

**Creation Care in Maasailand**  
**Utunzaji wa Uumbaji katika Mukhadha wa Wamaasai**  
**Erripoto oo Nkitobirunot te Enkop oo Irmaasai**

**Lessons to Bless the Church and God's Good Creation**

**Theological Education by Extension**

**Written by Suzana Sitayo**

**Edited by Beth E. Elness-Hanson**

**Forewords by Godson Abel Mollel and Knut Holter**

**Translations by Daniel Kosia Mokoro and Joseph Kosia**

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## The Bishop's Blessing

It gives much joy and honor, having been entrusted in introducing *Creation and Care in Maasailand*, a work that speaks by itself whereby spiritual, culture, and environmental awareness embrace one another and therefore, compacted within Maasai community in their contextual setting. This work appears in real time with insightful aspects on traditional and spiritual aspects that give birth to the sustainable practices and livelihood that are essential in local and global context.

This multi-disciplinary work finds its roots in systematic and classical integration of biblical creation and care, Maasai traditional environmental knowledge, climate science and other sources within biblical, eco-theological frameworks, and it could not emerge without commitment, love, and the writers' own participation in the spiritual and life experience in Maasai community.

Through theological, cultural, ethnographic, contextual, environmental, and ecological consideration in Maasai sociocultural setting, this work brings to light an outstanding awareness, whereby societal ecological responsibility earns its significant consideration. Bishops, pastors, evangelists, church elders, policy makers, educators, practitioners, and participants in local-global contexts will find this work valuable and a credible source at hand. It paves more ways for meaningful reflections and practices that takes creation care more seriously and meaningfully, where spiritual, cultural, and conservation aspects are seriously considered and, therefore, strengthening these contextual and societal imperatives.

This work embraces critical thinking and takes the context seriously. It is readable, practical, and understandable for all the giraffes and the dik-diks.

One may not but admirably bless the facilitator of *Creation and Care in Maasailand*, a well-known and honored lady by the Maasai of Tanzania as she appears in Maasailand, whose nick name is (Mama Anya), by using the Maasai blessing: *Mikitamayana Engai* (God bless you).

With all my hearty thanks, appreciation, and salutation,

Rev. Dr. Godson Abel Mollel  
Bishop of the ELCT North Central Diocese  
Evangelical Lutheran Church in Tanzania

## **A Double Blessing**

This book is part of a project on climate change mitigation in Maasailand. The book can be seen as a tangible and concluding result of this project. However, the book should not be taken as an end of the project. On the contrary, the lessons that are found throughout the book have a potential of being used in the time ahead. They can and should be used as tools for facilitating not only reflection around climate change mitigation in Maasailand but also corresponding action on grassroots level, such as in schools, churches, and other community groups.

Climate change mitigation is a topic that attracts much interest today, in Maasailand and beyond. Most projects and researchers, however, approach the question of climate change mitigation from typically sciences perspectives. It might therefore come as a surprise that the present project—now in the form of a book—approaches the challenges of climate change mitigation from perspectives that encourage Maasai reading communities—such as confirmation classes, women’s Bible study groups, theological students, and secondary school students—to let traditional Maasai and biblical wisdom on creation care to interact.

If the approach of the project and book comes as a surprise, it may still exemplify the double blessing of letting traditional Maasai wisdom and practice on creation care interact with corresponding biblical wisdom. Both traditions honor the Creator and our responsibility for continuing creation care. So let us read the two together and then act accordingly!

Rev. Prof. Dr. Knut Holter  
Project Supervisor at VID Specialized University, Norway,  
NLA University College, Norway

# **Part 1: Overview of the Creation Care in Maasailand Project**



# 1. Overview of the Project that Developed these Lessons

## A Blessing from Mama Anya

Growing up as a Lutheran pastor's daughter and as one who studied in Bible college, I was very familiar with the biblical concept of blessings. I recall my course in Genesis, where I learned that Abraham was blessed to be a blessing to all the people groups of the world (Genesis 12). This is a foundational text laying out God's mission of reconciliation of humans and all creation. Then, through faith in Jesus, we are grafted into this covenant, such that we are also blessed to be a blessing and be part of God's grace-filled work of reconciliation. Yes, I understood this in my *head*.

However, it was during my three years teaching at the MaaSae Girls Lutheran Secondary School in Monduli (2002–2004) that I began to glimpse how blessings were palpable in Maasailand, and this insight profoundly expanded my understanding. When the rains come, the Maasai say, "Ewo Engai" (God has come). The Maasai have helped me understand the power of blessings in all of life. I began to understand blessings with my heart.

Now, with this Marie Skłodowska-Curie postdoctoral research project, primarily funded by the European Union's research commission, I have the privilege of living out being a blessing with my hands—actually doing things together with many wonderful collaborators. I designed a project to be a blessing when developed together with the Maasai. In research language, this means "two-way transfer of knowledge" and "shared impacts." So, when I gathered a stellar group of Maasai Stakeholders to shape this project, I explained that I had come with an empty calabash (gourd), something that carries the true blessing of milk. This metaphor of a calabash makes sense in Maasailand where women milk the cows directly into gourds, providing the staple of the Maasai diet

in a shared calabash for sustaining the life of the family. I came with a calabash—a framework for a research project—yet at the beginning, it was empty. I invited the Stakeholders to fill the calabash with the blessings of Maasai values and traditional wisdom. Then, these blessings would shape the project and be shared with the broader Maasai community. Blessed to be a blessing. (See more information on the Stakeholder role, p. 15.)

In a discussion with one of the Stakeholders, I said, "You help me be a better blessing; this work is shaped by your wisdom." Yes, I brought some resources, thanks to the funding of the EU research council, but as many know, resources can cause problems if used unwisely and do not address identified needs. The Stakeholders and other collaborators made these resources a blessing. So, I was surprised to read in a book on faith-based environmental activism that the red thread (theme) uniting all the essays was "tensions."<sup>1</sup> Providentially, this project was the opposite, characterized by eager participation (all accepted my invitation to be involved), respectful cooperation, and even shared joy, especially seen in Maasai music and dance. Ewo Engai! God has showered blessings upon this project, because the empty calabash was filled with Maasai values and wisdom. I am forever grateful. Asante sana. Ashe naleng'.

Mungu akubariki. /Mikitamayana Engai. / With blessings,  
Mama Anya / Beth E. Elness-Hanson, PhD

<sup>1</sup> Jens Köhrsen, Julia Blanc, and Fabian Huber, eds., *Religious Environmental Activism* (Routledge, 2023).

## Acknowledgements

I am profoundly grateful for the following people who have helped to facilitate this project and “fill my empty calabash (gourd)” with Maasai values and wisdom, as well as many other significant contributions (see p. 13). “I am because we are, and since we are, therefore, I am.”

Rev. Bishop Dr. Godson Abel Mollel,  
North Central Diocese, Evangelical  
Lutheran Church in Tanzania

Rev. Prof. Dr. Joseph Parsalaw, retired Vice  
Chancellor, Tumaini University Makumira

Rev. Prof. Dr. Knut Holter, Supervisor, VID  
Specialized University, Norway

### Stakeholders (see p. 15)

- Dr. Neema Kitasho
- Mrs. Sion Kereine
- Mr. Julius Laiser
- Rev. Ezekiel Lemaso
- CPA Elizabeth Loiruck
- Ms. Martha Ntoiopo
- Hon. Benedict Ole Nangoro
- Prof. Dr. Sarone Ole Sena
- Rev. Prof. Dr. Joseph Parsalaw
- Rev. Dr. Suzana Sitayo

### Authors (see p. 16)

- Mwl. Lais Joseph
- Rev. Ezekiel Megiroo
- Rev. Dr. Suzana Sitayo

### VID Specialized University, Norway

- Dean Vebjørn Horsfjord
- Prof. Tomas Sundnes Drønen
- Prof. Daniela Rapisarda
- Prof. Rebecca Solevåg
- Ms. Maria Tendenes

### Core Collaborators and Support

- Office Management Secretary Joyce Felix Mshanga, Vice Chancellor’s Office, Tumaini University Makumira
- Rev. Dr. Seth Mesiaki Ole Sululu, Principal, Makumira Training Institute
- Dr. Daniel Kosia Mokoro, Translator, Statistics Analyst
- Mr. Joseph Kosia, Research Assistant, Translator
- Deputy Principal for Administration Randall Stubbs, Makumira Training Institute, and Director, Cultural Arts Centre
- Deputy Principal for Academics Emmanuel Athanas Ndale, Makumira Training Institute
- Assistant Director Gloria Kileo, Cultural Arts Centre
- Nacco and Imani at Khaki Media Pro
- Mr. Goodluck Natai
- Ms. Laurie Meyer
- Dr. Elenn’ Parrish

### Fieldwork Sites

- MaaSae Girls Lutheran Secondary School*
  - Head of School Tulizael Marco Mbise
  - Mwl. Lais Joseph
  - Matron Elisifa Mollel
  - Student research participants and choirs

### *Moringe Sokoine Secondary School*

- Head of School Lazaro Ndooki
- Mwl. Yona Mollel
- Student research participants and choirs

### *Amazing Grace Widows and Orphans*

- Founder and CEO Winny Ene Sirikwa
- Research participants

### *Asasi Ya Naapok (Naapok Bead Project, CBO)*

- Mrs. Bethany Friberg, Lutheran missionary, research project facilitator at *Asasi Ya Naapok*
- Naapok artisan research participants

### *Kibaya Lutheran Church*

- TEE research participants

### *Wasso Lutheran Church*

- TEE research participants

### *Olchoroonyokie Village*

- Mwinj. Raphael Sitelu Laiser
- Rev. Magilani Lesion Molell
- Chairman Silas Loiruk Laiser, Olchoroonyokie
- Choir director Abel Zephania Molell
- Student research participants and choirs

### *Lendikinya Lutheran Church*

- Mwinj. Seth Nnko
- Student research participants and choir

### *Monduli Special Guests*

- Monduli District Office Environmental Officer, Isaack Urassa
- District Pastor Gervas Meitamei
- Retired District Pastor Joel Nangole
- Fr. John Maendeleo

## Research Project Background and Funding

This is part of a Marie Skłodowska-Curie postdoctoral research project facilitated by Dr. Beth E. Elness-Hanson (“Mama Anya”), a former volunteer teacher at the MaaSae Girls Lutheran Secondary School (MGLSS) in Monduli, Tanzania, for three years (2002–2004).

The research was funded primarily by the European Commission (European Union) and partially funded and managed by VID Specialized University, Stavanger, Norway, with supervisor, Rev. Prof. Dr. Knut Holter. The Tanzanian local partner was Rev. Prof. Dr. Joseph Parsalaw, who was then Vice Chancellor at Tumaini University Makumira, Usa River, Tanzania. All the Stakeholders, writers, and other collaborators were compensated for their services in alignment with Tanzanian government established rates.



## Stakeholders and Other Core Collaborators

The project began by receiving a blessing by Rev. Bishop Dr. Godson Abel Mollel with permission to engage the research in the North Central Diocese of the Evangelical Lutheran Church in Tanzania (ELCT).

Then, a stellar Maasai Stakeholder Group served as the advisory council, meeting twice in Arusha. This group shaped the research by:

- Determining the core Maasai values for the overall project;
- Establishing the learning outcomes for the lessons; and later,
- Evaluating the draft lessons in accordance with the established values and learning outcomes.

## The Maasai Stakeholders

These Stakeholders graciously shared their traditional knowledge and expertise:

- Dr. Neema Kitasho, environmental scientist, Lecturer at Sokoine University of Agriculture
- Mrs. Sion Kereine, a leader at *Asasi Ya Naapok* (Naapok Bead Project, CBO), Ketumbeine council member from 2005–2015
- Mr. Julius L. Laiser, CBNRM, Natural Resources Management specialist, Technical Advisor for LOKEEN-Natron, and Co-Lead Implementing Person for the Faith for Restoration Project (4FR) funded by CKU in collaboration with WWF, RECODDA and LOKEEN.
- Rev. Ezekiel Lemaso, Senior Pastor of Ilkiranyi Parish of ELCT North Central Diocese; Lecturer and Deputy Principal (formerly Academic Officer) at Oldonyosambu Theological College; North Central Diocese representative for this project appointed by the bishop.
- CPA Elizabeth Loiruck, Deputy Principal for Planning, Finance, and Administration at the Arusha Lutheran Medical Training Centre and Director and Founder of TAA Finance
- Ms. Ntopoi Martha, environment planning and management
- Honorable Benedict Ole Nangoro, retired Minister of Parliament representing Kiteto who served as the Deputy Minister of Livestock Development and Fisheries
- Prof. Dr. Sarone Ole Sena, Professor and Deputy Vice Chancellor in charge of academic affairs at the International Leadership University, Kenya
- Rev. Prof. Dr. Joseph Parsalaw, retired Vice Chancellor of Tumaini University Makumira, local research partner
- Rev. Dr. Suzana Sitayo, Lecturer at Tumaini University Makumira and Principal of Oldonyosambu Theological College

## About the Authors

### ***Mwalimu Lais Joseph: Secondary School Lesson Writer and Teacher***

Mwalimu (Teacher) Lais Joseph is an advanced level teacher with expertise in biology and geography. He was located at the MaaSae Girls Lutheran Secondary School at the time of the writing and teaching of the lessons there. He intersected his natural science competence with his Indigenous Maasai knowledge in the development of these lessons. This breadth of knowledge is applied through his honed skills as an effective educator, demonstrated in the lesson writing and his instruction of them. His knowledge and pedagogical skill are demonstrated also in the cleaver coalescing of these aspects with biblical creation care messaging developed in collaboration with Rev. Megiroo. The prayer at the end of Lesson 1, Chapter 12, is a beautiful example of the value he brought to this project.

### ***Rev. Ezekiel Megiroo: Confirmation/Kipa Imara Lesson Writer and Teacher***

Rev. Ezekiel Megiroo is a Pastor at Evangelical Lutheran Church in Tanzania, North Central Diocese. He is the pastor in charge of the Monduli Lutheran Parish and former instructor at Oldonyosambu Theological College. With responsibility over worshipping sites and the confirmation program in each location, Rev. Megiroo has developed and taught the lessons for the confirmation ministry. These lessons become an important resource for the entire North Central Diocese and other Maasai contexts. With further developments beyond this project, Rev. Megiroo has initiated the Monduli Parish Youth Campaign on Creation Care. He continues as a vanguard of biblical ecojustice and a resource for the ELCT.

### ***Rev. Dr. Suzana Simon Sitayo: TEE and Women's Bible Study Groups Lesson Writer and Teacher***

Rev. Dr. Suzana Simon Sitayo is a Tanzanian theologian, ordained minister, and academic serving the Evangelical Lutheran Church Tanzania. She holds a PhD in Religious Science, with a master's degree in missiology. She has been a Lecturer at Tumaini University Makumira since 2018 and supervises undergraduate and master's research. Alongside her university role, she has served as College Principal of Oldonyosambu Theological College (OTC) for training lay pastors (called evangelists in the ELCT) who are trusted local leaders and teachers in the church. Thus, she is the author of these lessons for the TEE (Theological Education by Extension) students at OTC.

## Other Collaborators

### ***Rev. Dr. Seth Mesiaki Ole Sululu***

Rev. Dr. Sululu is Principal of the Makumira Training Institute. He is also a lecturer at both the Faculty of Theology and Faculty of Education, Humanities, and Science at Tumaini University Makumira since 2012. He is a leading expert on Maasai music, holding a PhD in ethnomusicology from University of Hildesheim, Germany. He graciously served as the adjudicator for the special choir competitions that integrated main teaching points into traditional Maasai tunes. He also was the managing producer of the music videos sung by the winners of the music competitions.

### ***Dr. Daniel Kosia Mokoro***

Dr. Kosia is a Senior Education Lecturer at Tumaini University Makumira where he is an instructor for research methods, educational assessment, and statistics courses. He provided statistical analysis expertise for the data analysis of the 11,240 data points collected in the pre-, post-lesson, and longitudinal surveys. In addition, he provided the final Maa translation language review. Moreover, Dr. Kosia is a mentor for Mama Anya with her ongoing development of understanding of the Maasai.

### ***Mr. Joseph Kosia***

Mr. Kosia was engaged as the research assistant for this project. He was the principal facilitator of the orientation and survey data collection during the fieldwork. His multifaceted support and strategic help included the primary Maa language translation of surveys and the lessons, bringing his enthusiasm, diligence, and trustworthiness into every task.

## **About the Lessons**

### ***The Lesson Development Process***

After the Stakeholders developed the core Maasai values and established the learning outcomes (see p. 11), three Maasai writers worked with these guidelines and developed three lessons for each of the following four groups.

<b>Lesson Groups</b>	<b>Author</b>
Confirmation/ <i>Kipa Imara</i>	Rev. Ezekiel Megiroo
Secondary education in Diocese owned institutions	Mr. Lais Joseph
Women's Groups	Rev. Dr. Suzana Sitayo
Theological education by extension (TEE) training for lay pastors (called evangelists in the ELCT)	Rev. Dr. Suzana Sitayo

### ***Collaborative Writing***

The overall coherence of the content developed by three different writers writing was primarily shaped by the core values and learning outcomes—such as the main point for each lesson—that the Stakeholders had established. Yet, some content is distinct, as it includes the writer's perspective that was curated for their own target group. In addition, there was collaboration in the writing process that supported cohesion. For example, Dr. Sitayo shared early versions of her lessons with the other writers. Rev. Megiroo and Mr. Joseph met and worked together to share their expertise of biblical theology and natural science respectively. They also collaborated with an initial test of a lesson with confirmation student groups. Furthermore, Mama Anya supported the development of the lessons through providing the writers with the lesson plan template; pedagogy training on active learning and integrating cognitive, affective, and behavioral learning outcomes; as well as providing resources on ecotheology and climate change information related to a Maasai or pastoralist context that could be appropriated for their lesson development. These aspects helped to develop core coherence for the project.

The writers revised the lessons twice. First, the writers made revisions after feedback of their draft lessons from the Stakeholders. The Stakeholders evaluated the lessons according to the core values and learning outcomes that they established at the beginning of the project in the first Stakeholder meeting. In this second Stakeholder meeting, the Stakeholders worked in small groups to review the draft lesson content from their expertise and competencies: 1) Bible and theology; 2) Maasai traditional knowledge and anthropology; 3) climate science and environmental studies; and 4) hope within a Maasai context. The writers made the final content revisions after statistical analysis of surveys that were part of Mama Anya's research aspect of this project.

### **The Research Project**

Mama Anya developed a survey, reviewed by the lesson writers and two professors of research methods, to identify knowledge and attitudes related to the four lesson themes: 1) biblical creation care, 2) Indigenous environmental knowledge, 3) climate science, and 4) hope (see p. 19). All surveys were taken anonymously in alignment with international research ethical standards. Ethical reviews include:

- The Data Protection Services of Sikt—the Norwegian Agency for Shared Services in Education and Research (Reference # 484011).
- The Tanzania Commission for Science and Technology (COSTECH) (Project reference: CST00000053-2023).

The participants took the surveys *before* the lessons to determine the baseline understanding of the participants. *After* the instruction of the lessons in a half-day seminar format, the participants took the same survey again. *After several weeks*, the participants took the same survey for the third and final time. The surveys demonstrated what knowledge and attitudes developed through participating in the lessons and how these developments were sustained, or not, over several weeks.

The detailed description of the research project appears in a book written by Mama Anya (Beth Elness-Hanson), *Creation Care and the Church in Maasailand: Leveraging Underutilized Resources in Response to the Climate Crisis* (proposed title, forthcoming 2026). This book describes the theoretical frameworks, research design, ethical reviews, methods, the survey, and the statistical analysis of the survey data with more detail, as well as an examination of how this model of creation care contributes to the scholarship and practice of faith-based climate activism. Some more public interest information of the research appears at <https://www.mamaanya.com/>. The website also provides all the lessons printed in this book for downloading without cost. The introduction in this volume provides only a summary of the research which helps the reader to understand the larger postdoctoral research project.

### **Three Languages**

The lessons were originally written in English. According to the group for which the lessons were developed, the lessons are published in one or two languages. Secondary education in Diocese owned institutions is English medium. Thus, the lessons here are only in English. The Theological Education by Extension (TEE) training for lay pastors (called evangelists in the ELCT) is primarily taught in Kiswahili. Thus, the lessons appear in parallel columns of English and Kiswahili. For both the confirmation groups and the women's groups, it is prudent to have a Maa translation. For the translations, there were two steps of an initial translation and a following check and revision of the translation. The native Maa language speakers who worked diligently on the Maa translation are Dr. Daniel Kosia Mokoro and Mr. Joseph Kosia.

One of the challenges in presenting climate science terminology in Maa was that these are new and rather technical concepts to render into a language without existing terminology. There were three native Maa speakers who all have advanced education in environmental management and/or climate science who checked and developed the Kiswahili vocabulary as well as developed and revised the Maa vocabulary used for this project (see Appendix A). This project is indebted to this crucial contribution of these three experts: Dr. Neema Kitasho, Mr. Julius Laiser, and Mr. Lashumbai Kilolong in collaboration with the Maa translators, Dr. Daniel Kosia Mokoro and Mr. Joseph Kosia.

## Engai or Enkai?

The Maa language has several dialects and some variations in spelling. For example, the word for God in Maa has two spellings: *Engai* or *Enkai*. In this collection of essays, the writers had their own preferences for the spelling, thus, both *Engai* or *Enkai* appear in the following lessons. Other Maa language spellings are established by the translators according to their Monduli and Ketumbeine area contexts.

## Integrative Lessons

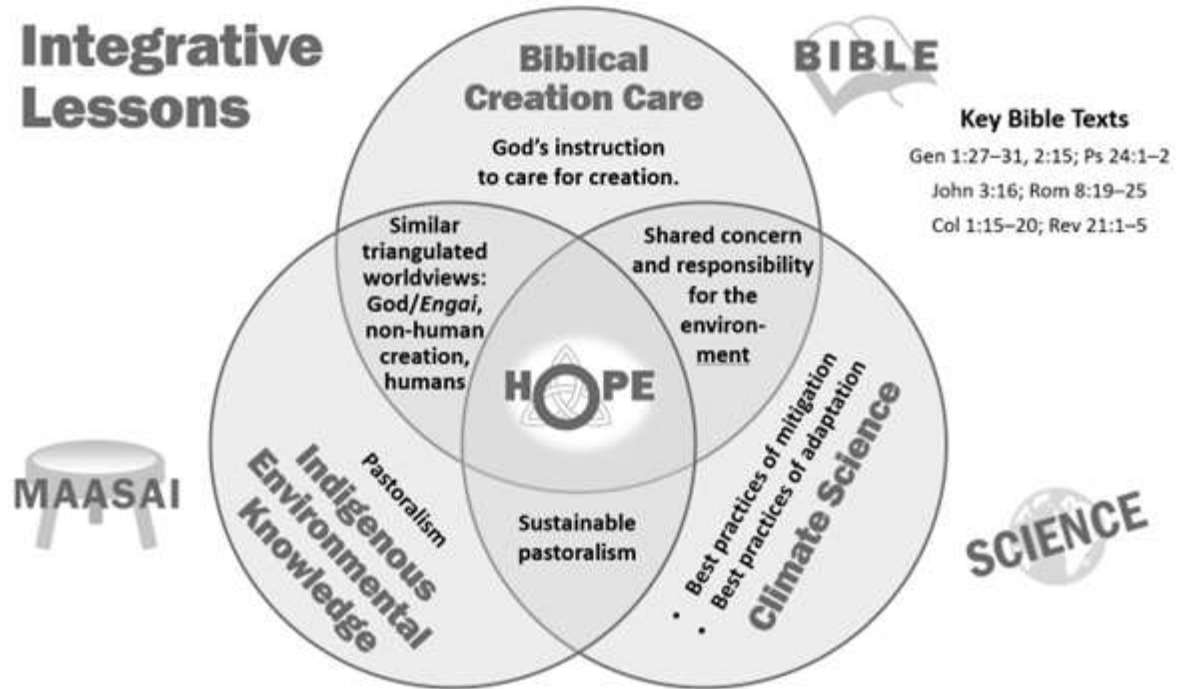
It is undeniable that increasing extreme weather events, changing rainfall patterns, and other environmental degradations have dramatically impacted the traditional Maasai, whose pastoralist livelihoods are dependent upon natural resources.

With these concerns, three Maasai writers—guided by Maasai Stakeholder values and learning outcomes—developed three lessons that enable the community to face the challenges arising from climate change. These lessons are designed to empower the Maasai with biblical, scientific, and practical knowledge to expand the enduring Indigenous environmental knowledge of the Maasai. In addition to knowledge, the lessons include opportunities to enliven motivation for working together and making a difference—engaging the future with hope—as we are commissioned to care for God’s good creation.

There are main points for each of the three lessons that determine the majority of each lesson’s content. Each lesson integrates previews of the next

lesson and subsequent lessons, while also reviewing key concepts from previous lesson (see the illustration). The lessons’ main points are:

1. **Biblical creation care:** God has commissioned (instructed) us to care for God’s good creation. In this lesson, we see how texts in the Bible teach us that God has entrusted us to be part of God’s work. The creation care lessons—the first lesson for each group—represent a general summary of common biblical and ecotheological viewpoints. These lessons are examples from the voices of the writers and do not claim to be the only way of approaching creation care. Additional perspectives and insights are found in the Resources for Lesson 1 in Chapter 15.



2. **Indigenous environmental knowledge:** The Maasai worldview—of the interdependence between humans, the environment, and Engai—is similar to Bible’s “creation triangle” (see p. 45). In this lesson, our Maa community will affirm our Indigenous skills of managing our ancestral land and learn about how our good traditions align with climate science.
  3. **Integrating climate science**—that is appropriate for a Maasai context—can help prevent global climate change as well as prepare for the local challenges faced now. In this lesson, our Maa community will expand our knowledge in caring for creation, by not only supporting Maasai traditions but also appropriating science research that explains the best practices of climate change mitigation (reducing the causes of climate change) and adaptation (reducing the risks of the negative effects of climate change).
  4. **Hope:** Each lesson wraps up with hope shared from the Bible, Maasai wisdom, and the climate scientists.
- Explore the lessons in this volume and discover how each author engaged these main concepts for their group.

## Website

These printed lessons can also be found online in a PDF form at <https://www.mamaanya.com/>.

They are free to download and use to be a blessing with the same Creative Commons license CC BY-NC-SA: Attribution-NonCommercial-ShareAlike (see the colophon/publishing information at the front of this book).

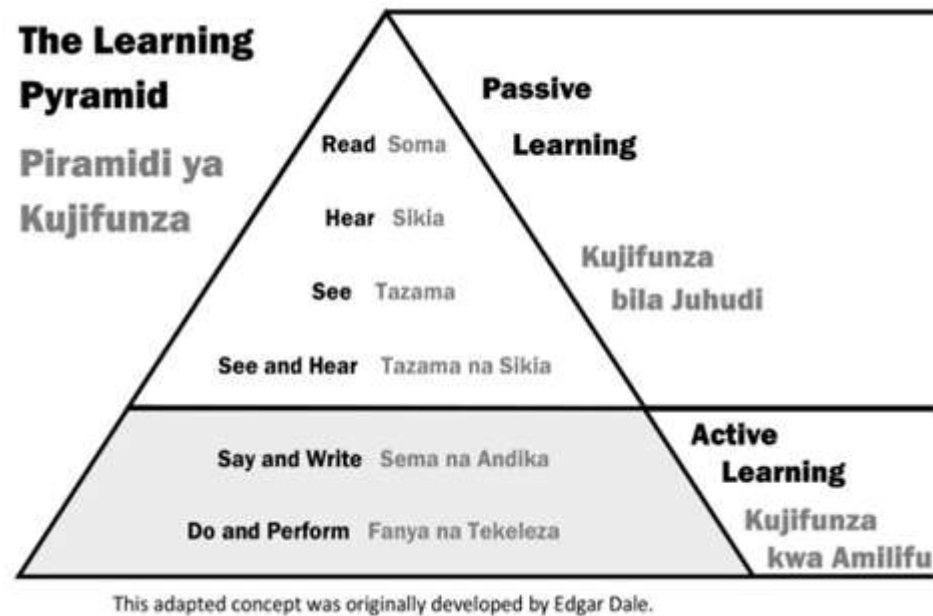
## 2. Teaching Tips for Teachers

### English

- **Adaptable:** These lessons are examples. The Maasai writers wrote the lessons for different groups. Teachers can adapt the lesson plans for other contexts by adding or removing aspects.
- **Italics:** *Words in italics* in the lesson plans are instructional information for the teacher.
- **Active learning:** Active learning methods have stronger learning outcomes rather than lecturing. The most effective and memorable learning happens through methods, such as saying, writing, doing, and performing.
  - This includes small group discussion and exercises where the participants are reflecting upon the concepts and putting them into their own words.
  - Small groups are more productive when there are groups of two to three participants in a group, so that each has an opportunity to speak in short reflection times.

### Kiswahili

- **Inayoweza Kubadilika:** Masomo haya ni mifano. Waandishi wa Wamaasai waliandika masomo kwa makundi tofauti. Walimu wanaweza kurekebisha mipango ya masomo kwa muktadha mwingine kwa kuongeza au kuondoa vipengele.
- **Italiki:** *Maneno yaliyoandikwa kwa alama za italiki* katika mipango ya somo ni taarifa za mafundisho kwa Mwalimu/mfundishaji



- **Kujifunza kwa ushirikiv** Mbinu za kujifunza kwa vitendo/ushiriki zina matokeo bora ya kujifunza badala ya kutoa mihadhara. Kujifunza kwa ufansi na kwa kumbukubmu zaidi hutokea kupitia mbinu, kama vile kusema, kuandika, Kutenda, na kufanya vizuri.
  - Hii inajumuisha majadiliano na mazoezi ya vikundi vidogo ambapo washiriki wanatafakari dhana na kuziweka kwa maneno yao wenyewe.
  - Vikundi vidogo vina tija zaidi wakati kuna vikundi vya washiriki wawili hadi watatu katika kikundi kimoja, ili kila kimoja kipate fursa ya kuzungumza kwa muda mfupi wa kutafakari.

- **Singing as a pedagogical strategy:** In several of the lessons in this book, the writers have encouraged an application (“Took”) activity where small groups of students work together to turn the main point of the lesson into a verse that they write in order to sing it with a traditional Maasai song tune. This is a strong pedagogical strategy for many reasons. First, it reviews the main point of the lesson. Second, music is a great way to remember, because singing involves using more and different brain functions. Third, putting the content into their own words is an important part of reflective learning. Furthermore, putting words to a traditional Maasai tune is not only an effective use of limited lesson time, but it also affirms the Maasai culture. Yes, singing is an important pedagogical strategy, but it will take some time. Try to allow 15-minutes in the lesson time, or perhaps, the students can be given an assignment to work on after class and bring back to the next lesson. This would also provide review of the first lesson before the next lesson begins.
- **Minute markings:** Minutes for each activity are suggested in the far-left column to fit into a 60-minute lesson. These can be adapted according to your available time.
- **A lot of information in the lesson plans:** There is a lot of information in the lesson plans. It may be difficult to include all the information in one 60-minute lesson. Some information is provided to have the core lesson content available for the teachers of the lessons.
- **Lessons for four different groups:** Teachers can compare the lessons from the four different groups for other ideas to see how another writer had developed lesson plans for their specific group.
- **Collected resources in the last three chapters:** Additional information appears in the last three Resource chapters: 15, 16, and 17. All the authors contributed to collecting resources, which were combined at the end of the book. These are resources to expand the teacher’s understanding, but there is too much detail that is beyond the scope of each lesson. The intent is that teachers can read through these resources to be better equipped for teaching the lesson plan without having to do independent research.
- **Kuimba kama mkakati wa ufundishaji:** Kwa masomo kadhaa katika kitabu hiki, waandishi wamehimiza shughuli ya matumizi (“Took”) ambapo vikundi vidogo vya wanafunzi hufanya kazi pamoja ili kugeuza hoja kuu ya somo kuwa ubeti ambao wanaandika ili kuiimba kwa ala/sauti ya nyimbo ya kitamaduni ya Wamaasai. Huu ni mkakati imara wa ufundishaji kwa sababu nyingi. Kwanza, unapitia hoja kuu ya somo. Pili, muziki ni njia nzuri ya kukumbuka, kwa sababu kuimba kunahusisha kutumia kazi nyingi zaidi na tofauti kwenye ubongo. Tatu, kuweka maudhui katika maneno yao wenyewe ni sehemu muhimu ya kujifunza kwa kutafakari. Zaidi ya hayo, kuweka maneno kwenye wimbo wa kitamaduni wa Wamasai si tu matumizi bora ya muda mdogo wa somo, lakini pia inathibitisha utamaduni wa Wamasai. Ndiyo, kuimba ni mkakati muhimu wa ufundishaji, lakini itachukua muda. Jaribu kuruhusu dakika 15 katika muda wa somo, au labda, wanafunzi wanaweza kupewa kazi ya kufanya baada ya darasa na kuiwasilisha watakaporudi kwenye somo linalofuata. Hii pia itatoa mapitio ya somo la kwanza kabla ya somo linalofuata kuanza.
- **Alama za dakika:** Dakika za kila shughuli zinapendekezwa katika safu wima ya kushoto ili kuendana na somo la dakika 60. Hizi zinaweza kubadilishwa kulingana na muda uliopo.
- **Taarifa nyingi katika mipango ya somo:** Kuna taarifa nyingi katika mipango ya somo. Inaweza kuwa vigumu kujumuisha taarifa zote katika somo moja la dakika 60. Kuna baadhi ya taarifa hutolewa ili kubaki na maudhui ya msingi ya somo yanayopatikana kwa urahisi kwa walimu wa masomo.
- **Masomo kwa makundi manne tofauti:** Walimu wanaweza kulinganisha masomo kutoka kwa makundi manne tofauti kwa mawazo mengine ili kuona jinsi mwandishi mwingine alivyotengeneza mipango ya somo kwa ajili ya kundi lao.
- **Rasilimali zilizokusanywa katika sura tatu zilizopita:** Taarifa za ziada zinaonekana katika sura tatu zilizopita za Rasilimali: 15, 16, na 17. Waandishi wote walichangia kukusanya rasilimali, ambazo ziliunganishwa mwishoni mwa kitabu. Hizi ni rasilimali za kupanua uelewa wa mwalimu, lakini kuna maelezo mengi sana ambayo yako nje ya upeo wa kila somo. Kusudi ni kwamba walimu waweze kusoma rasilimali hizi ili wawe na vifaa bora vya kufundisha mpango wa somo bila kulazimika kufanya utafiti wa kujitegemea.

