure value for money services
2. An effective productive administration capable of sustainable service delivery	2 To create an efficient, effective and accountable administration
3. An open transparent corruption free and responsive Municipality	3 To provide open transparent corruption free governance
	4 To communicate effectively and be responsive to the needs of the Community
4. A quality living environment that is conducive to development and investment	5 To provide and maintain bulk and service infrastructure that will address backlogs and provide for future development
5. A safe, healthy and secure living environment	6 To promote the well-being, health, safety and security of our community
6. <u>Sustainable development of the Municipal Area (environment, economy, people)</u>	7 To develop, manage and regulate the built environment

	8 <u>To conserve and manage the natural environment and mitigate the impacts of climate change</u>
	9. To promote cultural and socio economic development of our community

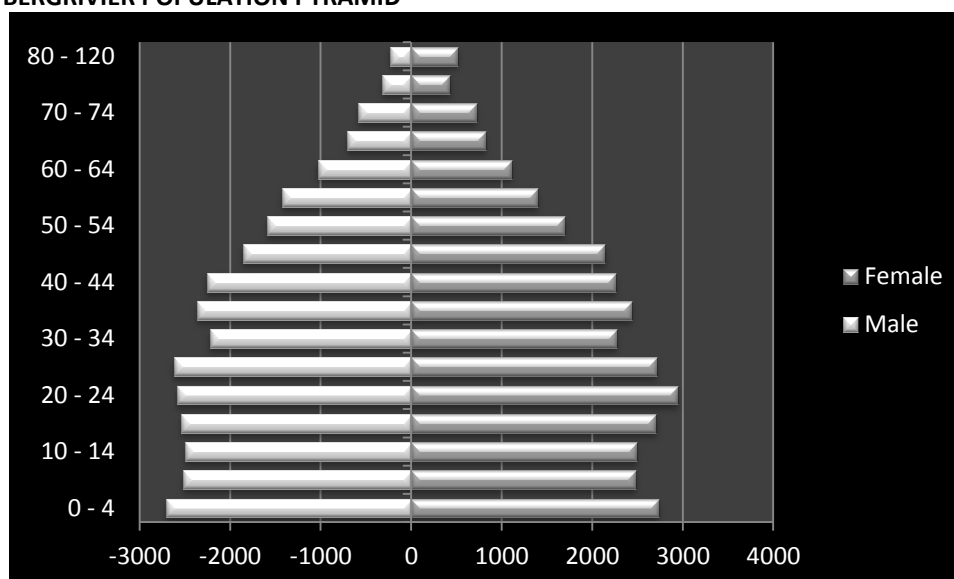
The IDP is supplemented by a number of sector plans, strategies and other documents. In developing a Climate Change Adaptation Plan, it is essential to first examine existing related documentation in order to avoid duplication and ensure alignment with current local strategic initiatives. A list of these plans, strategies and other documents are indicated in the table below;

TABLE 3: EXISTING STRATEGIES AND PLANS

FRAMEWORK / SECTOR PLAN	STATUS
Spatial Development Framework (2013)	Approved by the Municipal Council on 26 February 2013.
Revised Disaster Management Plan (DMP) and Risk Preparedness Plans (Contingency Plans) (2013)	Approved by the Executive Mayor on 19 February 2013
Housing Pipeline (2012)	Approved by the Municipal Council in August 2012
Water Services Development Plan (2010)	Approved by the Municipal Council in 2010
LED Strategy (2010)	Approved by the Municipal Council in 2010
Bergervier Municipality Biodiversity Report (2010)	Approved by the Municipal Council in 2010
Local Biodiversity Strategic And Action Plan (LBSAP) (2011)	Approved by the Municipal Council in 2011
2012/14 Risk Register	Approved by the Municipal Council in September 2012
Air Quality Management Plan (2012)	Approved by the Municipal Council in May 2012
Draft Integrated Waste Management Plan (2012)	Draft form, submitted to DEADP for comment. Pending Council approval. Will be included in final IDP Review
Integrated Coastal Management Plan (2013)	Approved by WCDM. To be adopted by local municipalities

3.5 DEMOGRAPHIC AND SOCIO ECONOMIC OVERVIEW

According to the 2011 Census figures, the population figure for Bergervier Municipality in 2001 was 46327. This figure increased substantially to 61897 in 2011, which is indicative of extensive migration into the Municipal Area. This translates to a population growth of 2.8% per annum. The figure below represents a population pyramid for Bergervier Municipality. The shape of the pyramid typically depicts an area with a rapid growth rate.

FIGURE 2: BERGRIVIER POPULATION PYRAMID

Poverty is a challenge that all municipalities have to deal with, and Bergrivier is no exception. The poverty rate in the Municipality is 33.8%, which is the second highest in the West Coast District. There are a total of 8748 urban households in the Municipality of which 2208 are registered as indigent. This figure constitutes 25.2% of the total number of households and is increasing annually. Indigent households are defined as households where the combined monthly income of the household is less than the equivalent of two state pensions plus 10%. This is exacerbated by the general unemployment rate which is an optimistic 6.8% (Census 2011).

The Municipality's dominant employment sector is the Agriculture, Forestry and Fishing Sector but jobs in this sector declined by 27% between 2000 and 2010. (Western Cape Government: Provincial Treasury: Regional Economic Development Profile 2011 and Municipal Economic Review & Outlook: West Coast District 2012). The Agriculture sub-sector is the most significant contributor, and primary agricultural activities include livestock farming (sheep, cattle, pig) and grain and fruit farming (cultivated crops such as grapes, water melons, flowers, water lilies and assorted vegetables). Rooibos tea is also grown in the Municipal Area. The Agriculture sub-sector and also provides secondary employment opportunities such as packaging, bottling and agro-processing jobs.

The following table indicates the growth across sectors for the period 2000 -2011. As can be seen, the Agriculture, forestry and fishing sector, which is the most dominant employment sector remains in decline. Mining and quarrying, electricity gas and water and central government sectors have also declined. The construction, wholesale & retail trade, catering and accommodation, transport, storage and Communication, finance, insurance, real estate and business services and community, social & personal services sectors have experienced some growth. The wholesale and retail trade Sector includes the tourism sub sector, which has been identified as a sector for future economic growth in the Municipal Area.

TABLE 4: MUNICIPAL GDPGROWTH ACROSS SECTORS (2000 - 2011)

INDUSTRY	BERGRIVIER
Agriculture, forestry & fishing	-2.7%
Mining & quarrying	-8.3%
Manufacturing	5.1%
Electricity, gas & water	-2.4%
Construction	10.6%
Wholesale & retail trade, catering and accommodation	8.0%
Transport, storage and Communication	4.3%
Finance, insurance, real estate and business services	8.3%
Community, social & personal services	0.5%
General government	-1.2%
Total	2.8%

(Western Cape Government: Municipal Economic Review & Outlook: West Coast District 2013).

