

CHAPTER 13

Durban, climate change, and socio-political transformation

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Climate change is the most unjust possible situation that human activity could have created. It is effectively a result of the byproducts of what has turned out to be an immensely indulgent lifestyle in a handful of countries. It is likely to cause – and we are already seeing some of these impacts – enormous shifts in how life interacts on the planet, in how ecosystems function, and in how human societies feed, water and warm themselves. A disaster on this scale, with the sorts of resource scarcities, impacts on human security, and conflicts that are likely to emerge, should be classified a crime against humanity and all of life. The most vulnerable and the most affected people are the least responsible for the problem. And those most responsible continue to avoid commitments or real action on climate change.

But even if the world entirely stopped emitting carbon tomorrow morning, there would still be impacts from human-caused climate change, and there would still be a need to find ways to cope with those impacts. The sooner and stronger climate change adaptation measures are implemented, the lower the threat that climate change presents, especially in the short term.

There are many actions South Africans can take at national, regional and

community level, to ward off the worst, or to adapt to the changes. In many senses, adaptation echoes sustainability practices, with education and understanding critical for ensuring the development of effective adaptation plans that are relevant to unique local circumstances. Adaptation in no way reduces the need for meaningful mitigation on an international scale, but it does offer the potential to significantly reduce the direct impacts on vulnerable peoples. What it does demand, though, is active participation at community level and the development of plans in full partnership with those who will most benefit from adaptation action.

Encouraging individual, household and community adaptation

Rural African communities know how to cope with a very temperamental climate and over many centuries have developed innovative adaptation mechanisms for natural disasters. This includes knowledge on selecting seed for a variety of weather conditions, and community networks that are able to provide a support buffer for the most affected households during a disaster. However, climate change is expected to increase the frequency of extreme events, and this is likely to reduce community and household ability to cope. In addition, in many cases new types of information may become important, and communities will need to seek solutions outside of their traditional sources of information.

The benefits of adaptation are immediate and usually local, but there are also longer-term positive impacts that are ultimately of benefit nationally and globally. Adaptation actions could, in fact, be beneficial even without the looming threats posed by climate change. Many South African communities already face a

complexity of stresses such as land degradation as a result of overpopulation in the ex-homelands (a result of forced resettlements during apartheid), water abstraction for commercial agriculture and timber plantations, and poverty, which combine to increase the vulnerability of these communities to the impacts of climate change.

Adaptation solutions are not often much different from sustainability practices to address existing problems, and it is highly valuable to draw on experiences from sustainability projects to plan and implement climate change adaptation.

For example:

- Educating children, and girls in particular, improves people's ability to learn about and cope with changes in their environment
- Improving maternal health is also likely to reduce the impact of malaria and other diseases
- Providing clean water and energy will improve health and reduce people's vulnerability to climate change impacts

Successful adaptation will require involvement and action at individual, household and community level; many of the coping mechanisms will need to be developed locally to be most effective for specific local conditions. In many cases, people will develop adaptation mechanisms organically, as they would deal with any other changes in their environment, and there is some evidence of this occurring already.

Nationally, it will be valuable to develop and implement policy and actions to enhance adaptive capacity of the most vulnerable population groups, such as rural

communities in the drier parts of the countries, or the elderly in cities. On a regional level, for example, local governance structures could play a role in protecting ecosystems from development through rezoning and thus enhance the capacity of those ecosystems to attenuate floods and droughts.

Education and awareness are, as always, a crucial starting point for behavioural change. Education/awareness about climate change should focus on developing and implementing actions that people can relate to and see the benefits of immediately.

Climate change in South Africa

In very general terms, South Africa is expected to become warmer throughout the country, drier in most of the country but with increased rainfall to the east of the Drakensberg escarpment.