**Part 2:**  
**Lessons for Theological Education by Extension (TEE)**  
**(English/Kiswahili)**



## 9. TEE Lesson 1: English/Kiswahili

## Biblical Creation Care

### Utunzaji wa Uumbaji wa Kibiblia

## Main Point

**God has commissioned (instructed) us to care for God’s good creation.**



**Mungu ametuamuru (ametuagiza) kutunza uumbaji mwema wa Mungu.**

## Learning Outcomes

As a result of this lesson, the learner will:

Kama matokeo ya somo hili, mwanafunzi atafanya:

## Cognitive: Know



#### Biblical Mandate

- Know that God made the world, and it was very good (**Genesis 1:31a**); and God loves it (**John 3:16**).
- Understand that we have been given a mandate (commissioned or instructed) to look after what God has made (**Genesis 2:15**).
- Understand that the world has gone wrong because of human sin (especially seen in selfishness and greed).
- Be aware that failing to love one another is sin (**Mathew 22:37–39**), thus spoiling natural resources that could be used by many is a sin.
- Realize that Jesus died for the whole world—not just humans.
- Realize that though God has control over the weather, yet God gave humanity the responsibility of caring for the environment.
- Know that God will restore creation when Jesus Christ returns.



#### Mamlaka ya Kibiblia

- Fahamu kwamba Mungu aliumba ulimwengu, na ulikuwa mzuri sana (**Mwanzo 1:31a**); na Mungu anaupenda (**Yohana 3:16**).
- Elewa kwamba tumepewa agizo (tumeagizwa au tumeagizwa) la kutunza kile ambacho Mungu ameumba (**Mwanzo 2:15**).
- Elewa kwamba ulimwengu umeharinika kwa sababu ya dhambi ya mwanadamu (hasa inavyodhihirika katika ubinafsi na uchoyo).
- Kujua kwamba kutopendana ni dhambi (**Mathayo 22:37–39**), kwa hivyo kuharibu maliasili ambazo zingeweza kutumiwa na wengi ni dhambi.
- Tambua kwamba Yesu alikufa kwa ajili ya ulimwengu wote—si wanadamu tu.
- Tambua kwamba ingawa Mungu ana udhibiti wa hali ya hewa, lakini Mungu aliwapa wanadamu jukumu la kutunza mazingira.
- Fahamu kwamba Mungu atarejesha uumbaji wakati Yesu Kristo atakaporudi.

### Climate Change Introduction

- Realize that humans have caused damage to the planet.
- Recall the various ways in which the earth has been damaged by human activities and greed (sin).
- Introduce that the Maasai traditional environmental knowledge has good ways to take care of creation (more in lesson 2).
- Introduce basic climate science knowledge, like global-warming gases (greenhouse gases) (more in Lesson 3).



### Utangulizi wa Mabadiliko ya Tabianchi

- Tambua kwamba wanadamu wamesababisha uharibifu kwenye dunia.
- Kumbuka njia mbalimbali ambazo dunia imeharibiwa na shughuli za binadamu na uchoyo (dhambi).
- Tambulisha kwamba maarifa ya kitamaduni ya mazingira ya Wamaasai ni njia nzuri za kutunza uumbaji (zaidi katika somo la 2).
- Eleza maarifa ya msingi ya sayansi ya tabia nchi, kama vile gesi za ongezeko la joto la dunia (zaidi katika Somo la 3).

### Hope

- Know that our Creator, the God of Hope, loves the world and will never abandon it.
- With the knowledge God has given to humanity, the environment can be cared for in ways that nurture renewal of the creation.



### Tumaini

- Fahamu kwamba Muumba wetu, Mungu wa Tumaini, anapenda ulimwengu na hatauacha kamwe.
- Kwa maarifa ambayo Mungu amewapa wanadamu, mazingira yanaweza kutunzwa kwa njia zinazochochea uhuishaji wa uumbaji.

#### Affective: Feel



- Students will reflect on their role in God’s creation.
- **Blessed** by God’s good creation.
  - **Honored** to be commissioned by God to care for creation.
  - **Committed** to care for God’s creation.

- Wanafunzi watatafakari kuhusu jukumu lao katika uumbaji wa Mungu.
- Wamebarikiwa na uumbaji mzuri wa Mungu.
  - Wameheshimiwa kutumwa na Mungu kutunza uumbaji.
  - Wamejitolea kutunza uumbaji wa Mungu.

#### Behavioral: Do



- Students in small groups will:
- Identify traditional songs and practices that reveal that the Maasai people acknowledge God as a creator;
  - Write a new verse from this lesson’s content;
  - Then sing the song.



- Wanafunzi katika vikundi vidogo watafanya hivi:
- Kubainisha nyimbo na desturi za kitamaduni zinazoonyesha kwamba Wamaasai wanamtambua Mungu kama muumbaji;
  - Kutunga wimbo mpya ubeti mmoja kutoka kwa maudhui ya somo hili;
  - Kisha kuimba wimbo huo.

**Notes for Teachers**

- *Words in italics* are guiding information for the teachers.
- Teachers are encouraged to use active learning methods rather than lecturing. This includes small group discussion and exercises.
- Minutes for each activity are suggested in the far-left column to fit into a 60-minute lesson.
- See other good resources in Chapter 22 to equip the teacher prior to teaching the lesson.
- English Bible text from the ESV, [Gen 1 ESV - The Creation of the World - In the - Bible Gateway](#)

**Teaching Equipment Needed**

- Anthropogenic (human caused) climate change chart (on blackboard or large paper)

**Student Supplies / Handouts**

- Bibles
- Soft/bulletin board on the wall and clips or pins or tape to post large paper on the walls
- BOOK: A chart of Bible verses or slips of paper with Bible verses: Genesis 1:31; Genesis 2:15; Psalm 24:1–2; John 3:16
- HOPE: Slips of paper with Bible verses: Romans 8:19–21; Colossians 1:15–17; Revelation 21:1–5

**Vidokezo kwa Walimu**

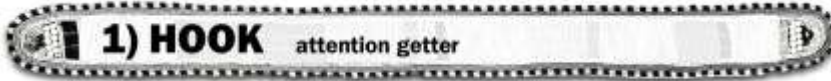
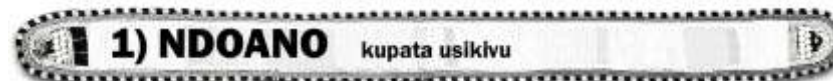
- Maneno yaliyoandikwa kwa herufi za italiki ni mwongozo kwa walimu.
- Walimu wanahimizwa kutumia mbinu za kujifunza kwa vitendo badala ya kutoa mihadhara. Hii inajumuisha majadiliano na mazoezi ya vikundi vidogo.
- Dakika za kila shughuli zinapendekezwa katika safu wima ya kushoto ili kuendana na somo la dakika 60.
- Tazama nyenzo zingine nzuri katika Sura ya 22 ili kumpa mwalimu ujuzi kabla ya kufundisha somo.
- Kiswahili Biblia kutoka SRUV, [Mwanzo 1 | SRUV Bible | YouVersion](#);

**Vifaa vya Kufundishia Vinahitajika**

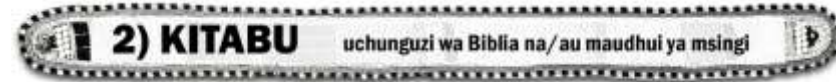
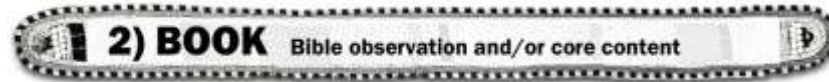
- Chati ya mabadiliko ya tabianchi yanayosababishwa na binadamu (kwenye ubao mweusi au karatasi kubwa)

**Vifaa vya Wanafunzi / Vipeperushi vya Karatasi**

- Biblia
- Ubao laini/wa matangazo ukutani na kifaa cha kubania karatasi au pini au utepe wa kubandika karatasi kubwa ukutani
- KITABU: Chati ya mistari ya Biblia au vipande vya karatasi vyenye mistari ya Biblia: Mwanzo 1:31; Mwanzo 2:15; Zaburi 24:1–2; Yohana 3:16
- TUMAINI: Vipande vya karatasi vyenye mistari ya Biblia: Warumi 8:19–21; Wakolosai 1:15–17; Ufunuo 21:1–5

Time	Content	Maudhui
		
	<p><b>Maa Stories, Cultural Instructions, and Practices on Creation Care</b></p>	<p><b>Hadithi za Maa, Maelekezo ya Kitamaduni, na Namna za Utunzaji wa Uumbaji</b></p>
5	<ul style="list-style-type: none"> <li>How do Maasai stories show that God is the creator and the owner of creation?</li> </ul> <p><i>The students are encouraged to take notes for future reference.</i></p> <p><i>Students may identify and share the traditional knowledge and practices that promote creation care, such as:</i></p> <ul style="list-style-type: none"> <li>Cultural norms and taboos that advocate for creation care,</li> <li>Cultural teaching at various age groups that insist on creation care, or</li> <li>Daily practices in life that recognize the importance of creation care.</li> </ul> <p><b>Transition statement (connecting Hook to Main Point)</b></p>	<ul style="list-style-type: none"> <li>Hadithi za Wamaasai zinaonyeshaje kwamba Mungu ndiye muumbaji na mmiliki wa uumbaji?</li> <li>Wanafunzi wanahimizwa kuandika maelezo kwa ajili ya marejeleo ya baadaye.</li> </ul> <p><i>Wanafunzi wabainishe na kushirikisha maarifa na desturi za kitamaduni zinazochoea utunzaji wa uumbaji, kama vile:</i></p> <ul style="list-style-type: none"> <li>Kanuni na miiko ya kitamaduni inayotetea utunzaji wa uumbaji,</li> <li>Mafundisho ya kitamaduni katika makundi rika mbalimbali yanayosisitiza utunzaji wa uumbaji, au</li> <li>Vitendo vya kila siku maishani vinavyotambua umuhimu wa utunzaji wa uumbaji.</li> </ul> <p><b>Kauli kiunganishi (kuunganisha Ndoano na Hoja Kuu)</b></p>
1	<ul style="list-style-type: none"> <li>The rich Maasai traditional knowledge as we heard—on the goodness of God’s creation and human responsibility in the proper use and caring of creation—align very well with the Bible teachings.</li> <li>Let’s look together at some important texts in the Bible.</li> </ul>	<ul style="list-style-type: none"> <li>Utajiri wa Maarifa ya kitamaduni ya Wamaasai kama tulivyosikia—juu ya wema wa uumbaji wa Mungu na wajibu wa mwanadamu katika matumizi na utunzaji sahihi wa uumbaji—yanaendana vyema na mafundisho ya Biblia.</li> <li>Hebu tuangalie pamoja baadhi ya maandiko muhimu katika Biblia.</li> </ul>





## Bible Discussions

15 *Form small groups consisting of three to four students each. The groups are assigned to read and discuss one of the following verses. The questions are available on the same sheet of paper that have Bible verses.*



- What does this Bible verse say about God?
- What does this Bible verse say about God's creation?
- What does this Bible verse say about the relationship between humans and God's creation?
- Choose a reporter for your group to write down key points and be prepared to share your insights with the rest of the class.

*Bible text from the ESV unless otherwise noted.*

- **Genesis 1:31a** And God saw everything that he had made, and behold, it was very good.
- **Genesis 2:15** The LORD God took the man and put him in the garden of Eden to work it and keep it. (עָבַד is the Hebrew word that means both work and serve).
- **Psalms 24:1** The earth is the LORD's and the fullness thereof, / the world and those who dwell therein,
- **John 3:16** "For God so loved the world, that he gave his only Son, that whoever believes in him should not perish but have eternal life." (The "world" in New Testament Greek is *kosmos*, all the created world, including non-human creation.)

*Each group reporter gives a 1 to 2-minute summary presentation of key points.*

*Collect the key points to be attached to the wallboard.*

## Majadiliano ya Biblia

*Unda vikundi vidogo vyenye wanafunzi watatu hadi wanne kila kimoja. Vikundi vimepewa jukumu la kusoma na kujadili mojawapo ya mistari ifuatayo. Maswali yanapatikana kwenye ile karatasi yenye mistari ya Biblia.*

- Ubeti huu wa Biblia unasema nini kuhusu Mungu?
- Ubeti huu wa Biblia unasema nini kuhusu uumbaji wa Mungu?
- Ubeti huu wa Biblia unasema nini kuhusu uhusiano kati ya wanadamu na uumbaji wa Mungu?
- Chagua mwandishi kwa ajili ya kikundi chako ili aandike mambo muhimu na awe tayari kushiriki maarifa yako kwa darasa lote.

*Maandishi ya Biblia kutoka SRUV isipokuwa kama yametajwa vinginevyo.*

- **Mwanzo 1:31a** Mungu akaona kila kitu alichokifanya, na tazama, ni chema sana.
- **Mwanzo 2:15** BWANA Mungu akamtwa huyo mtu, akamweka katika bustani ya Edeni, ailime na kuitunza. (עָבַד ni neno la Kiebrania linalomaanisha kazi na kuitumikia.)
- **Zaburi 24:1** Nchi na vyote vilivyomo ni mali ya BWANA, / Dunia na wote wakao ndani yake.
- **Yohana 3:16** Kwa maana jinsi hii Mungu aliupenda ulimwengu, hata akamtoa Mwanawe pekee, ili kila mtu amwaminiye asipotee, bali awe na uzima wa milele. ("Ulimwengu" katika Kigiriki cha Agano Jipya ni *κοσμος*, ulimwengu wote uliombwa, ikiwa ni pamoja na uumbaji usio wa kibinadamu.)

*Kila mwandishi wa habari wa kikundi hutoa muhtasari wa dakika 1 hadi 2 wa mambo muhimu.*

*Kusanya mambo muhimu yatakayoambatanishwa kwenye ubao wa ukutani.*

## God's Charge to Care for Creation (Main point)

*Note to the teacher: The Maasai traditionally understand that God controls the weather. There is also biblical teaching of God's sovereignty over the weather. However, if this idea was applied to climate change, then some students may think incorrectly that we can do nothing to reduce the negative effects of climate change (which is different than weather, as identified below). So, these lessons seek to both affirm God's sovereignty while also recognizing that God has commissioned us to care for the creation, which also can reduce the negative effects of climate change. Please uphold this tension and nuanced thinking in your teaching.*

The Bible emphasizes that humans are entrusted with the care of the earth. **Genesis 2:15:** "The LORD God took the man and put him in the garden of Eden to work it and keep it." The Hebrew word from the Bible that is translated as "work" can also mean "serve," which indicates the responsibility to minister to the creation in a way that is different from having mastery over or dominating over it.

## Image of God

- 5 *The facilitator should guide the students to discover a beginning understanding of **Genesis 1:27**, that humankind is created "in the image of God."*
- Turn in your Bibles to **Genesis 1:27**. Who will read it for the class?
    - So, God created man in his own image, / in the image of God he created him; / male and female he created them.
  - What does it mean that humankind is created "in the image of God" in relation to caring for creation?
    - God revealed Godself through nature/creation.

## Jukumu la Mungu la Kutunza Uumbaji (Hoja Kuu)

*Dokezo kwa mwalimu: Wamaasai wanaelewa kijadi kwamba Mungu anadhibiti hali ya hewa. Pia kuna mafundisho ya kibiblia kuhusu uhuru wa Mungu juu ya hali ya hewa. Hata hivyo, ikiwa wazo hili lilitumika kwa mabadiliko ya tabianchi, basi baadhi ya wanafunzi wanaweza kufikiri kimakosa kwamba hatuwezi kufanya chochote kupunguza athari mbaya za mabadiliko ya tabianchi (ambayo ni tofauti na hali ya hewa, kama ilivyoainishwa hapa chini). Kwa hivyo, masomo haya yanalenga kuthibitisha uhuru wa Mungu huku pia yakitambua kwamba Mungu ametuagiza kutunza uumbaji, ambao pia unaweza kupunguza athari mbaya za mabadiliko ya tabianchi. Tafadhali shikilia mvutano huu na mawazo yenye mantiki katika ufundishaji wako.*

Biblia inasisitiza kwamba wanadamu wamepewa jukumu la kutunza dunia. **Mwanzo 2:15:** "BWANA Mungu akamtwa huyo mtu, akamweka katika bustani ya Edeni, ailime na kuitunza." Neno la Kiebrania kutoka Biblia linalotafsiriwa kama "kazi" linaweza pia kumaanisha "kutumikia," ambalo linaonyesha jukumu la kuhudumia uumbaji kwa njia tofauti na kuwa na mamlaka juu yake au kutawala juu yake.

## Mfano wa Mungu

- Mwezeshaji anapaswa kuwaongoza wanafunzi kugundua uelewa wa mwanzo wa **Mwanzo 1:27**, kwamba wanadamu wameumbwa "kwa mfano wa Mungu."*
- Fungua Biblia zako kwenye **Mwanzo 1:27**. Nani atasoma kwa ajili ya darasa?
    - Mungu akaumba mtu kwa mfano wake, / kwa mfano wa Mungu alimwumba, / mwanamume na mwanamke aliwaumba.
  - Inamaanisha nini kwamba wanadamu wameumbwa "kwa mfano wa Mungu" kuhusiana na kutunza uumbaji?
    - Mungu alijifunua kupitia asili/uumbaji.

- Humas are representatives to look after and take care of the world that God loves.
- Jesus became part of creation.

*The discussion can also reflect on how both men and women in various social positions in the Maasai society have played a role reflecting “the image of God.”*

- However, the world has been spoiled because of human sin—especially seen in selfishness and greed.
- This is opposite of Jesus’s teaching in **Mathew 22:37–39**, which commands love of God and love of others. And [Jesus] said to him, “You shall love the Lord your God with all your heart and with all your soul and with all your mind. This is the great and first commandment. And the second is like it: You shall love your neighbor as yourself.”

## Climate Change Introduction

3 *Knowledge generation through quick questions and short answers.*

- How do the Maasai understand the concept of climate change?
- What are some effects of climatic change that we see now that are drastically different from what we have in our traditional stories?

Here’s some beginning information about how science can inform us about caring for God’s creation. We will review and add more information in lesson 3.

## Climate Change Definition (Key point)

- 7
- Climate change refers to long-term changes in temperature, precipitation, wind patterns, and other aspects of the Earth’s climate system.



- Binadamu ni wawakilishi wa kutunza na kutunza ulimwengu ambao Mungu anaupenda.
- Yesu alifanyika/ alijifanya sehemu ya uumbaji.

*Majadiliano yanaweza pia kutafakari jinsi wanaume na wanawake katika nafasi mbalimbali za kijamii katika jamii ya Wamaasai wamechukua jukumu la kuonyesha “mfano wa Mungu.”*

- Hata hivyo, ulimwengu umeharibiwa kwa sababu ya dhambi ya mwanadamu—hasa inavyodhihirishwa katika ubinafsi na uchoyo.
- Ambapo ni kinyume na mafundisho ya Yesu katika **Mathayo 22:37–39**, ambayo inaamuru upendo kwa Mungu na upendo kwa wengine. [Yesu] Akamwambia, “Mpende Bwana Mungu wako kwa moyo wako wote, na kwa roho yako yote, na kwa akili zako zote. Hii ndiyo amri iliyo kuu, tena ni ya kwanza. Na ya pili yafanana nayo, nayo ni hii, Mpende jirani yako kama nafsi yako.”

## Utangulizi wa Mabadiliko ya Tabianchi

*Uzalishaji wa maarifa kupitia maswali ya haraka na majibu mafupi.*

- Wamaasai wanaelewaje dhana ya mabadiliko ya tabianchi?
- Ni athari gani za mabadiliko ya tabianchi tunazoziona sasa ambazo ni tofauti sana na zile tulizonazo katika hadithi zetu za kitamaduni?

Hapa kuna taarifa za mwanzo kuhusu jinsi sayansi inavyoweza kutufahamisha kuhusu kutunza uumbaji wa Mungu. Tutapitia na kuongeza taarifa zaidi katika somo la tatu.

## Ufafanuzi wa Mabadiliko ya Tabianchi (Hoja muhimu)

- Mabadiliko ya tabianchi yanarejelea mabadiliko ya muda mrefu katika halijoto, mvua, mifumo ya upepo, na vipengele vingine vya mfumo wa tabia nchi wa Dunia.

### ***Climate Change is:***

- Any process that causes adjustments to a climate system could be described as creating “climate change.” These processes include volcanic eruptions and cyclical changes in solar activity. The planet’s climate has constantly been changing over geological time.
- However, the current period of warming is occurring more rapidly than many past events. Scientists are concerned by the rapid human-induced warming because of the serious implications for the stability of the planet’s climate.
- Today, however, the phrase is most often used as shorthand for anthropogenic climate change—in other words, climate change caused by humans. The principal way in which humans are understood to be affecting the climate is through the release of heat-trapping gases into the air, such as burning fossil fuels (oil, coal, gas, plastics).<sup>1</sup>

### ***Global-warming gases (“Greenhouse Gases”)***

- Have you heard about global-warming or “greenhouse gases” before?
- These are the heat-trapping gases that absorb and trap the sun’s radiation in earth’s atmosphere—like a blanket—so the heat cannot escape.<sup>2</sup>
- So, the earth warms up—like a person in a blanket.
- But the earth is getting too hot and causing problems that are seen in effects like:<sup>3</sup>
  - The rise of sea level;
  - Extreme weather like flooding in some areas and droughts in other areas; and
  - These droughts can cause crops to fail.
  - There are more effects that will be discussed further in lesson 3.

### ***Mabadiliko ya Tabianchi ni:***

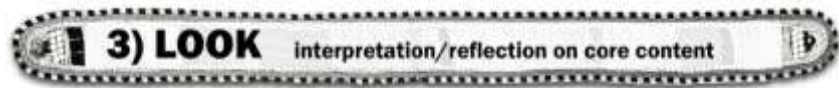
- Mchakato wowote unaosababisha marekebisha kwenye mfumo wa tabianchi unaweza kuelezewa kama unaosababisha “mabadiliko ya tabianchi.” Mchakato hii inajumuisha mlipuko wa volkeno hadi mabadiliko ya mzunguko katika shughuli za jua. Tabia nchi ya dunia imekuwa ikibadilika kila mara kwa wakati wa kijiolojia.
- Hata hivyo, kipindi cha sasa cha ongezeko la joto kinatokea kwa kasi zaidi kuliko matukio mengi ya zamani. Wanasayansi wana wasiwasi na ongezeko la joto la haraka linalosababishwa na binadamu kwa sababu ya athari kubwa kwa uthabiti wa tabia nchi ya dunia.
- Hata hivyo, leo, msemu huo mara nyingi hutumika kama kifupi cha mabadiliko ya tabianchi yanayosababishwa na binadamu—kwa maneno mengine, mabadiliko ya tabianchi yanayosababishwa na binadamu. Njia kuu ambayo wanadamu wanayoathiri tabia nchi ni kupitia kutolewa kwa gesi zinazozuia joto angani, kama vile kuchoma mafuta ya visukuku (mafuta, makaa ya mawe, gesi, plastiki).<sup>1</sup>

### ***Gesi zinazoongeza joto dunia***

- Je, umesikia kuhusu ongezeko la joto dunia au “gesi mbaya zinazoongeza joto” hapo awali?
- Hizi ni gesi zinazozuia joto; zinazonyonya na kunasa mionzi ya jua katika angahewa ya dunia—kama blanketi—hivyo joto haliwezi kutoroka.
- Kwa hivyo, dunia inapata joto—kama mtu aliyevaa blanketi.
- Lakini dunia inapata joto sana na kusababisha athari kama:
  - Kupanda kwa usawa wa bahari;
  - Hali mbaya ya hewa kama mafuriko katika baadhi ya maeneo na ukame katika maeneo mengine; na
  - Na ukame huu unaweza kuharibu uoto wa asili na mazao.
  - Kuna athari zaidi ambazo zitajadiliwa zaidi katika somo la 3.

### Human Caused (Anthropogenic) Climate Change

- Greed and selfishness keep industries burning fossil fuels in order to make money instead of caring for the environment.
- While we know what to do to reduce the negative effects of climate change, knowledge does not empower us to do it. The sins of selfishness, greed, and apathy are too strong. This lack of love is going against the great commandment to love one another.  
**John 13:34–35:** [Jesus said,] “A new commandment I give to you, that you love one another: just as I have loved you, you also are to love one another. By this all people will know that you are my disciples, if you have love for one another.”



### Mabadiliko ya Tabianchi Yanayosababishwa na Binadamu

- Uchoyo na ubinafsi huwafanya viwanda viendeleo kuchoma mafuta ya visukuku ili kupata pesa badala ya kutunza mazingira.
- Ingawa tunajua la kufanya ili kupunguza athari mbaya za mabadiliko ya tabianchi, maarifa hayatuwezeshi kuyafanya. Dhambi za ubinafsi, uchoyo, na kutojali ni kubwa sana. Ukosefu huu wa upendo ni kwenda kinyume na amri kuu ya kupendana.  
**Yohana 13:34–35:** [Yesu alisema,] “Amri mpya nawapa, Mpendane. Kama vile nilivyowapenda ninyi, nanyi mpendane vivyo hivyo. Hivyo watu wote watatambua ya kuwa ninyi mmekuwa wanafunzi wangu, mkiwa na upendo ninyi kwa ninyi.”



## The Maasai Context

- 4 The Maasai have the saying “*melaikinoi ororei te enkigwena*,” which means, “Through meeting discussions every problem finds its solution.”



### Impact of Climate Change on the Maasai

- For the Maasai, climate change is experienced as significant shifts in weather systems that impact their traditional way of life.
  - In Maasailand, climate change means changes in weather patterns, like less rain, more droughts, and unpredictable seasons.
  - These changes make it harder to find water and grass for their animals.
  - The Maasai see this as both a spiritual issue linked to *Engai* and a result of human actions.
- The impacts upon the Maasai will be discussed further in the next lesson.

## Muktadha wa Wamaasai

Wamaasai wana msemo “*melaikinoi ororei te enkigwena*,” unaomaanisha, “Kupitia mijadala ya mikutano kila tatizo hupata suluhisho lake.”

### Athari za Mabadiliko ya Tabianchi kwa Wamaasai

- Kwa Wamaasai, mabadiliko ya tabianchi hutokea kama mabadiliko makubwa katika mifumo ya hali ya hewa yanayoathiri mtindo wao wa maisha wa kitamaduni.
  - Kwa Wamaasai, mabadiliko ya tabianchi yanamaanisha mabadiliko katika mifumo ya hali ya hewa, kama vile mvua kidogo, ukame zaidi, na misimu isiyotabirika.
  - Mabadiliko haya hufanya iwe vigumu kupata maji na nyasi kwa ajili ya wanyama wao.
  - Wamaasai wanaona hili kama suala la kiroho linalohusiana na *Engai* na matokeo ya matendo ya binadamu.
- Athari kwa Wamaasai zitajadiliwa zaidi katika somo lijalo.

4

## Biblical Creation Care Continued



- God has given us the Bible to guide us in all our ways. Therefore, when the Maasai have Bible meetings aiming at seeking solutions and guidance, the Holy Spirit will empower us and lead us. The word of God has transforming power that can encourage us!
- Think back to that most beautiful place in your area that you want to preserve.
  - Think of the wild animals in the bush and their environment that need protection.
  - Do not forget the soil that you always preserve to avoid soil erosion.
  - The truth is, we are not doing this only for the sake of humankind but also for God's sake who so loved the world and died to reconcile the world to Godself.

### Reflection

*Students will reflect on their position in God's creation.*

- Think of how you feel when the creation provides all you need.
  - **Blessed** by God's good creation.
- Think of the position each human holds as entrusted by God.
  - Mention the tasks of Maa elders, leaders, warriors, men, women and parents and children concerning creation care.
- Think of God's purpose in placing you in that position in God's creation.
  - **Honored** to be commissioned by God to care for creation.
- Think of your sincere response to God for such a blessing.
  - **Committed** to care for God's creation.

### This is the first step.

- In our second of 3 lessons, we will look at WHICH Maasai traditions are good for caring for God's creation.

## Utunzaji wa Uumbaji wa Kibiblia Unaendelea

- Mungu ametupa Biblia ili ituongoze katika njia zetu zote. Kwa hivyo, wakati Maa wanapokuwa na mikutano ya Biblia inayolenga kutafuta suluhisho na mwongozo, Roho Mtakatifu atatutia nguvu na kutuongoza. Neno la Mungu lina nguvu ya kubadilisha ambayo inaweza kututia moyo!
- Fikiria tena mahali pazuri zaidi katika eneo lako ambapo unataka kuhifadhi.
  - Fikiria wanyama wa porini kwenye vichaka na mazingira yao wanaohitaji ulinzi.
  - Usisahau udongo ambao unahifadhi kila wakati ili kuepuka mmomonyoko wa udongo.
  - Ukweli ni kwamba, hatufanyi hivi kwa ajili ya wanadamu tu bali pia kwa ajili ya Mungu ambaye aliupenda ulimwengu sana na akafa ili kupatanisha ulimwengu na Mungu Mwenyewe.

### Tafakari

*Wanafunzi watatafakari nafasi yao katika uumbaji wa Mungu.*

- Fikiria jinsi unavyohisi wakati uumbaji unakupa kila kitu unachohitaji.
  - **Umeharikiwa** na uumbaji mzuri wa Mungu.
- Fikiria nafasi ambayo mwanadamu anayo kama alivyokabidhiwa na Mungu.
  - Taja kazi za wazee wa Maa, viongozi, mashujaa, wanaume, wanawake na wazazi na watoto zinazohusu utunzaji wa uumbaji.
- Fikiria kusudi la Mungu katika kukuweka katika nafasi hiyo katika uumbaji wa Mungu.
  - **Umeheshimiwa** kuagizwa na Mungu kutunza uumbaji.
- Fikiria mwitikio wako wa dhati kwa Mungu kwa baraka kama hiyo.
  - **Umehitolea** kutunza uumbaji wa Mungu.

### Hii ni hatua ya kwanza.

- Katika somo letu la pili kati ya masomo 3, tutaangalia NJIA nzuri za asili za Wamasai za kutunza uumbaji wa Mungu.

- In our third and last lesson, we will look more at WHAT we can practically do to care for God’s creation.
- For now, let’s reflect more on WHY this matters and HOW we, the people of God, can make a difference.

## Hope

6 *Outcome: Know that our Creator, the God of Hope, loves the world and will never abandon it.*



- Give a slip of paper with each of the 3 Bible verses to 3 students and ask them to look up the Bible text and be ready to read it to the whole class.
  - **Romans 8:19–21**
  - **Colossians 1:15–17**
  - **Revelation 21:1–5**
- When the Maasai or other people hear about the climate change crisis, they may get depressed or anxious. This is called **climate anxiety**.



*Remind the students of the merciful ways Engai dealt with the creation through myths and Maa stories.*

*For example, there have been periods of traumatic war among the Maa groups, diseases in history that killed almost all Maa livestock, severe drought that deprived the Maasai of wealth and that caused suffering; but God is the God of hope, and God will never abandon God’s creation.*

- However, it is important to have hope!
- First, God is the God of hope who loves and sustains the world! And God has promised not to abandon it but rather restore it! Let’s look at 3 example Bible verses.