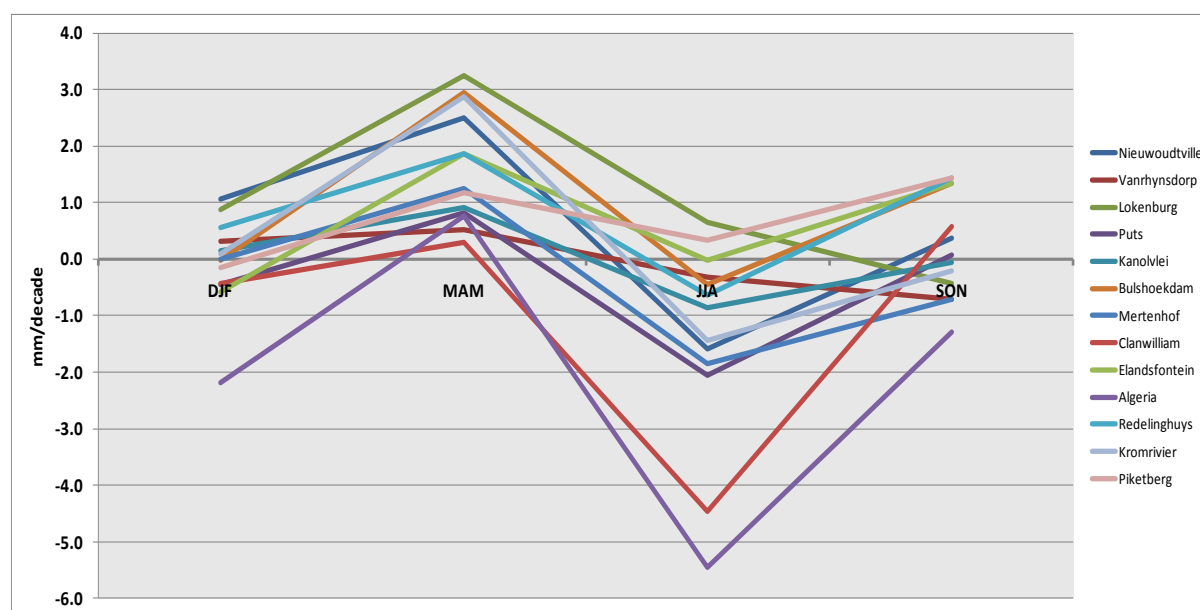
3.6 CLIMATIC CONDITIONS AND TRENDS

Ms Daleen Lötter of the CSIR has undertaken research on the climate history of the region as part of her PHD. An inventory of rainfall and temperature data from 13 weather stations in the West Coast District was obtained from the Institute for Soil, Climate and Water (Agricultural Research Council) and the South African Weather Service. Data from all stations was quality controlled and a range of methodologies used to detect trends in rainfall and temperature. It is acknowledged that not all of these weather stations are situated in the Bergrivier Municipal Area, but it is believed that they provide an adequate overview of climatic trends in the Municipal Area.

Lötter made the following observations in terms of rainfall:

- ≈ All stations except Clanwilliam and Algeria experienced an increase in annual rainfall;
- ≈ Only the Lokenburg and Redelinghuys stations exhibited statistically significant trends;
- ≈ Maximum annual rainfall anomalies ranged between an increase of 10.5 mm/decade at Redelinghuys and a drying of 6.5 mm/decade at Algeria;
- ≈ A general decreasing trend in annual rain days was seen over the study area with four stations exhibiting significant decreases;
- ≈ A decrease in rain days along with an increase in rainfall was observed for 8 of the 13 stations. She suggests that the changes in rainfall totals could largely be explained by an increase in the intensity of rain events
- ≈ Seasonal analysis revealed a general downward trend for most stations during June-July-August period and a strong upward trend for the months of March to May.

FIGURE 3: RAINFALL TRENDS

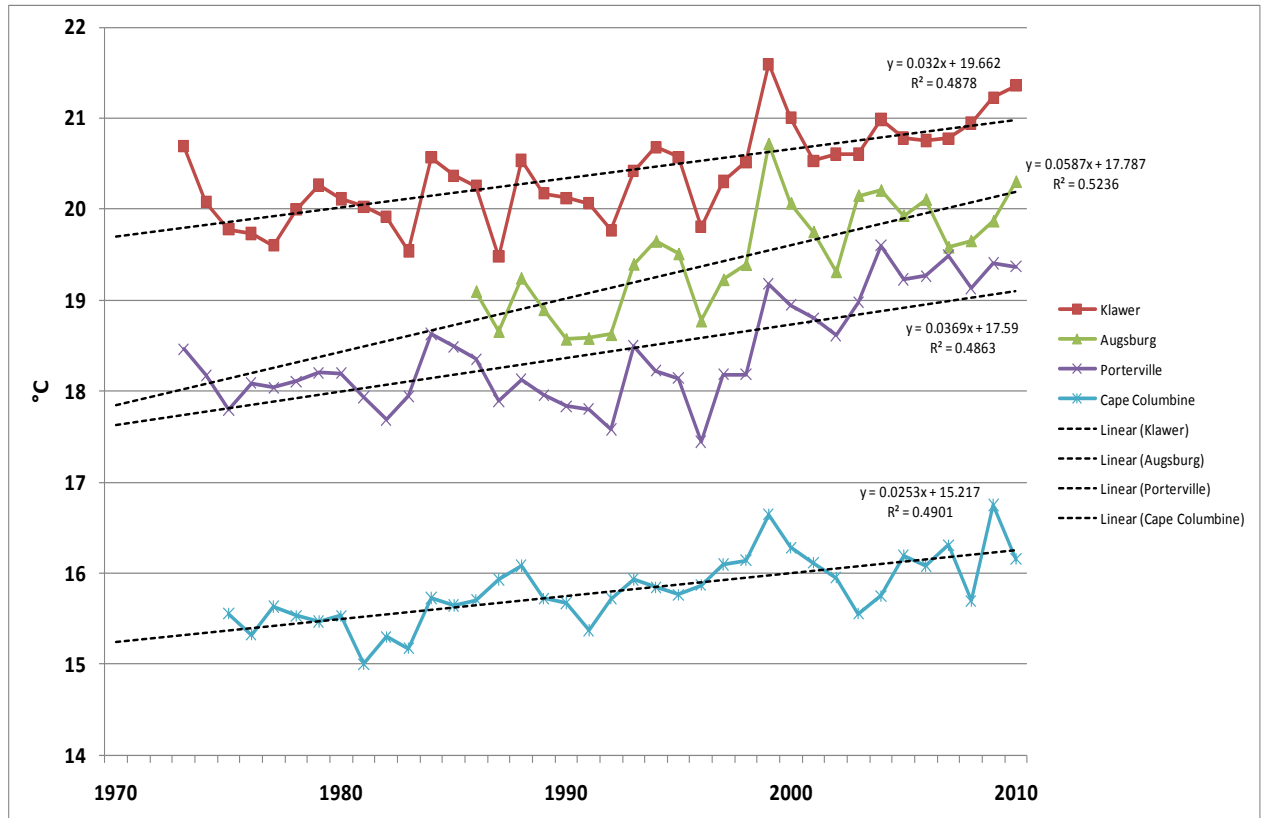


(SOURCE: LÖTTER 2012)