Most of the country is classified as semi-arid, and already faces severe water pressures. The country's main economic hub, Gauteng province, imports water through interbasin transfers within the country, and also with a significant import from Lesotho. The pressures on the water resources within South Africa include heavy and in many cases unsustainable abstraction for agriculture, timber, mining, urban use and industry. The bulk of the water is used in agriculture, and used in mostly very inefficient irrigation schemes in commercial agriculture.

Pollution from industry and urban settlements is significant, but the key impact on water resources is from mining. Acid mine drainage already threatens water quality significantly in many areas in Gauteng and the North West province,

but as mines shut down and there is no longer a pumping of the mine floodwaters, it is expected that the rivers and groundwater resources in these areas will become severely contaminated – bearing in mind that we already see at least one large dam rendered useless for human and agricultural use due to acid mine drainage. In addition, there are numerous new applications for mining and prospecting in Mpumalanga, which if approved could literally poison rivers of importance to the western half of the country, including the Free State and the arid North West province. The prospect of natural gas fracking operations in the Karoo threatens water resources in yet another vast area.

The impacts of climate change on South Africa include significantly increased water stress, significant loss of biodiversity particularly in areas with high endemism or biodiversity hotspots such as the Succulent Karoo and the Cape Floral Kingdom, migration of animal species, increased food security risks, increased poverty, and increased human migration with potential for conflict.

The country has made weak commitments to mitigation despite being responsible for about half of Africa's greenhouse gas emissions, and heavily supports the carbon markets. It has also committed to further significant increases in emissions through its coal energy development, ignoring the implications for air and water pollution. Adaptation planning is progressing in some urban areas but there is little in the public domain about national level adaptation.

Climate change in Durban

Durban has a semi-tropical climate and benefits from being to the east of the

Drakensberg escarpment, a key South African “raintrap”. It is considerably less pressured in terms of water availability than most of the rest of the country, but there are stresses on the city both in terms of increasing water demands and future water availability.

Predicting climate change impacts is an ongoing challenge. There is no precision and the models are not at high enough resolution to provide detailed predictions, but judging from trends and using the information that is available, it is possible to make some predictions.

Durban is expected to become warmer, with daily maximum temperatures increasing by 2-3°C and daily minimum temperatures by 3-4°C over all seasons. An increase in heat waves is expected over the October to March period with temperatures over 30°C, as well as a higher number of days with temperatures over 30°C.

In the short term it is not expected that there will be significant changes to rainfall, but by mid century an increase of 10-20% is expected, going up to 30-100% by 2100. There will also be an increase in the number of days with more than 10mm of rainfall, but also a significant increase in evaporation. Modeling shows no significant change in the frequency and intensity of droughts. Further detailed analysis will provide a more accurate indication of the situation in the region.

As a result of these changes, expected environmental impacts include biodiversity loss, significant decreases in water availability, increased health challenges, decreased agricultural activity, an increase in storms and flooding events, and ecosystem loss.

Migration to the city from rural areas and other parts of South Africa will increase Durban's population and increase the demands on existing infrastructure and resources. Environmental refugees are already evident, with people moving to the city because of loss of land in rural areas for various reasons, including timber plantations, in addition to widespread stresses such as low livelihoods potential and immigration from other countries. An inability to cope with the needs of migrants could lead to destabilisation, displacement of some groups, and conflict.

Water

Increased rainfall is likely to lead to high average runoff and streamflow, potentially providing for replenishment of dams and the ecological reserve. But it is also expected that there will be an increase in evaporation, low absorption of rain into soils, and higher-impact runoff, all of which is likely to lead to increased pressures in some systems. Work is in progress to develop a better understanding of what is likely to happen in terms of water availability in eThekweni (the greater Durban region) as a result of climate change.

Durban's existing population is already straining its water systems, and the population is increasing. There is also the potential additional stress expected in the near future of the city becoming a centre for climate change refugees from rural areas and drier parts of the country.

Higher rainfall is potentially valuable for the city and could create opportunities for household rainwater harvesting, as well as adding to groundwater stores and the ecological reserve. To be able to ensure adequate supply for

household and economic use, the water will need to be captured, purified and allocated. The municipality is expecting to face additional challenges with regard to storage and distribution of water. Even with higher rainfall, the increasing demands on the reserve and the periods of particularly dry or wet weather will place pressure and additional strains on health systems.

