

Name of School

Subject

Geography

Examiner

Date

Term 1

Total marks

75

Type

Data-handling Task

Duration

2 periods

Grade

10

Moderator

Special Instructions/Equipment

- ❖ The Data-handling Practical Task introduces and creates awareness of the consequences of climate change and what action we can take to play our part in decreasing our Carbon Footprint.
- ❖ Please refer to the [Energy & Climate Action Guidebook](#) to learn more about renewable energy resources, climate change and what action you and your learners can take to reduce energy usage and create awareness of climate change. The aim of the assessment is to assess and develop skills outlined in CAPS and create awareness amongst students on the importance of alternative energy resources and climate change.
Note: Learners must complete the assessment alone with no group discussions or additional support. For further details, refer to the lesson plan.

CAPS Link

Term 1 – Data-handling Task: The Atmosphere.

Skills Developed

Analysing and synthesising information from different sources; Drawing, analysing and interpreting graphs; Using and analysing case studies; Labelling diagrams and describing the illustrated process or feature; Reading and interpreting maps, synoptic weather maps, satellite images; Conducting practical work, recording and interpreting findings; ESD – Climate Action

Specific Link and alignment with other Subject Assessments include:

Tourism Term 4 – Case Study Climate Change and tourism
English Home Language Term 1 – Task 1 – Listening for Comprehension – Passage on Climate Variability.

**GEOGRAPHY
ASSESSMENT**

**GRADE 10
MARKS:75**

**TERM 1
DURATION: 120 MINUTES**

Instructions and information:

- Answer ALL questions.
- Start each question on a new page.
- Number the answers correctly according to the numbering system used in this task.
- Diagrams must be fully labelled.
- Write neatly and legibly.

QUESTION 1

Study *Figure 1: Thermal structure of the atmosphere*, and answer the questions that follow.

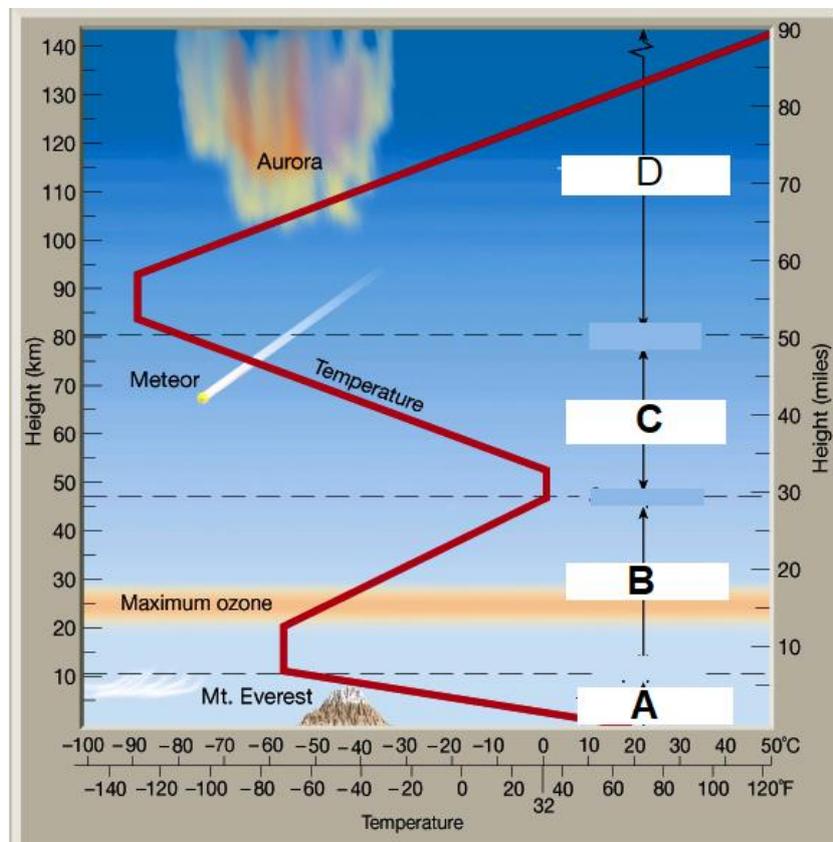


Figure 1: Thermal structure of the atmosphere (Lutgens and Tarbuck's *The Atmosphere*, 2001 :20)
Available at: https://www.ux1.eiu.edu/~cfjps/1400/atmos_struct.html