Lötter made the following observations in terms of temperature based on data from four weather stations, one of which was Porterville which is situated in our Municipal Area:

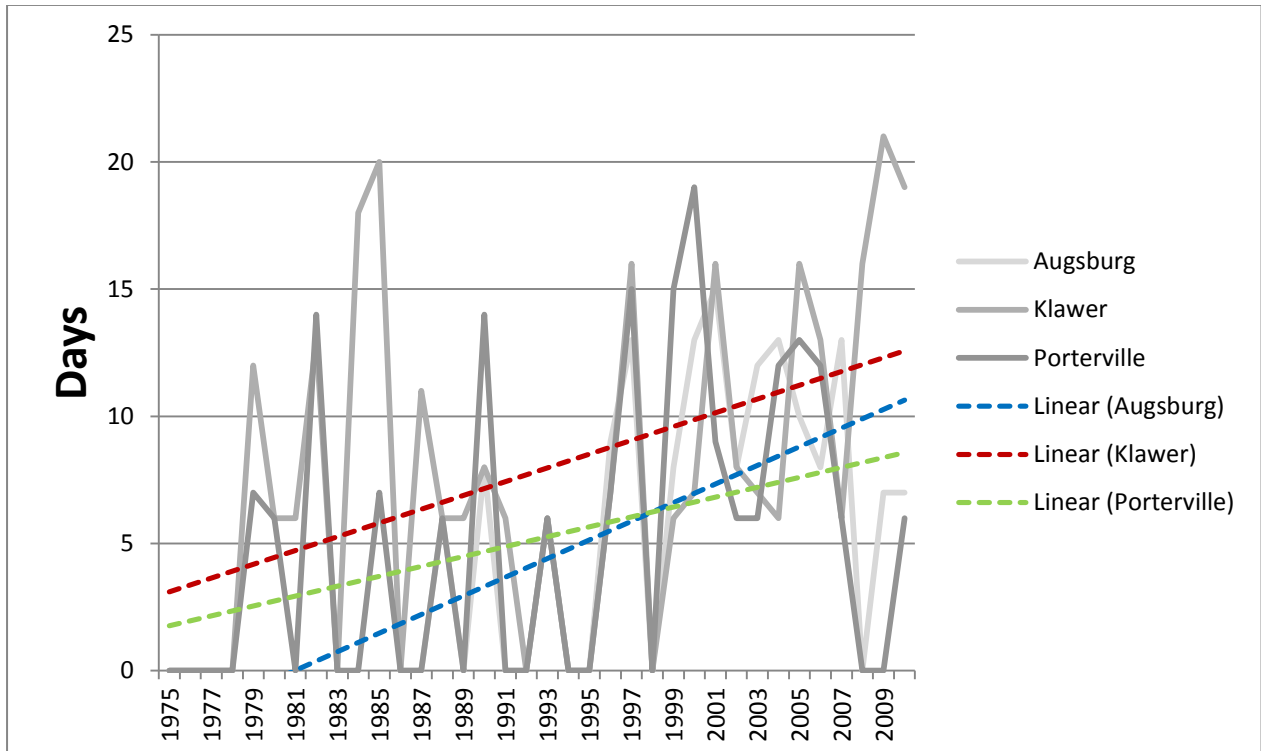
- ≈ The top ten warmest years for all stations consistently occurred after 1997. The only exception was Klawer which registered 1973 as the 10th warmest year.
- ≈ The warmest five years since 1973 in the Porterville region were 2004, 2005, 2006, 2009 and 2010.
- ≈ The annual average, maximum and minimum temperatures increased significantly for all 4 stations for the observed period, and average trends across stations equated to an increase of 1.4 °C (Tave), 1.6 °C (Tmax) and 1.1 °C (Tmin) over 38 years.
- ≈ All four stations also displayed significant increases in all seasons, and the average mean temperature trend increase over the observed period was found to be 1.3°C for summer, 1.8°C for autumn, 1.4 °C for winter 1.2 °C and for spring.

FIGURE 4: TRENDS IN TEMPRATURE



(SOURCE: LÖTTER 2012)

FIGURE 5: TRENDS IN HEATWAVE DAYS



(SOURCE: LÖTTER 2012)

4 STRATEGIC PARTNERSHIPS

Numerous partnerships have been formed under the Bergrivier Municipal Support Programme banner, thus broadening the climate adaptation related support the municipality has been receiving, and hopefully will continue to receive. This is advantageous for numerous reasons, namely:

- ≈ Capacity building is facilitated at the local, district, and provincial level, including the development of specialist capacity;
- ≈ The establishment of strategic partnerships which support more informed decision making amongst all stakeholders;
- ≈ A collaborative consultative approach allows for the building of a community of practice that includes a myriad of networks between different municipal stakeholder's (district and local), spheres of government, specialists and government as well as local representatives, sectors, government, and specialists.

These networks enable:

- ≈ Municipal officials and councillors to develop an improved understanding of climate change and its projected impacts on their area;
- ≈ Specialist scientists who may not necessarily have experience in participatory adaptation approaches to participate in such approaches;
- ≈ Provincial officials to improve their understanding of the challenges faced at local level;
- ≈ All roleplayers to increase their network and access to each other, thereby facilitating improved learning and communication;
- ≈ Local municipalities to have improved access to specialists to assist with complex or novel decision making;
- ≈ Provincial officials are able to facilitate the implementation of national and provincial climate adaptation strategies and policies at local level; as well as feed into these strategies and policies from the local level.

The following strategic partnerships warrant specific note:

4.1 WESTERN CAPE DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND DEVELOPMENT PLANNING (CLIMATE CHANGE SUB DIRECTORATE)

The Western Cape Department of Environmental Affairs and Development Planning (Climate Change and Biodiversity Directorate) is the custodian of the Municipal Support Programme (MSP), and were the initiators of the project. Ms Penny Price acted as facilitator during the process and provided a valuable link between the different stakeholders during the process. They will continue to play a role in the valuable role in the implementation of the plan.

4.2 COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH AND THE UNIVERSITY OF CAPE TOWN

An unrelated funding application by Dr Emma Archer van Garderen of the Council for Scientific and Industrial Research (CSIR) and Dr Gina Ziervogel from the University of Cape Town's (UCT) Environmental and Geographical Science Department (EGS) secured a small amount of funding in order to run one climate adaptation workshop in the West Coast District. On hearing about the DEADP MSP programme, a meeting was set up and it was decided that it would be advantageous to join forces with the MSP Bergrivier process. The rationale behind this decision included the following considerations:

- ≈ They wanted to target a municipality within the West Coast District, and Bergrivier Municipality was one such municipality;
- ≈ A key priority of the funding was to align with the priorities of the Western Cape Provincial Government in the area of climate change adaptation;
- ≈ The funding received was small and would only facilitate one workshop, and the partnership would contribute a significant value-add to the Bergrivier process which it was felt outweighed the value of running an isolated workshop in another municipal area.