*Have the designated student read the Bible verse to the whole class. Below is the text to guide the discussion.*

- Katika somo letu la tatu na la mwisho, tutaangalia zaidi NJIA ambazo tunaweza kwa vitendo ili kutunza uumbaji wa Mungu.
- Kwa sasa, hebu tutafakari zaidi kuhusu KWA NINI hili ni muhimu na JINSI sisi, watu wa Mungu, tunavyoweza kuleta mabadiliko.

## Tumaini

*Matokeo: Jua kwamba Muumba wetu, Mungu wa Tumaini, anaupenda ulimwengu na hatauacha kamwe.*

- Wape wanafunzi 3 karatasi yenye mistari yote mitatu 3 ya Biblia na uwaombe wawe tayari kuisoma kwa darasa zima.
  - **Warumi 8:19–21**
  - **Wakolosai 1:15–17**
  - **Ufunuo 21:1–5**
- Wamaasai au watu wengine wanaposikia kuhusu mgogoro wa mabadiliko ya tabianchi, wanaweza kufadhaika au kuwa na wasiwasi. Hii inaitwa **wasiwasi wa tabianchi**.

*Wakumbushe wanafunzi jinsi Engai anavyoshughulikia uumbaji kwa huruma kupitia hadithi za Wamaa.*

*Kwa mfano, kumekuwa na vipindi vya vita vya kutisha miongoni mwa makundi ya Wamaa, magonjwa katika historia yaliyoua karibu mifugo yote ya Wamaa, ukame mkali uliowanyima utajiri wa Wamaa na kusababisha mateso; lakini Mungu ni Mungu wa matumaini, na Mungu hatawahi kuacha uumbaji wa Mungu.*

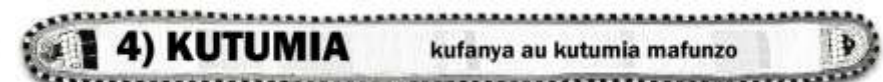
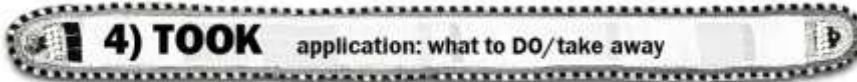
- Hata hivyo, ni muhimu kuwa na matumaini!
- Kwanza, Mungu ni Mungu wa matumaini anayependa na kutegemeza ulimwengu! Na Mungu ameahidi kutouacha bali kuurejesha! Hebu tuangalie mifano 3 ya mistari ya Biblia.

*Mwanafunzi aliyeteuliwa asome ubeti wa Biblia kwa darasa zima. Hapa chini kuna maandishi ya kuongoza majadiliano.*

- **Romans 8:19–21** The creation waits in eager expectation for the children of God to be revealed. For the creation was subjected to frustration, not by its own choice, but by the will of the one who subjected it, in hope that the creation itself will be liberated from its bondage to decay and brought into the freedom and glory of the children of God.
  - Did you hear? The creation will be freed from its bondage to decay.
- **Colossians 1:15–17** The Son is the image of the invisible God, the firstborn over all creation. For in him all things were created: things in heaven and on earth, visible and invisible, whether thrones or powers or rulers or authorities; all things have been created through him and for him. He is before all things, and in him all things hold together. For by him all things were created, in heaven and on earth, visible and invisible, whether thrones or dominions or rulers or authorities—all things were created through him and for him. And he is before all things, and in him all things hold together.
  - Here we read that God is the Creator and Sustainer of the world and will never abandon the creation but will reconcile ALL things to Jesus Christ. We do not understand how this is going to happen, but we trust God’s promises.
  - So, we know that Jesus is holding all things together—including the earth.
- **Revelation 21:1–5** Then I saw a new heaven and a new earth, for the first heaven and the first earth had passed away, and the sea was no more. And I saw the holy city, new Jerusalem, coming down out of heaven from God, prepared as a bride adorned for her husband. And I heard a loud voice from the throne saying, “Behold, the dwelling place of God is with man. He will dwell with them, and they will be his people, and God himself will be with them as their God. He will wipe away every tear from their eyes, and death shall be no more, neither shall there be mourning, nor crying, nor pain anymore, for the former things have passed away.” And he who was seated on the throne said, “Behold, I am making all things new.” Also he said, “Write this down, for these words are trustworthy and true.”
- **Warumi 8:19–2** Kwa maana viumbe vyote pia vinatazamia kwa shauku nyingi kufunuliwa kwa wana wa Mungu. Kwa maana viumbe vyote pia vilitiishwa chini ya ubatili; si kwa hiari yake, ila kwa sababu yake yeye atiyevitiisha katika tumaini; kwa kuwa viumbe vyenyewe navyo vitawekwa huru na kutolewa katika utumwa wa uharibifu, hata viingie katika uhuru wa utukufu wa watoto wa Mungu.
  - Umesikia? Uumbaji utawekwa huru kutoka katika utumwa wake wa kuoza.
- **Wakolosai 1:15–17** Naye ni mfano wa Mungu asiyeonekana, mzaliwa wa kwanza wa viumbe vyote. Kwa kuwa katika yeye vitu vyote viliumbwa, vilivyo mbinguni na vilivyo juu ya nchi, vinavyoonekana na visivyoonekana; ikiwa ni vitu vya enzi, au milki, au enzi, au mamlaka; vitu vyote viliumbwa kwa njia yake, na kwa ajili yake. Naye amekuwako kabla ya vitu vyote, na vitu vyote hushikana katika yeye.
  - Hapa tunasoma kwamba Mungu ndiye Muumba na Mlinzi wa ulimwengu hataacha kamwe uumbaji wa Mungu bali ataunganisha vitu VYOTE na Yesu Kristo. Hatuelewi jinsi hili litakavyotokea, lakini tunaziamini ahadi za Mungu.
  - Kwa hivyo, tunajua kwamba Yesu anaratibisha vitu vyote—ikiwa ni pamoja na dunia pamoja.
- **Ufunuo 21:1–5** Kisha nikaona mbingu mpya na nchi mpya; kwa maana mbingu za kwanza na nchi ya kwanza zimekwisha kupita, wala hakuna bahari tena. Nami nikauona mji ule mtakatifu, Yerusalemu mpya, ukishuka kutoka mbinguni kwa Mungu, umewekwa tayari, kama bibi arusi aliyekwisha kupambwa kwa mumewe. Nikasikia sauti kubwa kutoka katika kile kiti cha enzi ikisema, Tazama, maskani ya Mungu ni pamoja na wanadamu, naye atafanya maskani yake pamoja nao, nao watakuwa watu wake. Naye Mungu mwenyewe atakuwa pamoja nao. Naye atafuta kila chozi katika macho yao, wala mauti haitakuwapo tena; wala maombolezo, wala kilio, wala maumivu hayatakuwapo tena; kwa kuwa mambo ya kwanza yamekwisha kupita. Na yeye aketiye juu ya kile kiti cha enzi akasema, Tazama, nayafanya yote kuwa mapya. Akaniambia, Andika ya kwamba maneno hayo ni amini na kweli.

- Here, the original Greek language has a meaning of *renewed* earth and not a new one. Yes, God has promised not to abandon God’s creation but to renew it!
- **This is good news!** This is news we can trust, because it is from our trustworthy God. The foundation of our hope is not wishful thinking, but a trustworthy and loving God.
  - In our third lesson, we also learn about hope from the scientists.

- Hapa, lugha ya asili ya Kigiriki ina maana ya dunia iliyofanywa upya na si mpya. Ndiyo, Mungu ameahidi kutoacha uumbaji wa Mungu bali kuufanya upya!
- **Hii ni habari njema!** Hii ni habari tunayoweza kuiamini, kwa sababu inatoka kwa Mungu wetu anayeaminika. Msingi wa tumaini letu si mawazo ya kutamani, bali ni Mungu anayeaminika na mwenye upendo.
  - Katika somo letu la tatu, pia tunajifunza kuhusu tumaini kutoka kwa wanasayansi.



## Creation Care in Song



10 *This activity may take 10–15 minutes. So, while it is a very good application, it needs enough time to be done well.*

- With a partner or small group, remind yourselves of the traditional songs and practices that reveal that the Maasai people acknowledge God as a creator and those that praise God for God’s creation and ask for God’s intervention at the time of severe drought.
- To one of the traditional songs, write a new verse from this lesson’s content.
- Sing the song and new verse.

### Other Activity Options

- Or
- Write down several important points that you are eager to teach in Sunday school classes on creation care. Share it with your partner and clip the papers on the board for others to see.
  - Discuss with your partner the beautiful environment in your village, its features, and the benefit it offers to the people and animals. Identify how society took measures to conserve it.
  - Write down two points on how God involves humankind in caring for creation.

## Uanagalizi wa Uumbaji katika Wimbo

*Shughuli hii inaweza kuchukua dakika 10–15. Kwa hivyo, ingawa ni programu nzuri sana, inahitaji muda wa kutosha kuikamilisha vizuri.*

- Pamoja na mwenzako au kikundi kidogo, jikumbusheni zile nyimbo na desturi za kitamaduni zinazoonyesha kwamba Wamaasai wanamtambua Mungu kama muumbaji na zile zinazomsifu Mungu kwa uumbaji wa Mungu na kwamba wanaomba Mungu aingilie kati wakati wa ukame mkali.
- Katika mojawapo ya nyimbo hizo za kitamaduni, andika ubeti mpya kutoka kwa maudhui ya somo hili.
- Imba wimbo na ubeti mpya.

### Shughuli Nyingine Zinazoweza Kufanyika

1. Zungumzia jambo moja au mawili muhimu ambayo una hamu ya kuwafundisha watoto wako au wajukuu zako kuhusu utunzaji wa uumbaji.
2. Jadili na mwenzi wako/kikundi kidogo kuhusu mazingira mazuri katika kijiji chako, sifa zake, na faida ambayo yanatoa kwa watu na wanyama. Tambua jinsi jamii ilivyochukua hatua za kuyahifadhi.
3. Zungumzia njia moja au mbili ambazo Mungu anawahusisha wanadamu katika kutunza uumbaji. Swali la 3 litaulizwa tena katika

*Question 3 will be asked again in Lesson 3 where we see specific ways creation care can reduce the negative effects of climate change.*

*The whole group will sing one traditional song to thank God for rain and grass.*

*Somo la 3 ambapo tunaona njia mahususi za utunzaji wa uumbaji ambazo zinaweza kupunguza athari mbaya za mabadiliko ya tabianchi.*

*Kundi zima litaimba wimbo mmoja wa kitamaduni wa kumshukuru Mungu kwa mvua na nyasi.*

**Prayer**

.5 God, the creator of heaven and earth, we thank you for the blessing of creation and honor of being created in your image.

Thank you for rain and grass, milk, and children.

We are asking—through your grace and kindness that lasts forever—to enable us to accomplish our task of caring for your creation. Give us unshaken hope at the midst of dramatic climate change. For you are our refuge now and forever. Amen.

**Maombi**

God, muumba wa mbingu na dunia, tunakushukuru kwa baraka ya uumbaji na heshima ya kuumbwa kwa mfano wako.

Asante kwa mvua na nyasi, maziwa, na watoto.

Tunaomba—kupitia neema na wema wako unaodumu milele—utuwezeshe kutimiza kazi yetu ya kutunza uumbaji wako. Tupe tumaini lisilotikisika katikati ya mabadiliko makubwa ya tabianchi. Kwa maana wewe ndiye kimbilio letu sasa na milele. Amina.

**Bibliography**





<sup>1</sup> “Climate Change Mitigation and Adaptation: Simple Guide to Schools in Africa” (UNESCO, United Nations Educational, Scientific and Cultural Organization, 2019), 4, <https://unesdoc.unesco.org/ark:/48223/pf0000372168>.

<sup>2</sup> “Climate Change Mitigation and Adaptation:,” 4.

<sup>3</sup> “Climate Change Mitigation and Adaptation:,” 8–12.

10. TEE Lesson 2: English/Kiswahili

**Pastoralist Maasai Traditional Environmental Knowledge for Creation Care  
Ujuzi wa Asili wa Wamaasai kwa Ajili ya Utunzaji wa Uumbaji**

<p><b>Main Point</b></p>	<p>The Maasai world view—of the interdependence between humans, the environment, and <i>Engai</i>—is similar to Bible’s “creation triangle.”</p>		<p>Mtazamo wa ulimwengu wa Wamaasai—wa utegemezi kati ya wanadamu, mazingira, na <i>Engai</i>—unafanana na “pembetatu ya uumbaji” ya Biblia.</p>
<p><b>Learning Outcomes</b></p>	<p>As a result of this lesson, the learner will:</p>		<p>Kama matokeo ya somo hili, mwanafunzi atafanya:</p>
<p><b>Cognitive: Know</b></p> 	<p><b>Bible</b></p> <ul style="list-style-type: none"> <li>Know that the biblical “creation triangle” refers to the relationship between God, humanity, and non-human creation.</li> </ul> <p><b>Maasai</b></p> <ul style="list-style-type: none"> <li>Understand that the Maasai triangulated worldview on the importance of harmony with <i>Engai</i>, humans, and non-human creation for humanity’s wellbeing is similar to the “creation triangle” in the Bible.</li> <li>The concept of blessing (<i>empuris e Engai</i>) or curse (<i>eng’oki</i>) as a result of hostile relationship between humankind and God but also between humankind and non-human creation.</li> <li>Understand the Maasai worldview of ecosystem.</li> <li>Know that the Maasai traditional environmental knowledge (TEK) are good ways to take care of creation.</li> </ul>	 <p><b>Biblia</b></p> <ul style="list-style-type: none"> <li>Fahamu kwamba “pembetatu ya uumbaji” ya kibiblia inarejelea uhusiano kati ya Mungu, ubinadamu, na uumbaji usio wa kibinadamu.</li> </ul>  <p><b>Wamaasai</b></p> <ul style="list-style-type: none"> <li>Elewa kwamba mtazamo wa ulimwengu wa Wamaasai kuhusu umuhimu wa maelewano na <i>Engai</i>, wanadamu, na viumbe visivyo vya binadamu kwa ustawi wa binadamu ni sawa na “pembetatu ya uumbaji” katika Biblia.</li> <li>Dhana ya baraka (<i>empuris e Engai</i>) au laana (<i>eng’oki</i>) kama matokeo ya uhusiano wa uadui kati ya wanadamu na Mungu lakini pia kati ya wanadamu na viumbe visivyo wanadamu.</li> <li>Elewa mtazamo wa ulimwengu wa Wamaasai wa mfumo ikolojia.</li> <li>Fahamu kwamba maarifa ya kitamaduni ya mazingira ya Wamaasai ni njia nzuri za kutunza uumbaji.</li> </ul>	

## Hope

- Thus, we can face the challenges of climate change with **hope**.
- First, we know that our Creator, the God of Hope, loves the world, and **God will never abandon it**.
- Second, as followers of Jesus Christ, **we are empowered by the Holy Spirit** to be a blessing to others (social justice) and the creation (environment).



## Tumaini

- Hivyo basi, tunaweza kukabiliana na changamoto za mabadiliko ya tabianchi kwa **matumaini**.
- Kwanza, tunajua kwamba Muumba wetu, Mungu wa Tumaini, anapenda ulimwengu, **na Mungu hatauacha kamwe**.
- Pili, kama wafuasi wa Yesu Kristo, **tumewezeshwa na Roho Mtakatifu** kuwa baraka kwa wengine (haki ya kijamii) na uumbaji (mazingira).

### Affective: Feel



- Proud to be Maasai, who sustain biodiversity, protect ecosystems, and keep environmentally sustainable livelihoods

- Tuna sababu ya kujivunia kuwa Wamaasai, wanaodumisha bioanuwai, kulinda mifumo ikolojia, na kudumisha maisha endelevu ya kimazingira.

### Behavioural: Do



- Identify several challenges that prevent the applicability of Maasai traditional environmental knowledge.
- Identify three ways that Maasai traditional knowledge and creation care practices are also best practices of climate change mitigation (reduction) and/or adaptation (increased resilience for climate change impacts).
- Identify one or two new ways that can expand traditional Maasai creation care for climate change mitigation and/or adaptation.
- Write one stanza of a song about traditional Maasai environmental knowledge and practices that are also best practices of climate change mitigation (reduction). Use the common melody that is known by most students.

- Bainisha changamoto kadhaa zinazozuia utekelezaji wa maarifa ya jadi ya Wamaasai.
- Bainisha njia tatu za maarifa ya jadi ya Wamaasai na mbinu za utunzaji wa uumbaji ambazo pia ni mbinu bora za kupunguza na/au kukabiliana na athari za mabadiliko ya tabianchi.
- Bainisha njia moja au mbili mpya ambazo zinaweza kupanua utunzaji wa uumbaji wa jadi ya Wamaasai kwa madhumuni ya kupunguza na/au kuhimili athari za mabadiliko ya tabianchi
- Andika ubeti mmoja wa wimbo kuhusu maarifa na mbinu za kitamaduni za mazingira za Wamaasai ambazo pia ni mbinu bora za kupunguza mabadiliko ya tabianchi. Tumia sauti ya kawaida inaojulikana na wanafunzi wengi.

### Teaching Equipment Needed

- Pictures of the effects of climate change
- Optional: bring a 3-legged stool, *olorika*
- Flipchart, marker pen, clips or tape

### Vifaa vya Kufundishia Vinahitajika


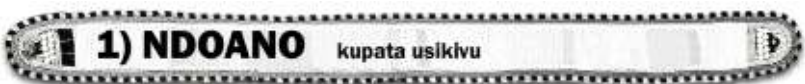
- Picha za athari za mabadiliko ya tabianchi
- Hiari: kigoda chenye miguu 3, *olorika*
- Chati mgeuzo, kalamu ya alama, klipu au tepu

### Student Supplies / Handouts

- Flip chart or large paper and marker pens

### Vifaa vya Wanafunzi / Vipeperushi vya Karatasi

- Ubao wa karatasi au karatasi kubwa na kalamu za alama

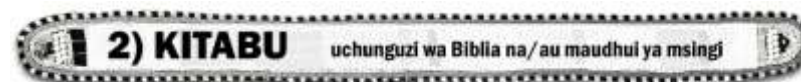
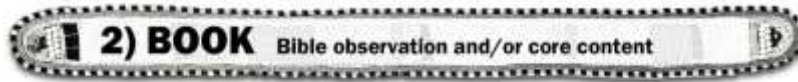
Time	Content	Maudhui
		
4	<p>We are going to play a multiple-choice quiz game with two questions. Get in groups of 2 to help each other answer the questions. Get a scrap/blank piece of paper out to write down your answers.</p> <ol style="list-style-type: none"> <li>How much of Tanzania’s national income (gross domestic product, GDP) comes from tourism?                      A) over 10% B) over 15% C) over 20%                     <ul style="list-style-type: none"> <li><b>Answer: C) over 20%</b>, which is about 8.25 trillion shillings generated by 1,790,301 tourists who visited Tanzania in 2023 alone.<sup>1</sup></li> </ul> </li> <li>What percent of Tanzania’s tourists come to Maasai areas?                      A) 19% B) 29% C) 39%                     <ul style="list-style-type: none"> <li><b>Answer: C) 39%</b> Over 13.3% of the tourists visited the Ngorongoro Conservation Area alone (during 2023, <i>excluding</i> Arusha National Park and Mt. Kilimanjaro).<sup>2</sup> Adding visits to Serengeti (12.0%) and Tarangire (9.0%), we see that 3 of the top 5 tourist attractions are places in Maasailand!</li> </ul> </li> </ol> <ul style="list-style-type: none"> <li>• Raise your hand if you got both questions correct! Hongera sana!</li> <li>• Develop a hypothesis base on the observations of this data for why you think that so much of the tourism income comes into this northern part of Tanzania? You have 2 minutes to come up with a quick hypothesis.</li> <li>• Let’s get 3 volunteer groups to share their hypothesis with the entire class.</li> </ul> <p><i>Discuss briefly.</i></p>	<p>Tutacheza mchezo wa jaribio la kuchagua jibu sahihi katika maswali mawili. Wanafunzi waunde vikundi vya watu wawili wawili ili kusaidiana kujibu maswali. Chukua kipande cha karatasi tupu ili kuandika majibu yako.</p> <ol style="list-style-type: none"> <li>Kiasi gani cha mapato ya taifa la Tanzania (pato la taifa) kinatokana na utalii?                      A) zaidi ya 10% B) zaidi ya 15% C) zaidi ya 20%                     <ul style="list-style-type: none"> <li><b>Jibu: C) zaidi ya 20%</b>, ambayo ni takriban shilingi trilioni 8.25 zilizozalishwa na watalii 1,790,301 waliotembelea Tanzania mwaka wa 2023 pekee.</li> </ul> </li> <li>Ni asilimia ngapi ya watalii wa Tanzania huja katika maeneo ya Wamaasai?                      A) 19% B) 29% C) 39%                     <ul style="list-style-type: none"> <li><b>Jibu: C) 39%</b> Zaidi ya 13.3% ya watalii walitembelea Eneo la Hifadhi la Ngorongoro pekee (mwaka 2023, ukiondoa Hifadhi ya Taifa ya Arusha na Mlima Kilimanjaro). Bila kusahau ziara za Serengeti (12.0%) na Tarangire (9.0%), tunaona kwamba vivutio vitatu kati ya vitano bora vya utalii ni maeneo ya Wamaasai!</li> </ul> </li> </ol> <ul style="list-style-type: none"> <li>• Inua mkono wako ikiwa umejibu maswali yote mawili kwa usahihi! Hongera sana!</li> <li>• Tengeneza msingi wa nadharia kuhusu uchunguzi wa data hii kwa nini unafikiri kwamba mapato mengi ya utalii yanatokana na eneo hili la kaskazini mwa Tanzania? Una dakika 2 za kutoa dhana fupi.</li> <li>• Tuache vikundi 3 vya kujitolea vishiriki dhana yao na darasa zima.</li> </ul> <p><i>Jadili kwa ufupi.</i></p>

**Transition statement (connecting Hook to Main Point)**

- 1
- The main reason why Maasai areas are visited by many tourists is the presence of natural environments in the wild.
  - This demonstrates the Masai mastery in protecting the environment and biodiversity.
  - Now let's take a look at how the Maasai have been dealing with creation care.

**Kauli kiunganishi (kuunganisha Ndoano na Hoja Kuu)**

- Sababu kuu kwa nini maeneo ya Wamaasai hutembelewa na watalii wengi ni uwepo wa mazingira ya asili porini.
- Hii inaonyesha ustadi wa Wamaasai katika kulinda mazingira na bioanuwai.
- Sasa hebu tuangalie jinsi Wamaasai wamekuwa wakishughulikia utunzaji wa uumbaji.



**Maasai Traditional Environmental Knowledge**



**Maarifa ya Jadi ya Mazingira ya Jamii ya Wamaasai**

10 *Have the students form small groups. There are 12 topics for discussion, which could be divided into one topic for 12 groups or two topics for 6 groups, or whatever fits well. Adapt the groups or delimit questions as needed.*

- Discuss the Maasai traditional knowledge (TEK) and creation care practices of your topic.
- Then, write three points for each topic you have discussed in point form on a large sheet of paper. Later, we will post these on the wall.

Traditional Maasai methods of environmental care that reflect a deep respect for nature and sustainable living. Here are some traditional Maasai ways of environmental care:

**1. Use of Indigenous Knowledge**

The Maasai pass down knowledge from generation to generation of local plants and wildlife, natural herbs for medicine, and avoiding harmful harvesting practices to ensure their well-being. This supports biodiversity and sustainable use of resources.

*Waambie wanafunzi waunde vikundi vidogo. Kuna mada 12 za majadiliano, ambazo zinaweza kugawanywa katika mada moja kwa vikundi 12 au mada mbili kwa vikundi 6, au chochote kinachofaa vizuri. Badilisha vikundi au tenga maswali inavyohitajika.*

- Jadili maarifa ya jadi ya Wamaasai na mbinu za utunzaji wa uumbaji wa mada yako.
- Kisha, andika hoja tatu kwa kila mada uliyojadili kwa umbo la hoja kwenye karatasi kubwa. Baadaye, tutazibandika ukutani.

Mbinu za kitamaduni za Wamaasai za utunzaji wa mazingira zinazoonyesha heshima kubwa kwa asili na maisha endelevu. Hapa kuna baadhi ya njia za kitamaduni za Wamaasai za utunzaji wa mazingira:

**1. Matumizi ya Maarifa Asilia**

Wamaasai hurithisha maarifa kutoka kizazi hadi kizazi kuhusu mimea ya eneo lao na wanyamapori, mimea asilia kwa ajili ya tiba, na kuepuka mbinu hatarishi za kuvuna ili kuhakikisha ustawi wao. Hii inasaidia bioanuwai na matumizi endelevu ya rasilimali.

## 2. Rotational Grazing

The Maasai divide the land into portions for specific reasons: *olopololi/osupuko* for dry-season grazing, *oloisukut* wet-season grazing area, *orpurkel* for communal grazing lands. This gives the land time to recover and prevents overgrazing, which protects grasslands and prevents soil erosion.

## 3. Care for Ritual Sites and Sacred Natural Sites

The Maasai consider certain natural sites as sacred and protected from exploitation, including trees (like *oreteti*), hills (for example, Oldonyolengai, Oldonyomoruak, and Elerai areas), and water sources. There are also traditional laws to protect these areas. These areas serve as biodiversity hotspots and contribute to conservation.

## 4. Water Conservation

The Maasai avoid pollution of natural water sources like rivers and seasonal streams, because they rely on them for human and livestock survival. Instead, they often dig shallow wells near dry riverbeds to access clean water without harming the ecosystem.

## 5. Controlled Burning

The Maasai use controlled or prearranged location burning to manage grasslands. This clears old, dry grass and encourages new growth, helping maintain the ecosystem. (The roots of grasses are good “carbon sinks,” storing carbon in the soil, see lesson 3.)

## 6. Respect for the Natural Laws/Customary laws, Myths and Taboos

The Maasai respect the natural/customary laws that require care of creation in order to obtain blessings and avoid curses. Maasai have an age-set system with set of customary laws that prohibit any unnecessary attempt to stray from what is good. Violence towards biodiversity is normally done by children; the uncircumcised (*ilayok*) have to be cleansed through rituals before and after

## 2. Malisho ya Mzunguko

Wamaasai hugawanya ardhi katika sehemu kwa sababu maalum: *olopololi/osupuko* kwa ajili ya malisho ya msimu wa kiangazi, eneo la malisho ya msimu wa mvua la *oloisukut*, *orpurkel* kwa ajili ya malisho ya jamii. Hii huipa ardhi muda wa kuona na kuzuia malisho kupita kiasi, ambayo hulinda nyasi na kuzuia mmomonyoko wa udongo.

## 3. Utunzaji wa Maeneo ya Tambiko na Maeneo Matakatiifu ya Asili

Wamaasai wanachukulia baadhi ya maeneo asilia kuwa matakatiifu na kulindwa dhidi ya matumizi mabaya, ikiwa ni pamoja na miti (kama vile *oreteti*), vilima (kwa mfano, maeneo ya Oldonyolengai, Oldonyomoruak, na Elerai), na vyanzo vya maji. Pia kuna sheria za kitamaduni za kulinda maeneo haya. Maeneo haya hutumika kama maeneo yenye bayoanuwai na huchangia katika uhifadhi.

## 4. Uhifadhi wa Maji

Wamaasai huepuka uchafuzi wa vyanzo vya maji asilia kama vile mito na vijito vya msimu, kwa sababu wanategemea hivyo kwa ajili ya kuishi kwa binadamu na mifugo. Badala yake, mara nyingi huchimba visima vidogo karibu na mito iliokauka ili kupata maji safi bila kudhuru mfumo ikolojia.

## 5. Uchomaji Uliodhibitiwa

Wamaasai hutumia uchomaji wa eneo uliodhibitiwa au uliopangwa mapema ili kudhibiti nyasi. Hii husafisha nyasi za zamani, kavu na kuhimiza ukuaji mpya, na kusaidia kudumisha mfumo ikolojia. (Mizizi ya nyasi husaidia kuhifadhi kaboni kwenye udongo kama ilivyojadiliwa katika somo la 3.)

## 6. Kuheshimu Sheria za Asili/Sheria za Kitamaduni, Hadithi na Miiko

Wamaasai huheshimu sheria za asili/mila zinazolenga utunzaji wa uumbaji ili kupata baraka na kuepuka laana. Wamaasai wana mfumo wa kiumri wenye seti ya sheria za kitamaduni zinazokataza jaribio lolote lisilo la lazima. Vurugu dhidi ya bioanuwai kwa kawaida hufanywa na watoto hivyo wasiotahiriwa (*ilayok*) wanapaswa kutakaswa kupitia mila kabla na baada

circumcision rites. Therefore, it is forbidden and it is shameful for warriors (*ilmuran*) to destroy biodiversity unnecessarily.

## 7. Minimalist Lifestyle

The Maasai live a semi-nomadic lifestyle with a minimal environmental footprint. Their homes (*manyatta*) are made from natural, biodegradable materials like mud, sticks, and cow dung.

## 8. Anti-pollution Lifestyle

Traditional Maasai lifestyle does not produce solid wastes and harmful gases that harms the environment.

## 9. Common Use of Nature and Resources Managing Scarce Resources

Fertile areas with good weather, vegetation, and water sources are very scarce in Maasailand, and thus, they are owned communally. There is not over possession by a few people.

## 10. Keeping Domestic Animals

The Maasai do not kill or feed on wild animals. Therefore, they are not poachers.

## 11. Preserve Trees and Shrubs

Traditionally, the Maasai do not cut living tress. They collect deadwood for cooking (and now there is a movement toward fuel efficient stoves). Maasai use herbs for medicine, trees for domestic purposes, and grass for their livestock, so they have rules for preserving plants.

## 12. Elders and Leaders Responsibilities

The prime duty of the Maasai leaders is to ensure their customs and rules are observed for the wellbeing of the society. This includes environmental rules, as they believe that in order to live well, there must be harmony between people and environment.

ya mila za tohara. Kwa hivyo, ni marufuku na ni aibu kwa wapiganaji (*ilmuran*) kuharibu bioanuwai bila sababu.

## 7. Mtindo wa Maisha wa Kiwango cha Chini

Wamaasai wanaishi maisha ya kuhamahama kidogo yenye athari ndogo ya kimazingira. Nyumba na boma zao (*emanyatta*) zimetengenezwa kwa nyenzo asilia, zinazoweza kuoza kama vile matope, vijiti, na kinyesi cha ng'ombe.

## 8. Mtindo wa Maisha wa Kupambana na Uchafuzi

Mtindo wa maisha wa kitamaduni wa Wamaasai hauzalishi taka ngumu na gesi hatari zinazodhuru mazingira.

## 9. Matumizi ya Rasilimali kwa Ushirika na Usimamizi wa Rasilimali Adimu

Maeneo yenye rutuba au yenye hali nzuri ya hewa lakini pia vyanzo vya maji na mimea ni adimu sana katika Wamaasai, na hivyo, yanamilikiwa kwa pamoja. Hakuna umiliki kupita kiasi wa watu wachache.

## 10. Kufuga Wanyama wa Nyumbani

Wamaasai hawauki au kula wanyama wa porini. Kwa hivyo, wao si wawindaji haramu.

## 11. Hifadhi Miti na Vichaka

Kijadi, Wamaasai hawakati miti hai. Wanakusanya kuni zilizokufa kwa ajili ya kupikia (na sasa kuna harakati za kuelekea matumizi ya majiko yanayotumia nishati kidogo). Wamaasai hutumia mimea kwa ajili ya dawa, miti kwa madhumuni ya nyumbani, na nyasi kwa mifugo yao, kwa hivyo wana sheria za kuhifadhi mimea.

## 12. Majukumu ya Wazee na Viongozi

Jukumu kuu la viongozi wa Wamaasai ni kuhakikisha mila na sheria zao zinazingatiwa kwa ustawi wa jamii. Hii inajumuisha sheria za mazingira, kwani wanaamini kwamba ili kuishi vizuri, lazima kuwe na mahusiano mazuri kati ya watu na mazingira.

## Science

20 Consider the following techniques where environmental and climate science affirm traditional Maasai environmental knowledge.