In rural areas, improved water storage and management could be used to extend water access and support rural livelihoods. Less reliable water availability could exacerbate the existing struggle for good and clean water, leading to increased malnutrition, dehydration and the prevalence of diseases such as cholera, with severe impacts on people living with HIV and AIDS.

Floods

The expected increase in frequency and intensity of flood events as a result of climate change will place additional demands on the municipality's response capacity to storms and flooding which ensures temporary shelter and food, and reconstruction work. Coping with this might need to take on new dimensions such as the need for new medical treatment, longer term and more extensive refugee accommodation, new transport infrastructure, and assistance with new livelihood options.

Floods have impacts on human security and health, and ecosystem health. They disrupt and damage infrastructure including roads, bridges and railway lines, communication and electrical infrastructure. They can also lead to water contamination if water systems are compromised.

Higher rainfall is also likely to expose communities to more frequent localised flooding, especially if stormwater systems are unable to cope with the frequency or intensity of floods. In areas or communities where clean water is not provided, higher rainfall could lead to greater incidences of water contamination and associated health complications. Flooding also offers opportunities for new breeding grounds for disease vectors.

Communities and properties in low-lying areas would be inundated and this could lead to displacement during emergency periods, or for the long term in some cases. Shack settlements are especially vulnerable because of poor construction, often in areas prone to flooding, with no stormwater systems, and high concentrations of people.

Rural communities could become isolated, preventing support from emergency services and increasing the risk of disease. There are also psychological concerns such as the effects of trauma and depression following loss of friends and family, homes and livelihoods. These personal losses increase stress and hamper people's ability to recover and return to a normal life.

Health

Vulnerable populations such as the elderly and people living with HIV and AIDS are likely to become more pressured as a result of heat stress, food insecurity, and exposure to disease outbreaks.

Increased heat stress will affect people across all income groups, but especially more vulnerable groups such as children and the elderly, and people with

poor access to clean drinking water.

Cholera and other water-borne diseases are likely to become more prevalent as a result of floods.

Small changes in temperature and precipitation can lead to malaria outbreaks, a disease which is likely to increase its presence in Durban. The municipality's existing malaria program will need to be upgraded to cope with the increased stresses expected.

The sea

Natural systems in Durban can cope with a sea level rise of up to 20 cm, but it is expected that by 2100 sea level rise could reach 50 to 90 cm. Durban is already experiencing an increase in sea levels, at a rate of 2.7mm/year between 1970-2003. This is expected to continue and accelerate.

Sea level rise is projected to cost R134 billion (USD\$16.3 billion) if the annual direct and indirect benefits are considered, such as the impacts of coastal erosion on tourism and inundation on property and industry.

Durban is hilly, so most of the city will not be inundated, but several sites are at risk. This includes industrial areas in the Durban South Basin, a number of transport hubs including the harbour, beaches that are important for tourism, parts of the city centre, and some agriculturally and ecologically important areas to the south of the city.

Higher sea levels and increased erosion will impact coastal ecosystems such as mangroves, estuaries and coral reefs, which are important breeding and feeding

grounds for many economically and ecologically important marine fish species. This will affect fish stocks and biodiversity, with impacts on livelihoods and tourism. There may also be salination of some aquifers which would reduce freshwater availability. Changes in rainfall that affect coastal ecosystems reduce the ability of these ecosystems to act as buffers for the impacts of sea level rise and sea storms.

It is likely that Durban will be impacted by Indian Ocean cyclones or the effects of cyclones moving further south, with more severe and more frequent storms. This will lead to increased coastal erosion, and damage to coastal ecosystems and infrastructure such as roads, railway lines, bridges and homes.