Dr Archer van Garderen has many years of experience working in the West Coast District on climate related projects including work undertaken in the Sandveld between 2007 and 2009 on the implications of climate change for the two key agri-businesses in the area namely potatoes and rooibos (see Archer et al 2009). This work entailed a highly effective partnership between the private sector (Potato South Africa and the South African Rooibos Council), Cape Nature and scientists from UCT and the University of the Witwatersrand who analysed and communicated key findings relating to climate change on these agri-businesses. She also worked further north, in the Suid Bokkeveld, for more than a decade.

Dr Ziervogel has many years of academic research and project experience in climate adaptation at the local level. She has assessed the barriers to adaptation in five coastal cities in South Africa and has undertaken research exploring how climate adaptation can be aligned with development priorities such as water, agriculture, and food security. She has also contributed to climate change policy development at municipal and national level.

4.3 CLIMATE SYSTEM ANALYSIS GROUP

UCT's Climate System Analysis Group (CSAG) is one of the leading climate research groups in Africa. It focuses on addressing the climate change knowledge needs, developing capacity, and engaging with users around adaptation, policy and impacts. CSAG was therefore approached to assist with the climate science component of the MSP by looking at historical trends and future projections. They indicated that there would be a mutual benefit in partnering with DEADP's MSP, in that they would like to engage with local municipalities in order to gain a better understanding of what is required of climate science at the local level and how best to meet this need, particularly with a view to setting up some kind of sustainable system of engagement around this need. CSAG therefore made a small amount of funding available to support the addition of Anna Steynor and Ruwani Walawege to the group.

Anna Steynor is a climate scientist who has been specializing in local level adaptation planning and the development of climate information products. With a background in both climate science and

applied adaptation, she facilitates the robust use of climate information in adaptation decision-making. She has expertise in stakeholder engagement and climate services and plays a key role in building capacity in the uptake of the Climate System Analysis Group's (CSAG) tools, such as the Climate Information Portal. She has experience in delivering CSAG's climate projections in a user-friendly manner, alongside providing expertise in their application for vulnerability and adaptation planning.

Ruwani Walawege is also a climate scientist focusing on stakeholder engagement and training, who has a particular interest in how to better communicate climate information and translate this into useful information for various stakeholders that is easily accessible and understandable.

4.4 AFRICAN CLIMATE AND DEVELOPMENT INITIATIVE

The African Climate and Development Initiative (ACDI) aims to stimulate the interdisciplinary research and training that is needed to address the pressing issues of low carbon and climate resilient development, and they were looking for a local municipal area within the West Coast District where they could focus a trans/inter-disciplinary climate research programme drawing on the intellectual capital of a range of disciplines at UCT. They approached DEADP and recognising that this would provide additional longer term support to the MSP process in Bergrivier and a partnership was set up.

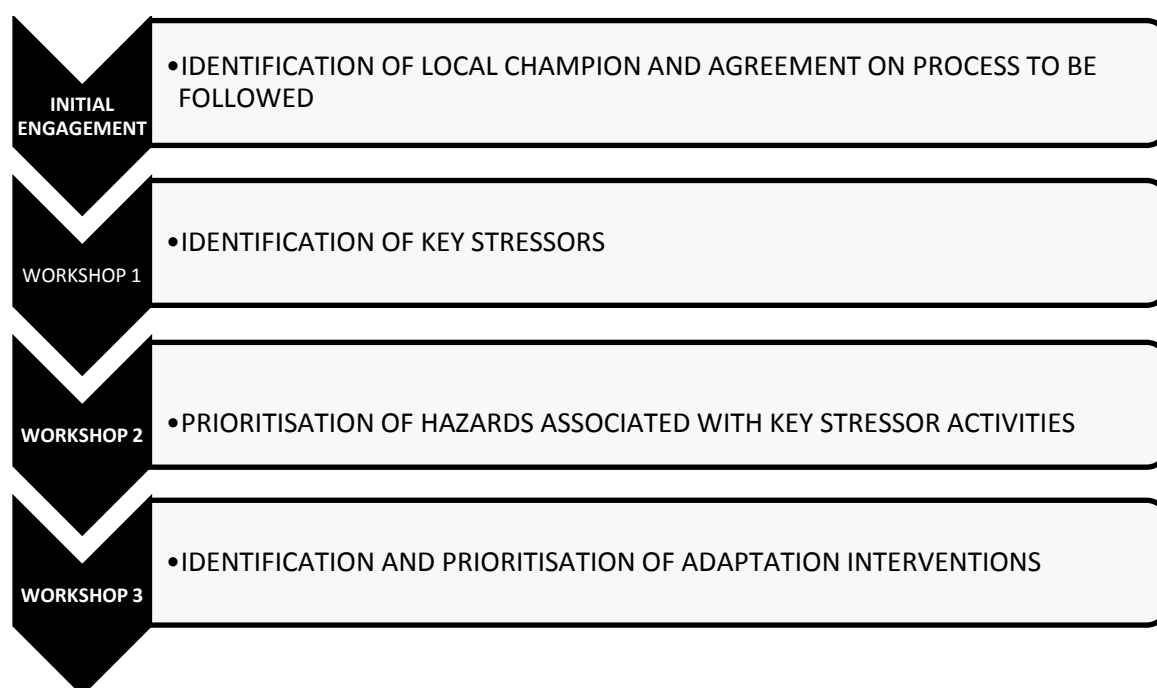
The ACDI group have engaged in a separate facilitated process aimed at identifying inter-/trans-disciplinary climate related research topics within the Bergrivier Municipal area, and this has now evolved into a trans / inter disciplinary Climate Change Network which meets on a regular basis. A significant number of the MSP Climate Adaptation Planning team are also part of the ACDI process, thus ensuring that the research topics are supportive of the emerging climate adaptation needs.

4.5 COMMUNITY PARTNERSHIPS

A concerted effort was made to include the local community in the development of the plan. Some Ward Committee Members, as well as representatives from the Municipality's most predominant sectors, namely tourism and agriculture and other key role players were also invited to participate.

5 CLIMATE ADAPTATION PROCESS / METHODOLOGY

The development of the plan was undertaken through a four step process which entailed an initial engagement and three workshops. The process can be summarised as follows:

FIGURE 6: CLIMATE CHANGE ADAPTATION PLANNING PROCESS

Workshops were reasonably well attended, with some being better attended than others. A slight disadvantage was a lack of continuity by some sectors at all workshops.

5.1 INITIAL ENGAGEMENT

A presentation was made to members of the Bergrivier Mayoral Committee in Piketberg on 14 August 2012 to discuss and plan the process for the development of the Climate Adaptation Plan. In addition to the councillors, the meeting was also attended by relevant officials, representatives from DEA&DP Climate Change Sub-Directorate, and two representatives from UCT's Climate System Analysis Group (CSAG). The outcome of this inception meeting was agreement on the process to be followed, the timing, and the roles and responsibilities amongst the various roleplayers.

Critical to the success of the engagement, a local 'climate champion' was identified, namely Tracey Stone, Manager: Strategic Services. This provided not only a contact person within the Municipality, but also an institutional anchor for the process. The process was also supported by the various Municipal Departments.

