

Strategies for climate change adaptation for sustainable development

C.H.D. Magadza

In this presentation some methods of identification of vulnerability to and adaptive capacity and strategy to climate change will be presented.

Firstly current trends in climate change and climate variability will be presented to indicate discernible changes in regional climate variability and climate change. Analysis of mean seasonal Zimbabwean met stations indicates a warming trend in the thirty year period from 1965 to 1994. The Zambezi valley and western Zimbabwe indicate a decreasing precipitation trend, ranging between -1mm to almost 15 mm per decade.

The result of these trends is examined by analysis of drought trends and stream flows. The IPCC gives projections of river flows in the sub region by 2050. Data from some rivers in the region now indicate long term reduction in discharge rates. Further analysis of drought frequencies in the sub region shows that drought frequency has increased by about thirty fold between the 70s and 2000. This development now means that the region has recurring costs associated with droughts management.

While climate change will have long term accumulative impacts on sustainable developments, its immediate impact is in the effects of extreme events. Identification of economic and social factors affected by climate change and climate variability is a necessary step in planning adaptation to global warming. Key sectors likely to be impacted by climate change and climate variability, with ramifications into sustainable development in the sub region are

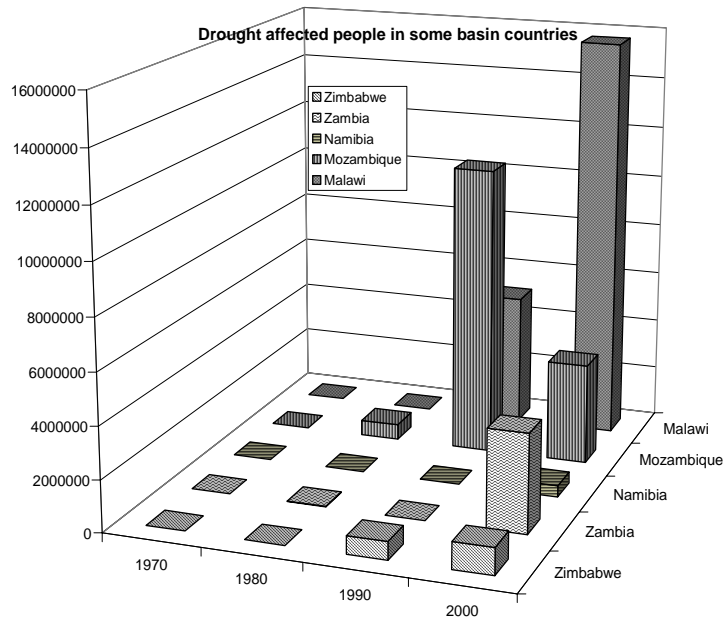
- Impacts on energy resources
- Impacts on food security
- Impacts on health
- Impacts on human settlements.

The sub-region is critically dependant on hydroelectric power from the Zambezi river basin. In the past, severe droughts have had wide ranging economic impacts in the industrial and agricultural sector. During drought crop production at large scale farming is heavily dependant of electrical power for irrigation. Thus a reduction in hydroelectric power generation leads to loss in both industrial as well as agricultural output. The economic impacts due to curtailment of the hydropower generation from Lake Kariba, resulting from the 1991/92 drought, was estimated to be some US\$102 million dollars loss in GDP, US\$36 million loss in export earnings and loss of 3000 job (Benson and Clay 1998).