Farming

eThekwini Municipality, of which Durban is the core, includes large areas of agricultural land including many subsistence farms that are rain-fed. Changes to rainfall distribution and seasonality will place increasing strain on farming, and subsistence farming in particular, because of crop and livestock losses. This will affect local food security.

If subsistence or small-scale farms that rely on rain do not have the profit margins to afford irrigation, or if there is inadequate water for irrigation, this could result in increased poverty and reduced food security.

Temperature rise is likely to result in a shift of agriculture to higher and cooler areas, changes in the types of crops planted, and an increase in the need for irrigation. For the period 2070-2100 it is already expected that the irrigation demands on Midmar Dam, the main supply for Durban, will increase by

25%. Moreover, during this same period, the Umgeni catchment, which is the main catchment for Midmar, is expected to have a reduction of water availability by an amount of water equivalent to that stored behind the dam.

Existing pressures on the water and land resources that affect agricultural productivity include degradation from bad land use practices, proliferation of alien invasive plant species, timber plantations that increase erosion and reduce biodiversity, and water extraction for timber and agriculture. Timber is also expanding into communal lands through so-called 'woodlot' schemes which are considered to be an extension of commercial plantations and ultimately benefit only timber companies.

Biodiversity

Durban is an unusual city in that, despite its population concentration, it has large natural areas, mainly protected as nature reserves or through the Durban Metropolitan Open Space System (DMOSS). There are still areas of land near the urban centre that are undeveloped, and strips of land in between developments that are left untouched. There are impacts on these areas, including invasive alien species, but nature thrives. For example, vervet monkeys and mongoose are fairly common residential visitors, as are a fantastic range of birds and reptiles. The area is home to a wealth of diversity and includes coastal dune forests, grassland, scarp forest and wetlands. It is home to 73 threatened species.

Biodiversity is sensitive to changes in temperature and rainfall, and although there are no clear data for Durban specifically (as of August 2010), it is expected

that by 2050 South Africa will see a reduction of 50% in areas covered by current biomes. In other parts of the country, shifts in species migrations are already evident. There is expected to be an increase of invasive alien species which will impact on biodiversity, ecosystem stability, economic activities, erosion, and water availability.

Increased sea surface temperature is likely to mean an increase in the migration of species living along the coast to higher altitude eastern escarpments. It is expected that there will be large extinctions, and that most animal species will become concentrated in higher eastern escarpment regions by 2070-2100. Sea level rise and storm surges are likely to affect dune vegetation and mangroves and floods are likely to impact on riparian and other vegetation, with roll-over impacts on fauna.

Durban's municipal adaptation priorities are outlined in Figure 13.1.

FIGURE 13.1: eThekweni Municipality's Adaptation Planning

Durban's municipal adaptation focus includes the following, as stated in a municipal document intended for the public (Lewis, 2011):

Disaster Risk Reduction:

- Improve early detection systems for storms and other natural disasters
- Enhance early warning communication to public

- Develop community disaster management plans and ensure awareness of plans in vulnerable locations
- Establish effective post disaster recovery and support plans across all sectors
- Assess and improve resistance of infrastructure to extreme weather events

Health

- Expand existing malaria prevention programme
- Secure sustainable energy and clean water sources for health provision
- Identify vulnerable groups – children, elderly, poor – and improve surveillance of disease outbreaks
- Heat emergency plans
- Education campaigns about heat stress, environmental health associated with climate change

Food Security

- Promote local food production within the municipality through small scale farmers' production
- Educate farmers on drought resistant crops, erosion prevention, efficient water use practices
- Establish community food reserves for emergency situations

Water and Sanitation

- Increase use of water recycling and promote water storage in cisterns and

rainwater catchment tanks

- Reduce water losses from municipal water systems – better leak detection and flow and pressure controls
- Reduce water demand from sanitation systems by using dry sanitation systems such as urinary diversion toilets and developing systems that use grey water for toilet flushing, low flush toilets, etc.
- Initiate water conservation education campaigns and community water development assessments
- Promote water conservation and possibly water trading for industries
- Assess the effects that increased heat, storms and sea level rise will have on water provision and sanitation infrastructure, and upgrade or relocate where necessary