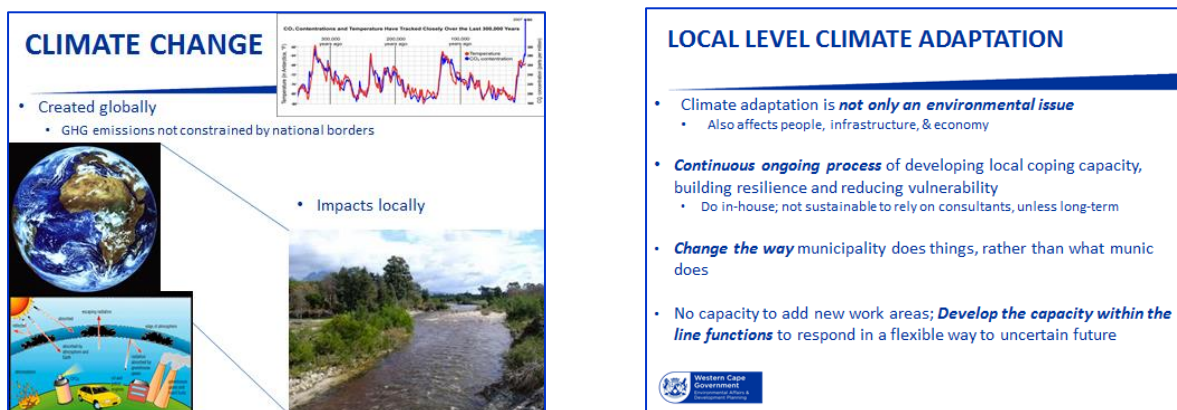
5.2 WORKSHOP 1 – ADAPTATION PROCESS, VULNERABILITY, CLIMATE HISTORY

The first workshop took place on 18 October 2012 in Piketberg and was opened by the Mayor of Bergrivier Municipality, Cllr E Manuel. It was reasonably well attended by a group made up of municipal officials, councillors, and external stakeholders.

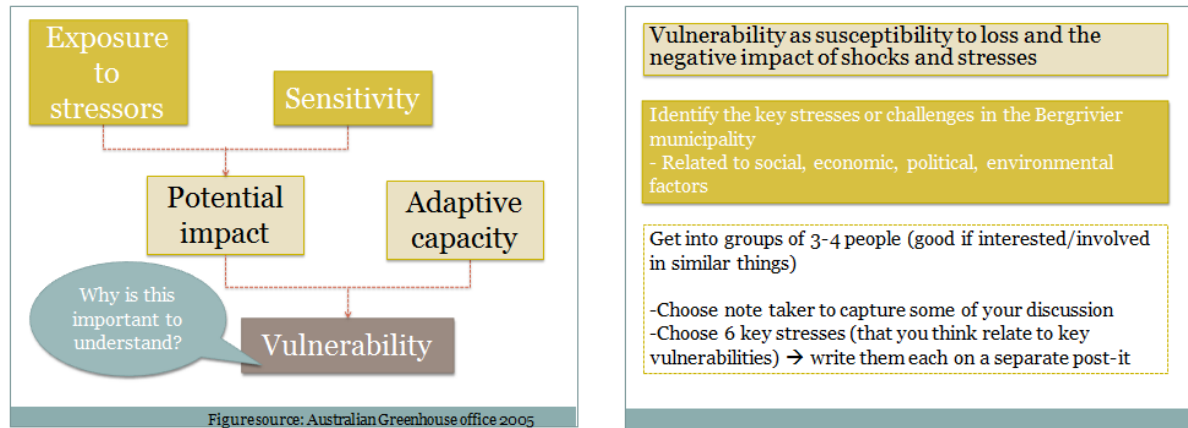
The assumption underpinning this workshop was the premise that climate change comprises one of many stressors that can amplify existing vulnerabilities. In order to reduce vulnerability to climate change therefore, one has to examine vulnerability per se. In order to assess vulnerability it is important to first establish what the key stressors experienced in the area are. These stressors are likely to coincide with many of the key development needs in the area. Strategies aimed at addressing these stressors overlap with some of the key priority areas reflected in the IDP.

The first presentation introduced climate change and climate adaptation basic concepts, as well as outlining the proposed process associated with the Municipal Support Programme.

FIGURE 7: EXAMPLES OF SLIDES FROM INTRODUCTORY PRESENTATION



This was followed by a short presentation on vulnerability and a participatory exercise which identified and prioritised key stressors being experienced in the area. The participants (around 20 in total) broke into four groups that identified a number of key stressors that were grouped into nine overarching topics. Participants then voted on which four out of these nine they regarded as the most significant, resulting in six key stressors being identified.

FIGURE 8: EXAMPLES OF SLIDES FROM THE VULNERABILITY PRESENTATION**FIGURE 9: A GROUP DISCUSSING KEY STRESSORS**

The top six key stressors that emerged from the exercise were:

1. The standard of infrastructure and services;
2. High dependency on grants;
3. Degraded environment due to development;
4. Poor water quality (river);
5. Limited employment opportunities; and
6. Migration and seasonal work (leading to increased social ills and competition for jobs by local people).

An up to date presentation followed on the climate history of the area which identified historical trends, highlighting changes that are already being seen in the Bergrivier area. This was based on the work of Daleen Lötter of the CSIR and is summarised in paragraph 3.6 (Climatic conditions and trends)

5.3 WORKSHOP 2 – CLIMATE VULNERABILITY AND IMPACTS

The second workshop was held in Piketberg on the 22 November 2012, and focussed primarily on the link between vulnerability and climate impacts.

Participatory exercises with the group revealed extensive examples of current and historical climate related events and how these have impacted on the Municipal Area as a whole.

A presentation followed on the key findings from recent analyses of climate projections for the area. With these in mind, a matrix was developed where significant climate hazards were examined in relation to key activities identified under the stressors exercise in the previous workshop. The group then undertook a prioritisation exercise wherein the likelihood of the hazard impacting on a specific sector or activity was rated (i.e. the risk). Substantive discussion took place as part of this prioritisation exercise, which entailed detail about the vulnerability and risk of the Bergrivier Municipal Area as a whole.

TABLE 5: KEY CLIMATE IMPACTS PER ACTIVITY AREA

Key sectors / activities	Climate hazards			
	High temp	Flood	Erratic rainfall	Heavy winds
Infrastructure - Roads	L	M	L	L
Infrastructure -Structures / buildings	M	L	L	M
Infrastructure - Low income housing	M	H	L	M
Infrastructure - Storm water	L	H	H	M
Service delivery - Water	M	M	L	L
Service delivery - Electricity	M	M	L	M
Natural Resources - veld / soil / land	H	M	M	L
Natural Resources - water quality / quantity	M	M	M	L
Residents' health	L	M	L	M
Seasonal work (employment)	M	M	L	L
Agriculture - wheat	M	L	H	M
Agriculture - potatoes	M	M	M	M
Agriculture - table grapes & wine grapes	M	L	M	L
Agriculture - fruit (Bo-berg)	M	L	L	M
Fishing	M	L	L	H
Tourism	M	M	M	M
Manufacture and trade	M	L	L	L

5.4 WORKSHOP 3 – IDENTIFYING CLIMATE ADAPTATION OPTIONS

The third workshop was held in Piketberg on the 30 January 2013 and was well attended, with the new Municipal Manager also attending.

