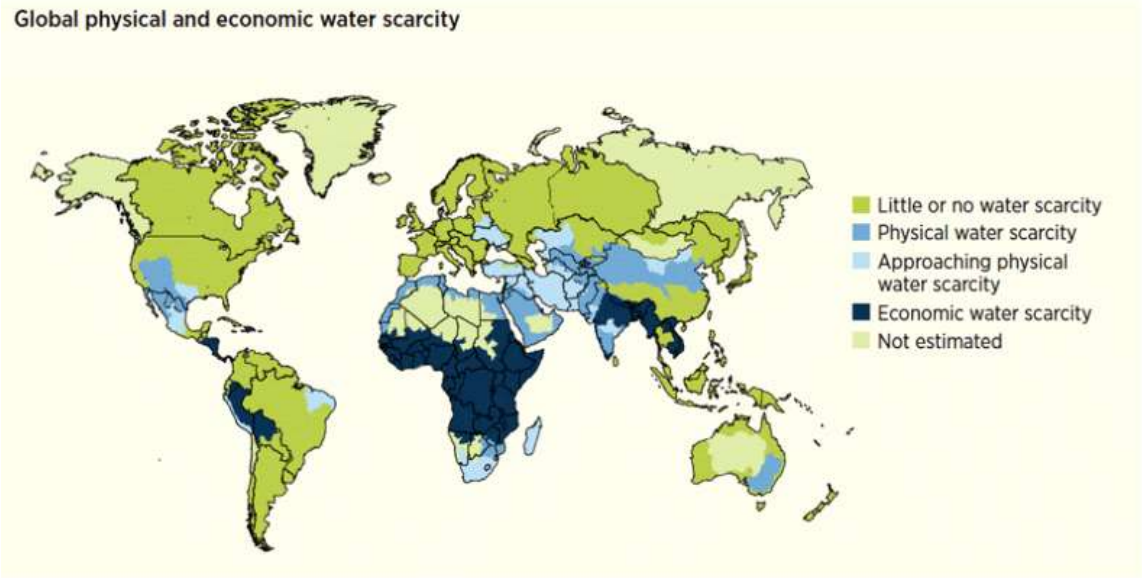
Climate change and Africa's water resources

Water is one of several key issues facing Africa now and in the future.

（Lindeque, Brent. "Here's How You Can Help with the Water Crisis in South Africa Right Now!" Good Things Guy, 7 Jan. 2016, www.goodthingsguy.com/south-afri-can-stories/water-shortage-sa-everyone-can-be-a-helper-a-hero-its-easy/. ）

Africa has the worst water shortage

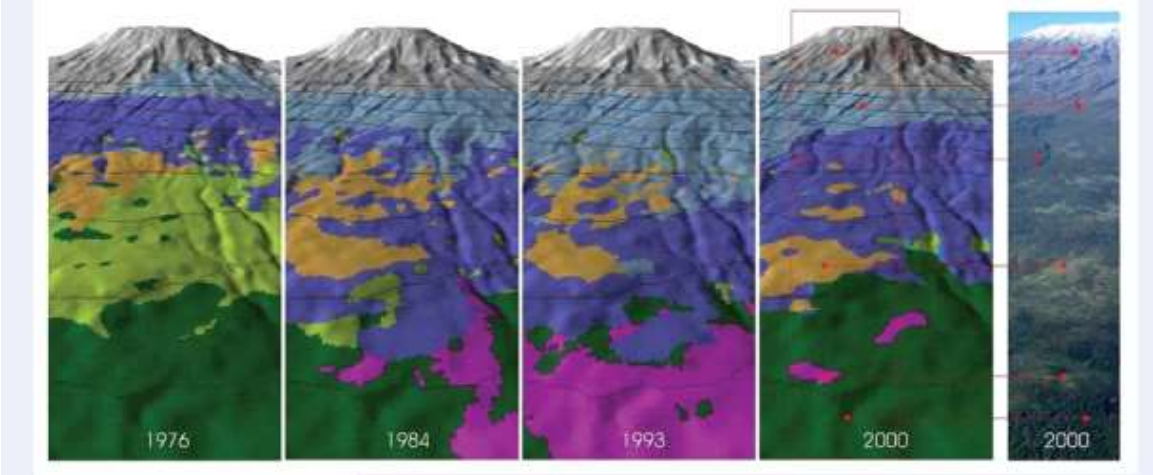


（ World Water Assessment Programme. “United Nations World Water Development Report 4. Volume 1: Managing Water under Uncertainty and Risk.” Water Library | UN Documentation Centre on Water and Sanitation. International Decade for Action 'Water for Life' 2005-2015,

www.zaragoza.es/ciudad/medioambiente/onu/en/detallePer_Onu?id=71. ）

Environmental changes in Kilimanjaro

There is evidence that climate change is changing the natural ecosystem of Kilimanjaro. For example, due to dry weather conditions, higher frequency and intensity of fires occurred on the slopes of Mount Kilimanjaro, causing the upper forest line to move down hundreds of meters during the 20th century. Since 1976, cloud forest coverage has finally been reduced by 150 square kilometers, which has had a significant impact on the capture of fog and temporary storage of rainwater, and therefore has a significant impact on the water balance in mountainous areas.