*Read the following five scientific means of caring for the environment.*

*After each one, identify one or two ways that can confirm and strengthen (what was identified above) or expand traditional Maasai creation care for climate change mitigation and/or adaptation. Write them on the flipchart.*

*If there is an opportunity to print out the text for each of the following 5 scientific means, then divide students into five groups to read their group's information. Each group will discuss and present to the entire class the ways that can confirm and strengthen (what was identified above) or expand traditional Maasai creation care for climate change mitigation and/or adaptation. Write them on the flipchart.*

*The information has been formatted for printing out for five groups. The challenge will be that each group will want to share for more than a one-minute summary. If there is a longer lesson time than 60-minutes, this is where to expand the lesson.*

Sustainable pastoralism <b>Ufugaji endelevu</b>	Protecting biodiversity <b>Kulinda bioanuwai</b>	Protecting ecosystems including grasslands <b>Kulinda mifumo ikolojia ikiwemo nyasi</b>	Preserving grasslands <b>Kuhifadhi nyasi</b>	Environmentally sustainable livelihoods <b>Maisha endelevu ya mazingira</b>
<i>Write responses on the flipchart. Andika majibu kwenye chati mgeuzo.</i>				

## Sayansi

Fikiria mbinu zifuatazo ambapo sayansi ya mazingira na tabianchi huthibitisha maarifa ya kitamaduni ya mazingira ya Wamaasai.

*Soma njia tano zifuatazo za kisayansi za kutunza mazingira. Baada ya kila moja, bainisha njia moja au mbili zinazoweza kuthibitisha na kuimarisha (kilichotambuliwa hapo juu) au pambanua utunzaji wa kitamaduni wa uumbaji wa Wamaasai kwa ajili ya kupunguza na/au kukabiliana na mabadiliko ya tabianchi. Ziandike kwenye chati mgeuzo/ubao wa karatasi.*

*Ikiwa kuna fursa ya kuchapisha maandishi kwa kila moja ya njia 5 zifuatazo za kisayansi, kisha wagawe wanafunzi katika vikundi vitano ili kusoma taarifa za kikundi chao. Kila kikundi kitajadili na kuwasilisha kwa darasa zima njia ambazo zinaweza kuthibitisha na kuimarisha (kile kilichoainishwa hapo juu) au kupanua utunzaji wa kitamaduni wa uumbaji wa Wamaasai kwa ajili ya kupunguza na/au kukabiliana na mabadiliko ya tabianchi. Waandike kwenye chati mgeuzo/ubao wa karatasi.*

*Taarifa zimepangwa kwa ajili ya kuchapishwa kwa vikundi vitano.*

*Changamoto itakuwa kwamba kila kikundi kitataka kushiriki kwa zaidi ya muhtasari wa dakika moja. Ikiwa kuna muda mrefu zaidi wa somo kuliko dakika 60, hapa ndipo pa kupanua somo.*

## 1. Sustainable pastoralism

- Sustainable pastoralism is a livestock production system that manages land and herds in an organized way to provide economic, social, and environmental benefit.
- Sustainable pastoralism contributes to environmental services: preserving land and ecosystem, biodiversity conservation, food and water security, and supporting resilient livelihoods.
- There is a widespread myth, “Pastoralist degrade the environment because they hoard animals.” The scientific evidence shows that degradation occurs when common property systems are eroded and in locations where herds are prevented from moving, which does not allow the pastures to renew.<sup>3</sup>
- However, according to Article 3 of the United Nations Declaration on the Rights of Indigenous Peoples, Indigenous Maasai have the right to self-determination.<sup>4</sup> Thus, pastoralist Maasai have the right to continue in a way to effectively manage their livestock and carefully manage their grazing land.
- Another widespread myth: “Pastoralists create conflict.” In contrast, “Pastoralism worldwide is characterized by peace, owing to the strong traditions of cooperation and resource sharing amongst pastoralist communities. Where conflicts prevail, there are usually underlying factors such as the erosion of local governance arrangements, expropriation of natural resources or alienation from services and decision making. Conflict is usually a manifestation of failure to provide security and basic services, and uphold basic rights, including common land right.”<sup>5</sup>
- **Four enemies of pastoralism:** Land grabbing for so-called conservation, climate change, non-pastoralist-friendly policies, and demographic challenges.

## 1. Ufugaji endelevu

- Ufugaji endelevu ni mfumo wa uzalishaji wa mifugo unaosimamia ardhi na mifugo kwa njia iliyopangwa ili kutoa faida ya kiuchumi, kijamii, na kimazingira.
- Ufugaji endelevu huchangia huduma za mazingira: kuhifadhi ardhi na mfumo ikolojia, uhifadhi wa bayoanuwai, usalama wa chakula na maji, na kusaidia riziki thabiti.
- Kuna dhana iliyoenea, “Wafugaji huharibu mazingira kwa sababu wanafuga wanyama wengi.” Ushahidi wa kisayansi unaonyesha kwamba uharibifu hutokea wakati mifumo ya mali ya pamoja inapoanguka na katika maeneo ambapo mifugo huzuiwa kuhamia, jambo ambalo haliruhusu malisho kujihuisha upya.<sup>3</sup>
- Hata hivyo, kulingana na Kifungu cha 3 cha Azimio la Umoja wa Mataifa kuhusu Haki za Watu wa Asili, Wamaasai wa Asili wana haki ya kujitawala.<sup>4</sup> Hivyo, Wamaasai wafugaji wana haki ya kuendelea kusimamia mifugo yao kwa ufanisi na kusimamia ardhi yao ya malisho kwa uangalifu.
- Dhana nyingine iliyoenea: “Wafugaji huunda migogoro.” “Ufugaji duniani kote una sifa ya amani, kutokana na mila imara ya ushirikiano na ugawanaji wa rasilimali miongoni mwa jamii za wafugaji. Pale ambapo migogoro inatawala, kwa kawaida kuna sababu za msingi kama vile mmomonyoko wa mipango ya utawala wa ndani, unyang'anyi wa maliasili au kutengwa na huduma na kutoshirikishwa kufanya maamuzi. Migogoro kwa kawaida ni dhahirisho la kushindwa kutoa usalama na huduma za msingi, na kutetea haki za msingi, ikiwa ni pamoja na Haki ya Ardhi ya Pamoja.”<sup>5</sup>
- **Maadui wanne wa ufugaji:** Unyang'anyaji wa ardhi kwa ajili ya kile kinachoitwa uhifadhi, mabadiliko ya tabianchi, sera zisizo rafiki kwa wafugaji, na changamoto za idadi ya watu.

## 2. Protecting Biodiversity

- In simple terms, biodiversity refers to all types of life on Earth. Protecting biodiversity is protection for the more than 100 million living species in the world.
- The diversity of species (including plants, animals, bacteria, and fungi) and ecosystems keep the global ecosystem in balance, providing everything in nature that we, as humans, need to survive, including food, clean water, medicine, and shelter.<sup>6</sup>
- Here are five ways to protect biodiversity:
  - Prevent the cutting of trees.
  - Put a ban on hunting of most animals.
  - More efficiently utilize natural resources.
  - Maintain the protected areas for animals where no human activities are allowed.
  - Poaching and hunting wild animals should be prevented.

## 2. Kulinda Bioanuwai

- Kwa maneno rahisi, bioanuwai inamaanisha aina zote za maisha Duniani. Kulinda bioanuwai ni ulinzi kwa zaidi ya spishi milioni 100 zinazoishi duniani.
- Utofauti wa spishi (ikiwa ni pamoja na mimea, wanyama, bakteria, na kuvu) na mifumo ikolojia huweka mfumo ikolojia wa kimataifa katika usawa, na kutoa kila kitu katika asili ambacho sisi, kama wanadamu, tunahitaji ili kuishi, ikijumuisha chakula, maji safi, dawa, na makazi.<sup>6</sup>
- Hapa kuna njia tano za kulinda bioanuwai:
  - Zuia ukataji miti.
  - Weka marufuku ya uwindaji wa wanyama wengi.
  - Tumia maliasili kwa ufanisi zaidi.
  - Dumisha maeneo yaliyolindwa kwa wanyama ambapo hakuna shughuli za kibinadamu zinazoruhusiwa.
  - Uwindaji haramu na uwindaji wa wanyama wa porini unapaswa kuzuiwa.

### 3. Protecting Ecosystems

- Let's start this subtopic by reviewing the Maasai worldview of ecosystem, **the triangle of interdependency**.
  - **Side one:** The importance of land (*Oldonyo le Engai* for worship), water sources, and good weather (*osupuko* and *orpurkel* for grazing) for human and livestock survival.
  - **Side two:** The importance of livestock and plants (medicine) for human survival and for worship (animal for sacrifice and rituals, trees for altars, etc.).
  - **Side three:** The importance of harmonious relationships with fellow humans, God, and non-human creation for God's blessing and sustenance for human and non-human creation.
- Now, let us see how this is similar to the scientific concept of an ecosystem.
  - "An ecosystem is a geographic area where plants, animals, and other organisms, as well as weather and landscapes, work together to form a bubble of life."<sup>7</sup>
  - Ecosystems consist of living organisms and non-living things like temperature, humidity, and land.
- The importance of ecosystems
  - "All of the Earth's plants and animals rely on ecosystems to provide food and habitat. Ecosystems must maintain a delicate balance in order to stay vital."<sup>8</sup> For example, the wildebeest living on the savannah ecosystem of the Serengeti need water sources and grass to eat. If the wildebeest herd eats all the grass, it will have to search for grass elsewhere until the rains return and renews the grass.
- **Protecting the Earth's Ecosystems:** The ecosystems of the Earth can be protected through responsible use of natural resources.
  - Conserve water resources and be responsible about water usage.
  - Develop and use proper waste management.
  - Avoid the use of chemical pesticides and develop the use of natural pesticides.

### 3. Kulinda Mifumo Ikolojia

- Tuanze mada hii ndogo kwa kupitia mtazamo wa ulimwengu wa Wamaasai wa mfumo ikolojia, **pembetatu ya utegemeano wa pande zote**.
  - **Upande wa kwanza:** Umuhimu wa ardhi (*Oldonyo le Engai* kwa ajili ya ibada), vyanzo vya maji, na hali nzuri ya hewa (*osupuko* na *orpurkel* kwa ajili ya malisho) kwa ajili ya kuishi kwa binadamu na mifugo.
  - **Upande wa pili:** Umuhimu wa mifugo na mimea (dawa) kwa ajili ya kuishi kwa binadamu na kwa ajili ya ibada (mnyama kwa ajili ya kafara na mila, miti kwa ajili ya madhabahu, n.k.).
  - **Upande wa tatu:** Umuhimu wa mahusiano mazuri na wanadamu wenzake, Mungu, na uumbaji usio wa binadamu kwa ajili ya baraka na riziki ya Mungu kwa ya uumbaji wa binadamu na usio wa binadamu.
- Sasa, hebu tuone jinsi dhana hii inavyofanana na dhana ya kisayansi ya mfumo ikolojia.
  - "Mfumo ikolojia ni eneo la kijiografia ambapo mimea, wanyama, na viumbe vingine, pamoja na hali ya hewa na mandhari, hufanya kazi pamoja ili kuunda kiputo cha uhai."<sup>7</sup>
  - Mifumo ikolojia ina viumbe hai na vitu visivyo hai kama vile halijoto, unyevunyevu, na ardhi.
- Umuhimu wa mifumo ikolojia
  - "Mimea na wanyama wote wa Dunia hutegemea mifumo ikolojia kutoa chakula na makazi. Mifumo ikolojia lazima idumishe usawa mzuri ili kubaki hai."<sup>8</sup> Kwa mfano, nyumbu wanaoishi katika mfumo ikolojia wa savannah wa Serengeti wanahitaji vyanzo vya maji na nyasi za kula. Ikiwa kundi la nyumbu litakula nyasi zote, litalazimika kutafuta nyasi kwingine hadi mvua itakaporudi na kuiboresha nyasi.
- **Kulinda Mifumo Ikolojia ya Dunia:** Mifumo ikolojia ya Dunia inaweza kulindwa kupitia matumizi yanayofaa.
  - Hifadhi rasilimali za maji na uwajibikaji kuhusu matumizi ya maji.
  - Kuendeleza na kutumia usimamizi sahihi wa taka.
  - Epuka matumizi ya dawa za kuua wadudu za kemikali na kuendeleza matumizi ya dawa za kuua wadudu za asili.
  - Panda spishi za asili.

- Plant native species.
- Engage in reforestation where trees have been cut.
- Develop diverse cropping systems to help maintain soil productivity and prevent erosion instead of using single crop systems.
- Use natural fertilizers and reduce the use of chemical fertilizer.
- Protect wildlife in your area by respecting wildlife habitats, by reporting instances of illegal wildlife trade or poaching, and by not supporting wildlife-exploitation activities.

- Shiriki katika upandaji miti tena ambapo miti imekatwa.
- Kuendeleza mifumo mbalimbali ya upandaji miti ili kusaidia kudumisha uzalishaji wa udongo na kuzuia mmomonyoko badala ya mfumo wa upandaji wa mazao ya aina moja.
- Tumia mbolea asilia na kupunguza matumizi ya mbolea ya kemikali.
- Kulinda wanyamapori katika eneo lako kwa kuheshimu makazi ya wanyamapori, kuripoti matukio ya biashara haramu ya wanyamapori au ujangili, na usiunge mkono shughuli za unyonyaji wa wanyamapori.

## 4. Preserving grasslands

*Grasslands are also a type of ecosystem, but it will have special focus here in a Maasai context.*

- “Grasslands are found where there is not enough regular rainfall to support the growth of a forest, but not so little that a desert forms. In fact, grasslands often lie between forests and deserts.”<sup>9</sup>
- Grasslands are very good *carbon sinks* (meaning they have the ability to store large amounts of carbon).
- Allowing grasslands to rest during the dry season by moving to high grounds (*osupuko*) and returning from these high grounds (*osupuko*) to go to low grounds (*olpurkel*) when the rains return is a good way of managing grass, trees, and flowers (flora).
- “Grasslands store approximately 34% of the global terrestrial stock of carbon... Unlike forests where vegetation is the primary source of carbon storage, most of the grassland carbon is stored in the soil.”<sup>10</sup>
- “Increased drought and wildfire risk make grasslands more reliable carbon sinks than trees... Trees are still critical. [Research] does not suggest that grasslands should replace forests on the landscape or diminish the many other benefits of trees.”<sup>11</sup>
- “Threats to natural grasslands, as well as the wildlife that live on them, include farming, overgrazing, invasive species, illegal hunting, and climate change.”<sup>12</sup>

## 4. Kuhifadhi nyasi

*Nyasi pia ni aina ya mfumo ikolojia, lakini itakuwa na mwelekeo maalum hapa katika muktadha wa Wamaasai.*

- “Nyasi za malisho hupatikana pale ambapo mvua ya kawaida haitoshi kuhimili ukuaji wa msitu, lakini si kidogo sana kiasi cha kuunda jangwa. Kwa kweli, nyasi za malisho mara nyingi ziko kati ya misitu na majangwa.”<sup>9</sup>
- Nyasi za malisho ni vyanzo vyema vya kuhifadhi kaboni (ikimaanisha zina uwezo wa kuhifadhi kiasi kikubwa cha kaboni).
- Kuruhusu nyasi za malisho kupumzika wakati wa kiangazi (kwa kuhamia *osupuko*) na kurudi kutoka maeneo ya juu (*osupuko*) kwenda maeneo ya chini (*olpurkel*) mvua zinaporudi ni njia nzuri ya kudhibiti nyasi, miti, maua (mimea).
- “Nyasi za malisho huhifadhi takriban 34% ya akiba ya kaboni duniani kote... Tofauti na misitu ambapo mimea ndiyo chanzo kikuu cha uhifadhi wa kaboni, kaboni nyingi ya nyasi huhifadhiwa kwenye udongo.”<sup>10</sup>
- “Kuongezeka kwa hatari ya ukame na moto kunafanya nyasi za malisho kuwa vyanzo vya kaboni vinavyotegemewa zaidi kuliko miti... Hata hivyo, Miti bado ni muhimu sana. [Utafiti] haupendekezi kwamba nyasi za malisho yanapaswa kuchukua nafasi ya misitu kwenye mandhari au kupunguza faida nyingine nyingi za miti.”<sup>11</sup>
- “Vitisho kwa nyasi asilia, pamoja na wanyamapori wanaoishi juu yake, ni pamoja na kilimo, ufugaji kupita kiasi, spishi vamizi, uwindaji haramu, na mabadiliko ya tabianchi.”<sup>12</sup>

## 5. Environmentally sustainable livelihoods

- Living sustainably “...encompasses the skills, assets (both material and social) and the approaches which will be used by individuals and communities in order to survive. The sustainability element implies that these individuals or communities can confront and overcome moments of stress and/or crisis, and that they are able to maintain or even improve current and future skills and assets without exploiting their supply of natural resources.”<sup>13</sup>
- Threats for environmental livelihood security (ELS) include external factors, such as climate change, population growth, and government policies.
- There are core resources (“capital”) for sustainable livelihoods: natural, human, social, physical, and economic resources.<sup>14</sup>

## 5. Maisha endelevu kiikolojia yanayolingana na mazingira

- Kuishi kwa uendeleu “...kunajumuisha ujuzi, mali (nyenzo na kijamii) na mbinu zitakazotumiwa na watu binafsi na jamii ili kuishi. Kipengele cha maisha uendeleu kinamaanisha kwamba watu hawa au jamii wanaweza kukabiliana na kushinda nyakati za msongo wa mawazo na/au mgogoro, na kwamba wanaweza kudumisha au hata kuboresha ujuzi na mali za sasa na za baadaye bila kutumia rasilimali zao za asili.”<sup>13</sup>
- Vitisho kwa usalama wa maisha endelevu ya mazingira vinajumuisha mambo ya nje, kama vile mabadiliko ya tabianchi, ukuaji wa idadi ya watu, na sera za serikali.
- Kuna rasilimali za msingi (“mtaji”) kwa maisha endelevu: rasilimali za asili, binadamu, kijamii, kimwili, na kiuchumi.<sup>14</sup>

### 3) LOOK interpretation/reflection on core content

## Maasai



- 4
- So, let us now connect these climate change mitigation and adaptation practices with the big picture of the Maasai understanding of the world (worldview).
  - These traditional environmental knowledge practices of the Maasai are good for creation care.
  - These creation care practices represent the Maasai understanding of the world that centers on mutual dependence (interdependence) with the environment that is created by *Engai*—seen in caring for people, livestock, all living things, and the land (humans and non-human creation)—which then sustains Maasai life and livelihoods.
    - So, the Maasai understand that human flourishing (well-being) in life comes from harmonious relationships with 1) *Engai*, 2) other people, and 2) non-human creation.
    - These three aspects are seen as a three-legged stool, *olorika*.
    - With all three legs being strong, it can be solid—even on uneven ground—and work optimally.
    - The Maasai concept of blessing (*empuris e Engai*) or curse (*eng'oki*) as a result of hostile relation between humankind and God but also between humankind and non-human creation.
    - This made the Maasai respect the natural laws/customary laws that requires them to take care of creation in order to obtain blessings and avoid curses.
    - Maasai have an age-set system of customary laws that prohibit any unnecessary attempt of distraction of biodiversity by the warriors (*ilmuran*). Violence towards biodiversity is normally done by children; the uncircumcised (*ilayok*) have to be cleansed through rituals before and after circumcision rites. Therefore, it is forbidden and it is shameful for *ilmuran* to destroy biodiversity unnecessarily.

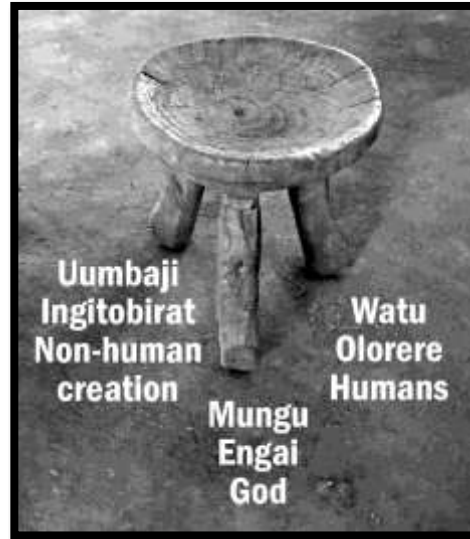
### 3) UCHUNGUZI ufafanuzi au tafakari ya maudhui ya msingi

## Wamaasai

- Kwa hivyo, hebu sasa tuunganishe mbinu hizi za kupunguza na kuhimili mabadiliko ya tabianchi na mtazamo mkubwa wa Wamaasai kuhusu ulimwengu (mtazamo wa ulimwengu).
- Mbinu hizi za kitamaduni za maarifa ya mazingira za Wamaasai ni nzuri kwa utunzaji wa uumbaji.
- Mbinu hizi za utunzaji wa uumbaji zinawakilisha uelewa wa Wamaasai unaozingatia utegemezi wa pande zote mbili na mazingira ambayo yameundwa na *Engai*—yanayoonekana katika kuwatunza watu, mifugo, viumbe vyote vilivyo hai, na ardhi (wanadamu na viumbe visivyo binadamu)—ambayo hudumisha maisha na riziki ya Wamaasai.
  - Kwa hivyo, Wamaasai wanaelewa kwamba ustawi wa binadamu maishani unatokana na uhusiano mzuri na 1) *Engai*, 2) watu wengine, na 2) viumbe visivyo binadamu.
  - Vipengele hivi vitatu vinaonekana kama kigoda chenye miguu mitatu, *olorika*.
  - Kwa kuwa ina miguu mitatu inakuwa na nguvu na imara—hata kwenye ardhi isiyo na usawa—na kufanya kazi vizuri zaidi.
  - Mtizamo wa Wamaasai wa baraka (*empuris e Engai*) au laana (*eng'oki*) kama matokeo ya uhusiano wa uadui kati ya wanadamu na Mungu lakini pia kati ya wanadamu na viumbe visivyo wanadamu.
  - Uliwafanya Wamaasai kuheshimu sheria za asili/sheria za kitamaduni zinazowataka kutunza uumbaji ili kupata baraka na kuepuka laana.
  - Wamaasai wana mfumo wa rika pamoja na sheria za kitamaduni zinazokataza jaribio lolote lisilo la lazima la kuvuruga bioanuwai na wapiganaji (*ilmuran*). Vurugu dhidi ya bioanuwai kwa kawaida hufanywa na watoto; wasiotahiriwa (*ilayok*) hata hivyo wanapaswa kutakaswa kupitia mila kabla na baada ya ibada za tohara. Kwa hivyo, ni marufuku na ni aibu kwa *ilmuran* kuharibu bioanuwai bila pasipo na ulazima.

## Bible: Biblical Creation Triangle

- 4
- The Maasai understanding of the world—represented by a three-legged stool (*olarika*)—is similar to the biblical understanding of the world seen in the “creation triangle.”<sup>15</sup>
  - Biblical scholars call this the “creation triangle,” where peace (*shalom* in biblical Hebrew) comes from harmony with God, others, and non-human creation.
  - The peace (*shalom*) comes from being reconciled (in a right relationship) with God that is lived out in peace with others (social justice) and peace with creation (creation care/environmentalism).



## Biblia: Pembetatu ya Uumbaji wa Kibiblia

- Uelewa wa Wamaasai kuhusu ulimwengu—unaowakilishwa na kiti chenye miguu mitatu (*olarika*)—unafanana na uelewa wa kibiblia kuhusu ulimwengu unaonekana katika “pembetatu ya uumbaji.”<sup>15</sup>
- Wasomi wa Biblia wanaita hii “pembetatu ya uumbaji,” ambapo amani (*shalom* katika Kiebrania cha Biblia) hutokana na upatanisho na Mungu, wanadamu, na uumbaji usio wa kibinadamu.
- Amani (*shalom*) hutokana na kupatanishwa (katika uhusiano sahihi) na Mungu ambao huishi kwa amani na wengine (haki ya kijamii) na amani na uumbaji (utunzaji wa uumbaji/mazingira).

- Thus, the Christian worldview centers on the gospel—the good news that reconciles sinful and selfish people to the Creator God.
- The power of the gospel enables the transformation that we discussed in the first lesson.
  - Selfishness, apathy (uncaring), and greed are driving the climate change crisis.
  - Good science is not enough. Knowledge does not empower us to overcome human selfishness and greed.
  - We need to be transformed! We need to have a meaning and purpose in life that is not just human greed, consumerism, and doing things that make lots of money and are contributing to global-warming gases and, thus, climate change.
  - Living as gospel-centered people gives us a purpose in life to make a difference.
- Kwa hivyo, mtazamo wa Kikristo wa ulimwengu unazingatia injili—habari njema inayowapatanisha watu wenye dhambi na wenye ubinafsi na Mungu Muumba.
- Nguvu ya injili huwezesha mabadiliko tuliyojadili katika somo la kwanza.
  - Ubinafsi, kutojali na uchoyo vinasababisha mgogoro wa mabadiliko ya tabianchi.
  - Sayansi nzuri haitoshi. Maarifa hayatuwezeshi kushinda ubinafsi na uchoyo wa kibinadamu.
  - Tunahitaji kubadilishwa! Tunahitaji kuwa na maana na kusudi maishani ambalo si tu uchoyo wa kibinadamu, ulaji, na kufanya mambo yanayopata pesa nyingi lakini pia yanachangia gesi zinazoongeza joto duniani na, hivyo, mabadiliko ya tabianchi.
  - Kuishi kama watu wanaozingatia injili kunatupa kusudi maishani la kuleta mabadiliko.

- The Holy Spirit empowers us and our Christian communities to live out our biblical convictions in a way to be a blessing to the world.
- As followers of Jesus, we live out our faith—empowered by the Holy Spirit—in service to others (social justice) and service to creation (environment justice).
- Amazingly, that the power that raised Christ from the dead is available to us who believe!

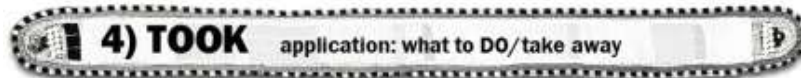
**Ephesians 1:18–21** [I pray that] “having the eyes of your hearts enlightened, that you may know what is the hope to which he has called you, what are the riches of his glorious inheritance in the saints, and what is the immeasurable greatness of his power toward us who believe, according to the working of his great might that he worked in Christ when he raised him from the dead and seated him at his right hand in the heavenly places.”

- Roho Mtakatifu hutuwezesha sisi na jamii zetu za Kikristo kuishi kulingana na imani zetu za kibiblia kwa njia ya kuwa baraka kwa ulimwengu.
- Kama wafuasi wa Yesu, tunaishi kulingana na imani yetu—tukiwezesha na Roho Mtakatifu—katika kuwahudumia wengine (haki ya kijamii) na kuwahudumia viumbe (mazingira).  
**Waefeso 1:18–21** [Naomba hivyo] “macho ya mioyo yenu yatiwe nuru, mjue tumaini la mwito wake jinsi lilivyo; na utajiri wa utukufu wa urithi wake katika watakatifu jinsi ulivyo; na ubora wa ukuu wa uweza wake ndani yetu tuaminio jinsi ulivyo; kwa kadiri ya utendaji wa nguvu za uweza wake; aliotenda katika Kristo alipomfufua katika wafu, akamweka mkono wake wa kuume katika ulimwengu wa roho; juu sana kuliko ufalme wote, na mamlaka, na nguvu, na usultani, na kila jina litajwalo, wala si ulimwenguni humu tu, bali katika ule ujao pia...”

### Look Continued: Hope



- 2
- Thus, we can face the challenges of climate change with hope.
  - First, we know that our Creator, the God of Hope, loves the world, and God will never abandon it.
  - Second, as followers of Jesus Christ, we are empowered by the Holy Spirit to be a blessing to others (social justice) and the creation (environment).



### Tazama Inaendelea: Tumaini

- Hivyo, tunaweza kukabiliana na changamoto za mabadiliko ya tabianchi kwa matumaini.
- Kwanza, tunajua kwamba Muumba wetu, Mungu wa Tumaini, anapenda ulimwengu, na Mungu hatauacha kamwe.
- Pili, kama wafuasi wa Yesu Kristo, tumewezeshwa na Roho Mtakatifu kuwa baraka kwa wengine (haki ya kijamii) na uumbaji (mazingira).



14 *Questions for short answers.*

- Why is it important to maintain ecosystems?
- How can I conserve water in my surroundings?
- What are some restoration projects I can join?
- What can I do to protect wildlife in my area?

*Maswali ya majibu mafupi.*

- Kwa nini ni muhimu kudumisha mifumo ikolojia?
- Ninawezaje kuhifadhi maji katika mazingira yangu?
- Ni miradi gani ya urejesho ambayo naweza kujiunga nayo?
- Ninaweza kufanya nini ili kulinda wanyamapori katika eneo langu?

Support conversations such as:

- **Engaging in restoration projects:**
  - **Ecosystem restoration** projects aim to enhance ecological integrity and improve the wellbeing of both ecosystems and local communities.
  - Grasslands and trees play crucial roles in carbon sequestration and provide habitat for animals.
- **Educating and raising awareness:**
  - **Stay informed:** Keep yourself updated on environmental issues, conservation practices, and scientific advancements related to ecosystems.
  - **Share knowledge:** Raise awareness among your co-workers, family, friends, and community about the importance of maintaining ecosystems and the actions they can take.
  - **Engage in environmental education programs:** Support or participate in local environmental education initiatives that promote ecological literacy and provide training to local communities on matters such as sustainable farming.<sup>16</sup>

## Song writing

Or

*This activity may take 10–15 minutes. So, while it is a very good application, it needs enough time to be done well.*

- Each small group writes one stanza of a song about traditional Maasai environmental knowledge and practices that are also best practices of climate change mitigation (reduction). Use the common melody that is known by most students. A call and response Maasai tune may be a good way to start. Then, have each group sing their verse.

Saidia mazungumzo kama vile:

- **Kushiriki katika miradi ya urejesho:**
  - **Miradi ya urejesho wa mifumo ikolojia** inalenga kuimarisha uadilifu wa ikolojia na kuboresha ustawi wa mifumo ikolojia na jamii za wenyeji.
  - Mashamba na miti huchukua jukumu muhimu katika ufyonzaji wa kaboni na kutoa makazi kwa wanyama.
- **Kuelimisha na kuongeza uelewa:**
  - **Endelea kupata taarifa:** Jijulishe kuhusu masuala ya mazingira, desturi za uhifadhi, na maendeleo ya kisayansi yanayohusiana na mifumo ikolojia.
  - **Shirikisha maarifa:** Ongeza uelewa miongoni mwa wafanyakazi wenzako, familia, marafiki, na jamii kuhusu umuhimu wa kudumisha mifumo ikolojia na hatua wanazoweza kuchukua.
  - **Shiriki katika programu za elimu ya mazingira:** Saidia au shiriki katika mipango ya elimu ya mazingira katika eneo lako: mipango inayokuza uelewa wa ikolojia na kutoa mafunzo kwa jamii za wenyeji kuhusu masuala kama vile kilimo endelevu.<sup>16</sup>

## Uandishi wa nyimbo

*Shughuli hii inaweza kuchukua dakika 10–15. Kwa hivyo, ingawa ni programu nzuri sana, inahitaji muda wa kutosha kuikamilisha vizuri.*

- Kila kikundi kidogo waandike ubeti mmoja wa wimbo kuhusu maarifa na desturi za kitamaduni za kimazingira za Wamaasai ambazo pia ni njia bora za kupunguza mabadiliko ya tabianchi. Tumia sauti ya kawaida unaojulikana na wanafunzi wengi. Wimbo wa Wamaasai wa kupokezan unaweza kuwa njia nzuri ya kuanzia. Kisha, kila kikundi kiimbe ubeti wao.