- 1.1 The layer of the atmosphere that sustains life. (1)
- A Mesosphere
 - B Troposphere
 - C Thermosphere
 - D Stratosphere
- 1.2 The change in temperature with the increase in height in layer B is between: (1)
- A 20°C to -56°C
 - B -56°C to 20°C
 - C 20°C to 60°C
 - D -56°C to 0°C
- 1.3 O₃ is found in this layer (1)
- A D
 - B C
 - C B
 - D -A
- 1.4 The range in height of the Mesosphere in kilometres is from... (1)
- A 0 to 10 km
 - B 12 to 50 km
 - C 50 to 80 km
 - D 80 to 100 km
- 1.5 The TWO layers where temperature decreases with height are... (1)
- A layers A and B
 - B layers A and C
 - C layers B and C
 - D layers B and D
- 1.6 The layer of the atmosphere where clouds are formed: (1)
- A Thermosphere
 - B Mesosphere
 - C Stratosphere
 - D Troposphere

- 1.7 Negative lapse rate occurs in... (1)
- A layers B and D
 - B layers A and D
 - C layers A and C
 - D layers B and C
- 1.8 The Tropopause is the boundary between... (1)
- A the Troposphere and Thermosphere
 - B the Troposphere and Mesosphere
 - C the Troposphere and Stratopause
 - D the Troposphere and Stratosphere

[8]

QUESTION 2

Study *Figure 2: The water cycle* and answer the questions that follow.

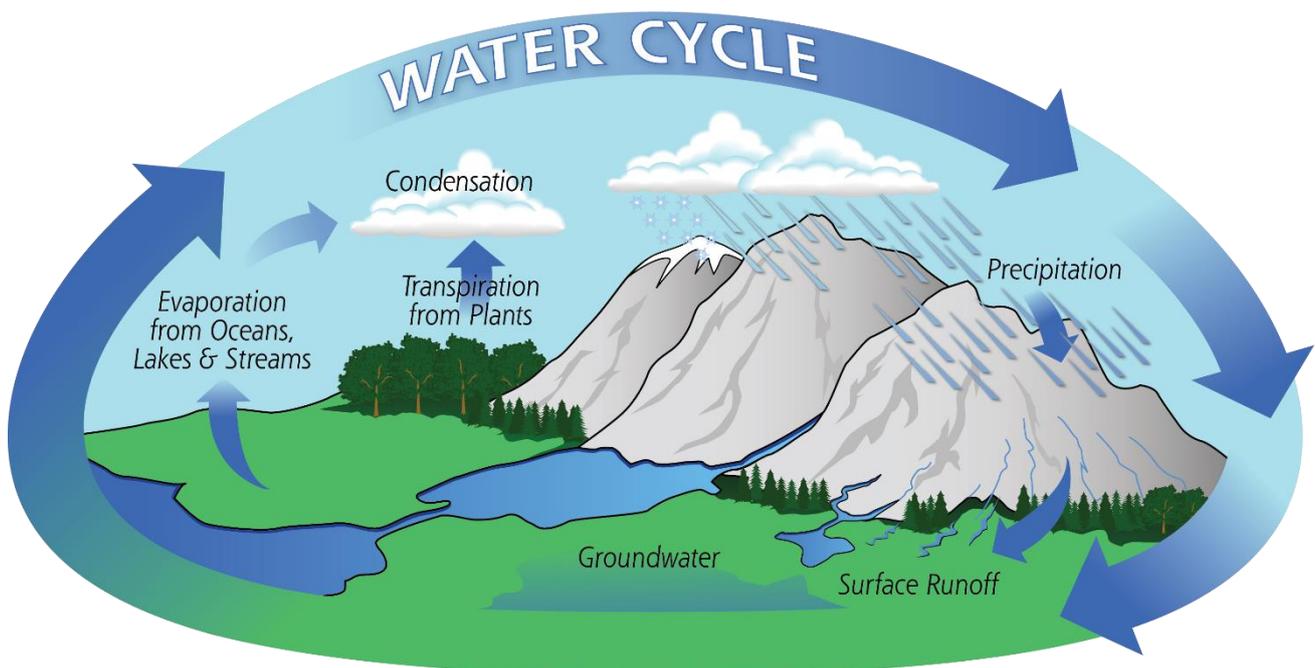


Figure 2: The water cycle
Available at: <https://gpm.nasa.gov/education/water-cycle>

- 2.1 Give the term that best describes each of the following statement below:
- a) The continuous movement of water from the surface of the earth to the atmosphere and back. (3)
 - b) The point at which condensation takes place. (2)
 - c) Water from the atmosphere to the ground in the form of a solid or liquid. (2)
- 2.2 How does human activity interfere with the water cycle? (2)
- 2.3 List two ways how you think we can save water? (2)
- [7]**

QUESTION 3

Read the text "*Climbing Mount Everest in thin air*" then answer the questions.