The focus of this workshop was the identification and prioritisation of adaptation interventions aimed at mitigating the climate impact on specific high risk activity areas as identified in the matrix exercise developed during the previous workshop.

The workshop started off with a recap of the process and information presented and collected to date. The participants then agreed that they would restrict the identification of adaptation interventions to the activity areas identified through the matrix exercise as being high risk. If time allowed some of the medium risk areas could be examined. It was decided that although the fishing industry was identified as a high priority risk, this would not be addressed as there was no representation from this sector present. The following high risk areas were focussed on:

1. Mainstreaming of climate change adaptation into municipal governance
2. Climate resilient low income housing
3. Storm water management
4. Conservation of natural resources
5. Agriculture

Before breaking into groups, the following key discussion points emerged around the climate adaptation process, climate vulnerability, the current status quo of related projects, and problem areas and barriers to implementation.

The workshop participants then divided into two groups, one focussed on mitigating the risk relating to the 'natural' environment, and the other on the mitigating the risk relating to the 'built environment'. The adaptation interventions that were identified are outlined in the section below.

6 CLIMATE ADAPTATION OBJECTIVES AND INTERVENTIONS

6.1 OBJECTIVES

The objective of the Climate Change Adaptation Plan is to identify ways in which the Municipality can respond to the impacts of climate change within the parameters of its powers and functions and its available resources.

Climate change cannot be addressed by any single entity or organisation and it is imperative that all stakeholders work together proactively to develop a climate resilient Western Cape, South Africa and World.

Climate change is not only an environmental issue, it effects people, infrastructure and the economy, and as such should not be seen as a separate function, but rather a lens through which the Municipality views its functions. Adapting to climate change is therefore not a new function but rather a way of doing the same things in a different way. This equates to mainstreaming climate change into all planning, development and decision making.

It is also important to acknowledge that the impacts of climate change are not necessarily all negative and there are opportunities which need to be identified.

6.2 INTERVENTIONS

6.2.1 MAINSTREAMING OF CLIMATE CHANGE ADAPTATION INTO MUNICIPAL GOVERNANCE

Problem statement: Adaptation to climate change should not be viewed as a separate function of the Municipality but rather be mainstreamed as a consideration in all planning and development. Capacity needs to be developed amongst all stakeholders, knowledge co-produced and shared, and valuable experience developed around successful climate adaptation.

A priority that needs to be addressed is how to get increased political buy-in to the climate adaptation process to ensure that the identified adaptation interventions can be taken forward effectively. The timeline for the implementation of identified adaptation interventions will depend on the availability of funding, and if there is no available funding how long it will take to source funding. Successful implementation is also dependant on the coordination of environmental forums/structures.

The following table identified interventions (existing, planned, and proposed) aimed at achieving this.

TABLE 6: MAINSTREAMING OF CLIMATE CHANGE ADAPTATION INTO MUNICIPAL GOVERNANCE

PROJECT	DETAIL	PROJECT DRIVER(S)	EXISTING STAKEHOLDERS	BUDGET	OPPORTUNITIES/ SUPPORT / COLLABORATION / RESEARCH
Capacity building and awareness – officials and decision makers to create buy in.	<ul style="list-style-type: none"> Training and information dissemination 	Strategic Manager (BM)	<ul style="list-style-type: none"> DEADP (Climate Change Sub Directorate) Councillors Municipal officials 	In house	<ul style="list-style-type: none"> ACDI UCT
Capacity building - community	<ul style="list-style-type: none"> Seminar to create awareness and information dissemination Green Ambassadors – youth development programme (EPWP) 	Strategic Manager (BM)	<ul style="list-style-type: none"> DEADP – EPWP co-ordinator 	In house	<ul style="list-style-type: none"> Provincial EPWP Co-ordinators DEADP (Climate Change Sub Directorate) ACDI Climate Change Network
Environment sector engagement	<ul style="list-style-type: none"> Targeted participatory planning process to include environmental issues in IDP (Environment Sector 	Municipal Manager (BM)	<ul style="list-style-type: none"> Ward committees BEMF GCBC 	In house	<ul style="list-style-type: none"> Cape Nature

PROJECT	DETAIL	PROJECT DRIVER(S)	EXISTING STAKEHOLDERS	BUDGET	OPPORTUNITIES/ SUPPORT / COLLABORATION / RESEARCH
	engagements)		<ul style="list-style-type: none"> • West Coast Biosphere • Local interested stakeholders 		

6.2.2 CLIMATE RESILIENT LOW COST HOUSING

Problem statement: Typically in the past, no consideration was given to climatic considerations when designing low cost housing. Low cost houses are essentially cement shacks with little or no insulation and no inclusion of any measures to mitigate local climate risk. This situation not only compromises the health of residents, but also serves to increase their vulnerability to climate hazards associated with climate change, such as increased temperatures, increased intensity of rainfall, increased intensity of wind, etc.

Bergervier Municipality currently has a housing pipeline, which will result in the construction of low cost houses in various towns in the Municipal Area over the next five years. This provides the ideal opportunity to include climate considerations into the design of the development as well as individual houses. There is also a need to retrofit the existing low cost housing; however this will pose a challenge as existing houses are now in private ownership.

The following table identified interventions (existing, planned, and proposed) aimed at achieving this.

TABLE 7: CLIMATE RESILIENT LOW COST HOUSING

PROJECT	DETAIL	PROJECT DRIVER(S)	EXISTING STAKEHOLDERS	BUDGET	OPPORTUNITIES/ SUPPORT / COLLABORATION / RESEARCH
Assess the potential for new low cost housing developments to be more climate resilient.	<ul style="list-style-type: none"> Ensure climate risk reduction considerations are incorporated into the design of new housing developments, e.g. <ul style="list-style-type: none"> Must do environmental / vulnerability assessments / redo mapping of flood lines Disaster Risk Assessment of Bergervier and broader West Coast District currently being undertaken. 	<ul style="list-style-type: none"> Manager Human Settlement (BM). Manager Disaster Management (BM). 	<ul style="list-style-type: none"> PDMC WCDM DMC UCT (Hons student – Dr G Ziervogel). 	ACDI budget for student field work.	<ul style="list-style-type: none"> DEADP to facilitate collaboration.
Greening RDP housing design.	<ul style="list-style-type: none"> Explore the potential for RDP house to be more environmentally friendly and suitable for climate impacts (intense heat, water runoff, etc). 	<ul style="list-style-type: none"> Manager Human Settlement (BM). 	<ul style="list-style-type: none"> Energy Research Centre (H Wlokas). Solairedirect Trust (H Morris). 	R57,000	<ul style="list-style-type: none"> Students to explore innovations; <ul style="list-style-type: none"> Inter / trans-disciplinary (environmental, social,