Snow/glacier

forest

Heather

grassland

Heather shrub

Bare rock

Cushion vegetation of Helichrysum

Woodland reclamation

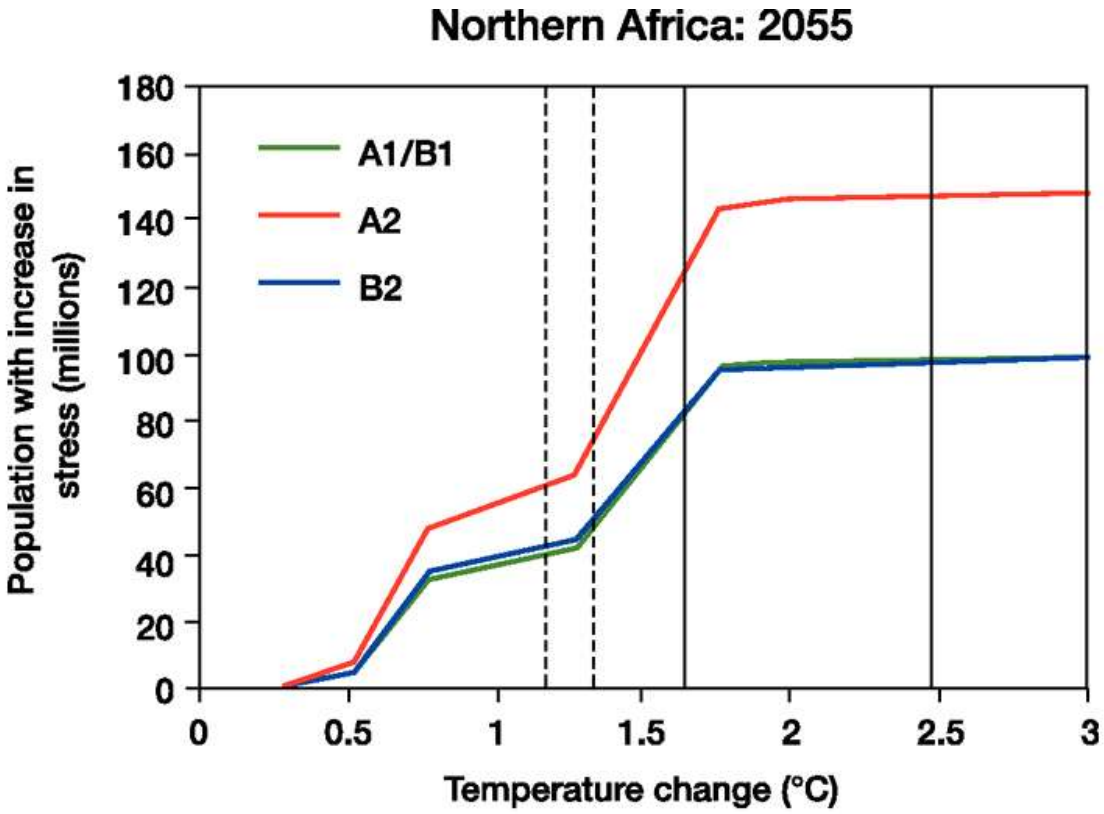
Changes in land cover in the upper area of Mount Kilimanjaro

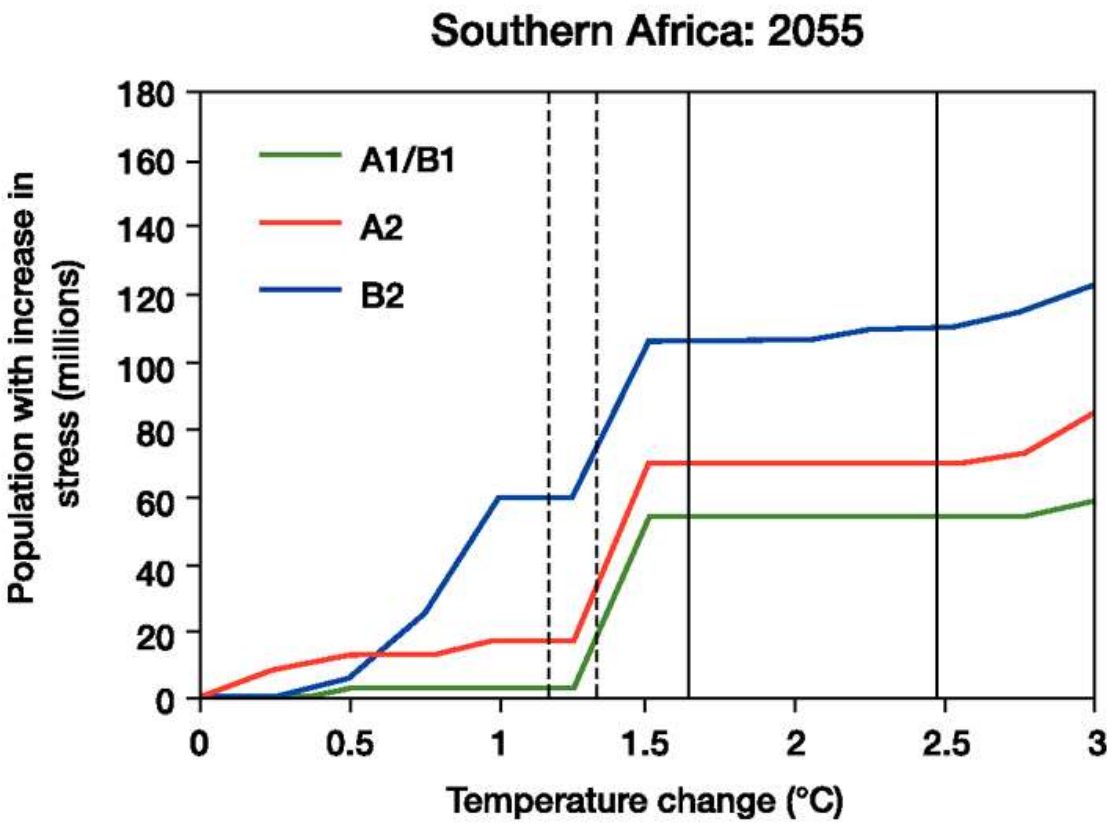
Vegetation Types	area 1976 (km^2)	area 2000 (km^2)	Variety (%)
Mountain forest	1066	974	-9
Subalpine heathlin	187	32	-83
Heather shrub	202	257	+27
Cushion vegetation of Helichrysum	69	218	+216
Grass	90	44	-51