Climbing Mount Everest

In the years since human beings first reached the summit of Mount Everest in 1953, climbing the world's highest mountain has changed dramatically. Imagine that you are climbing Mount Everest – the world's highest mountain. You are experienced and physically fit.

The peak is 8 850 m above sea level and you have reached 5 500 m, but you are not feeling well. All day you have felt dizzy and once or twice you almost passed out. You have to rest often and you cannot think clearly. You have the symptoms of altitude sickness. Altitude sickness describes several symptoms that happen to your body when you're exposed to a higher elevation within a short period of time.

Anyone who has climbed a major mountain is very aware of two climatic phenomena. 1) It's harder to breathe the higher you go. 2) It gets colder the higher you go. If you are camping on the mountain add 3) it takes a lot longer to cook most food the higher you go.

Climbing Mount Everest is a challenge not only because of its steepness, but also because of its height. Altitude sickness is always a problem on high mountain climbs. The higher you climb the thinner the air gets. At the top of Everest, the air is three times thinner than it is at sea level. The percentage of oxygen in the air itself is the same (about 20%), but it is less concentrated. So, with every breath, you get only a third of the oxygen you normally would. The oxygen concentration is so low at this altitude that even paraffin won't burn

Adapted from: <https://www.nationalgeographic.com/adventure/article/climbing-mount-everest-1>

- 3.1 What is the height of Mount Everest? (1)
- 3.2 How far does mount Everest extend into the troposphere? Is it... (1)
 a) quarter of the way,
 b) halfway, or
 c) three quarters of the way?
- 3.3 What is the difference in the air at sea level and at the top of Mount Everest? (2)
- 3.4 Why does the air get thinner as the altitude increases? (2)
- 3.5 Why does it take longer to boil water as the altitude increases? (2)
- 3.6 3A climber takes in 300 000 molecules of oxygen in one breath at sea level. How many molecules of oxygen does the climber take in one breath at the top of Mount Everest? (2)
- 3.7 Explain why it is necessary for mountain climbers to be physically fit to tackle mountains such as Mount Everest. (4)

[14]

QUESTION 4

Refer to the extract showing the weather condition in Ladysmith, Kwa-Zulu Natal.

Ladysmith gets warm and humid during summer (average around 25° C) and most of the rainfall comes during this time. Because of the heat, the storms can get quite spectacular. Winters in Ladysmith are moderate, with dry sunny days and chilly nights.

Month	Precipitation	Maximum	Minimum	Average Sunlight
	mm	°C	°C	Hours
January	11.4	26	14	8
February	10.9	25	14	8
March	8.9	24	13	8
April	3.8	22	10	8
May	2.5	19	6	9
June	0.8	17	4	9
July	0.8	17	4	9
August	0.8	20	6	10
September	2.3	23	9	10
October	5.6	25	12	9
November	10.7	25	13	8
December	12.5	26	14	8

- 4.1 During which season in Ladysmith warm and moist? (1)

- 4.2 Give a reason for your answer in question 4.1 (1)
- 4.3 Calculate the temperature range for August. (2)
- 4.4 Account for the low rainfall in June and July (4)
- 4.5 Draw a line graph showing maximum temperatures of Ladysmith from APRIL to SEPTEMBER. (8)

Use the following information:

Vertical scale: 1 cm = 5 °c

Horizontal scale 1 cm = 1 month

QUESTION 5

Study the diagram in Figure 3: illustrating the Heating of the Atmosphere.