PROJECT	DETAIL	PROJECT DRIVER(S)	EXISTING STAKEHOLDERS	BUDGET	OPPORTUNITIES/ SUPPORT / COLLABORATION / RESEARCH
	<ul style="list-style-type: none"> Investigate what additional funding would be needed to make houses more 'climate resilient' How to minimize subsidies for these households – rainwater tanks and solar options. (both existing and new housing). Could link to Aurora solar farm trust/Solaire project and enterprise fund. Build capacity to maintain and create jobs around it. Vertical gardens should be investigated (insulation, food, improved use of water). 	<ul style="list-style-type: none"> Project Manager (BM). Strategic Manager (BM). 			and architectural) <ul style="list-style-type: none"> Scope to change specifications for contractor, needs to be informed by research Could search for funding for climate 'top-up'. Green Building DEADP to facilitate collaboration
'Green building' retrofitting of existing low cost housing	<ul style="list-style-type: none"> Rainwater tanks, solar water heaters, and vertical gardens Solairedirect Solar Trust in Aurora (Project – Enterprise Fund – trying to build local jobs, maintenance, etc) 	<ul style="list-style-type: none"> Manager Human Settlement (BM). Project Manager (BM). Strategic Manager (BM). 	<ul style="list-style-type: none"> Energy Research Centre (H Wlokas). Solairedirect Trust (H Morris). 	To be determined	<ul style="list-style-type: none"> Green Building Council ACDI. DEADP to facilitate collaboration

6.2.3 STORMWATER MANAGEMENT

Problem statement: The Municipality's storm water management plans for Piketberg did not fully take into account the effect of run-off water from the mountain, and as a result, many houses in the northern part of Piketberg, including the recently constructed low cost houses flood on a regular basis. As a result of this, when rain is forecast for Piketberg, the Municipality puts sandbags to divert water away from the area. This is however not sustainable, particularly in view of the rainfall intensification trends in the area. This problem also manifests in other areas of the Municipality and storm water related issues always receive a high priority during the public participation process that accompanies revisions to the IDP.

Master plans are in place to deal with this and other infrastructure related issues but funding to implement these plans is limited. One of the projects contained in the storm water master plan is the diversion of excess storm water into a dam as a flood prevention measure in Piketberg. These plans therefore provide an opportunity to include climate change considerations into new infrastructure planning and development.

The following table identified interventions (existing, planned, and proposed) aimed at achieving this.

TABLE 8: STORMWATER MANAGEMENT

PROJECT	DETAIL	PROJECT DRIVER(S)	EXISTING STAKEHOLDERS	BUDGET	OPPORTUNITIES/ SUPPORT / COLLABORATION / RESEARCH
Improved management of storm water	<ul style="list-style-type: none"> Ensure climate considerations are taken into account when developing / revising infrastructure master plans Improve storm water maintenance <ul style="list-style-type: none"> Increased occurrence of storm water drain clearing, particularly before significant rainfall. 	<ul style="list-style-type: none"> Manager Civil Services (BM) 	<ul style="list-style-type: none"> City of Cape Town (CCT) UCT (Engineering faculty) 	To be determined	<ul style="list-style-type: none"> Link to CHEC (Research opportunities) Link to Provincial Infrastructure Framework DEADP to facilitate collaboration between CCT and Bergrivier
Investigate alternative use of storm water	<ul style="list-style-type: none"> Assess rainwater harvesting potential and explore potential to channel water to commonage / open spaces (Piketberg North) – this could provide an opportunity to use these areas for recreational purposes or communal 	<ul style="list-style-type: none"> Strategic Manager (BM). Manager Civil Services (BM) 	<ul style="list-style-type: none"> Cassidra (Rainwater harvesting) DWAF (Rainwater harvesting) 	To be determined	<ul style="list-style-type: none"> Potential links with green economy (new innovations))

PROJECT	DETAIL	PROJECT DRIVER(S)	EXISTING STAKEHOLDERS	BUDGET	OPPORTUNITIES/ SUPPORT / COLLABORATION / RESEARCH
	food gardens (food security and cooler areas)				
Regulation of storm water drainage (By-law)	<ul style="list-style-type: none"> Develop a by-law aimed at reducing storm water run-off across the municipality through the restriction of the amount of hard surfaces allowed on a particular erf. This will encourage infiltration of water on site rather than having to increase the design specifications of the storm water system to accommodate growing urban areas and / or increased intensity of rainfall. 	<ul style="list-style-type: none"> Manager Civil Services (BM) 	-	In house	UCT (Sustainable Urban Drainage Systems (SUDS))

6.2.4 CONSERVATION OF NATURAL RESOURCES

Problem Statement: Invasive alien vegetation compromises the availability of water in the Berg River, and increases the fire risk in the area as a whole. Climate projections indicate a trend towards higher mean annual temperatures in the area, which will increase the fire risk as well as potentially compromising water supply. Bergrivier Municipality can play a more significant role in alien clearing initiatives in the area through utilisation of the Extended Public Works Programme (EPWP), as well as increased municipal representation on initiatives such as the Department of Water Affairs, Department of Agriculture's Land Care programme, Department of Environmental Affairs' Working for Water and Working for Wetlands programmes. There is also significant potential to participate in programmes of the West Coast District Municipality.

Localising involvement at the municipal level will increase job opportunities in the area, which may have a related positive affect on reducing the challenges associated with the dependence on seasonal work in the area. At present most of the municipality's EPWP funds are spent on infrastructure related projects, however the Western Cape Government EPWP co-ordinator could assist with the utilisation of EPWP funds to develop invasive alien vegetation clearing projects. A concern was raised that many women are excluded from participating in EPWP projects, due to the fact that they receive social grants. This needs to be investigated, as there are a lot of female-headed households in the municipality who are missing out on this employment opportunity.

Private sector involvement is essential to the climate adaptation process, and in the area of alien vegetation clearing there is already a proposed PPC biomass-to-energy initiative underway in the Piketberg area. This provides an opportunity for the municipality to partner with the private sector around this and other similar initiatives with the support of the Provincial Green Economy Programme.

There is also a potential opportunity to link in with and utilise the ICLEI Local Action for Biodiversity (LAB) Agreement, which the municipality signed in 2010. This could potentially introduce an ecosystem services component to the adaptation planning at some point, which could significantly open up further collaborative and/or funding opportunities. Funding is currently a constraint, but a few projects have been initiated nonetheless under this initiative.

The following table identified interventions (existing, planned, and proposed) aimed at achieving this.