(Hemp, Andreas. Climate Change‐Driven Forest Fires Marginalize the Impact of Ice Cap Wasting on Kilimanjaro. Andreas Hemp, 2005, Wiley Online Library, onlinelibrary.wiley.com/doi/full/10.1111/j.1365-2486.2005.00968.x.)

Who is affected?

People, animals, and plants are all affected.





（Figure 9.3 - AR4 WGII Chapter 9: Africa, archive.ipcc.ch/publications_and_data/ar4/wg2/en/figure-9-3.html. ）

Due to climate change, the runoff in the water-scarce basin is less than 1000m3/person/year, and when the runoff is greatly reduced, the population faces greater water shortage pressure.

This criterion is linked to a Learning Outcome

What are the effects of the hazard?

1.health：A large number of studies have linked climate change to the health problems of the African continent. For example, the results of the Malaria Risk Distribution Map

Project in Africa (MARA/ARMA) show the distribution of regions with suitable climate for malaria by 2020, 2050 and 2080 (Thomas, 2004). By 2050 and continuing until 2080, most areas of the Western Sahel and most areas of south-central Africa may become unsuitable for malaria transmission. Other assessments using sixteen climate change scenarios (e.g., Hartmann, 2002) show that by 2100, changes in temperature and precipitation can change the geographic distribution of malaria in Zimbabwe, while areas that were previously densely populated and unsuitable for malaria transmission have become Suitable for spreading.

2.agriculture：Research has been done on the impact of climate change on the growing season and agricultural system, as well as the possible impact on livelihoods (Thornton, 2006). Recent studies have shown that by 2100, net crop income may fall by as much as 90%, and small-scale farms will be the most affected. However, adaptation may reduce these negative effects (Benhin, 2006).

3.Biodiversity：

Ecosystem impacts	Area affected
About 5,000 African plant species impacted: substantial reductions in areas of suitable climate for 81-97% of the 5,197 African plants examined, 25-42% lose all area by 2085.	Africa
Fynbos and succulent Karoo biomes: losses of between 51 and 61%.	South Africa
Critically endangered taxa (e.g. Proteaceae): losses increase, and up to 2% of the 227 taxa become extinct.	Low-lying coastal areas
Losses of nyala and zebra: Kruger Park study estimates 66% of species lost.	Malawi South Africa (Kruger Park)
Loss of bird species ranges: (restriction of movements). An estimated 6 species could lose substantial portions of their range.	Southern African bird species (Nama-Karoo area)
Sand-dune mobilisation: enhanced dune activity.	Southern Kalahari basin – northern South Africa, Angola and Zambia. For details in Sahel, see Section 9.6.2 and Chapter 4, Section 4.3.
Lake ecosystems, wetlands	Lake Tanganyika
Grasslands	Complex impacts on grasslands inc-luding the role of fire (southern Africa)

(PICC, PICC. “9.4.5 Ecosystems.” 9.4.5 Ecosystems - AR4 WGII Chapter 9: Africa, 2007, archive.ipcc.ch/publications_and_data/ar4/wg2/en/ch9s9-4-5.html.)

What measures can be taken to reduce the harm?

1.migrate:Historically, migration due to drought and floods was regarded as one of the adaptation options. Migration is also considered to provide a source of income for those immigrants, who are employed as

seasonal workers.

2.Traditional and modern water storage technology, water source protection and water storage.

3.Planting drought-tolerant and early-maturing crops.

4.Formulate policies on climate change.

Thoughts on this issue

Climate problems cannot be avoided, but if people incorporate flexible and efficient methods into their management plans, the possible costs will be much lower than the costs incurred by not adopting climate change adaptation measures.