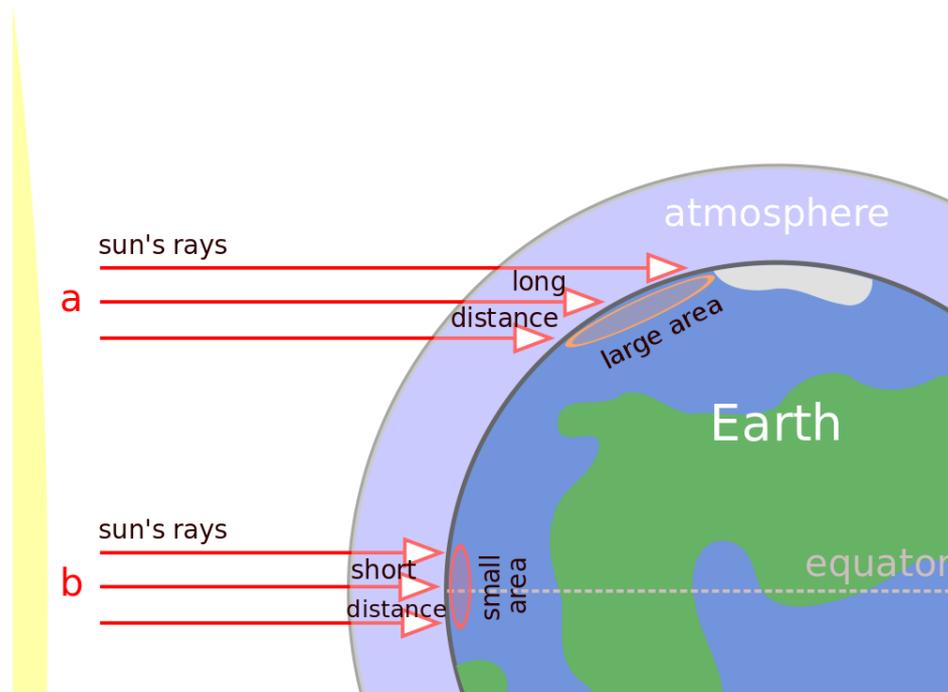


Figure 3: Illustrating the heating of the Earth's atmosphere
Available at: <https://www.opengeography.org/ch-3-earths-atmosphere.html>

- 5.1 Define the term insolation (1)
- 5.2 Provide an alternative term for the following: (2)
 - (a) long-wave radiation
 - (b) short-wave radiation
- 5.3 Explain why the lower layers of the atmosphere are heated by the process of conduction. (2)
- 5.4 Explain why places along the equatorial region (0° latitude) record a higher temperature as compared to places more towards the polar regions (60° to 90° latitude). (4)
- 5.5 In a paragraph of not more than 8 lines, explain why only 47% of the sun's energy reaches the surface of the earth. (4)
- 5.6 How does the increase of Greenhouse gases in the atmosphere cause Global warming? (2)

[15]

QUESTION 6

Read the Case Study and answer the following questions.

CASE STUDY: Climate change and sub-Saharan Africa

Increasing temperatures and sea levels, changing precipitation patterns and more extreme weather are threatening human health and safety, food and water security and socio-economic development in Africa, according to a new report devoted exclusively to the continent.

The State of the Climate in Africa 2019 report, a multi-agency publication coordinated by the World Meteorological Organization (WMO), provides a snapshot of current and future climate trends and associated impacts on the economy and sensitive sectors like agriculture. It highlights lessons for climate action in Africa and identifies pathways for addressing critical gaps and challenges.

"This report shows increasing climate change threats for human health, food and water security and socio-economic development in Africa. The report emphasises the inequality of the situation for Africa, noting that carbon dioxide emissions for the state of Texas in the USA are higher than the total carbon dioxide footprint of sub-Saharan Africa – a region of 720 million people.

"Climate change is having a growing impact on the African continent, hitting the most vulnerable hardest, and contributing to food insecurity, population displacement and stress on water resources. In recent months we have seen devastating floods, an invasion of desert locusts and now face the looming spectre of drought because of a La Niña event. The human and economic toll has been aggravated by the COVID-19 pandemic," said WMO Secretary-General Petteri Taalas.

The report makes recommendations to wealthy nations to help Africa. These recommendations include the following:

- Expanding the continent's meteorological monitoring network, so that farmers can have access to better information about climate patterns in the region.
- Investing in water storage or "water harvesting" facilities in Kenya, Ethiopia and Tanzania. Improving national social insurance programmes to protect farmers and poor residents from the worst effects of climate-related disasters.
- Building early warning systems.