Coastal, Stormwater and catchment management

- Reassess areas vulnerable to flooding using predicted future rainfall changes, notify property owners, and restrict proposed developments in these areas
- Keep developments proposed in the coastal zone out of areas predicted to be affected by 1:50 sea storms and 50 years of sea level rise by adjusting setback lines to climate change scenarios
- Develop flood prevention and emergency response plans for areas that will become more prone to flooding
- Insist that new developments have stormwater management plans and flood attenuation features

- Incentivise and assist those in the most flood prone areas to relocate.

Infrastructure

- Ensure that new or upgrade infrastructure are not located in flood prone, low lying or coastal areas, and materials and designs account for increased temperature and severe weather
- Reduce energy demand through energy efficiency and on site renewable energy production
- Encourage use of public transport

Strategic planning and Economic Development

- Revise spatial development framework to prevent new developments in potentially hazardous areas by rezoning them
- Assess vulnerability of key industries to climate change and promote efficiency in these sectors
- Establish a coordinating mechanism to ensure that climate change predictions are accounted for in all sectors of municipal planning

Biodiversity

- Assess the vulnerability of indigenous habitats and species
- Revise DMOSS to ensure protection of refuge areas for climate sensitive species and maintain corridors that will allow these species to migrate to refuge areas as the temperatures and rainfall change

- Increase removal of alien invasive species, especially those affecting water supplies and those adapted to warmer and drier conditions
 - Protect and rehabilitate ecosystems such as wetlands and mangroves that play a role in buffering storms as well as natural areas such as coastal forests that play a role in reducing heat in the city, filtering and absorbing water, and buffering floods.
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What does adaptation offer?

In a very real sense, adapting to climate change demands a strong rethink of current development practices, and almost forces sustainability options to the forefront. For example: biodiversity protection requires the safeguarding of natural areas, creation of new nature reserves and nature corridors; food security means ensuring that resources such as soil and water remain healthy; increasing the resilience of vulnerable communities includes education, human rights, health, and strong participation and co-planning; and ensuring economic growth involves intelligent management of water resources and other natural resources, as well as education and the development of well informed work teams. Figure 13.2 outlines some ideas for use in planning community climate change education and action workshops.

In order to ensure that as many people as possible weather the climate change storm, people must collectively build a more intricate and respectful relationship between human development, nature and economic development.

**FIGURE 13.2: Starting-point Questions for Community Education and Action
on Climate Change**

What do we need in order to build our own capacity to cope with climate change?

1. Understanding climate change.

- a. What is climate change?
- b. How will climate change affect my home, community, farm or business ?
- c. Can climate change be stopped?
- d. What are my local authority and national government doing to stop further climate change?
- d. What can I do to stop further climate change?

2. Planning for climate change

- a. What can I do to protect myself and my livelihood?
- b. What can I do to make sure that I have access to food, water and energy now and in future years?
- c. How do I make sure that I and my loved ones are informed about climate change and adaptation?
- d. What do I already know and what do I already have that I can use to help me cope with climate change
- f. What do I need in addition to this?

3. Government and institutional support

- a. Who in my community can help me find the information and resources that I need?
- b. Who in my community can help me develop an adaptation plan?
- c. What help can I get from: Agricultural extension officers / Health workers / Teachers / Experienced community members with knowledge about disasters / My community leaders ?

4. Sharing Experiences

- a. How can I help to make sure that as many people as possible in my own community know as much as possible about how to adapt to climate change?
- b. How can I learn from other communities across the world who are working on adaptation for climate change?
- c. How can I share what I have learnt with neighbouring communities and people elsewhere in my country and across the world?

5. Assessing and learning

- a. What have I done that's worked?
- b. How can I improve the concepts or projects that worked less well?

6. How can I get my government to improve its national scale planning for adaptation on a national scale?