1  
60

**Prayer**  
**End of lesson**





**Maombi**  
**Mwisho wa somo**

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11. TEE Lesson 3: English/Kiswahili

## Integrating Climate Science for a Maasai Context Kuunganisha Sayansi ya Hali ya Hewa kwa Muktadha wa Wamaasai

<b>Main Point</b>	<p><b>Integrating climate science—that is appropriate for a Maasai context—can help prevent and prepare for the challenges of climate change.</b></p>		<p><b>Kuunganisha sayansi ya tabianchi—ambayo inafaa kwa muktadha wa Wamaasai—kunaweza kusaidia kuzuia na kukabiliana na changamoto zinazotokana na mabadiliko ya tabianchi.</b></p>
<b>Learning outcomes</b>	As a result of this lesson, the learner will:		Kama matokeo ya somo hili, mwanafunzi atafanya yafuatayo:
<b>Cognitive: Know</b>  	<p><b>Climate science</b></p> <ul style="list-style-type: none"> <li>• <b>Review:</b> Understand the core concepts of climate science, i.e., climate change, glanket effect (greenhouse effect), human caused global-warming gases (elsewhere called greenhouse gases, GHGs) and their effects on ecosystems and humans.</li> <li>• <b>Review:</b> Understand the main impacts of climate change upon ecosystems and humankind</li> <li>• Know the difference between climate change mitigation (prevention) and adaptation (reducing risk of bad effects)</li> <li>• Understand core principles of sustainable pastoralism</li> </ul> <p><b>Maasai</b></p> <ul style="list-style-type: none"> <li>• Know best practices of mitigation appropriate for a traditional Maasai context.</li> <li>• Know best practices of adaptation for resilience appropriate for a traditional Maasai context.</li> <li>• Know the ongoing challenges in Maasai context:             <ul style="list-style-type: none"> <li>○ Land rights</li> <li>○ Population growth</li> <li>○ Food and water insecurity</li> </ul> </li> </ul>	  	<p><b>Sayansi ya Tabianchi</b></p> <ul style="list-style-type: none"> <li>• <b>Mapitio:</b> Kuelewa dhana kuu za sayansi ya tabianchi, yaani, mabadiliko ya tabianchi, athari ya gesi zinazoongeza joto la dunia (athari ya blanketi), gesi zinazosababisha ongezeko la joto duniani zinazosababishwa na binadamu na athari zake kwa mifumo ikolojia na wanadamu.</li> <li>• <b>Mapitio:</b> Elewa athari kuu za mabadiliko ya tabianchi kwa mifumo ya ikolojia na binadamu</li> <li>• Fahamu tofauti kati ya kupunguza mabadiliko ya tabianchi (kinga) na kukabiliana nayo (kupunguza hatari ya athari mbaya)</li> <li>• Elewa kanuni kuu za ufugaji endelevu</li> </ul> <p><b>Wamaasai</b></p> <ul style="list-style-type: none"> <li>• Fahamu mbinu bora za kukabiliana nayo zinazofaa kwa muktadha wa jadi ya Wamaasai.</li> <li>• Fahamu mbinu bora za kukabiliana nayo kwa ajili ya ustahimilivu unaofaa kwa muktadha wa jadi ya Wamaasai.</li> <li>• Fahamu changamoto zinazoendelea katika muktadha wa Wamaasai:             <ul style="list-style-type: none"> <li>○ Haki za ardhi</li> <li>○ Ongezeko la idadi ya watu</li> <li>○ Ukosefu wa chakula na maji</li> </ul> </li> </ul>

### Biblical Creation Triangle

- Understand how climate science can support creation care with its spiritual and ethical dimensions of environmental stewardship described in biblical teachings.



### Hope

- Understand that climate scientists and environmentalists have hope that human efforts can mitigate climate change, which encourages hope.
- Know key Bible texts that teach that God has promised to never abandon creation and will result in its ultimate reconciliation and restoration.
- Realize that our efforts to address climate change are part of working towards God’s hopeful future while being faithful to God’s commission to care for creation.



### Pembetatu ya Uumbaji wa Biblia

- Elewa jinsi sayansi ya tabianchi inavyoweza kusaidia utunzaji wa uumbaji katika mapana yake ya kiroho na kimaadili ya uwakili wa mazingira yalivyoelezwa katika mafundisho ya Biblia.

### Tumaini

- Elewa kwamba wanasayansi wa tabianchi na wanamazingira wana matumaini kwamba juhudi za binadamu zinaweza kupunguza mabadiliko ya tabianchi, ambayo huhimiza matumaini.
- Fhamu maandiko muhimu ya Biblia yanayofundisha kwamba Mungu ameahidi kutowahi kuuacha uumbaji na kwamba hatimae uumbaji utapatanishwa na kurejeshwa kikamilifu.
- Tambua kwamba juhudi zetu za kushughulikia mabadiliko ya tabianchi ni sehemu ya shughuli inayopelekea hatima yenye tumaini kutoka kwa Mungu huku tukiwa waaminifu kwa agizo la Mungu la kutunza uumbaji.

#### Affective: Feel



- **Equipped** with appropriate knowledge
- **Empowered** with knowledge for climate change mitigation and adaptation in Maasailand
- **Eager** to make a difference
- **Responsible** for making a difference
- **Hopeful** for their future, because God loves the world and will never abandon it.

- **Wamepewa** maarifa yanayofaa
- **Wamewezeshwa** kupitia maarifa ya kupunguza na kuhimili mabadiliko ya tabianchi katika ardhi ya Wamaasai
- **Wana hamu** ya kuleta mabadiliko
- **Wana wajibu** wa kusababisha mabadiliko mazuri
- **Wana matumaini** kwa mustakabali wao, kwa sababu Mungu anaupenda ulimwengu na hatauacha kamwe.

#### Applicative: Do



- Draw a table with two columns and identify some best practices of climate change mitigation on one column and of adaptation on the second column (practices that fit in a Maasai context).
- Identify 3 appropriate ways that one can make a difference in climate change mitigation (reduction) in a traditional Maasai context.

- Chora jedwali lenye safu mbili na ibainishe baadhi ya mbinu bora za kupunguza mabadiliko ya tabianchi kwenye safu moja na za kukabiliana na hali kwenye safu ya pili (njia zinazofaa katika muktadha wa Wamaasai).
- Bainisha njia 3 zinazofaa ambazo mtu anaweza kuleta mabadiliko katika kupunguza mabadiliko ya tabianchi (kupunguza) katika muktadha wa kitamaduni wa Wamaasai.

- Identify 3 appropriate ways that one can make a difference in climate change adaptation (resilience) in a traditional Maasai context.
- Bainisha njia 3 zinazofaa ambazo mtu anaweza kuleta mabadiliko katika kukabiliana na mabadiliko ya tabianchi (ustahimilivu) katika muktadha wa kitamaduni wa Wamaasai.

**Teaching Equipment Needed**

- Climate change illustrations
- Picture of the blanket effect on flip chart or large paper
- Flip chart or blackboard

**Vifaa vya Kufundishia Vinahitajika**

- Michoro ya mabadiliko ya tabianchi
- Picha ya athari ya gesi zinazoooneza joto la dunia/blanketi kwenye ubao wa karatasi au karatasi kubwa
- Ubao wa karatasi au ubao wa kawaida

**Student Supplies / Handouts**

- Blank paper and pen/pencil
- Handout: Climate Change Mitigation and Adaptation (pages 169–170)

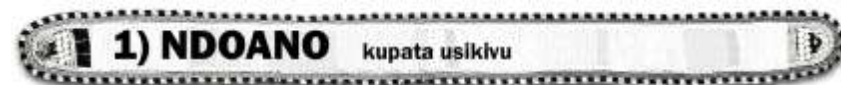
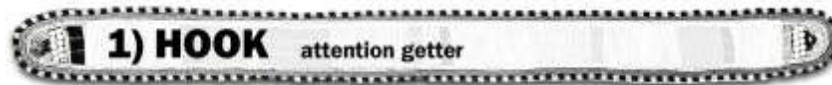
**Vifaa vya Wanafunzi / Vipeperushi vya Karatasi**

- Karatasi tupu na kalamu/penseli
- Kitini: Kupunguza na Kuzuia athari za Mabadiliko ya Tabianchi na uhimilivu wake (kurasa 169–170)

Time

Content

Maudhui



- 8 *The students should form small groups and discuss for 2 minutes.*
- Identify the climate changes effects that have occurred in their Indigenous environment.
  - Compare the environment during their childhood with the current environmental status.

*One from each group should present one observation in front of the class. Each presenter is given 1 minute.*

*Try to move through this fairly quickly, as this is discussing what we already know, in order to provide more time for developing new understandings.*

**Transition Statement (connecting Hook to Main Point)**

- 1 • From the views shared, it is clear that there are significant changes to our environment, something that negatively affects our traditional way of living.

*Wanafunzi wanapaswa kuunda vikundi vidogo na kujadili kwa dakika 2.*

- Bainisha athari za mabadiliko ya tabianchi zilizotokea katika mazingira yao ya asili.
- Linganisha mazingira wakati wa utoto wao na hali ya mazingira ya sasa.

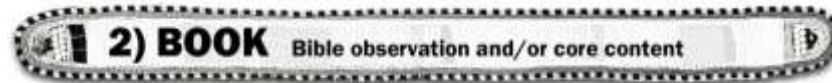
*Mmoja kutoka kila kundi anapaswa kuwasilisha uchunguzi mmoja mbele ya darasa. Kila mtoa mada anapewa dakika 1.*

*Jaribu kupitia hili haraka sana, kwani hili linajadili kile tunachokijua tayari, ili kutoa muda zaidi wa kukuza maarifa mapya.*

**Kauli kiunganishi (kuunganisha Ndoano na Hoja Kuu)**

- Kutokana na maoni yaliyoshirikishwa, ni wazi kwamba kuna mabadiliko makubwa katika mazingira yetu, jambo ambayo huathiri vibaya mtindo wetu wa maisha wa kitamaduni.

- Now, let us see what is happening to our environment from a scientific point of view. This knowledge will enable us to better understand what is going on outside of our context that affects us even on our land.
- In the first lesson, we were reminded of God’s commission to humankind to care for God’s creation. In the second lesson, we identified how Maasai traditional environmental knowledge and sustainable pastoralism align with God’s instruction to care for the creation. In this lesson, we will focus on climate science in two ways.
  - First, we see that sustainable pastoralism aligns with conservation and climate science in many ways.
  - Second, we will look at ways that we can expand our traditional knowledge with information from the scientists to help us develop ways to decrease the effects of climate change and how to also reduce the risk of the bad effects we are already experiencing.



*Teaching notes: Ask the following 7 questions and guide the discussion— 3 minutes average for each of first 6 questions; #7 has 10 minutes. Fill in discussion with the content below.*

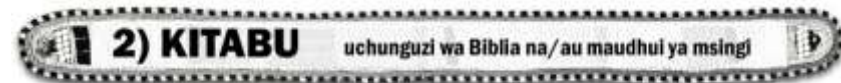
*In a 60-minute lesson, everything cannot be included. More information is provided here to inform the teacher.*

## Climate Science: Climate Change Mitigation and Adaptation

- 18 Let us start with a review of core concepts about climate change.



- Kupitia mitazamo ya kisayansi sasa, hebu tuone kinachotokea kwa mazingira yetu. Maarifa haya yatakuwezesha kuelewa vyema kinachoendelea nje ya muktadha wetu na kuathiri hata katika ardhi yetu.
- Katika somo la kwanza, tulikumbushwa agizo la Mungu kwa wanadamu la kutunza uumbaji wa Mungu. Katika somo la pili, tulitambua jinsi maarifa ya jadi ya mazingira ya Wamaasai na ufugaji endelevu vinavyoendana na maagizo ya Mungu ya kutunza uumbaji. Katika somo hili, tutazingatia sayansi ya tabianchi kwa njia mbili.
  - Kwanza, tunaona kwamba ufugaji endelevu unaendana na uhifadhi na sayansi ya tabianchi kwa njia nyingi.
  - Pili, tutaangalia jinsi ambavyo tunaweza kupanua maarifa yetu ya kitamaduni kupiti taarifa kutoka kwa wanasayansi ili kutusaidia kukuza njia za kupunguza athari za mabadiliko ya tabianchi na jinsi ya kupunguza hatari ya athari mbaya ambazo tayari tunazipata.



*Maelezo ya kufundisha: Uliza maswali 7 yafuatayo na uongoze majadiliano—wastani wa dakika 3 kwa kila swali kati ya maswali 6 ya kwanza; #7 ina dakika 10. Jaza majadiliano na maudhui yaliyo hapa chini.*

*Katika somo la dakika 60, kila kitu hakiwezi kujumuishwa. Taarifa zaidi zimetolewa hapa ili kumjulisha mwalimu.*

## Sayansi ya Tabianchi: Kupunguza na Kukabiliana na Mabadiliko ya Tabianchi

Tuanze na marudio ya dhana kuu ihusuyo mabadiliko ya tabianchi.

## 1. What is climate change?

- **Review:** Climate change refers to long-term changes in temperature, precipitation, wind patterns, and other aspects of the Earth's climate system. (Key concept!)
- Climate scientists are concerned because all over the Earth the climate is changing.
- Any process or event that produces differences to a climate system can create climate change. This can include events such as volcanic eruptions.<sup>1</sup>
- While the climate has changed over the many thousands of years that science has studied, the planet is getting hotter and faster than at any other time in the history of the Earth.<sup>2</sup>
- Now, the main cause of climate change is a result of human activity. This is called "anthropogenic climate change," which means human-caused climate change.<sup>3</sup>

## 2. What is the difference between weather and climate?

- **Weather** "is local and temporary. Weather happens at a particular time and place..."
- **Climate** "describes conditions over the long term and over an entire region. Climate is the big picture. It is the big picture of temperatures, rainfall, wind and other conditions over a larger region and a longer time than weather."<sup>4</sup>
- Now, I will give you some circumstances, and you all tell me if each one is related to **weather or climate**.
  - There was 13 mm of rain yesterday. [Weather]
  - The average high temperature of Arusha in the month of January over the past 25 years is 28 degrees. [Climate]
  - The average rainfall in Arusha for the month of April is 360 mm. [Climate, because the average over many years.]
  - Last week, the average high temperature was 28 degrees. [Weather]
  - Arusha's average annual rainfall is 1,180 mm. [Climate, because the average over many years.]

## 1. Mabadiliko ya tabianchi ni nini?

- **Marudio:** Mabadiliko ya tabianchi hurejelea mabadiliko ya muda mrefu katika hali ya joto, mvua, mifumo ya upepo, na vipengele vingine vya mfumo wa tabianchi wa Dunia. (Dhana muhimu!)
- Wanasayansi wa tabianchi wana wasiwasi kwa sababu tabianchi inabadilika kote duniani.
- Mchakato au tukio lolote linalozalisha tofauti katika mfumo wa tabianchi linaweza kusababisha mabadiliko ya tabianchi. Mojawapo ya matukio hayo ni kama vile milipuko ya volkeno.<sup>1</sup>
- Wakati utafiti wa kisayansi unaonyesha tabianchi imebadilika kwa maelfu ya miaka, dunia inazidi kuwa na joto na kasi zaidi kuliko wakati mwingine wowote katika historia ya Dunia.<sup>2</sup>
- Sasa, sababu kuu ya mabadiliko ya tabianchi ni matokeo ya shughuli za kibinadamu. Hii inaitwa "mabadiliko ya tabianchi yanayosababishwa na binadamu."<sup>3</sup>

## 2. Tofauti kati ya hali ya hewa na tabianchi ni ipi?

- **Hali ya hewa** "ni ya ndani na ya muda. Hali ya hewa hutokea kwa wakati na mahali fulani..."
- **Tabianchi** "inaelezea hali kwa muda mrefu na kwa eneo zima. Tabianchi ni kwa mtazamo mpana. Ni mtazamo mpana wa halijoto, mvua, upepo na hali zingine katika eneo kubwa na muda mrefu zaidi kuliko hali ya hewa ya kila siku."<sup>4</sup>
- Sasa, nitawapa hali fulani, na nyote mniambie kwa kila moja kama inahusiana na **hali ya hewa au tabianchi**.
  - Kulikuwa na mvua ya 13 mm jana. [Hali ya hewa]
  - Wastani wa halijoto ya juu ya Arusha katika mwezi wa Januari katika kipindi cha miaka 25 iliyopita ni nyuzi joto 28. [Tabianchi]
  - Wastani wa mvua huko Arusha kwa mwezi wa Aprili ni 360 mm. [Tabianchi, kwa sababu ni wastani wa hali ya hewa kwa miaka mingi.]
  - Wiki iliyopita, wastani wa halijoto ya juu ulikuwa nyuzi joto 28. [Hali ya hewa]

- The average windspeed in Arusha yesterday was 5 km per hour. [Weather]

### 3. What is the primary cause of climate change?

- “The principal way in which humans are understood to be affecting the climate is through the release of heat-trapping [greenhouse] gases into the air.”<sup>5</sup>
- These gases are called global-warming gases because these gases collect in the atmosphere and trap the heat that would normally rise into space. Thus, they warm up the surface of the earth like a greenhouse keeps warm air in the building.
- We can think of this like a blanket that keeps us warm, so we can think of it as the blanket that keeps the Earth warm.

Show a picture or draw a simple image of the **greenhouse effect** or **blanket effect** on the blackboard. See the picture on the back cover of this book.

#### “The Greenhouse Effect” or “The Blanket Effect”?

The Greenhouse effect a standard metaphor that works in many Western contexts. However, it does not work well in a Maasai context, where most of the people have not seen a greenhouse. Thus, this concept has been adapted to “The Blanket Effect” which is more understandable in a Maasai contexts. Blankets helps to keep a person warm, and the Maasai are renown for their red plaid blankets (shuka). Since adapting this metaphor, other climate scientists have also used the blanket metaphor.

### 4. What are the sources of global-warming gases?<sup>6</sup>

Main human-caused global-warming (greenhouse) gases:

- **Carbon dioxide** (CO<sub>2</sub>) is produced by burning fossil fuels, like coal and petrol in cars...
  - and even burning plastic drinking bottles!
  - Plastic production and burning make up 5% of global-warming gases globally.

- Wastani wa mvua ya kila mwaka ya Arusha ni 1,180 mm. [Tabianchi, kwa sababu ni wastani wa hali ya hewa kwa miaka mingi.]
- Kasi ya wastani ya upepo jijini Arusha jana ilikuwa kilomita 5 kwa saa. [Hali ya hewa]

### 3. Chanzo kikuu cha mabadiliko ya tabianchi ni nini?

- “Njia kuu inayofahamika ambayo kwayo binadamu wanaathiri hali ya hewa ni kwa kutoa gesi zinazoshikilia joto hewani.”<sup>5</sup>
- Gesi hizi huitwa gesi zinazoongeza joto la dunia kwa sababu gesi hizi hukusanyika angani na kunasa joto ambalo kwa kawaida hupanda angani. Kwa hivyo, hupasha joto uso wa dunia.
- Tunaweza kufananisha gesi hii kama blanketi linalotupa joto, kwa hivyo tunaweza kufananisha kama blanketi linaloipa Dunia joto.

Onyesha picha au chora picha rahisi ya **athari ya blanketi** kwenye ubao mweusi. Tazama jalada la kitabu hiki upande wa nyuma.

#### Athari ya blanketi kwa ongezeko la joto la dunia

1. Mionzi mingi hufyonzwa na uso wa Dunia na kuipasha joto.
2. Baadhi ya mionzi ya jua huakisiwa na Dunia na angahewa.
3. Baadhi ya mionzi ya infrared hupita kwenye angahewa. Baadhi hufyonzwa na kutolewa tena pande zote na molekuli za gesi zinazoongeza joto la dunia. Athari ya hii ni kupasha joto uso wa Dunia na sehemu ya chini ya angahewa.
4. Mionzi ya infrared hutolewa na uso wa Dunia.

### 4. Vyanzo vya gesi zinazoongeza joto duniani ni vipi?<sup>6</sup>

Gesi kuu zinazoongeza joto duniani zinazosababishwa na binadamu:

- **Kaboni dioksidi** (CO<sub>2</sub>) hazalishwa kwa kuchoma mafuta ya visukuku, kama vile makaa ya mawe na petroli katika magari...
  - na hata kuchoma chupa za plastiki za maji!
  - Uzalishaji na uchomaji wa plastiki hutengeneza 5% ya gesi zinazoongeza joto duniani kote.

- Half of this plastic is single-use plastics, which should be avoided.
- Note that burning plastic bottles releases toxic chemicals that are very bad for humans and the environment (see Resources for Lesson 3, Chapter 17).<sup>7</sup>

*Focus on the problems of plastic, especially plastic bottles, as this is easier to change, and because plastic is very toxic to both human health and the environment. In addition to the above information, there are toxic chemicals that leach (come out of) plastic bottles and micro and nanoplastics that are found in all human organs including the brain. **Summary: avoid plastics for many reasons!!!***

- **Methane** (CH<sub>4</sub>) is produced by modern agriculture, such as cow's gas, and burning biomass. While not as common as carbon dioxide, methane is at least 30 times more powerful at trapping heat.
- There are other global-warming gases and substances that occur naturally. These include:
  - **Water vapor** (H<sub>2</sub>O) is caused by evaporation of rain and "contrails" or vapor trails that are straight line clouds following airplanes caused by engine exhaust or changes in air pressure; and
  - **Volcanic ash**, caused by eruption of volcanos.

*Put little or no time into the details below, but this following paragraph is provided for the teacher in case it comes up in student questions.*

- Other common human-produced global-warming gases:
  - **Nitrous oxide** (N<sub>2</sub>O) is used in medical procedures, rocket propellants, and motorcar racing; and
  - **Ozone** (O<sub>3</sub>) is formed by the reaction of sunlight with air containing hydrocarbons and nitrogen oxides.

- Nusu ya plastiki hii ni plastiki zinazotumika mara moja, ambazo zinapaswa kuepukwa.
- Kumbuka kwamba kuchoma chupa za plastiki hutoa kemikali zenye sumu ambazo ni mbaya sana kwa wanadamu na mazingira (tazama Nyenzo za Somo la 3, Sura ya 17).<sup>7</sup>

*Zingatia matatizo ya plastiki, hasa chupa za plastiki, kwani ni rahisi kubadilika na kuacha matumizi yake, na kwa sababu plastiki ni sumu sana kwa afya ya binadamu na mazingira. Zaidi ya hilo kuna kemikali zenye sumu ambazo hutoka kwenye chupa za plastiki pamoja na chembe ndogo na nanoplastiki ambazo matokeo yake zinapatikana katika viungo vyote vya binadamu ikiwa ni pamoja na ubongo wa mtu aliyetumia chupa za plastiki. **Muhtasari: epuka plastiki kwa sababu nyingi!!!***

- **Methane** (CH<sub>4</sub>) huzalishwa na kilimo cha kisasa, kama vile gesi ya ng'ombe, na biomasi inayowaka. Ingawa si ya kawaida kama kaboni dioksidi, methane ina nguvu zaidi ya mara 30 katika kunasa joto.
- Kuna gesi na vitu vingine vya kiasili vinavyosababisha joto duniani. Hizi ni pamoja na:
  - **Mvuke wa maji** (H<sub>2</sub>O) husababishwa na uvukishaji wa mvua au njia za mvuke ambazo ni mawingu ya ubeti ulionyooka yanayofuata ndege yanayosababishwa na moshi wa injini au mabadiliko katika shinikizo la hewa; na
  - **Majivu ya volkeno**, yanayosababishwa na mlipuko wa volkeno.

*Weka muda mfupi au usitumie muda mwingi katika maelezo yaliyo hapa chini, lakini aya hii ifuatayo imetolewa kwa mwalimu iwapo itajitokeza katika maswali ya wanafunzi.*

- Gesi zingine za kawaida zinazozalishwa na binadamu zinazoongeza joto duniani:
  - **Oksidi ya nitrous** (N<sub>2</sub>O) hutumika katika matumizi ya kimatibabu, vichocheo vya roketi, na mbio za magari; na
  - **Ozoni** (O<sub>3</sub>) Inauundwa kutokana na mmenyuko wa mwanga wa jua na hewa yenye hidrokaboni na oksidi za nitrojeni.

- **Chlorofluorocarbons** (CFCs and HCFCs) are manufactured chemicals found in refrigerants, chemical agents used to make foams for mattresses, aerosol propellants in medicinal applications, degreasing solvents, and such.

## 5. What are the primary effects of climate change?<sup>8</sup>

- Trapped heat in the atmosphere as a result of human-produced **global-warming gases** is causing **the Earth to heat up**. A hotter Earth causes problems.
- Below are 4 categories of problems, though the impacts may overlap in one or more categories.

### 1. Extreme weather events

- Heat waves
- Drought in some areas and increase of sand dunes.
- Floods and soil erosion in other areas
- Hurricanes and typhoons, which are more frequent and stronger due to warmer ocean waters.

### 2. Effects upon humans

- Famine and food insecurity, due to droughts and flooding that ruins crops
- Freshwater shortages
- Health problems, such as more malaria and other climate-sensitive diseases and poor air quality causes respiratory diseases
- Heat stress that is longer and hotter than normal which causes, including: Heat related health problems, especially for pregnant and older women, and death for vulnerable people, especially the sick and elderly as well as livestock
- Destruction of homes, due to flooding and hurricanes
- Migration or “climate change refugees” due to migration caused by lack of water, crop failure, extreme weather, etc., thus, livelihood shift
- Land rights/tenure challenged
- Toxic chemicals and CO<sub>2</sub> emissions from burning plastics

- **Klorofluorokaboni** (CFC na HCFC) ni kemikali zinazotengenezwa zinazopatikana katika viyoyozi, mawakala wa kemikali wanaotumika kutengeneza povu kwa magodoro, vichocheo vya erosoli katika matumizi ya kimatibabu, miyeyusho ya kuondoa mafuta, na kadhalika.

## 5. Je, ni madhara gani ya msingi ya mabadiliko ya tabianchi?<sup>8</sup>

- Joto lililokwama angani kutokana na **gesi zinazozalishwa** na binadamu zinazosababisha ongezeko la joto duniani husababisha **Dunia kupata joto**. Dunia yenye joto zaidi husababisha matatizo.
- Hapa chini kuna makundi 4 ya matatizo, ingawa athari zinaweza kuingiliana katika kundi moja au zaidi.

### 1. Matukio ya hali mbaya ya hewa

- Mawimbi ya joto
- Ukame katika baadhi ya maeneo na ongezeko la matuta ya mchanga.
- Mafuriko na mmomonyoko wa udongo katika maeneo mengine
- Vimbunga vikali na typhoons, ambavyo hutokea mara kwa mara na kwa nguvu zaidi kutokana na maji ya bahari yenye joto zaidi.

### 2. Athari kwa binadamu

- Njaa na ukosefu wa usalama wa chakula, kutokana na ukame na mafuriko yanayoharibu mazao
- Uhaba wa maji safi
- Matatizo ya kiafya, kama vile malaria na magonjwa mengine yanayotokana na mabadiliko ya tabianchi na hali mbaya ya hewa husababisha magonjwa ya kupumua
- Msongo wa joto la muda mrefu na wenye joto kali zaidi kuliko kawaida husababisha: Matatizo ya kiafya yanayohusiana na joto, hasa kwa wanawake wajawazito na wazee, na vifo kwa watu walio katika mazingira magumu, hasa wagonjwa na wazee pamoja na mifugo
- Uharibifu wa nyumba, kutokana na mafuriko na vimbunga
- Uhamiaji au “wakimbizi wa mabadiliko ya tabianchi” kutokana na uhamiaji unaosababishwa na ukosefu wa maji, kwa mazao, hali mbaya ya hewa, n.k., hivyo, mabadiliko katika upatikanaji wa riziki
- Changamoto za haki za ardhi/umiliki wa ardhi

**3. Impacts on ecosystems**

- Africa is expected to warm up 1.5 times faster than the global average affecting ecosystems and natural resources.
- Rangeland destruction including invasive species.
- The rise of sea levels, due to melting ice caps at the North and South Poles and other icebergs, is destroying coastal communities and some island nations, such as the Marshall Islands, Kiribati, Tuvalu, and the Maldives.

**4. Impacts on national security**

- Conflicts will increase over limited natural resources, both within regions within a country and between nations.
- Rivers and their precious waters are often shared resources between regions and nations. Downstream areas have less water.

- While most of the climate crisis has been caused by large industrial areas like Europe, USA, and China, the poorer countries—like Tanzania—will be more effected!
  - One reason is that many Africans are dependent upon natural resources for their livelihoods.
  - Unfortunately, poorer countries—which will be impacted the most—have the least amount of resources to manage the effects!

**6. What is the difference between mitigation and adaptation?<sup>9</sup>**

- Mitigation measures are those actions that are taken to *reduce* global-warming gas emissions.
- Adaptation measures are based on decreasing vulnerability and risk to the effects of climate change.
- Thus, mitigation seeks to *reduce* the causes of climate change, while adaptation seeks to make people more *resilient* or less vulnerable to the impacts of climate change.

- Kemikali zenye sumu na uzalishaji wa CO<sub>2</sub> kutokana na plastiki zinazoungua.

**3. Athari kwa mifumo ikolojia**

- Afrika inatarajiwa kuongezeka joto mara 1.5 zaidi kuliko wastani wa kimataifa unaoathiri mifumo ikolojia na maliasili.
- Uharibifu wa maeneo ya malisho ikiwa ni pamoja na spishi vamizi.
- Kuongezeka kwa viwango vya bahari, kutokana na kuyeyuka kwa barafu kwenye ncha za Kaskazini na Kusini za dunia na milima mingine ya barafu, kunaharibu jamii za pwani na baadhi ya visiwa, kama vile Visiwa vya Marshall, Kiribati, Tuvalu, na Maldives.

**4. Athari kwa usalama wa taifa**

- Migogoro itaongezeka kutokana na rasilimali asilia chache, ndani ya maeneo ndani ya nchi na kati ya mataifa.
- Mito na maji yake ya thamani mara nyingi ni rasilimali za pamoja kati ya maeneo na mataifa. Maeneo ya mwisho ya mito yatapata maji kidogo.

- Ingawa mgogoro mwingi wa tabianchi umesababishwa na maeneo makubwa ya viwanda kama vile Ulaya, Marekani, na China, nchi maskini zaidi—kama Tanzania—zitaathiriwa zaidi!
  - Sababu moja ni kwamba Waafrika wengi wanategemea rasilimali asili kwa ajili ya riziki zao.
  - Kwa bahati mbaya, nchi maskini zaidi—ambazo zitaathiriwa zaidi—zina kiasi kidogo cha rasilimali za kudhibiti athari hizo!

**6. Tofauti kati ya kupunguza na kukabiliana na hali ni ipi?<sup>9</sup>**

- Hatua za kupunguza hali ni zile hatua zinazochukuliwa ili kupunguza uzalishaji wa gesi unaotokana na ongezeko la joto duniani.
- Mbinu za kuhimili mabadiliko ya tabianchi zinatokana na kupunguza hatari na urahisi wa kuathirika kwa binadamu na mazingira.
- Hivyo, kukabiliana na hali kunalenga *kupunguza* sababu za mabadiliko ya tabianchi, huku *kukabiliana* na hali kunalenga kuwafanya watu wawe na ustahimilivu zaidi au wasiwe na hatari kubwa kutokana na athari za mabadiliko ya tabianchi.

## 7. What are ways of mitigation of and adaptation to climate change that are:

- Informed by climate science and
- Appropriate for a traditional Maasai context?

*Take out a piece of paper and draw a line down the middle of the paper with the left heading of Mitigation and the right heading of Adaptation.*

*The teacher can choose from the following lists randomly and guide a discussion. (Students have to say/write on the respective columns, whether it is a mitigation or adaptation method).*

*These lists are too detailed and are provided to support the teacher's understanding. The teacher should not discuss all of these but rather choose the most appropriate items for their group. Write the findings on the flipchart or blackboard for later discussion.*

*IF A HANDOUT IS POSSIBLE: Another teaching method for this question is to provide the handout below with a detailed list of mitigation and adaptation strategies. Then have the students read and discuss the questions as they engage the content of the handout.*

- I will name different items. Let us discuss them and work together to identify which of these practices are related to climate change **mitigation** (reduction) and/or **adaptation** (increased resilience for climate change impacts).

*Discuss the mitigation and adaptation strategies for 10 minutes.*



## 7. Ni njia zipi za kupunguza na kukabiliana na mabadiliko ya tabianchi ambazo:

- Zinatokana na sayansi ya tabianchi na
- Zinafaa kwa muktadha wa kitamaduni wa Wamaasai?

*Toa karatasi na chora ubeti katikati ya karatasi, upande wa kushoto andika kupunguza athari, alafu upande wa kulia andika kuhimili athari. Mwalimu anaweza kuchagua kutoka kwenye orodha zifuatazo bila mpangilio na kuongoza majadiliano. (Wanafunzi wanatakiwa kusema/kuandika kwenye karatasi aliyogawanya kama mjia iliyotajwa ni ya kupunguza au kuhimili athari).*

*Orodha hizi zina maelezo mengi na zimetolewa ili kusaidia uelewa wa mwalimu. Mwalimu hapaswi kujadili haya yote bali kuchagua vipengee vinavyofaa zaidi kwa kundi lake. Andika matokeo kwenye chati mgeuzo au ubao mweusi kwa majadiliano ya baadaye.*

*IKIWA KITINI KINAWEZEKANA: Njia nyingine ya kufundisha swali hili ni kutoa kitini kilicho hapa chini orodha ya kina ya mikakati ya kupunguza na kukabiliana. Kisha-wanafunzi wasome na kujadili maswali wanaposhirikisha maudhui ya kitini.*

- Nitataja vipengee tofauti. Hebu tuvijadili na tufanye kazi pamoja ili kubaini ni vitendo gani kati ya hivi vinavyohusiana na **kupunguza** na/au **kukabiliana** (kuongezeka kwa ustahimilivu kwa athari za mabadiliko ya tabianchi).