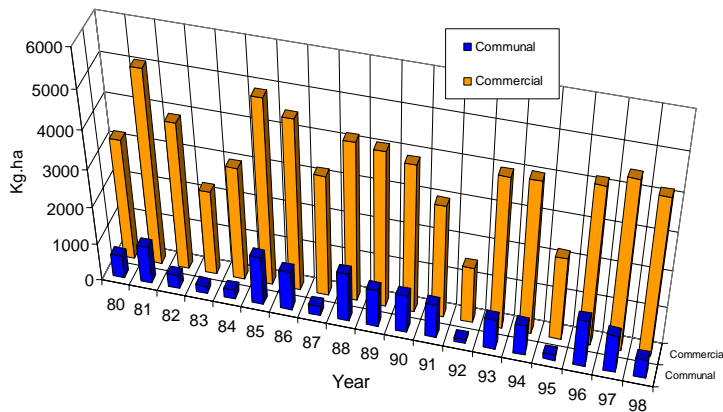
“The direct impacts on agriculture and the knock on impacts were also quite severe. These limited estimates provide a window on possible economic impacts of climate change mediated water resources changes in the medium term, i.e. into the middle of this century, a time span within the planning window of economic development strategies. “Desanker and Magadza 2001

Planning of adaptive strategies to impacts of drought is effective if the extent of social sectors of communities affected and their location is well documented. Figure 1

summarises the trends in number of people affected by droughts in the Zambezi basin countries



As global warming increasingly impacts on food production it is necessary to examine aspects of food production that relate to vulnerability to food security. Droughts in Southern Africa, and indeed in Africa, clearly show the need to examine agricultural and land policy paradigms. In southern Africa two parallel production systems have existed side by side, viz subsistence agriculture on largely non adjudicated land, and commercial agriculture on land that has commercial value. Figure 2 contrasts production levels in the two farm systems. It shows that the subsistence farm system



is highly susceptible to drought effects. Sine this system employs millions of subsistence farmers an important adaptive strategy is the crafting of an agricultural policy that increases the efficiency of such

farmers, transiting them from mere subsistence to surplus producers.

Southern Africa has several human and livestock diseases that are transmitted by invertebrate hosts. Models of vector distribution changes show that many areas that are free of vector born diseases such as malaria will become suitable habitats for the disease vectors. Recent data from South Africa show that biome shifts are already underway. The implication is that a major change in the distributional range of disease vectors is also occurring. This requires evaluation of current vector control and vector borne disease management.

Low lying areas in the Zambezi and Limpopo basins have been subjected to devastating floods in the last two decades, leading to loss of life and property as well as costly damage to infrastructure. Damage to infrastructure constitutes significant erosion on GDP, estimated to be as high as 15% of GDP in the severely affected states. In areas of surface water scarcity human settlements tend concentrate near river flood plains. Adaptive measures should consist of effective early warning systems, standing measures of emergency rescue and possible relocation in chronic cases...

Adaptive capacity for sustainable development is also a function of the social capital of a state. In Table 1 a profile of some of the Zambezi Basin states is given, in comparison to three other developing countries in the world. The Table emphasises the need for the sub region to address the issue of poverty to enhance adaptive capacity both at community and household levels. The major factor eroding social capital in the sub region is the HIV/AIDS pandemic.

Table 1 Socio-economic profile of Zambezi Basin countries.

Country	% GDP per Capita growth(2002)	Life expectancy	School Enrolment	% Adult literacy	HDI	Education index	Poverty Index	Probability at birth of not surviving to age 40
Zimbabwe	-0.8	33.9	58	90	0.49	0.79	37.5	74.8
Zambia	-1.2	32.7	45	79.9	0.34	0.68	50.4	70.1
Malawi	1.1	37.8	74	61.8	0.39	0.66	46.8	59.6
Angola	-0.1	40.1	30	42	0.39	0.38	-	49.2
Botswana	2.5	41.4	70	78.9	0.56	0.56	43.5	61.9
Mozambique	2	45.2	41	46.5	0.35	0.45	49.8	56.0
Namibia	0.9	45.3	71	83.3	.61	0.61	37.3	52.3
Average	1	39.49	56	68.91	0.45	0.59	43.5	60.5
India	4	63.7	55	61.3	.59	.59	31.4	15.3
Philippines	1.1	69.8	81	92.6	.75	.89	15.0	7.4
Cuba	3.5	76.7	78	96.9	.81	.91	5	4.1
Average	3	70.07	71.33	83.6	0.72	0.8	17.13	8.93
Ratio	0.33	0.56	0.78	0.82	0.63	0.74	2.51	6.77