TABLE 9: CONSERVATION OF NATURAL RESOURCES

PROJECT	DETAIL	PROJECT DRIVER(S)	EXISTING STAKEHOLDERS	BUDGET	OPPORTUNITIES/ SUPPORT / COLLABORATION / RESEARCH
Expand and	<ul style="list-style-type: none"> EPWP budget to include projects 	<ul style="list-style-type: none"> Project 	<ul style="list-style-type: none"> DEADP – EPWP co- 	To be	<ul style="list-style-type: none"> Investigate issue of women

PROJECT	DETAIL	PROJECT DRIVER(S)	EXISTING STAKEHOLDERS	BUDGET	OPPORTUNITIES/ SUPPORT / COLLABORATION / RESEARCH
participate in existing alien clearing programmes	<p>aimed at clearing invasive alien plants and fighting bush fires</p> <ul style="list-style-type: none"> • Ensure that Municipality is represented on the EPWP Environmental Arts & Culture Sector meeting. • Source funding for alien clearing projects • Send resulting biomass to local industry; like PPC (part of existing process whereby they are obtaining a permit to burn solid waste) • Expand PPC solid waste burning project (part of an existing process) • Green economy opportunity <ul style="list-style-type: none"> ○ Value chain for Bio Mass • Clear water hyacinths <ul style="list-style-type: none"> ○ Partnership with Department of Agriculture and West Coast District Municipality who are already involved 	<ul style="list-style-type: none"> • Manager (BM) • Strategic Manager (BM). 	<p>ordinator</p> <ul style="list-style-type: none"> • Cederberg Besproeingsraad (A significant stakeholder, coordinates alien clearing, etc. • Cape Nature • West Coast District Municipality • PPC • Department of Agriculture • Working for water • Working for Wetlands 	determined	<p>who get social grants not qualify for EPWP</p> <ul style="list-style-type: none"> ○ Legal Resource Centre ○ Provincial EPWP Offices <ul style="list-style-type: none"> • Link to DEADP ECO invest project (Biomass investment opportunity) • West Coast Biosphere • Table Mountain Fund (Community alien removal projects) • GCBC • Spier (Key example of alternative use of biomass)
Expand existing Working on Fire programmes	<ul style="list-style-type: none"> • Fire Protection Associations <ul style="list-style-type: none"> ○ Need increased support so that can go into lowlands areas ○ Join FPAs – linked to the Veld and Forest Fire Act • Build synergies with Disaster Management through EPWP 	<ul style="list-style-type: none"> • Manager Disaster Management (BM) 	<ul style="list-style-type: none"> • Working for Fire 	To be determined	<ul style="list-style-type: none"> • CFPA • GCBC

PROJECT	DETAIL	PROJECT DRIVER(S)	EXISTING STAKEHOLDERS	BUDGET	OPPORTUNITIES/ SUPPORT / COLLABORATION / RESEARCH
	<ul style="list-style-type: none">Increased support so that the municipality can employ people permanently (an existing challenge)				

6.2.5 AGRICULTURE

Problem statement: The agriculture sector was less involved in this planning process, which is primarily attributable to the time of year when the meetings were held. Despite this there was a great interest in climate change and the impact thereof on the agriculture sector. The contribution of the Agriculture sector in funding some of the early work on the implications of climate change for the Sandveld is also acknowledged.

The sector thus needs to be a priority for further engagement. It was suggested that a forum be established so that farmers (small-scale and commercial) can be assisted with long-term planning, and the clear identification of stresses, priority threats and adaptation opportunities, as well as integration within the municipality strategy. This will also be necessary so that the agricultural sector can be represented more in the IDP planning process, as an on-going engagement. There was a suggestion that a municipal representative participate in the existing agricultural unions which could be taken further, as the unions have on a number of occasions expressed interest in understanding climate change implications.

The following table identified interventions (existing, planned, and proposed) aimed at achieving this.

TABLE 10: AGRICULTURE

PROJECT	DETAIL	PROJECT DRIVER(S)	EXISTING STAKEHOLDERS	BUDGET	OPPORTUNITIES/ SUPPORT / COLLABORATION / RESEARCH
Agriculture	<ul style="list-style-type: none"> Targeted participatory planning process for Agricultural Sector in IDP (Agriculture Sector engagements) Mainstream agriculture sector into municipal planning Municipality should have a representative on the Agriculture Union 	Municipal Manager	Department of Agriculture Agriculture Unions	In house	Land Care Programme

7 CONCLUSION

This plan seeks to identify a range of interventions that can be implemented over the short to medium term. The timeline for the implementation of identified adaptation interventions will depend on the availability of funding, and if there is no available funding how long it will take to source funding . Priority will be given to the interventions that can be done in-house, while others will be referred to future budgets.

Collaboration and the establishment of networks is critical to the successful implementation of this plan, and the he Municipality would like to thank all the role-players that participated in the development of the plan and who together with us will work on its implementation.

TABLES AND FIGURES

TABLE 1: POWERS AND FUNCTIONS OF THE MUNICIPALITY	6
TABLE 2: GOALS AND STRATEGIC OBJECTIVES OF THE MUNICIPALITY	7
TABLE 3: EXISTING STRATEGIES AND PLANS.....	8
TABLE 4: MUNICIPAL GDP GROWTH ACROSS SECTORS (2000 - 2011).....	10
TABLE 5: KEY CLIMATE IMPACTS PER ACTIVITY AREA.....	19
TABLE 6: MAINSTREAMING OF CLIMATE CHANGE ADAPTATION INTO MUNICIPAL GOVERNANCE	22
TABLE 7: CLIMATE RESILIENT LOW COST HOUSING	24
TABLE 8: STORMWATER MANAGEMENT	26
TABLE 9: CONSERVATION OF NATURAL RESOURCES.....	28
TABLE 10: AGRICULTURE.....	31
FIGURE 1: MAP OF BERGRIVIER MUNICIPALITY.....	5
FIGURE 2: BERGRIVIER POPULATION PYRAMID.....	9
FIGURE 3: RAINFALL TRENDS	11
FIGURE 4: TRENDS IN TEMPERATURE (SOURCE: LÖTTER 2012)	12
FIGURE 5: TRENDS IN HEATWAVE DAYS	12
FIGURE 6: CLIMATE CHANGE ADAPTATION PLANNING PROCESS	16
FIGURE 7: EXAMPLES OF SLIDES FROM INTRODUCTORY PRESENTATION	17
FIGURE 8: EXAMPLES OF SLIDES FROM THE VULNERABILITY PRESENTATION	18
FIGURE 9: A GROUP DISCUSSING KEY STRESSORS.....	18

ACCRONYMS AND ABBREVIATIONS

ACDI	African Climate and Development Initiative
BEMF	Berg Estuary Management Forum
BM	Bergrivier Municipality
CBO	Community based organisation
CFPA	Cederberg Fire Protection Association
CHEC	Cape Higher Education Consortium
CSAG	Climate Systems Analysis Group
CSIR	Council for Scientific and Industrial Research
DEADP	Department of Environmental Affairs and Development Planning
DMP	Disaster Management Plan
EGS	Environmental and Geographical Science
EPWP	Extended Public Works Programme
FPA	Fire Protection Agency
GCBC	Greater Cederberg Biodiversity Corridor
GDP	Gross Domestic Product
IDP	Integrated Development Plan
IPCC	Intergovernmental Panel on Climate Change
MSP	Municipal Support Programme
NCCRP	National Climate Change Response Policy
NGO	Non-Government Organisation
PDMC	Provincial Disaster Management Centre
SDF	Spatial Development Framework
SUDS	Sustainable Urban Drainage
TMF	Table Mountain Fund
UCT	University of Cape Town
WCCCRS	Western Cape Climate Change Response Strategy
WCDM	West Coast District Municipality
WCDM DMC	West Coast District Municipality Disaster Management Centre
WCG	Western Cape Government