*Jadili mikakati ya kupunguza makali na kukabiliana nayo kwa dakika 10*

Mitigation	Adaptation	Kupunguza	Kukabiliana
<p><b>1. Plant trees which absorb CO<sub>2</sub></b> (especially trees that are native to the area).</p> <p><b>2. Energy efficiency (reducing carbon)</b></p> <p>a) Use more efficient wood burning cooking stoves to reduce burning of wood (which puts global-warming gases into the environment).<sup>1</sup> [See Resources Chap. 17 for an example stove.]</p> <p>b) Increase the use of renewable energy such as solar power.</p> <p>c) Use energy efficient LED lights or compact fluorescent lights (CFLs) instead of old incandescent light bulbs.</p> <p>d) Turn off electrical lights when not being used.</p> <p><b>3. Reduce the use of plastic bottles and recycle the bottles that are used.</b></p> <p>e) Because single-use plastic is produced</p>	<p><b>5. Water</b></p> <p>h) Develop water harvesting and storage mechanisms.<sup>3</sup></p> <p>i) In acute water scarcity, temporarily migrate to areas where water is accessible.</p> <p>j) Develop water catchment areas (reservoirs) boreholes, piped water, and dams.<sup>4</sup> [See Resources Chap. 17.]</p> <p><b>6. Food security</b></p> <p>k) Put in place food security enhancement strategies (food reserve).<sup>5</sup></p> <p>l) The households' ability to purchase food is the most important food security strategy.<sup>6</sup></p> <p>m) A reliable income source and asset base is crucial for household response to climate shocks.<sup>7</sup></p> <p>n) 58% reported that they resort to selling livestock... in response to shocks.<sup>8</sup></p> <p><b>7. Infrastructure resilience</b></p> <p>o) More secure house and facility locations</p> <p>p) Preventive and precautionary measures (evacuation plans, health issues, etc.)</p> <p><b>8. Ecosystem and landscapes</b></p> <p>q) Landscape restoration (natural landscape) and reforestation</p> <p>r) Conservation of natural ecosystem (biodiversity and water)</p> <p><b>9. Traditional environmental knowledge</b></p> <p>s) Identify and sustain indigenous/traditional Maasai knowledge with practices that are good for caring for the environment; "...local knowledge systems and institutions should buttress policy-making and implementation to promote local resilience."<sup>9</sup></p> <p>t) "Gradual and medium to long-term livelihood diversification initiative is a highly recommended policy strategy to increase resilience among pastoral communities as opposed to the current policy which</p>	<p><b>1. Panda miti ambayo inachukua kaboni dioksidi, CO<sub>2</sub></b> (hasa miti ambayo ni ya asili ya eneo la hilo).</p> <p><b>2. Ufanisi wa nishati (kupunguza kiwango cha kaboni)</b></p> <p>a) Tumia majiko ya kuni yenye ufanisi zaidi ya kuni ili kupunguza uchomaji wa kuni (ambao huweka gesi zinazoongeza joto kwenye dunia kwenye mazingira).<sup>1</sup> [Tazama Nyenzo sura ya 17 kuhusu kuchoma biomasi chini na mfano wa jiko linalotumia mafuta kidogo.]</p> <p>b) Kuongeza matumizi ya nishati mbadala kama vile nishati ya jua.</p> <p>c) Tumia taa za LED zisizo na nishati au taa za fluorescent (CFL) badala ya balbu za zamani za incandescent.</p> <p>d) Zima taa za umeme wakati hautumiki.</p> <p><b>3. Punguza matumizi ya chupa za plastiki na urejeshe tena chupa zinazotumika.</b></p>	<p><b>5. Maji</b></p> <p>h) Tengeneza njia za kuvuna na kuhifadhi maji.</p> <p>i) Katika uhaba mkubwa wa maji, hamia kwa muda kwenye maeneo ambayo maji yanapatikana.</p> <p>j) Kuendeleza maeneo ya kukusanyia maji, visima, maji ya bomba, na mabwawa.<sup>4</sup> [Tazama picha hapa chini katika Nyenzo sura ya 17.]</p> <p><b>6. Usalama wa chakula</b></p> <p>k) Weka mikakati ya kuimarisha usalama wa chakula (hifadhi ya chakula).<sup>5</sup></p> <p>l) Uwezo wa kaya kununua chakula ndio mkakati muhimu zaidi wa usalama wa chakula.<sup>6</sup></p> <p>m) Chanzo cha mapato kinachotegemewa na msingi wa mali ni muhimu kwa mwitikio wa kaya dhidi ya majanga ya tabia nchi.<sup>7</sup></p> <p>n) Asilimia 58 ya kaya ziliripoti kuwa zimeamua kuuza mifugo...ili kudhibiti majanga ya tabia nchi.<sup>8</sup></p> <p><b>7. Ustahimilivu wa miundombinu</b></p> <p>o) Maeneo salama zaidi ya nyumba na kituo</p> <p>p) Hatua za kuzuia na za tahadhari (mipango ya uokoaji, masuala ya afya, n.k.)</p> <p><b>8. Mfumo wa ikolojia na mandhari</b></p> <p>q) Marejesho ya mazingira (mandhari ya asili) na upandaji miti upya</p> <p>r) Uhifadhi wa mfumo ikolojia asilia (bioanuwai na maji)</p> <p><b>9. Maarifa ya jadi ya mazingira</b></p> <p>s) Tambua na udumishe maarifa asilia/jadi ya Wamaasai na mazoea ambayo ni mazuri kwa kutunza mazingira; "...mifumo na taasisi za maarifa za wenyeji zinapaswa kuimarisha utungaji na utekelezaji wa sera ili kukuza ustahimilivu wa wenyeji."<sup>9</sup></p> <p>t) "Mpango wa mseto wa maisha wa taratibu na wa kati hadi mrefu ni mkakati wa kisera unaopendekezwa ili</p>

Mitigation	Adaptation	Kupunguza	Kukabiliana
<p>from fossil fuels, obtaining and creating these plastics produces large amounts of global-warming gases.</p> <p>f) Burning plastics puts toxic chemicals into the air and land that is harmful to health.<sup>2</sup></p> <p><b>4. Use garbage collection instead of burning garbage.</b></p> <p>g) Burning garbage releases carbon into the air. (See note “f” on burning plastic.)</p>	<p>condemns pastoralism as a backward and environmentally destructive activity.”<sup>10</sup></p> <p><b>10) Agro-pastoralism/small-scale agriculture</b></p> <p>u) Use flexible and diverse cultivation</p> <p>v) Develop seed banking.<sup>11</sup></p> <p>w) Incorporate crops that are more drought resistant than maize, “such as sorghum, pigeon-pea, finger millet, sweet potato and chickpea...”<sup>12</sup></p> <p><b>11) Leadership and governance</b></p> <p>x) Include women in decision making that affects their and their children’s lives to reduce the vulnerability of the entire household</p> <p>y) Strengthen local traditional leaders as the elders are in charge of resource control and allocation especially during periods of intense scarcity<sup>13</sup> and provide infrastructural, social, legal, and financial support</p> <p>z) Strengthen the village council for how to seek government support...for infrastructural, social, legal, and financial support.<sup>14</sup></p>	<p>e) Kwa sababu plastiki ya matumizi moja huzalishwa kutoka kwa nishati ya mafuta (kama petroli), kupata na kuunda plastiki hizi hutoa kiasi kikubwa cha gesi za joto za dunia.</p> <p>f) Tumia ukusanyaji wa taka badala ya kuchoma takataka.<sup>2</sup></p> <p><b>4. Takataka zinazochomwa hutoa kaboni hewani.</b></p> <p>g) Kuchoma plastiki huweka kaboni dioksidi na kemikali za sumu katika hewa na ardhi ambayo ni hatari kwa afya ya binadamu na wanyama na mazingira. (Angalia maelezo “f.”)</p>	<p>kuongeza ustahimilivu miongoni mwa jamii za wafugaji kinyume na sera ya sasa inayolaani ufugaji kuwa ni shughuli ya kurudi nyuma na kuharibu mazingira.”<sup>10</sup></p> <p><b>10. Kilimo-ufugaji/kilimo kidogo</b></p> <p>u) Tumia njia rahisi na tofauti za kilimo.</p> <p>v) Kuendeleza utunzaji wa mbegu.<sup>11</sup></p> <p>w) Jumuisha mazao yanayostahimili ukame zaidi kuliko mahindi, “kama vile mtama, njegere, mtama, viazi vitamu na kunde.”<sup>12</sup></p> <p><b>11. Uongozi na utawala</b></p> <p>x) Wajumuishe wanawake katika kufanya maamuzi ambayo yanaathiri maisha yao na ya watoto wao ili kupunguza hatari ya kaya nzima.</p> <p>y) Waimarishe viongozi wa kimila kwani wazee ndio wanaosimamia udhibiti na ugawaji wa rasilimali hasa nyakati za uhaba mkubwa,<sup>13</sup> na kutoa msaada wa miundombinu, kijamii, kisheria na kifedha.</p> <p>z) Imarisha halmashauri ya kijiji jinsi ya kutafuta msaada wa serikali...kwa msaada wa miundombinu, kijamii, kisheria na kifedha.<sup>14</sup></p>

**Table Bibliography**

<sup>1</sup> Ndesanjo, Theilade, and Nielsen. “Water scarcity is a common determinant of migration among pastoral communities.” (Berkhout 2012; Brockhaus et al. 2013). 2602, [https://doi.org/10.1007/978-3-030-45106-6\\_128](https://doi.org/10.1007/978-3-030-45106-6_128).

<sup>2</sup> Verma et al., “Toxic Pollutants from Plastic Waste-A Review,” *Procedia Environmental Sciences, Waste Management for Resource Utilisation*, 35 (January 1, 2016): 701–8, <https://doi.org/10.1016/j.proenv.2016.07.069>.

<sup>3</sup> Ndesanjo, Theilade, and Nielsen, 2603.

<sup>4</sup> Mwandosya, “National Adaptation Programme of Action (NAPA),” 2007, ix, <https://unfccc.int/resource/docs/napa/tza01.pdf>.

<sup>5</sup> Ndesanjo, Theilade, and Nielsen, 2601.

<sup>6</sup> Ndesanjo, Theilade, and Nielsen, 2601.

<sup>7</sup> Ndesanjo, Theilade, and Nielsen, 2602.

<sup>8</sup> Ndesanjo, Theilade, and Nielsen, 2601.

<sup>9</sup> Mwandosya, ix.

<sup>10</sup> Ndesanjo, Theilade, and Nielsen, 2607.

<sup>11</sup> Ndesanjo, Theilade, and Nielsen, 2601.

<sup>12</sup> J. Douwe Meindertsma and Jan J. Kessler, eds., 44. Meindertsma, J. Douwe, and Jan J. Kessler, eds. *Planning for a Better Environment in Monduli District*. Netherlands Economic Institute, 1997.

<sup>13</sup> Ndesanjo, Theilade, and Nielsen, 2604.

<sup>14</sup> Ndesanjo, Theilade, and Nielsen, 2605.

**Maasai: Which are practices that the Maasai do already?**

- 5
- Take a look at our lists.
  - Underline the things that the Maasai do.

*Below is an edited list of the one above that focuses on Maasai practices.*



**Wamaasai: Ni desturi zipi ambazo Wamaasai tayari wanafanya?**

- Angalia orodha zetu.
- Piga ubeti chini ya mambo ambayo Wamaasai hufanya.

*Hapa chini kuna orodha iliyohaririwa ya ile iliyo hapo juu inayozingatia desturi za Wamaasai.*

Mitigation	Adaptation	Kupunguza	Kukabiliana
<p><b>1. Trees: Traditionally not cutting trees;</b> Some: Dig “smile” pits that “regreen” the area with plants that take out CO<sub>2</sub> from the air (and also reduce soil erosion). [See Resources Chapter 17.]</p> <p><b>2. Energy efficiency:</b> Most use public transportation and walk. a) Some: more efficient wood burning cooking stoves b) Some: solar power c) Some: energy efficient LED lights d) Some: Turn off electrical lights when not used</p>	<p><b>5) Water</b> h) Some: Develop water harvesting and storage i) During dry seasons, temporarily migrate j) YES! Develop water catchment areas</p> <p><b>7) Infrastructure resilience</b> o) Some: More secure house and facility locations</p> <p><b>8) Ecosystem and landscapes</b> r) YES! Conservation of ecosystem and biodiversity</p> <p><b>9) Traditional environmental knowledge</b> s) Some: Identify and sustain traditional knowledge t) Some: Gradual livelihood diversification</p> <p><b>11) Leadership and governance</b> x) Some: Include women in decision making y) Some: Strengthen local traditional leaders for resource control and sharing z) Some: Strengthen the village council to seek government support</p>	<p><b>1. Miti: Kijadi haikatwagi miti.</b> Baadhi: Chimba mashimo ya "tabasamu" ambayo "hurudisha kijani" eneo hilo kwa mimea inayotoa CO<sub>2</sub> kutoka hewani (na pia hupunguza mmomonyoko wa udongo). [Tazama Rasilimali Sura ya 17.]</p> <p><b>2. Ufanisi wa nishati:</b> Wengi: Tumia usafiri wa umma na kutembea. a) Baadhi: majiko ya kupikia ya kuni yenye ufanisi zaidi b) Baadhi: nishati ya jua c) Baadhi: taa za LED zinazotumia nishati kidogo d) Baadhi: Zima taa za umeme zisipotumika</p>	<p><b>5) Maji</b> h) Baadhi: Kuendeleza uvunaji na uhifadhi wa maji i) Wakati wa kiangazi, huhama kwa muda j) NDIYO! Kuendeleza maeneo ya kuinga maji</p> <p><b>7) Ustahimilivu wa miundombinu</b> o) Baadhi: Maeneo salama zaidi ya nyumba na vituo</p> <p><b>8) Mfumo ikolojia na mandhari</b> r) NDIYO! Uhifadhi wa mfumo ikolojia na viumbe hai</p> <p><b>9) Maarifa ya jadi ya mazingira</b> s) Baadhi: Kutambua na kudumisha maarifa ya jadi t) Baadhi: Ubadilishaji wa utaratibu wa maisha</p> <p><b>11) Uongozi na utawala</b> x) Baadhi: Kuwajumuisha wanawake katika kufanya maamuzi y) Baadhi: Kuimarisha viongozi wa kitamaduni wa mitaa kwa ajili ya kudhibiti na kushiriki rasilimali z) Baadhi: Kuimarisha baraza la kijiji kutafuta msaada wa serikali</p>

### Integrating Climate Science for a Maasai Context

- 4 • Which are practices that Maasai do not traditionally do, but these are things that YOU could easily do—some of them without a lot of resources?
- Looking again at our list, put a double underline under things that we can do!

*This is an edited list of the one above that focuses on things that can be done or encouraged by the students among their families.*

### Kuunganisha Sayansi ya Tabianchi kwa Mukstadha wa Wamaasai

- Ni mazoea gani ambayo Wamaasai hawayafanyi kijadi, lakini ni mambo ambayo WEWE unaweza kuyafanya kwa urahisi—baadhi yake bila rasilimali nyingi?
- Tukiangalia tena orodha yetu, pigia mistari miwili chini ya mambo tunayoweza kufanya!

*Hii ni ile ile orodha ila imehaririwa kwa kuzingatia mambo ambayo yanaweza kufanywa au kuhimizwa na wanafunzi kufanywa miongoni mwa familia zao.*

Mitigation	Adaptation	Kupunguza	Kukabiliana
<p><b>1. Plant trees:</b> Plant trees that are native to the local area; Dig “smile” pits that “regreen” the area with plants that take out CO<sub>2</sub> from the air (and also reduces soil erosion).</p> <p><b>2. Energy efficiency</b> (reducing carbon) a) More: Use more efficient wood burning cooking stoves to reduce burning of wood. b) More: Increase the use of renewable energy such as solar power. c) More: Use energy efficient LED lights. d) More: Turn off electrical lights when not being used. Also, do not run an auto-mobile engine while waiting and not moving in a car.</p> <p><b>3. Reduce plastic bottles</b></p> <p><b>4. Garbage collection instead of burning</b></p>	<p><b>5. Water</b> h) More water harvesting and storage j) More water catchment areas (reservoirs)</p> <p><b>6. Food security</b> k) More food security strategies (food reserve)</p> <p><b>7. Infrastructure resilience</b> o) More secure houses p) Set up precautionary measures (i.e., evacuation plans)</p> <p><b>8. Traditional environmental knowledge</b> q) More Identification of traditional knowledge with practices that are good for creation care</p> <p><b>10. Agro-pastoralism/small-scale agriculture</b> u) Use flexible and diverse cultivation. w) Add drought resistant crops, such as sorghum, pigeon-pea, finger millet, sweet potato and chickpea.</p> <p><b>11. Leadership and governance</b> x) Include more women in decision making. y) Strengthen local traditional leaders as the elders are in charge of resource control. z) Strengthen the village council for how to seek government support.</p>	<p><b>1. Panda miti:</b> Panda miti ambayo ni ya asili katika eneo hilo; Chimba mashimo ya "tabasamu" ambayo "yanarudisha kijani" katika eneo hilo kwa mimea inayotoa CO<sub>2</sub> kutoka hewani (na pia hupunguza mmomonyoko wa udongo).</p> <p><b>2. Ufanisi wa nishati</b> (kupunguza kaboni) a) Zaidi: Tumia majiko ya kupikia ya kuni yenye ufanisi zaidi ili kupunguza uhomaji wa kuni. b) Zaidi: Ongeza matumizi ya nishati mbadala kama vile nishati ya jua. c) Zaidi: Tumia taa za LED zenye ufanisi wa nishati. d) Zaidi: Zima taa za umeme wakati hazitumiki. Pia, usiendeshe injini ya gari huku ukisubiri na huingii ndani ya gari.</p> <p><b>3. Punguza chupa za plastiki</b></p> <p><b>4. Ukusanyaji wa taka badala ya kuchoma</b></p>	<p><b>5. Maji</b> h) Uvunaji na uhifadhi zaidi wa maji j) Maeneo mengi ya vyanzo vya maji (mabwawa)</p> <p><b>6. Usalama wa chakula</b> k) Mikakati zaidi ya usalama wa chakula (hifadhi ya chakula)</p> <p><b>7. Ustahimilivu wa miundombinu</b> o) Nyumba salama zaidi p) Weka hatua za tahadhari (yaani, mipango ya uokoaji).</p> <p><b>8. Maarifa ya jadi ya mazingira</b> q) Utambuzi zaidi wa maarifa ya jadi kwa kutumia mbinu ambazo ni nzuri kwa utunzaji wa uumbaji</p> <p><b>10. Kilimo-ufugaji/kilimo kidogo</b> u) Tumia kilimo kinachonyumbulika na cha aina mbalimbali. w) Ongeza mazao yanayostahimili ukame, kama vile mtama, njegere, mtama, viazi vitamu na kunde.</p> <p><b>11. Uongozi na utawala</b> x) Jumuishwa wanawake wengi zaidi katika kufanya maamuz. y) Waimarishe viongozi wa kimila kwani wazee ndio wanaosimamia uhibitaji na ugawaji wa rasilimali hasa nyakati za uhaba mkubwa. z) Imarisha halmashauri ya kijiji jinsi ya kutafuta msaada wa serikali.</p>

### 3) LOOK interpretation/reflection on core content

#### So, what is ONE thing YOU can do in each category?



- 5
- On your paper, circle one thing in each category that YOU can do with your family and friends to make a difference in caring for God's creation?
  - Remember that our creation care is motivated by being called by God to care for the creation (**Genesis 2:15**). As we are reconciled (in a right relationship) with God, the nature of our faith is lived out: 1) in peace with others (social justice) and 2) peace with creation (creation care/environmental ethics).
  - Let's have two or three students share with the class just one of the things they want to do to make a difference.

#### Hope

- 3
- Knowing that we have a trustworthy and loving God, we can face the challenges of climate change with hope.
  - First, we know that our Creator, the God of Hope, loves the world, and God will never abandon it.
  - Second, as followers of Jesus Christ, we are empowered by the Holy Spirit to be a blessing to others (social justice) and the creation (environment).
  - Finally, even some scientists and environmentalists are hopeful that we can all do something little and together it adds up to make a big difference.



*There may not be enough time to highlight the following examples.*

### 3) UCHUNGUZI ufafanuzi au tafakari ya maudhui ya msingi

#### Kwa hivyo, ni jambo gani MOJA WEWE unaweza kufanya katika kila kategoria/kundi?

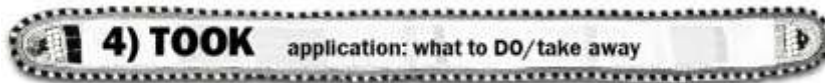
- Kwenye karatasi yako, zungushia kitu kimoja katika kila kipengele ambacho WEWE unaweza kufanya na familia yako na marafiki ili kuleta mabadiliko katika kutunza uumbaji wa Mungu?
- Kumbuka kwamba utunzaji wetu wa uumbaji unahamasishwa na wito wa Mungu kwetu wa kutunza uumbaji (**Mwanzo 2:15**). Tunapopatanishwa (katika uhusiano sahihi) na Mungu, asili ya imani yetu inadhihirika: 1) kwa amani na wengine (haki ya kijamii) na 2) amani na uumbaji (utunzaji wa uumbaji/maadili ya mazingira).
- wanafunzi wawili au watatu washirikishe darasa jambo moja wanalotaka kufanya ili kuleta mabadiliko.

#### Tumaini

- Tukijua kwamba tuna Mungu anayeaminika na mwenye upendo, tunaweza kukabiliana na changamoto za mabadiliko ya tabianchi kwa matumaini.
- Kwanza, tunajua kwamba Muumba wetu, Mungu wa Tumaini, anapenda ulimwengu, na Mungu hatauacha kamwe.
- Pili, kama wafuasi wa Yesu Kristo, tunawezeshwa na Roho Mtakatifu kuwa baraka kwa wengine (haki ya kijamii) na uumbaji (mazingira).
- Hatimaye, hata baadhi ya wanasayansi na wanamazingira wana matumaini kwamba sote tunaweza kufanya kitu kidogo na kwa pamoja kuleta mabadiliko makubwa.

*Huenda kusiwe na muda wa kutosha kuangazia mifano ifuatayo.*

- **Wangari Maathai**—the Kenyan Nobel Prize winner we talked about at the beginning of the lesson.
  - “The 30 million trees planted by Green Belt Movement volunteers—mostly rural women—throughout Kenya over the past 30 years are a testament to the individuals’ ability to change the course of environmental history.
  - “Working together, we have proven that sustainable development is possible; the reforestation of degraded land is possible; and the exemplary governance is possible when ordinary citizens are informed, sensitized, mobilized and involved in direct action for their environment.”<sup>10</sup>
- **Jane Goodall** did research with chimpanzees in Tanzania’s Gombe National Park for 30 years (1960–1990s). [See Resources for Lesson 3, Chapter 17.]
  - “Hope is what enables us to keep going in the face of adversity.”<sup>11</sup>
  - “I truly believe, and I’m not alone as a scientist, that we have a window of time when if we get together and take action, we can at least slow down climate change and loss of biodiversity... **I can’t save the world, but what can I do locally?... Whatever it is you care about, get together with some friends and take action. Do what you can do to solve what you are passionate about and you will find you make a difference.**”<sup>12</sup>
- **Wangari Maathai**—mshindi wa Tuzo ya Nobel ya Kenya tuliyezfungumzia mwanzoni mwa somo.
  - “Miti milioni 30 iliyopandwa na waliojitolea wa Green Belt Movement—hasa wanawake wa vijijini—kote nchini Kenya katika kipindi cha miaka 30 iliyopita ni ushahidi wa uwezo wa watu binafsi kubadilisha historia ya mazingira.
  - “Kwa kufanya kazi pamoja, tumethibitisha kwamba maendeleo endelevu yanawezekana; upandaji miti upya katika ardhi iliyoharibiwa unawezekana; na utawala bora unawezekana wakati raia wa kawaida wanapoarifiwa, kuhamasishwa, na kushiriki katika hatua za moja kwa moja kwa mazingira yao.”<sup>10</sup>
- **Jane Goodall** alifanya utafiti na sokwe katika Hifadhi ya Taifa ya Gombe nchini Tanzania kwa miaka 30 (1960–1990). [Tazama Rasilimali za Somo la 3, Sura ya 17.]
  - “Matumaini ndiyo yanayotuwezesha kuendelea mbele katika hali ngumu.”<sup>11</sup>
  - “Ninaamini kweli, na siko peke yangu kama mwanasayansi, kwamba tuna wakati ambapo tukikusanyika pamoja na kuchukua hatua, tunaweza kupunguza kasi ya mabadiliko ya tabianchi na upotevu wa bayoanuwai... **Siwezi kuokoa ulimwengu, lakini naweza kufanya nini hapa?... Chochote unachojali, ungana na marafiki na uchukue hatua. Fanya unachoweza kufanya ili kutatua kile unachopenda na utaona unaleta mabadiliko.**”<sup>12</sup>



### So, what now?

- 5
- In the first lesson, we saw that the traditional Maasai understanding is that *Engai* controls the weather.
  - Yet, in these lessons, we also learned that there is a difference between weather and climate, and we see that the greatest negative impact upon climate change is because of human activities—



### Kwa hivyo, nini sasa?

- Katika somo la kwanza, tuliona kwamba uelewa wa jadi wa Wamaasai ni kwamba *Engai* hudhibiti hali ya hewa.
- Hata hivyo, katika masomo haya, pia tulijifunza kwamba kuna tofauti kati ya hali ya hewa na tabianchi, na tunaona kwamba athari kubwa zaidi kwa mabadiliko ya tabianchi ni kwa sababu ya shughuli za binadamu—hasa kuzalisha gesi zinazoongeza joto la dunia hewani, kama vile kaboni dioksidi hwanjia ya kuchoma petroli.

especially putting global-warming gases into the air, such as carbon dioxide through burning petrol.

- So, we see that humans can have an important role in reducing the negative impacts of climate change. Our important role is fundamentally that of our commissioning from God to care for God’s beautiful creation. So, it is obvious that human activities are the principal causes of climate change and that humans have something to contribute in caring for the creation both traditionally and scientifically. Both scientific and Christian perspectives emphasize that human have responsibility to be stewards of the earth and protect it for future generations.
- We can make a difference! Let us discuss this in small groups.

### Activities to make a difference in the climate crisis

10

- Identify 3 appropriate ways that YOU want to make a difference in climate change mitigation (reduction) in a traditional Maasai context.
- Identify 3 appropriate ways that YOU want to make a difference in climate change adaptation (resilience) in a traditional Maasai context.



*Have a reporter from each group share one thing that the group members will do that was important in their conversation.*

### Song writing

Or *This activity may take 10–15 minutes. So, while it is a very good application, it needs enough time to be done well.*

Each small group writes one stanza of a song about traditional Maasai environmental knowledge and practices that are also best practices of climate change mitigation (reduction). Use the common melody that is known by most students. A call and response Maasai tune may be a good way to start. Then, invite each group to sing their verse.

- Kwa hivyo, tunaona kwamba wanadamu wanaweza kuwa na jukumu muhimu katika kupunguza athari mbaya za mabadiliko ya tabianchi. Jukumu letu muhimu kimsingi ni lile agizo la Mungu kwetu kutunza uumbaji wake mzuri. Kwa hivyo, ni dhahiri kwamba shughuli za binadamu ndizo sababu kuu za mabadiliko ya hali ya hewa na kwamba wanadamu wana kitu cha kuchangia katika kutunza uumbaji kijadi na kisayansi. Mitazamo ya kisayansi na ya Kikristo inasisitiza kwamba wanadamu wana jukumu la kuwa wasimamizi wa dunia na kuulinda kwa ajili ya vizazi vijavyo.
- Tunaweza kuleta mabadiliko! Hebu tujadili hili katika vikundi vidogo.

### Shughuli za kuleta mabadiliko katika mgogoro wa tabianchi

- Bainisha njia 3 zinazofaa ambazo WEWE unataka kuleta mabadiliko katika kupunguza mabadiliko ya tabianchi katika muktadha wa jadi ya Wamaasai.
- Bainisha njia 3 zinazofaa ambazo UNATAKA kuleta mabadiliko katika kukabiliana na mabadiliko ya tabianchi (ustahimilivu) katika muktadha wa kitamaduni wa Wamaasai.

*Wwandishi kutoka kila kikundi ashirikishe jambo moja ambalo wanakikundi watalifanya ambalo lilikuwa muhimu katika mazungumzo.*

### Uandishi wa nyimbo

*Shughuli hii inaweza kuchukua dakika 10–15. Kwa hivyo, ingawa ni programu nzuri sana, inahitaji muda wa kutosha kuikamilisha vizuri.*

Kila kikundi kiandike ubeti mmoja wa wimbo kuhusu maarifa na desturi za kitamaduni za kimazingira za Wamaasai ambazo pia ni njia bora za kupunguza mabadiliko ya tabianchi. Tumia sauti ya kawaida inayojulikana na wanafunzi wengi. Wimbo wa Wamaasai wa mtindo wa kupokezana unaweza kuwa njia nzuri ya kuanzia. Kisha, waalike kila kikundi kuimba ubeti wao.

1

Prayer

Maombi

60

End of lesson

Mwisho wa somo

## Bibliography

- <sup>1</sup> “Climate Change Mitigation and Adaptation: Simple Guide to Schools in Africa,” with Ann Therese Ndong-Jatta, UNESCO, United Nations Educational, Scientific and Cultural Organization, 2019, 4, <https://unesdoc.unesco.org/ark:/48223/pf0000372168>.
- <sup>2</sup> “Climate Change Mitigation and Adaptation,” 4.
- <sup>3</sup> “Climate Change Mitigation and Adaptation,” 4.
- <sup>4</sup> “Climate Change Mitigation and Adaptation,” 3.
- <sup>5</sup> “Climate Change Mitigation and Adaptation,” 4–5.
- <sup>6</sup> “Climate Change Mitigation and Adaptation,” 5–6.
- <sup>7</sup> Rinku Verma et al., “Toxic Pollutants from Plastic Waste- A Review,” *Procedia Environmental Sciences*, Waste Management for Resource Utilisation, vol. 35 (January 2016): 701–8, <https://doi.org/10.1016/j.proenv.2016.07.069>. “...plastics is burnt, releasing **toxic gases** like Dioxins, Furans, Mercury and Polychlorinated Biphenyls into the atmosphere. Further, burning of Poly Vinyl Chloride liberates *hazardous halogens and pollutes air*, the **impact of which is climate change**. The toxic substances thus released are posing a **threat to vegetation, human and animal health and environment as a whole**. Polystyrene is harmful to Central Nervous System. The hazardous brominated compounds act as **carcinogens and mutagens**. Dioxins settle on the crops and in our waterways where they eventually enter into our food and hence the body system. These Dioxins are the lethal persistent organic pollutants (POPs) and its worst component, 2,3,7,8 tetrachlorodibenzo-p-dioxin (TCDD), commonly known as agentorange is a **toxic compound which causes cancer and neurological damage, disrupts reproductive thyroid and respiratory systems**. Thus, **burning of plastic wastes increase the risk of heart disease, aggravates respiratory ailments such as asthma and emphysema and cause rashes, nausea or headaches, and damages the nervous system**. Hence, a sustainable step towards tomorrow’s cleaner and healthier environment needs immediate attention of the environmentalists and scientists. This review presents the hazards of incineration; open burning of plastics and effects of plastic in water and also a possibility of working out strategies to develop alternate procedures of plastic waste management.”
- <sup>8</sup> “Climate Change Mitigation and Adaptation,” 8–12.
- <sup>9</sup> “Climate Change Mitigation and Adaptation,” 13.
- <sup>10</sup> Maathai, *The Green Belt Movement*, xi. See also, Wangari Maathai. *The Green Belt Movement: Sharing the Approach and the Experience*. Revised edition. Lantern Publishing & Media, 2003; and Wangari Maathai. *Replenishing the Earth: Spiritual Values for Healing Ourselves and the World*. Random House, 2010.
- <sup>11</sup> Jane Goodall, Douglas Abrams, and Gail Hudson. *The Book of Hope: A Survival Guide for an Endangered Planet*. Viking, 2022.
- <sup>12</sup> Goodall, Jane. “Reasons for Hope” About the Planet’s Future, *Greater Boston*, GBH News’. 29 September 2023. <https://www.youtube.com/watch?v=LXXb5MjPbPI>.