However, Africa has made great efforts in driving the global climate agenda. This is demonstrated by the very high levels of ratification of the Paris Agreement – over 90%. Many African nations have committed to transitioning to green energy within a relatively short time frame. Clean energy and agriculture are, for example, prioritized in over 70% of African NDCs.

Vermaak, C. (2021) Climate change is an increasing threat to southern Africa. United National Climate Change. Available at: <https://unfccc.int/news/climate-change-is-an-increasing-threat-to-africa>

- 6.1 Define Climate Change. (1)
- 6.2 Explain why countries such as Texas in the USA contribute more to the carbon footprint than that of the entire region of sub-Saharan Africa (2)
- 6.3 Explain one reason why climate change may cause:
a) malnutrition
b) water scarcity
- 6.4 What is meant by “clean energy” and how can that help Africa to overcome the effects of global warming and climate change. (2)
- 6.5 Provide sustainable ways, mentioned in the Report, in which countries can help reduce the harmful effects of climate change on Africa. (6)
- TOTAL [15]**
- [75]**

GEOGRAPHY MEMO

**GRADE 10
MARKS:75**

TERM 1

QUESTION 1

- 1.1 B ✓
- 1.2 D ✓
- 1.3 C ✓
- 1.4 C ✓
- 1.5 B ✓
- 1.6 D ✓
- 1.7 A ✓
- 1.8 D ✓

(8 X 1) (8)

QUESTION 2

- 2.1 a)Water cycle ✓
- b)Dew point ✓
- c)Precipitation ✓
- 2.2 Humans directly change the dynamics of the water cycle through dams constructed for water storage, and through water withdrawals for industrial, agricultural, or domestic purposes. OR ✓✓
- When we clear land of vegetation to build roads and parking areas, we minimise water soaking into the ground.
- When there is more water on the surface, the possibility of flash floods increases, surface run-off is greater, and it can lead to soil erosion.
- 2.3 Any two ways: Stop eating meat or eat less meat. ✓✓
- Check your toilet for leaks. ...
- Stop using your toilet as an ashtray or wastebasket. ...
- Put a plastic bottle in your toilet tank. ...
- Take shorter showers. ...
- Install water-saving shower heads or flow restrictors. ...
- Do not use the hose to wash your car.
- Turn off the water while brushing your teeth. ...
- Turn off the water while shaving.

(7 x 1)
(7)

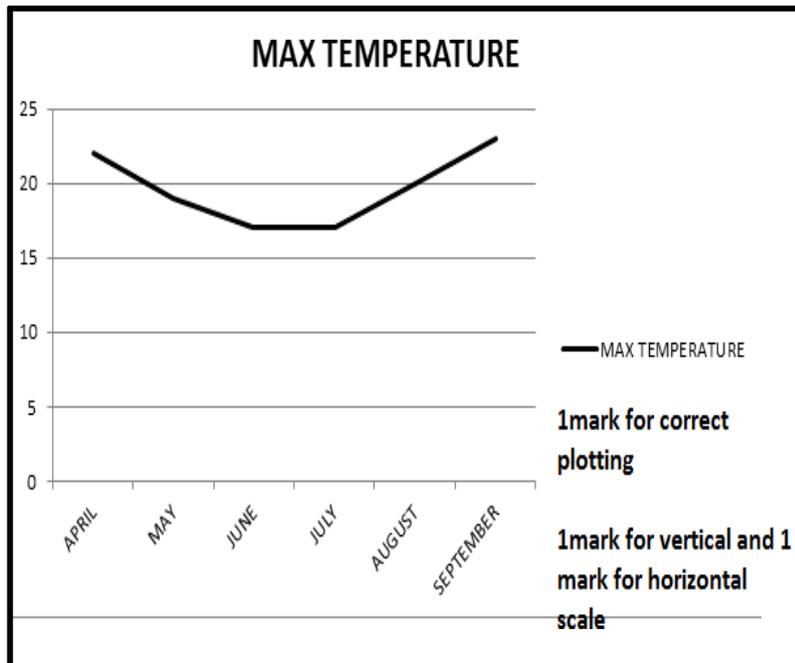
QUESTION 3

- 3.1 8 850 m ✓ (1 x 1) (1)
- 3.2 (c) Three quarters of the way ✓ (1 x 1) (1)
- 3.3 The air is three times thinner than it is at sea level. ✓ ✓ (2 x 1) (2)
- 3.4 As altitude increases and atmospheric pressure decreases, the boiling point of water decreases. ✓ ✓ (1x2) (2)
- 3.5 Thinner air means there is less oxygen to breathe/ oxygen is less concentrated ✓ ✓ (1 x 2) (2)
- 3.6 300 000 molecules ✓ ✓ (1 x 2) (2)
- 3.7 Steepness of the slope ✓ ✓ /
Altitude sickness ✓ ✓ / Feel dizzy / out of breath,
cannot think / oxygen is less concentrated / nose bleeds ✓ ✓ (2x2) (4)
- [14]