## **Part 3: Resources for the Lessons**





## 15. Resources for Lesson 1:

# Biblical Creation Care

### Resources Below

1. More Creation Care Related Bible Verses
2. If more time, here are more teaching suggestions
3. Creation Care Resources and Quotes from African Scholars
4. Creation Care Resource Books and Quotes

### 1. More Creation Care Related Bible Verses

*These are more Bible verses (beyond what has been discussed in the lessons) that reveal:*

- We have been given a mandate to look after what God has made.
  - We are called to care for our fellow humans.
  - Jesus died for all creation—not just humans.
  - All creation has suffered due to bad human actions.
  - God will restore creation when Jesus returns.
- **Genesis 1:25-28** “God made the wild animals according to their kinds, the livestock according to their kinds, and all the creatures that move along the ground according to their kinds. And God saw that it was good. Then God said, ‘Let us make man in our image, in our likeness, and let them rule over the fish of the sea and the birds of the air, over the livestock, over all the earth, and over all the creatures that move along the ground.’ So God created man in his own image, in the image of God he created him; male and female he created them. God blessed them and said to them, ‘Be fruitful and increase in number; fill the earth and subdue it. Rule over the fish of the sea and the birds of the air and over every living creature that moves on the ground.’”
  - **Genesis 4:9–10** Then the LORD said to Cain, “Where is your brother Abel?” / “I don’t know,” he replied. “Am I my brother’s keeper?” / The LORD said, “What have you done? Listen! Your brother’s blood cries out to me from the ground.
    - We are commissioned to care for others, which includes caring for the environment which others are dependent upon for their livelihoods.
  - **Leviticus 25:1–7** The LORD spoke to Moses on Mount Sinai, saying, “Speak to the people of Israel and say to them, When you come into the land that I give you, the land shall keep a Sabbath to the LORD. For six years you shall sow your field, and for six years you shall prune your vineyard and gather in its fruits, but in the seventh year there shall be a Sabbath of solemn rest for the land, a Sabbath to the LORD. You shall not sow your field or prune your vineyard. You shall not reap what grows of itself in your harvest, or gather the grapes of your undressed vine. It shall be a year of solemn rest for the land. The Sabbath of the land shall provide food for you, for yourself and for your male and female slaves and for your hired worker and the sojourner who lives with you, and for your cattle and for the wild animals that are in your land: all its yield shall be for food.
    - The land itself must be given a rest and not abused.

- **Leviticus 25:23-24** “The land must not be sold permanently, because the land is mine and you are but aliens and my tenants. Throughout the country that you hold as a possession, you must provide for the redemption of the land.”
- **Deuteronomy 10:14** “Behold, to the LORD your God belong heaven and the heaven of heavens, the earth with all that is in it.
  - All of heaven and earth belong to the LORD.”
- **Psalm 8:3-8** “When I consider your heavens, the work of your fingers, / the moon and the stars, which you have set in place, what is man that you are mindful of him, the son of man that you care for him? / You made him a little lower than the heavenly beings and crowned him with glory and honor. / You made him ruler over the works of your hands; you put everything under his feet: / all flocks and herds, and the beasts of the field, / the birds of the air, and the fish of the sea, all that swim in the paths of the seas.”

- **Psalm 104:14-24**

You cause the grass to grow for the livestock  
and plants for man to cultivate,  
that he may bring forth food from the earth  
and wine to gladden the heart of man,  
oil to make his face shine  
and bread to strengthen man’s heart.  
The trees of the LORD are watered abundantly,  
the cedars of Lebanon that he planted.  
In them the birds build their nests;  
the stork has her home in the fir trees.  
The high mountains are for the wild goats;  
the rocks are a refuge for the rock badgers.  
He made the moon to mark the seasons;  
the sun knows its time for setting.  
You make darkness, and it is night,

when all the beasts of the forest creep about.  
The young lions roar for their prey,  
seeking their food from God.  
When the sun rises, they steal away  
and lie down in their dens.  
Man goes out to his work  
and to his labor until the evening.  
O LORD, how manifold are your works!  
In wisdom have you made them all;  
the earth is full of your creatures.

- This selection of Psalm 104 is a beautiful creation psalm. The psalmist praises God for both creating and caring for the many, many different created beings in our world.
- **Matthew 6:26-27** “Look at the birds of the air: they neither sow nor reap nor gather into barns, and yet your heavenly Father feeds them. Are you not of more value than they? And which of you by being anxious can add a single hour to his span of life?”
  - God cares for the birds and all of God’s creation.
  - God’s care for us gives us hope in spite of challenges.
- **Romans 8:22-23** “We know that the whole creation has been groaning as in the pains of childbirth right up to the present time. Not only so, but we ourselves groan inwardly as we wait eagerly for our adoption as sons, the redemption of our bodies.”
- **1 Corinthians 10:26** For “the earth is the Lord’s, and the fullness thereof.” (Quote from Psalm 24:1)
  - Creation and all created things are inherently good because they are of the Lord.
- **Colossians 1:19-20** “For God was pleased to have all his fullness dwell in him [Christ] and through him to reconcile to himself all things, whether things on earth or things in heaven, by making peace through his blood shed on the cross.”

## 2. If more time, here are more teaching suggestions:

### *Invite students to reflect on their position in God's creation.*

- Think of how you feel when the creation provides you with all you need. (Blessed by God's good creation)
- Think of the position humans holds, being entrusted by God. Mention the tasks of Maa elders, leaders, warriors, men, women and parents and children concerning creation care. Think of God's purpose in placing you in that position in his creation. (Honored to be commissioned by God to care for creation)
- Think of your sincere response to God for such a blessing. (Committed to care for God's creation)

## 3. Creation Care Resources and Quotes from African Scholars

Here are some quotes from African men and women scholars and others on biblical creation care. They can be applied for Maasailand. They are organized into **creation care principles**, **gender and stewardship**, and **cultural perspectives**.

### *1. Creation Care Principles*

- **Kirsteen Kim** (2015, African theologian): "In Africa, caring for creation is about respecting God's gift of nature, not just protecting it."
  - This quote emphasizes that **caring for creation** is not just about environmental protection, but about **honoring and respecting** the earth as a divine gift.
- **J. Kameri-Mbote** (2000, Kenyan scholar): "African cultures, like the Maasai, believe creation should be respected, which aligns with the Bible's call to care for the earth."
  - This highlights the **biblical call to respect and care** for creation, which is also deeply rooted in **African cultural values**, such as those in Maasai culture.

### *2. Gender and Stewardship*

- **Nyambura J. Njoroge** (2009, Kenyan theologian): In Africa, women, like Maasai women, are key to protecting nature, reflecting the biblical call to nurture the earth."

- Njoroge points out how **women**, especially Maasai women, play a critical role in **protecting the environment**, which is aligned with the **biblical responsibility** to nurture creation.
- **Grace Ji-Sun Kim** (2012, Ecofeminist theologian): "Women's care for the earth reflects God's love, and their role in nature is part of biblical stewardship."
  - Kim connects **eco-feminism** with **biblical stewardship**, recognizing **women's role in creation care** as an expression of God's love and care for the world.

### *3. Cultural Perspectives on Creation Care*

- **Vusimuzi Madonsela** (2014, South African theologian): "God created the earth to be cared for by all people. In Maasailand, men and women share responsibility for creation care."
  - This quote acknowledges the **shared responsibility** of **men and women** in Maasailand for **creation care**, showing the **cultural practice of stewardship** in line with **biblical principles**.

## 4. Creation Care Resource Books and Quotes

The following are quotes on: **Core Principles of Creation Care**, **Environmental Stewardship as a Christian Duty**, and **Practical Implications and Theological Reflections**.

### 1. Core Principles of Creation Care

- **Moo, Douglas J., and Moo, Jonathan A.** (2018): “Creation care is not an optional add-on to the Christian life but is integral to the biblical mandate for humanity to steward the earth as God’s vice-regents.”
  - This emphasizes that **creation care** is a fundamental **biblical mandate**, central to the Christian faith.
- **Middleton, J. Richard** (2004): “The gospel encompasses not just the salvation of humanity but also the redemption of creation, making environmental stewardship an essential aspect of Christian witness.”
  - This highlights that **stewardship of creation** is tied to **salvation**, showing the **holistic** scope of the gospel.

### 2. Environmental caretaking as a Christian Duty

- **Bouma-Prediger, Steven** (2001): “The biblical vision of creation care calls Christians to a holistic approach where environmental stewardship is seen as a form of worship and obedience to God.”
  - **Environmental stewardship** is viewed as a **spiritual act**, a way to **worship and obey God**.
- **McCormick, Michael R.** (2009): “Understanding creation care from a Christian perspective involves recognizing that the natural world is a sacred trust from God, requiring us to manage it responsibly.”
  - **Creation care** is described as a **sacred responsibility** entrusted to humanity by God.
- **Stamps, Dennis L.** (2018): “Biblical stewardship is grounded in the understanding that God entrusts humanity with the responsibility to nurture and protect the environment as part of our divine mandate.”
  - This quote stresses that **biblical stewardship** is about **nurturing** and **protecting** the earth as part of God’s command.

- **Wirzba, Norman** (2013): “Biblical foundations for environmental ethics reveal that caring for the earth is not merely a practical concern but a spiritual duty reflecting our relationship with God as the Creator.”
  - **Caring for the earth** is framed as a **spiritual duty** that reflects humanity’s relationship with God as **Creator**.

### 3. Practical Implications and Theological Reflections

- **Robinson, Timothy S.** (2020): “Christians are called to be proactive in addressing environmental issues because caring for the earth is a reflection of our commitment to God’s creation and His commands.”
  - Christians are encouraged to be **active participants in environmental solutions**, demonstrating their **commitment to God’s creation**.
- **Wright, Christopher J. H.** (2020): “The church must embrace creation care as a central element of its mission, integrating environmental stewardship into its theology and practice.”
  - The church is called to make **creation care** a key part of its **mission**, incorporating it into both **theology and practice**.
- **Bauckham, Richard** (2022): “Creation care is deeply embedded in biblical theology, reflecting God’s concern for the entire created order and our role in maintaining its integrity.”
  - **Creation care** is deeply connected to **biblical theology**, emphasizing God’s **concern** for all of creation and humanity’s role in **maintaining its integrity**.
- **White, Lynn Jr.** (2012): “A biblical vision for environmental responsibility challenges Christians to reassess their relationship with nature and embrace a more ecologically aware lifestyle.”
  - A call to **reassess relationships with nature**, encouraging a **more ecologically conscious lifestyle** as part of **biblical responsibility**.



## 16. Resources for Lesson 2:

# Maasai Traditional Environmental Knowledge

### Resources Below

1. Information about the Maasai
2. Maasai Traditional Environmental Knowledge (TEK) are Good Ways to Take Care of Creation.
3. If more time, here are more teaching suggestions
4. Scientific Analysis of Maasai Traditional Environmental Knowledge (TEK)
5. Quotes from Resource Articles and Books
6. Sustainable Pastoralism

### 1. Information about the Maasai

- **The Maasai, a semi-nomadic pastoralist** community in East Africa, have developed a range of environmental practices that contribute to ecological balance and sustainability. The Maasai live in harmony with nature, caring for their cattle as a gift from the land.
  - In recent decades, the Maasai have faced significant challenges, including land pressure due to population growth, changes in land tenure systems, and climate change.
  - These challenges have sometimes strained their traditional practices.
- **Maasai traditional environmental knowledge (TEK):** The Maasai continue to adapt, blending their traditional knowledge with new strategies to sustain their way of life and care for the environment.
  - The Maasai traditional environmental knowledge (TEK) is a testament to their deep understanding of and respect for the natural world.
  - Rotational grazing, water conservation, and communal land management enable the Maasai to live sustainably in challenging environments.
  - As modern challenges arise, the Maasai continue to adapt their traditional practices, ensuring that their cultural heritage of environmental caretaker remains vital in the care of creation in Tanzania.
- **Community-Based Wildlife Conservation:** The Maasai have developed various community-based conservation initiatives that integrate wildlife protection with pastoralist practices. For instance, they participate in wildlife management programs and support conservation areas, recognizing the benefits of preserving wildlife for maintaining ecological health and promoting tourism.

## 2. Maasai Traditional Environmental Knowledge (TEK) are Good Ways to Take Care of Creation.

1. Traditional land use plan, e.g., zoning per season
2. Management of scarce resources
3. Shared use of nature and natural resources
4. Preserving trees for domestic and medicinal purposes
5. Prohibition of killing wild animals for cultural reason
6. Keeping domestic animals for food and worship purposes
7. Traditional rules, regulations, and taboos for environmental conservation
8. The responsibility of community leadership in environmental care

## 3. If more time, here are more teaching suggestions

- **Organize a debate** on topics like “The Role of Culture in Environmental Conservation.”
  - Use the Maasai example to highlight the value of cultural knowledge.
  - Pose a real-world problem, such as managing overgrazing or conserving water.
  - Challenge students to propose solutions using Maasai-inspired principles of caretaking and coexistence with nature.
- **Create a “Creation Care” Action Plan:**
  - **Activity:** After discussing Bible texts, have students create an “action plan” for how they, their school, or community can better care for the earth.
  - **Task:** The plan should be based on the biblical idea of stewardship, where they apply the principles of caring for the earth with reverence and responsibility.
  - **Outcome:** This encourages students to think practically about how they can implement biblical teachings in their daily lives.
- **Parent Engagement:** Have the students ask their parents three key questions:
  - What are the best ways to mitigate climate change?
  - What are the causes of climate change?
  - What are the best ways to reduce climate change?
- **Traditional practices:** Divide students into groups to discuss one of these traditional practices. Each group will explain the practice’s environmental benefits and how it reflects the principle of mutual dependence.
  - **Mutual Dependence:** Maasai life is centered around the interdependence of people and the environment.
  - **Pastoral Practices:** Traditional sustainable grazing methods that ensure ecosystems are preserved.
  - **Sacred Natural Sites:** Reverence for certain trees, rivers, and mountains that are vital to Maasai spirituality and physical well-being.
  - **Water Management:** Techniques for efficient use and conservation of water resources.
  - **Fire Management:** Controlled burning to prevent larger wildfires and encourage the regeneration of vital plant species for grazing.

## 4. Scientific Analysis of Maasai Traditional Environmental Knowledge (TEK)

Compiled by Beth Elness-Hanson

- **Sustainable pastoralism** (semi-nomadic pasturing of cattle)
  - "...pastoralism was...a highly productive system of land use that was more compatible with wildlife conservation than other rural production systems."<sup>1</sup>
  - "Once vilified as a destructive land use, since the late 1980s pastoralism has come to be understood as the livelihood system most compatible with wildlife. Unlike agriculturalists, who directly compete with wildlife habitat for productive land, pastoralists typically manage their rangelands in ways that support both wildlife and livestock."<sup>2</sup>
  - "Pastoralism is the dominant livestock production system in most of Africa. Pastoral practices are based on local endogenous knowledge of both the environment and the animal. It is based on the continued capacity to adapt to a harsh environment, characterized by the scarcity, dispersion and variability of natural resources over vast territories."<sup>3</sup>
  - Making strategic and sustainable use of land areas where, "Farming in the arid and semi-arid zones is socially unacceptable (low food security because of crop failure risks) and economically not feasible."<sup>4</sup> Arid lands "...are unsuitable for rainfed agriculture (the driest spot [in Monduli District] is Mfereji village in the rift valley with about 200 mm rainfall annually). Soils are generally shallow and not fertile."<sup>5</sup>
- **Protecting biodiversity**<sup>6</sup>
  - Not hunting wild animals or poaching, because they are not used as food sources.
  - Even lion hunting, a former prestigious act for a warrior, is no longer supported.
- **Protecting ecosystems**
  - "Manzano and others pointed to a growing body of scholarly research demonstrating what the Maasai had long known: that their management of the land did not degrade the Serengeti ecosystem but had actually helped sustain and even create it—the grasslands the Maasai had cultivated for hundreds of years were the same grasslands that many wild animals needed to thrive."<sup>7</sup>
  - Not cutting down wood, in general, no logging industry; no mangrove destruction. Rather scrounging for deadwood for fires.
  - Not burning for slash and burn agriculture. Perhaps limited burns for pest management.
  - Not making charcoal.
- **Preserving grasslands, which are "carbon sinks"** (meaning they have the ability to store large amounts of carbon). (Grasslands are also an ecosystem, but it has a special focus here in a Maasai context.)
  - Allowing grasslands to rest during the dry season by moving to high grounds (*osupuko*) and returning from high grounds (*osupuko*) to go to low grounds [*olpurkel*] when the rains return, which is a good way of managing grass, trees, and flowers (flora).
  - "Grasslands store approximately 34% of the global terrestrial stock of carbon according to the World Resources Institute. Unlike forests where vegetation is the primary source of carbon storage, most of the grassland carbon is stored in the soil."<sup>8</sup>
  - "Increased drought and wildfire risk make grasslands more reliable carbon sinks than trees... Trees are still critical. The study does not suggest that grasslands should replace forests on the landscape or diminish the many other benefits of trees."<sup>9</sup>
- **Environmentally sustainable livelihoods**
  - Pastoralist Maasai are not engaged in heavy industries that produce global-warming gases, such as agro-business, manufacturing, mining, and the like. However, cows do produce some methane, CH<sub>4</sub>.

- Pastoralist Maasai do not use artificial fertilizers that causes water pollution through phosphate and nitrate runoff.
- Pastoralist Maasai do not use herbicides and pesticides that are applied in industrial agro-business.
- Pastoralist Maasai do not practice blast fishing.
- Pastoralist Maasai do not engage in mining industries which often result in arsenic, lead, and other contaminants in the groundwater.
- Pastoralist Maasai do not engage in shipping that produces black carbon pollution, hydrocarbon oil spills from shipping refuse at the ports, as well as disposing excess nutrients from wastewater into the oceans.
- Pastoralist Maasai do not significantly contribute to the environmental challenges of urban cities.

### Bibliography:

- <sup>1</sup> Benjamin Gardner, *Selling the Serengeti: The Cultural Politics of Safari Tourism* (Athens, London: University of Georgia Press, 2016), 6. Footnote Ellis and Swift 1998; Coppock, Ellis, and Swift 1986; Warren 1995.
- <sup>2</sup> Gardner, 24.
- <sup>3</sup> Gaafar Rizgallah. “AU Guidelines to secure Pastoralism [sec] and prevent conflict in Africa”. African Union, 26 Sept 2022. <https://au.int/en/pressreleases/20220926/au-guidelines-secure-pastoralism-and-prevent-conflict-africa>
- <sup>4</sup> J. Douwe Meindertsma and Jan J. Kessler, eds., Meindertsma, J. Douwe, and Jan J. Kessler, eds. *Planning for a Better Environment in Monduli District*. (Netherlands Economic Institute, 1997) 46.
- <sup>5</sup> Meindertsma, 10–11.
- <sup>6</sup> Philip Isdor Mpango, ed., “National Environmental Master Plan for Strategic Interventions (2022 – 2032)” (United Republic of Tanzania Vice President’s Office, June 2022), 61, [https://www.vpo.go.tz/uploads/files/MASTER%20PLAN-English\\_eBOOK\\_FINAL.pdf](https://www.vpo.go.tz/uploads/files/MASTER%20PLAN-English_eBOOK_FINAL.pdf). Now this chart from page 62, representing left to right, 1975, 1995, and 2015. After the Serengeti, which has the strictest prohibitions of no hunting or human activity, then the most “high” and “medium” biodiversity quality habitat is in Maasailand, especially Ngorongoro—where the Maasai are being restricted (no cultivation) and forcefully displaced from. Note, there is little (or undiscernible) change since 1995 from these images. Furthermore, the Loliondo area is where hunting safaris are increasingly located, which impacts the natural ecosystems of biodiversity. Note, p. 61, “...most fires are caused by human activities particularly farm preparation. Driving forces include game hunting, honey collection, charcoal burning, and burning to simultaneously improve pasture quality...”
- <sup>7</sup> Stephanie McCrummen. ““This Will Finish Us:” How Gulf Princes, the Safari Industry, and Conservation Groups Are Displacing the Maasai from the Last of Their Serengeti Homeland.” (*The Atlantic*, 8 April 2024) 24.
- <sup>8</sup> Gord Vaadeland, “Grasslands, Forests & Wetlands - Nature’s Carbon Capture & Storage Solution,” *CPAWS*, 22 March 2016, <https://cpaws.org/grasslands-forests-wetlands-natures-carbon-capture-storage-solution/>.
- <sup>9</sup> Katherine E. Kerlin, “Grasslands More Reliable Carbon Sink Than Trees,” *University of California–Davis*, 9 July 2018, <https://climatechange.ucdavis.edu/climate/news/grasslands-more-reliable-carbon-sink-than-trees>.

## 5. Quotes from Resource Articles and Books

### 1. Creation Care & Environmental Stewardship

- **Hayhoe, Katharine** (Climate Scientist and Evangelical Christian) “Caring for the earth is an expression of our love for God and for our neighbors and should be an essential part of the Christian mission in the world.”
- **Maathai, Wangari** (Kenyan Environmentalist and Nobel Laureate) *The Challenge for Africa* (2009) “Indigenous knowledge and traditions can teach us valuable lessons in environmental stewardship and how to live in harmony with the land, honoring both creation and the Creator.”

### 2. Ecotheology & Spirituality

- **Njoroge, Nyambura J.** (African Theologian) “For African communities, creation care is not only an ecological practice but a spiritual one, deeply rooted in our cultural beliefs about the sacredness of the earth and its connection to the divine.”

### 3. Gender & Environmental Justice

- **Wright, Beverly.** (Women’s Environmental Advocate) “Women’s roles in environmental conservation are not just about resource management, but also about preserving the sacred relationships between community, land, and God.”

### 4. Maasai Ecological Practices & Sustainability

- **Bertram, Chris, and Chantal Vivier.** *Pastoralism and Development in Africa: Dynamic Change at the Margins*. Routledge, 2018. “Understanding Maasai environmental practices reveals the intricate connection between pastoral lifestyles and sustainable land management, highlighting how traditional knowledge can contribute to modern environmental solutions.”
- **Homewood, Katherine.** *Ecology of Pastoralism: The Maasai of East Africa*. Routledge, 2019. “The Maasai’s ecological practices, grounded in traditional knowledge, reflect a sophisticated understanding of environmental balance and sustainability, essential for the long-term health of their landscapes.”
- **Nugent, Paul.** *Smelling the Roses: Land Use and Livelihoods among the Maasai*. Oxford University Press, 2009. “The Maasai’s land management strategies, including their rotational grazing systems, are not merely traditional practices but reflect a deep-seated ecological wisdom that ensures resource sustainability.”

### 5. Traditional Knowledge and Environmental Stewardship

- **Maathai, Wangari.** *The Challenge for Africa*. Pantheon Books, 2009. “Indigenous practices, such as those of the Maasai, offer invaluable lessons in environmental stewardship, illustrating how traditional knowledge can inform and enhance modern conservation efforts.”
- **Spear, Thomas.** *The Maasai of Matapato: A Study of Rituals of Rebellion*. University of Chicago Press, 1981. “Maasai rituals and cultural practices are intertwined with environmental stewardship, demonstrating how cultural norms can shape and sustain ecological practices.”

## 6. Sustainable Pastoralism

### *Pastoralism Making variability work*

Source: Food and Agriculture Organization of the United Nations (FAO). 2021. Pastoralism – Making variability work. FAO Animal Production and Health Paper No. 185. Rome. <https://doi.org/10.4060/cb5855en>; Creative Commons Attribution-NonCommercial ShareAlike 3.0 IGO licence. Page numbers listed refer to the document's pages.

#### **A specialization in taking advantage of variability**

##### *Working with the natural environment*

Pastoralism “refers to a wide family of livestock-based, livelihood and food production systems that are highly diverse but that all share a specialization in improving animals’ diets (and welfare) by managing their grazing itineraries at a variety of scales in time and space. Better nourished animals are healthier and more productive. Adding value by managing grazing itineraries requires adaptation to levels of variability that are characteristic of natural environments, especially the ways in which temporal and spatial variability in the distribution of moisture combines with the diversity of plant species and differences in soil and terrain morphology to result in sequences of short-lived concentrations of potential inputs. The place and time of such concentrations cannot be predicted from one year to the next, but the concentrations can be used by pastoralists who are able to arrive at the right place at the right time, and by animals that are able to benefit from the opportunities created by their herders. For this reason, pastoralism is also described as a specialization in taking advantage of variability (p. 3).

“Pastoralism is based on close interactions among animals, humans and their environment. In this document, this characteristic is referred to as working with the natural environment, not simply extracting fodder or water but actually increasing resources for livestock, and doing so in ways that make the circular interaction with the ecosystem a constitutive part of the pastoral system itself (p. 5).

“Pastoralists pay great attention to their animals’ behaviour and skills, trying to influence and improve them and secure their continuity in

the breeding population. Production systems centred on proved knowledge and integrated landscape management offer great latitude for creating ‘health’ for soil, plants, wild and domestic animals, people and the climate (p. 5).

“Pastoralism takes advantage of the variability in potential inputs – which are maximized and turned into actual inputs – by matching it with the variability (or “flexibility” or “optionality”) in its own operational processes. Mobility and flexible land tenure systems are the most obvious examples of variability embedded in the operational processes of pastoralism (p. 6).

“Pastoralism’s specialist approach makes it not only a sustainable livestock system, but also a vantage point from which to obtain a particularly clear and open view of the much-needed reconsideration of agriculture and food systems in relation to resilience and climate change. Around the world, pastoral systems have effectively managed to produce food with the natural environment rather than in antagonism with it. This alone deserves attention and the mobilization of efforts to better understand, secure and promote the specialization of pastoralism” (p. 8).

#### **Pastoralism provides a host of benefits**

##### *Climate Change*

“Pastoralism has the potential to contribute to both adaptation to and mitigation of climate change. Pastoralism requires little fossil energy and is solar powered, as animals walk to their naturally grown feed instead of having it cultivated and transported to them” (p. 12).

## 17. Resources for Lesson 3:

# Climate Science for a Pastoralist Maasai Context

### Resources below:

1. Maasai: Helpful information for teachers about the Maasai culture
2. Climate Change Mitigation and Adaptation
3. Climate Change Mitigation and Adaptation in a Pastoralist Maasai Context (table)
4. Maasai Context: Mitigation (prevention) and Adaptation (risk reduction): “Smile” Pits, Fuel-efficient stoves, Water Catchment or Reservoir
5. Teaching Notes on Hope: Wangarĩ Maathai and Jane Goodall
6. Global Warming Temperature Increase (image)
7. Sources of Greenhouse Gases (image)
8. Global-warming Gases Percent Effect on Climate Change (table)
9. Increase of Carbon Dioxide in the Atmosphere (CO<sub>2</sub>) (image)
10. Methane Facts (CH<sub>4</sub>)
11. If more time, here are more teaching suggestions
12. Additional Resources: Books and Articles

### 1. Maasai: Helpful information for teachers about the Maasai culture

- When the rains come, the Maasai move their herds to new pastures, allowing the land to recover and grow fresh grass. This rotational grazing ensures that the land remains fertile and productive. The Maasai have inherited this practice from their ancestors, who understood that balance and respect for the land were key to their survival.
- In the dry season, when the earth cracks under the relentless sun, the Maasai must travel long distances to find water sources for their herds. The Maasai know where to find hidden springs and seasonal rivers, passed down through generations of knowledge. Water is not just a resource; it is a lifeline, a critical element that shapes their movements and daily routines.
- The Maasai community, known for their rich cultural heritage and traditional pastoralist lifestyle, has long depended on the natural environment for their livelihood. However, in recent years, the effects of climate change such as unpredictable rainfall, prolonged droughts, and diminishing grazing lands have posed significant challenges to their way of life. Therefore, integrating climate science into the Maasai context is crucial for understanding these changes and developing strategies to adapt and thrive in a changing environment.
- By blending modern climate science with the Maasai’s traditional ecological knowledge, we can create a holistic approach that respects cultural practices while promoting sustainable solutions. This integration not only empowers the Maasai to protect their environment and sustain their livelihoods but also enriches their understanding of the world around them, fostering resilience in the face of climate challenges.



## 2. Climate Change Mitigation and Adaptation

### *Mitigation: Focuses on reducing global-warming (greenhouse) gases*

- Mitigation centers on the root cause of climate change: the heat-trapping greenhouse gases humans are adding to the atmosphere faster than our planet can absorb them. These can be addressed by reducing the sources of greenhouse gas emissions, or enhancing “sinks” of greenhouse gases that remove them from the atmosphere.
- **Reducing sources:** Almost three-quarters of humans’ greenhouse gas emissions come from burning fossil fuels like coal, oil and natural gas,<sup>2</sup> so mitigation often focuses on replacing those fuels with other sources of energy, like renewables and nuclear power. Mitigation can also tackle other sources of greenhouse gases: protecting forests from being cut down, for instance, or collecting methane from landfills.
- **Enhancing sinks:** Other forms of mitigation, like growing new forests and designing and building “direct air capture” systems, work by taking greenhouse gases out of the atmosphere—sometimes called “carbon removal.” These approaches are challenging to do at a very large scale, and they do not eliminate the need to drastically lower our emissions. Still, authorities like the Intergovernmental Panel on Climate Change agree that some carbon removal will be needed to head off the worst climate change scenarios.<sup>3</sup>

### *Adaptation: Focuses on reducing the risk of negative impacts from climate change*

- If mitigation is successful worldwide, then one day greenhouse gases will stop building up in the atmosphere, and the planet will slowly stop warming. Even so, we will already have created a hotter world, changed the Earth’s weather patterns, and “locked in” some future changes—like sea level rise, which may continue for hundreds of years after the Earth’s temperature stabilizes.
- Adaptation to these changes will vary from place to place. Often, it involves building or retrofitting infrastructure, like a better storm drain system to manage increased flooding. But adaptation can also include natural solutions, like restoring wetlands to buffer hurricanes, or behavior and policy changes, like growing new food crops that can better handle warmer seasons and droughts.
- Ideally, adaptation is proactive, building systems to withstand not only current but future climate change. In Bangladesh, one of the most vulnerable countries in the world to sea level rise and saltwater intrusion, the port city of Mongla is investing in embankments, drainage, flood-control gates and water treatment to get ahead of rising waters, and economic development to provide refuge and work opportunities for thousands of people displaced from nearby towns. Areas that don’t take early steps like these will find themselves adapting reactively: rebuilding after climate change has already destroyed buildings, forced people from their homes, and taken livelihoods and lives.

Source: <https://climate.mit.edu/explainers/mitigation-and-adaptation>; Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International license (CC BY-NC-SA 4.0)

### 3. Climate Change Mitigation and Adaptation in a Pastoralist Maasai Context

Mitigation	Adaptation	Kupunguza	Kukabiliana
<p><b>1. Plant trees which absorb CO<sub>2</sub></b> (especially trees that are native to the area).</p> <p><b>2. Energy efficiency (reducing carbon)</b></p> <p>a) Use more efficient wood burning cooking stoves to reduce burning of wood (which puts global-warming gases into the environment).<sup>1</sup> [See Resources Chap. 17 for an example stove.]</p> <p>b) Increase the use of renewable energy such as solar power.</p> <p>c) Use energy efficient LED lights or compact fluorescent lights (CFLs) instead of old incandescent light bulbs.</p> <p>d) Turn off electrical lights when not being used.</p> <p><b>3. Reduce the use of plastic bottles and recycle the bottles that are used.</b></p>	<p><b>5. Water</b></p> <p>h) Develop water harvesting and storage mechanisms.<sup>3</sup></p> <p>i) In acute water scarcity, temporarily migrate to areas where water is accessible.</p> <p>j) Develop water catchment areas (reservoirs) boreholes, piped water, and dams.<sup>4</sup> [See Resources Chap. 17.]</p> <p><b>6. Food security</b></p> <p>k) Put in place food security enhancement strategies (food reserve).<sup>5</sup></p> <p>l) The households' ability to purchase food is the most important food security strategy.<sup>6</sup></p> <p>m) A reliable income source and asset base is crucial for household response to climate shocks.<sup>7</sup></p> <p>n) 58% reported that they resort to selling livestock... in response to shocks.<sup>8</sup></p> <p><b>7. Infrastructure resilience</b></p> <p>o) More secure house and facility locations</p> <p>p) Preventive and precautionary measures (evacuation plans, health issues, etc.)</p> <p><b>8. Ecosystem and landscapes</b></p> <p>q) Landscape restoration (natural landscape) and reforestation</p> <p>r) Conservation of natural ecosystem (biodiversity and water)</p> <p><b>9. Traditional environmental knowledge</b></p> <p>s) Identify and sustain indigenous/traditional Maasai knowledge with practices that are good for caring for the environment; "...local knowledge systems and institutions should buttress policy-making and implementation to promote local resilience."<sup>9</sup></p> <p>t) "Gradual and medium to long-term livelihood diversification initiative is a highly recommended</p>	<p><b>1. Panda miti ambayo inachukua kaboni dioksidi, CO<sub>2</sub></b> (hasa miti ambayo ni ya asili ya eneo la hilo).</p> <p><b>2. Ufanisi wa nishati (kupunguza kiwango cha kaboni)</b></p> <p>a) Tumia majiko ya kuni yenye ufanisi zaidi ya kuni ili kupunguza uchomaji wa kuni (ambao huweka gesi zinazoozeka joto kwenye dunia kwenye mazingira).<sup>1</sup> [Tazama Nyenzo sura ya 17 kuhusu kuchoma biomasi chini na mfano wa jiko linalotumia mafuta kidogo.]</p> <p>b) Kuongeza matumizi ya nishati mbadala kama vile nishati ya jua.</p> <p>c) Tumia taa za LED zisizo na nishati au taa za fluorescent (CFL) badala ya balbu za zamani za incandescent.</p> <p>d) Zima taa za umeme wakati hautumiki.</p> <p><b>3. Punguza matumizi ya chupa za plastiki na urejeshe tena chupa zinazotumika.</b></p>	<p><b>5. Maji</b></p> <p>h) Tengeneza njia za kuvuna na kuhifadhi maji.</p> <p>i) Katika uhaba mkubwa wa maji, hamia kwa muda kwenye maeneo ambayo maji yanapatikana.</p> <p>j) Kuendeleza maeneo ya kukusanyia maji, visima, maji ya bomba, na mabwawa.<sup>4</sup> [Tazama picha hapa chini katika Nyenzo sura ya 17.]</p> <p><b>6. Usalama wa chakula</b></p> <p>k) Weka mikakati ya kuimarisha usalama wa chakula (hifadhi ya chakula).<sup>5</sup></p> <p>l) Uwezo wa kaya kununua chakula ndio mkakati muhimu zaidi wa usalama wa chakula.<sup>6</sup></p> <p>m) Chanzo cha mapato kinachotegemewa na msingi wa mali ni muhimu kwa mwikitio wa kaya dhidi ya majanga ya tabia nchi.<sup>7</sup></p> <p>n) Asilimia 58 ya kaya ziliripoti kuwa zimeamua kuuza mifugo...ili kudhibiti majanga ya tabia nchi.<sup>8</sup></p> <p><b>7. Ustahimilivu wa miundombinu</b></p> <p>o) Maeneo salama zaidi ya nyumba na kituo</p> <p>p) Hatua za kuzuia na za tahadhari (mipango ya uokoaji, masuala ya afya, n.k.)</p> <p><b>8. Mfumo wa ikolojia na mandhari</b></p> <p>q) Marejesho ya mazingira (mandhari ya asili) na upandaji miti upya</p> <p>r) Uhifadhi wa mfumo ikolojia asilia (bioanuwai na maji)</p> <p><b>9. Maarifa ya jadi ya mazingira</b></p> <p>s) Tambua na udumishe maarifa asilia/jadi ya Wamaasai na mazoea ambayo ni mazuri kwa kutunza mazingira; "...mfumo na taasisi za maarifa za wenyeji zinapaswa kuimarisha utungaji na utekelezaji wa sera ili kukuza ustahimilivu wa wenyeji."<sup>9</sup></p>

Mitigation	Adaptation	Kupunguza	Kukabiliana
<p>e) Because single-use plastic is produced from fossil fuels, obtaining and creating these plastics produces large amounts of global-warming gases.</p> <p>f) Burning plastics puts toxic chemicals into the air and land that is harmful to health.<sup>2</sup></p> <p><b>4. Use garbage collection instead of burning garbage.</b></p> <p>g) Burning garbage releases carbon into the air. (See note “f” on burning plastic.)</p>	<p>policy strategy to increase resilience among pastoral communities as opposed to the current policy which condemns pastoralism as a backward and environmentally destructive activity.”<sup>10</sup></p> <p><b>10) Agro-pastoralism/small-scale agriculture</b></p> <p>u) Use flexible and diverse cultivation</p> <p>v) Develop seed banking.<sup>11</sup></p> <p>w) Incorporate crops that are more drought resistant than maize, “such as sorghum, pigeon-pea, finger millet, sweet potato and chickpea...”<sup>12</sup></p> <p><b>11) Leadership and governance</b></p> <p>x) Include women in decision making that affects their and their children’s lives to reduce the vulnerability of the entire household</p> <p>y) Strengthen local traditional leaders as the elders are in charge of resource control and allocation especially during periods of intense scarcity<sup>13</sup> and provide infrastructural, social, legal, and financial support</p> <p>z) Strengthen the village council for how to seek government support...for infrastructural, social, legal, and financial support.<sup>14</sup></p>	<p>e) Kwa sababu plastiki ya matumizi moja huzalishwa kutoka kwa nishati ya mafuta (kama petroli), kupata na kuunda plastiki hizi hutoa kiasi kikubwa cha gesi za joto za dunia.</p> <p>f) Tumia ukusanyaji wa taka badala ya kuchoma takataka.<sup>2</sup></p> <p><b>4. Takataka zinazochomwa hutoa kaboni hewani.</b></p> <p>g) Kuchoma plastiki huweka kaboni dioksidi na kemikali za sumu katika hewa na ardhi ambayo ni hatari kwa afya ya binadamu na wanyama na mazingira. (Angalia maelezo “f.”)</p>	<p>t) “Mpango wa mseto wa maisha wa taratibu na wa kati hadi mrefu ni mkakati wa kisera unaopendekezwa ili kuongeza ustahimilivu miongoni mwa jamii za wafugaji kinyume na sera ya sasa inayolaani ufugaji kuwa ni shughuli ya kurudi nyuma na kuharibu mazingira.”<sup>10</sup></p> <p><b>10. Kilimo-ufugaji/kilimo kidogo</b></p> <p>u) Tumia njia rahisi na tofauti za kilimo.</p> <p>v) Kuendeleza utunzaji wa mbegu.<sup>11</sup></p> <p>w) Jumuisha mazao yanayostahimili ukame zaidi kuliko mahindi, “kama vile mtama, njegere, mtama, viazi vitamu na kunde.”<sup>12</sup></p> <p><b>11. Uongozi na utawala</b></p> <p>x) Wajumuishe wanawake katika kufanya maamuzi ambayo yanaathiri maisha yao na ya watoto wao ili kupunguza hatari ya kaya nzima.</p> <p>y) Waimarishe viongozi wa kimila kwani wazee ndio wanaosimamia uhibitaji na ugawaji wa rasilimali hasa nyakati za uhaba mkubwa,<sup>13</sup> na kutoa msaada wa miundombinu, kijamii, kisheria na kifedha.</p> <p>z) Iimarisha halmashauri ya kijiji jinsi ya kutafuta msaada wa serikali...kwa msaada wa miundombinu, kijamii, kisheria na kifedha.<sup>14</sup></p>

See p. 117–118 for a Kiswahili and Maa table.

### Table Bibliography

<sup>1</sup> Ndesanjo, Theilade, and Nielsen. “Water scarcity is a common determinant of migration among pastoral communities.” (Berkhout 2012; Brockhaus et al. 2013). 2602, [https://doi.org/10.1007/978-3-030-45106-6\\_128](https://doi.org/10.1007/978-3-030-45106-6_128).

<sup>2</sup> Verma et al., “Toxic Pollutants from Plastic Waste-A Review,” *Procedia Environmental Sciences*, Waste Management for Resource Utilisation, 35 (January 1, 2016): 701–8, <https://doi.org/10.1016/j.proenv.2016.07.069>.

<sup>3</sup> Ndesanjo, Theilade, and Nielsen, 2603.

<sup>4</sup> Mwandosya, “National Adaptation Programme of Action (NAPA),” 2007, ix, <https://unfccc.int/resource/docs/napa/tza01.pdf>.

<sup>5</sup> Ndesanjo, Theilade, and Nielsen, 2601.

<sup>6</sup> Ndesanjo, Theilade, and Nielsen, 2601.

<sup>7</sup> Ndesanjo, Theilade, and Nielsen, 2602.

<sup>8</sup> Ndesanjo, Theilade, and Nielsen, 2601.

<sup>9</sup> Mwandosya, ix.

<sup>10</sup> Ndesanjo, Theilade, and Nielsen, 2607.

<sup>11</sup> Ndesanjo, Theilade, and Nielsen, 2601.

<sup>12</sup> J. Douwe Meindersma and Jan J. Kessler, eds., 44. Meindersma, J. Douwe, and Jan J. Kessler, eds. Planning for a Better Environment in Monduli District. Netherlands Economic Institute, 1997.

<sup>13</sup> Ndesanjo, Theilade, and Nielsen, 2604.

<sup>14</sup> Ndesanjo, Theilade, and Nielsen, 2605.

#### 4. Maasai Context: Mitigation (prevention) and Adaptation (risk reduction)

##### “Smile” Pits (Mitigation)

Digging many small 2-meter wide half circles—“smile” pits—“regreens” the area with plants that take out CO<sub>2</sub> from the air (and also reduces soil erosion).

- One recent example from the Lead Foundation: The Regreening Arusha Program’s “goal is to reach more than 3,600 households in Monduli district and restore at least 86,400 trees and 440 hectares of rangeland. This is achieved by reversing the process of desertification and degradation of ecosystems through the techniques of Kisiki Hai and Rainwater Harvesting in order to improve livelihoods and climate change resilience.
- See the amazing pictures at the link provided to see the Regreening Arusha Program: <https://leadfoundation.org/service/regreening-arusha-program/>
- See a short documentary of this Lead Foundation project in Engaruka at the link provided: <https://www.youtube.com/watch?v=RPJ9T4yAEGs&t=4s> (7:08 minutes)

##### Fuel-efficient stoves for the Maasai (Mitigation)

In Ketumbeine, Maasai women in the Naapok Bead Project are trained to build fuel-efficient stoves. These fuel-efficient stoves:

- Reduce the burning of firewood by 60% (less work to collect and haul wood),
  - Reduce the smoke in the home by 90% (less respiratory diseases) and
  - Reduce the number of children burned by cooking fires.
- See also: <https://internationalcollaborative.org/news-resources/>



(Photos: Beth E. Elness-Hanson; with permission)

## Water Catchment or Reservoir (Adaptation)

This reservoir is in the Nanja area and was hand dug with the cooperation of 3 or 4 neighboring families who all share the water. The rain collects during the rainy season and fills the reservoir. The thorn fence keeps animals out, so it is cleaner water. The water sustains the community for most of the dry season. Then, they dig out the bottom, bringing the soil to the top of the sides of the reservoir to make it deeper. (Photo: Beth E. Elness-Hanson, with permission)



## 5. Teaching Notes on Hope: Wangari Maathai and Jane Goodall

### Jane Goodall

*Goodall began her career in 1960 in Gombe National Park, Tanzania.*

“Hope is what enables us to keep going in the face of adversity.”<sup>1</sup> “I truly believe, and I’m not alone as a scientist, that we have a window of time when if we get together and take action, we can at least slow down climate change and loss of biodiversity...I can’t save the world, but what can I do locally?...Whatever it is you care about, get together with some friends and take action. Do what you can do to solve what you are passionate about and you will find you make a difference.”<sup>2</sup>

<sup>1</sup> Goodall, Jane. *The Book of Hope: A Survival Guide for an Endangered Planet*. Viking, 2022.

<sup>2</sup> Goodall, Jane. “Reasons for Hope” About the Planet’s Future, Greater Boston, GBH News’. 29 September 2023. <https://www.youtube.com/watch?v=LXXb5MjPbPI>.

Photo: Nicolas Richoffer; [https://commons.wikimedia.org/wiki/File:Jane\\_Goodall\\_2010.jpg](https://commons.wikimedia.org/wiki/File:Jane_Goodall_2010.jpg);  
Creative Commons Attribution-Share Alike 4.0 International licens



## Prof. Wangari Maathai: Kenyan Woman Awarded Nobel Peace Prize (2004)

Wangari Muta Maathai (1940–2011) “was a Kenyan social, environmental, and political activist who founded the Green Belt Movement, an environmental non-governmental organization focused on the planting of trees, environmental conservation, and women's rights. In 2004 she became the first African woman to win the Nobel Peace Prize.”<sup>1</sup>

- “...for her contribution to sustainable development, democracy and peace.” Wangari Maathai was the first African woman to receive the Nobel Peace Prize. She was also the first female scholar from East and Central Africa to take a doctorate (in biology), and the first female professor ever in her home country of Kenya. Maathai played an active part in the struggle for democracy in Kenya, and belonged to the opposition to Daniel arap Moi’s regime.
- “In 1977 she started a grass-roots movement aimed at countering the deforestation that was threatening the means of subsistence of the agricultural population. The campaign encouraged women to plant trees in their local environments and to think ecologically. The so-called Green Belt Movement spread to other African countries, and contributed to the planting of over thirty million trees.
- Maathai's mobilisation of African women was not limited in its vision to work for sustainable development; she saw tree-planting in a broader perspective which included democracy, women's rights, and international solidarity. In the words of the Nobel Committee: “She thinks globally and acts locally.”<sup>2</sup>

**“The 30 million trees planted by Green Belt Movement volunteers—mostly rural women—throughout Kenya over the past 30 years are a testament to the individuals’ ability to change the course of environmental history.**

**“Working together, we have proven that sustainable development is possible; the reforestation of degraded land is possible; and the exemplary governance is possible when ordinary citizens are informed, sensitized, mobilized and involved in direct action for their environment.”<sup>2</sup>**



<sup>1</sup> Source: [https://en.wikipedia.org/wiki/Wangari\\_Maathai](https://en.wikipedia.org/wiki/Wangari_Maathai)

<sup>2</sup> Source: <https://www.nobelprize.org/prizes/peace/2004/maathai/facts/>

<sup>2</sup> Wangari Maathai. *The Green Belt Movement: Sharing the Approach and the Experience*. Revised edition. (Lantern Publishing & Media, 2003) xi.

See also: Maathai, Wangari. *Replenishing the Earth: Spiritual Values for Healing Ourselves and the World*. Random House, 2010.

Photo: Kingkongphoto & www.celebrity-photos.com; [https://commons.wikimedia.org/wiki/File:Wangari\\_Maathai\\_in\\_2001.jpg](https://commons.wikimedia.org/wiki/File:Wangari_Maathai_in_2001.jpg);

Creative Commons Attribution-Share Alike 2.0 Generic license.

## 6. Global Warming Temperature Increase

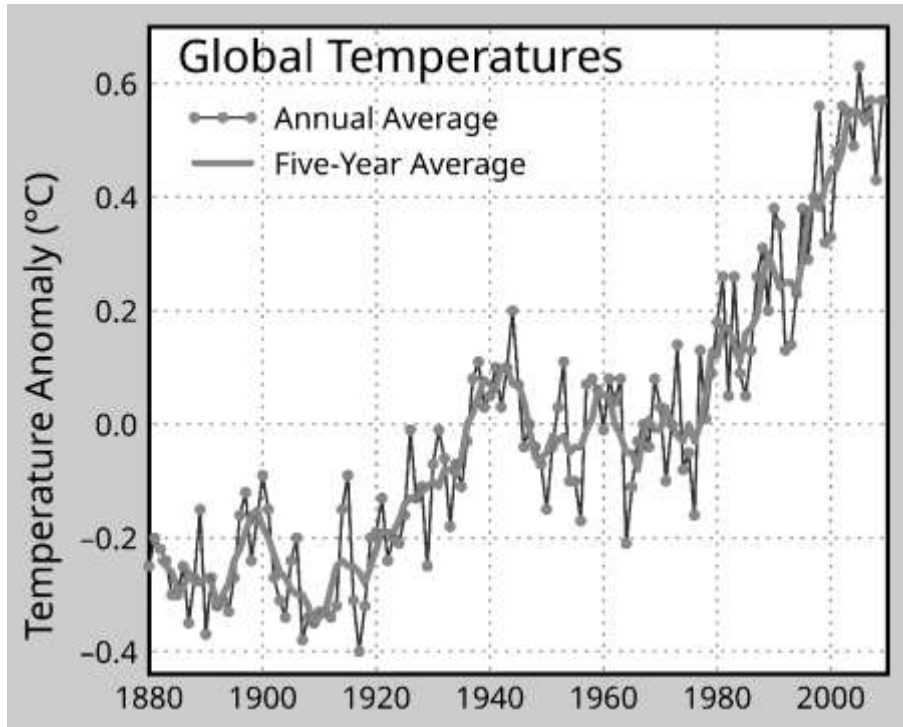
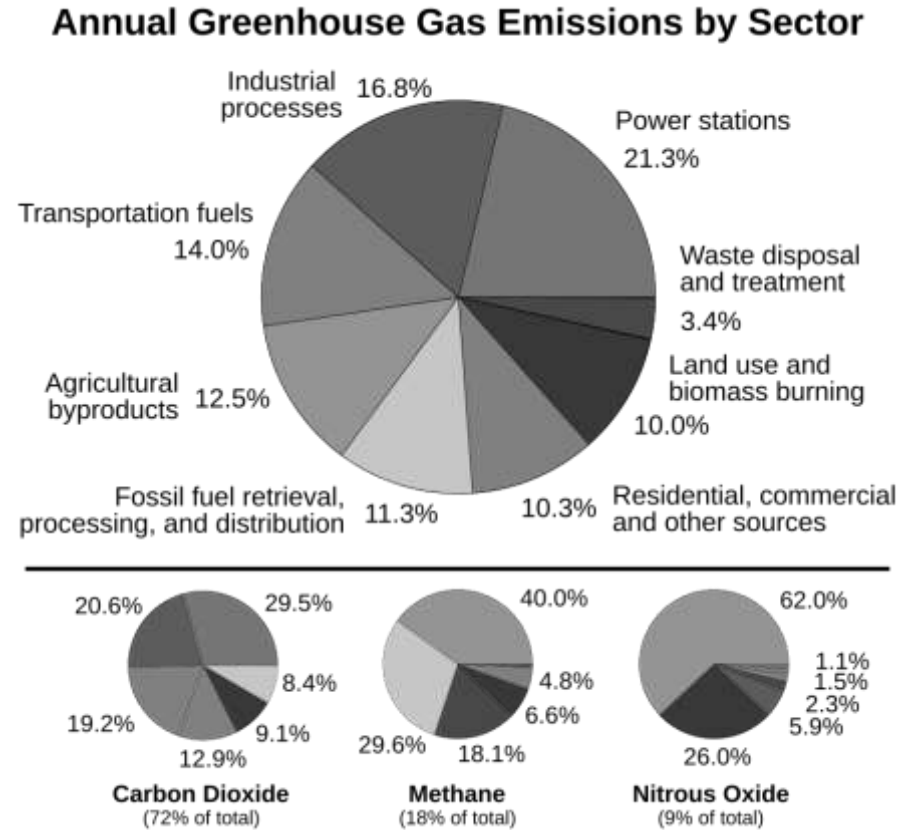


Image: Public Domain, Author, Schapel: Instrumental Temperature Record GISS.svg Instrumental Temperature Record GISS - File:Instrumental Temperature Record GISS.svg - [https://commons.wikimedia.org/wiki/File:Instrumental\\_Temperature\\_Record\\_GISS.svg](https://commons.wikimedia.org/wiki/File:Instrumental_Temperature_Record_GISS.svg)

## 7. Sources of Greenhouse Gases Image



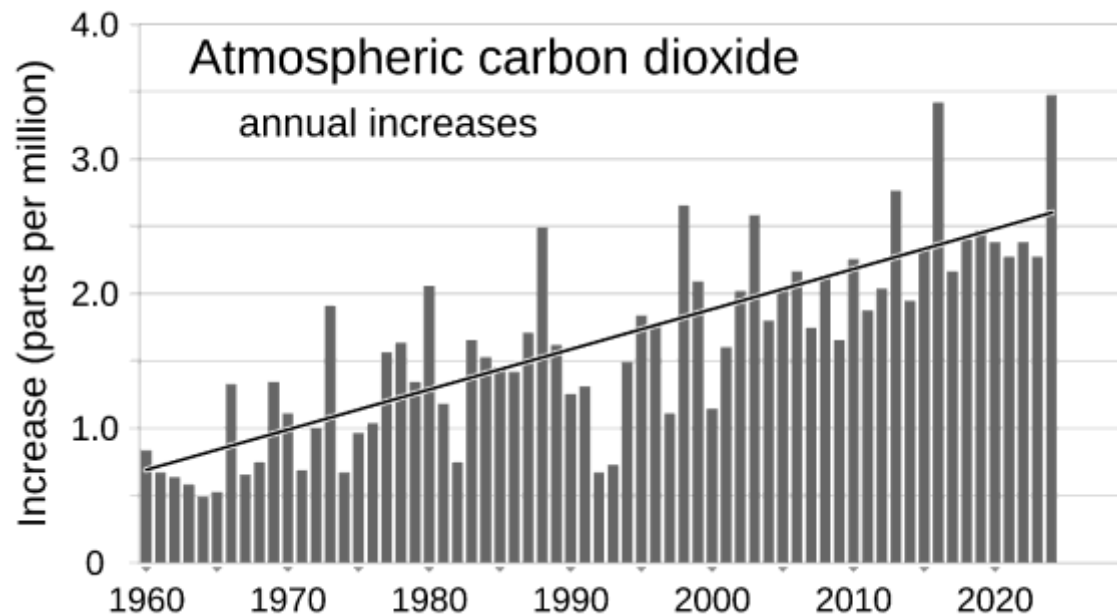
Source: [https://commons.wikimedia.org/wiki/File:Greenhouse\\_gases.svg](https://commons.wikimedia.org/wiki/File:Greenhouse_gases.svg)  
 Greenhouse Gas by Sector.png: Robert A. Rohde, Creative Commons Attribution-Share Alike 3.0 Unported license.

## 8. Global-warming Gases Percent Effect on Climate Change

Source: [https://commons.wikimedia.org/wiki/File:Greenhouse\\_Gases.jpg](https://commons.wikimedia.org/wiki/File:Greenhouse_Gases.jpg); Public Domain (modified, expanded info)

Effect on climate	Chemical formula	Name	Source
60%	CO <sub>2</sub>	carbon dioxide	burning fossil fuels (like coal and petrol in cars) deforestation, wildfires, burning wood
16%	HFCs	hydrofluorocarbons	refrigerants, aerosol propellants in medicinal applications, and degreasing solvents
15%	CH <sub>4</sub>	methane	wetlands, organic waste, livestock, modern agriculture, burning biomass
5%	N <sub>2</sub> O	nitrous oxide	fertilizers, fuels, medical uses, rocket propellants, and motorcar racing
2%	PFCs	perfluorocarbons	paint, textile and aluminum production
1%	SF <sub>6</sub>	sulphur hexaflouride	electrical industry, rubber production
1%	H <sub>2</sub> O	water vapor	irrigation, evaporation of rain, ice melting

## 9. Increase of Carbon Dioxide in the Atmosphere (CO<sub>2</sub>)



Source: RCraig09, Creative Commons Attribution-Share Alike 4.0 International license.

[https://commons.wikimedia.org/wiki/File:1960-\\_Annual\\_increases\\_in\\_atmospheric\\_carbon\\_dioxide.svg](https://commons.wikimedia.org/wiki/File:1960-_Annual_increases_in_atmospheric_carbon_dioxide.svg)

## 10. Methane Facts (CH<sub>4</sub>)

- Approximately 40% of methane gas emissions are from natural sources.
- The rest (60%) is produced by human activity, known as anthropogenic emissions.
- The largest human-caused source of methane is agriculture, which produces about one quarter of methane emissions.
- closely followed by the energy sector, which includes emissions from coal, oil, natural gas and biofuels.

(<https://www.iea.org/reports/global-methane-tracker-2022/methane-and-climate-change>)

## 11. If more time, here are more teaching suggestions

- **Adapt Teaching Materials to Different Maasai Regions:** While the core lesson is relevant across Maasai communities, consider adjusting examples or activities based on the specific challenges faced in different regions (e.g., water scarcity, soil degradation).
- **Local Experts:** Consider inviting local environmental experts or Maasai elders who practice sustainable land management to share their experiences and knowledge.
- **Study and teach others about the Maasai:** including traditional practices, beliefs, and their deep connection to the land. Understanding their cultural heritage helps appreciate their way of life.
- **Engage with Maasai community leaders and members** to hear their perspectives on climate change and environmental issues. Their traditional knowledge and experiences provide valuable insights into adapting to changes.
  - “How did our ancestors take care of the land and animals to ensure they stay healthy?”
  - “What natural signs do you look for to know when it’s time to move the cattle or plant crops?”
  - “How do you make sure that water sources and pastures are used wisely and not overused?”
  - “What lessons from the past can we use today to protect nature and our way of life?”
  - “How did the elders in our community teach you to care for the environment when you were young?”
  - “In your view, how has the climate changed over the years, and what did you do to adapt?”
- **Integration of Maasai Tradition and Modern Science:**  
Objective: Show how combining Maasai traditional knowledge with modern climate science can lead to effective climate action. Here are the instructions:
  - Discussion (5 minutes):
    - **Ask:** “How can we use our Maasai traditions alongside modern science to tackle climate change?”
    - Discuss how traditional Maasai practices, such as sustainable land and water management, align with modern scientific methods for mitigating and adapting to climate change.
  - Class Activity (5 minutes):
    - **Pair Work:** In pairs, students discuss how a traditional Maasai practice could be combined with a modern climate solution. For example, traditional water conservation methods could be paired with modern rainwater harvesting techniques, or traditional grazing methods could be adapted with modern sustainable farming practices.
    - **Class Sharing:** Invite students to share their ideas with the class.
- **Real-Life Examples:** Take students on a visit to a Maasai community or a local farm where they can see how people are adapting to climate change. This helps them learn directly from the community’s practices.
- **Talk to Elders:** Students can ask their grandparents (babu or koko) about how they adapt to changes in the weather and environment. These stories can be shared in class to learn from past generations. Here’s a question that students can ask their grandparents (babu or koko) about adapting to changes in the weather and environment:
  - “Babu/Koko, how did you and people in your time adjust to changes in the weather or environment? Have you noticed any differences in how the weather is now compared to when you were younger?”
  - This question encourages grandparents to reflect on their personal experiences and observe any environmental changes over time, helping bridge the generational gap and connect traditional knowledge with current environmental shift.

## 12. Additional Resources: Books and Articles

### *Combining Climate Science and Traditional Maasai Knowledge*

- **Brockington, Dan, and Jim Igoe.** *Pastoralism and Climate Change: Bridging Science and Indigenous Knowledge*. Routledge, 2017. Highlights how connecting science with Maasai traditions creates culturally relevant climate solutions.
- **Homewood, Katherine and Trench, Pauline.** *Climate Change and the Future of Pastoralism in Africa: A Maasai Case Study*. Routledge, 2022. Explores how blending climate science with Maasai traditional knowledge helps address climate change’s impacts on pastoralism.
- **Leach, Melissa, and Scoones, Ian.** *Sustainable Livelihoods and Climate Change: The Maasai and Beyond*. Routledge, 2021. Focuses on merging climate science with indigenous systems to build effective adaptation strategies.
- **Moss, Keith.** “Climate Change Adaptation Strategies Among the Maasai: Integrating Traditional Knowledge and Climate Science.” *Global Environmental Change*, vol. 40, 2022, pp. 100–112. Discusses how blending Maasai knowledge with climate science creates culturally suitable and effective adaptation strategies.
- **Ogutu, Joseph O., and Owen-Smith, Norman.** “Integrating Indigenous Knowledge and Climate Science for Pastoralist Adaptation: Lessons from the Maasai.” *Pastoralism: Research, Policy and Practice*, vol. 9, no. 1, 2018, pp. 23–37. Explores how integrating indigenous knowledge and science can strengthen resilience and adaptation.

### *Building Adaptation and Resilience*

- **Gibson, Craig C., and Stephen A. Marks.** *Integrating Climate Adaptation into Maasai Pastoralism: Policy and Practice*. Cambridge University Press, 2019. Examines how scientific and traditional insights can foster resilience against environmental challenges.
- **Homewood, Katherine.** “The Impact of Climate Change on Maasai Pastoralism: A Review of Current Knowledge and Future Directions.” *Environmental Science & Policy*, vol. 70, 2021, pp. 1–10. Reviews how combining science with Maasai practices aids in addressing climate variability impacts.
- **Ndegwa, Samwel.** “Climate Change and Pastoralism: Analyzing the Maasai Adaptation Strategies in the Context of Climate Science.” *African Journal of Environmental Science and Technology*, vol. 15, no. 2, 2018, pp. 91–105. Examines how Maasai strategies informed by both tradition and science showcase the potential for integrated climate management.
- **Nugent, Paul.** *The Climate Crisis and Pastoralism: Insights from the Maasai*. Oxford University Press, 2020. Discusses adaptive strategies that integrate scientific and ecological practices of the Maasai.

## Appendix A:

### Climate Change Vocabulary in English, Kiswahili, and Maa

Initial Maa translation by Mr. Lashumbai Kilolong, Dr. Neema Kitasho and Mr. Julius Laiser continued with the development of the concepts. Additional contributions by Dr. Daniel Kosia Mokoro and Mr. Joseph Kosia. This is a vocabulary in development.

English	Kiswahili	Maa
Maasai indigenous knowledge for the care and protection of creation	maarifa ya asili ya Wamaasai kwa ajili ya kujali na utunzaji wa uumbaji	eng'eno e tipat oo Irmaasai narripyeki inkitobirunot
traditional Maasai knowledge of care for the environment	maarifa ya kitamaduni ya Wamaasai kuhusu utunzaji wa mazingira	eng'eno/engarriyiano o orreje lo ilmaasai narripyeki enkop
adaptation	ustahimilivu	emokunotto/eng'iryata
average surface temperature	joto wastani la eneo	enkirowuaj te enkop
biodiversity	bioanuwai	iseuseu enkop
biofuel	nishati itokanayo na mabaki mimea	engima empuuti oo ingaitubulu
carbon dioxide	kaboni dioksidi	enkijape e kabon
carbon footprint	kanyagio za kaboni	iraruat e kabon
carbon neutral	uwiano wa kaboni	kabon nemeponari
caring for the environment	kutunza mazingira	erripoto/enking'urata enkop
clean energy	nishati safi	nishati sidai
climate	tabianchi	orreje le enkop
climate change	mabadiliko ya tabianchi	engibelekenyatta orreje le enkop
compost	mbolea	endulugumi
creation care	utunzaji wa uumbaji	enking'urata/erripoto o ingitobirat
deforestation	ukataji wa miti	endung'oto orkeek
drought	ukame	alamei
eco-friendly	rafiki wa ikolojia	naning'ore iltirenito

Creation Care in Maasailand

English	Kiswahili	Maa
ecosystem	mfumo wa kiikolojia	enchula oopookin toltiren
emissions	utoaji wa gesi hatari au gesi la joto duniani	emburuo torriono/engijape nainyalisho
energy-efficient	nishati fanisi	enishati/enkima nanarikino
environment	mazingira	enkop
environmental care	kutunza mazingira	enking'urata/erripoto enkop
exhaust fume	moshi wa magari	emburuo oo motokaani
extinction	kutoweka	engidaaya/enkiting'oto
extreme weather event	tukio kali la hali ya hewa	erishata sapuk enkiyape enkop
famine	njaa	esumash/alamei
flood	mafuriko	ingarriak sapukin naaruko
food waste	mabaki taka ya chakula	irmong'oitie loon'daikin
fossil fuels	mafuta ya visukuku	iila e tetrolu
global average temperature	wastani wa halijoto duniani	engirowaj rishati te enkop
global warming	ongezeko la joto duniani	emponata engirowaj te enkop
greenhouse effect or blanket effect	athari ya blanketi la joto angani	inaayau, orkila lenkirowaj toloing'ang'e
greenhouse gas (GHG) or global-warming gases	gesi zinazopasha joto dunia or gesi iongezayo joto la dunia ( <i>gesi ya chafu</i> is not preferred in this project)	irmuumwani ooirowaje enkop
habitat	makazi ya asili	manyisho e tipat
heat wave	wimbi la joto kali	engima nairowua naleng', ingatitin enkima sapuk
infectious diseases	magonjwa ya kuambukiza	imoyiaretin naahurtakinoi
mitigation	kupunguza/kudhibiti	engirishata
non-renewable energy	kawi isiyotumika tena nishati isiyojizalisha	enishati nemeponari
ozone	ozoni	erishata olaing'ang'e le ozon
petrol	petroli	petroli
pollutants	vichafuzi	olchafu /enkitarruoroto/altaka

Creation Care in Maasailand

English	Kiswahili	Maa
recycling	kuchakata	enkigilata oonkitobirunot
reforestation	upandaji miti	eunoto orkeek
refugee	mkimbizi	ilaisikak
renewable energy, energy from the sun and wind	nishati jadidifu, nishati kutoka kwa jua na upepo	enishati naponikino, enishati naing'waa engolong' o osiwuo
reservoir (of water)	hifadhi (ya maji) utunzaji wa maji	en'chumata o inkariak
sea-level rise	kupanda kwa kiwango cha maji baharini	edokunotto engare enaipasha
solar panels	seliumeme za jua	esolla
sunlight	mwanga wa jua	ewang'an engolong'
sustainability	endelevu	nemeiting'/enkata naado
temperature	halijoto	engirowaj
weather patterns	mabadiliko ya hali ya hewa	ingibelekenyat enkijape tolaing'ang'e
weather	hali ya hewa	enkijape
wind	upepo	osiwuo
wind turbine	vinu vya upepo	emashine osiwuo
world	dunia	enkop/olosho

## Appendix B:

### Website Resource: Visit MamaAny.com

<https://www.mamaanya.com/>

- The website also provides all the lessons for downloading without cost. Karibu!
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