QUESTION 4

- 4.1 Summer ✓ (1 x 1) (1)
- 4.2 26 °C is highest temperature ✓ and precipitation is 12.5 mm ✓ OR The highest temperature and precipitation are recorded in December which is summer. ✓
(1 x 1) (1)
- 4.3 20 °C – 6 °C ✓ = 14 °C ✓ OR 14 °C ✓ ✓ (2 x 1) (2)

4.4 Winter ✓✓ cold air sinks ✓✓ cold air subsides ✓✓ less evaporation ✓✓ (2 x 2)
(4)



4.5

(8x1) (8)

[16]

QUESTION 5

5.1 Incoming solar radiation ✓ (1 x 1) (1)

5.2 (a) terrestrial /ground/earth radiation/ infrared light ✓

(b) solar radiation/ ultraviolet rays/ visible light ✓ (2 x 1) (2)

5.3 Conduction transfers heat to lower layers through contact ✓✓ (1 x 2) (2)

5.4 Equator receives the direct sun (2x2) (4)

rays ✓✓ Equator is closer to the sun ✓✓

Sun rays travel a shorter distance to the earth surface ✓✓

Small surface area to heat ✓✓

Sun rays pass through a small amount of atmosphere, less scattering reflection and absorption ✓✓

Polar areas receive the oblique sun rays ✓✓ Polar area is further away from the sun ✓✓

5.5 Heat is lost through reflection, some of the sun's rays strike a surface and are sent back into the atmosphere without being absorbed. ✓✓ lighter surfaces reflect more heat than darker colours. Heat is lost through scattering, radiation bounces off dust particles in the atmosphere. ✓✓ Heat is lost through absorption; gases in the atmosphere take in radiation before they reach the earth's surface. Ozone absorbs and filters out harmful ultraviolet rays ✓✓ (2x2) (4)

5.6 Greenhouse gases are responsible for global warming because they trap heat that would otherwise escape from the atmosphere. Unlike oxygen and nitrogen, these gases can absorb radiation and hold onto heat. ✓✓ (1x2) (2)

QUESTION 6

- 6.1 Define Climate Change. (1)
Change in the average surface temperatures of the earth /change in weather patterns ✓
- 6.2 Explain why countries such as Texas in the USA contribute more to the carbon footprint than that of the entire region of sub-Saharan Africa (2)
Developed countries produce large amounts of pollution/more trees cleared for furniture, paper, settlement/more burning of fossil fuels like coal and oil ✓✓
- 6.3 Explain one reason why climate change may cause: (1)
a) malnutrition: Majority of subsistence farmers rely on rain for watering their crops; less rainfall will cause a drop in agricultural production and food supply and this will lead to malnutrition, undernourishment and famine. ✓✓
b) water scarcity: Climate change will result in less rainfall leading to drought and water scarcity. Dams and rivers will run dry. Farmers will have to resort to irrigation systems. Water restrictions will be imposed. ✓✓
- 6.4 What is meant by “clean energy” and how can that help Africa to overcome the effects of global warming and climate change. (2)
Clean energy is energy that comes from renewable, zero emission sources that do not pollute the atmosphere when used, as well as energy saved by energy efficiency measures. ✓

So, by using clean energy Africa will decrease their carbon emissions that causes global warming. ✓

- 6.5 Provide sustainable ways, mentioned in the Report, in which countries can help reduce the harmful effects of climate change on Africa. (6) (3x2)
- Expanding the continent’s meteorological monitoring network, so that farmers can have access to better information about climate patterns in the region. ✓✓
 - Investing in water storage or “water harvesting” facilities in Kenya, Ethiopia and Tanzania. ✓✓
 - Improving national social insurance programmes ✓✓
 - to protect farmers and poor residents from the worst effects of climate-related disasters. Building early warning systems. ✓✓

TOTAL **[15]**
[75]