

Climate Justice in Action: Managing Rangelands through Science and Traditional Knowledge for Environmental Conservation

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Table of Contents

Abstract.....	3
1.0 Introduction	3
2.0 Rangelands and Climate Justice: Opportunities and Challenges.....	4
3.0 Managing Rangelands through Science and Traditional Knowledge	6
4.0 Conclusion.....	8
References.....	9

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Kariuki Muigua*

Abstract

This paper critically discusses how rangelands can be effectively managed towards securing climate justice for people and planet. The paper defines rangelands. It observes that rangelands are vast and valuable ecosystems which provide numerous benefits for both people and planet. In particular, the paper notes that rangelands are important in global efforts to confront climate change and achieve climate justice. Despite their key role in the pursuit of climate justice, the paper notes that rangelands all over the world are facing mounting challenges leading to their decline and degradation. It notes that the degradation and decline of rangelands undermines effective climate action and fuels climate injustices. Consequently, the paper argues that managing rangelands is a key global agenda in the pursuit of climate justice. The paper discusses how rangelands can be managed through science and traditional knowledge for sound environmental conservation and climate justice.

1.0 Introduction

Climate justice is an important global ideal towards protecting people and planet from the adverse and mounting impacts of climate change. It has been observed that the world is witnessing a climate emergency¹. Human-induced climate change has led to widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere, leading to many weather and climate extremes in every region across the world². In addition, climate change is causing widespread adverse impacts and related losses and damages to both people and nature³. In particular, climate change is causing extreme weather and climatic events including droughts, water scarcity, severe wildfires, rising sea levels, extreme flooding, melting polar ice, catastrophic storms and declining biodiversity which are being witnessed all over the world⁴. It has been observed that these events are causing dangerous and widespread disruption, depletion and degradation of nature while also affecting the lives, health, livelihoods and well-being of billions of people all over the world⁵.

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¹ United Nations Environment Programme., 'Climate Action' Available at <https://www.unep.org/topics/climate-action> (Accessed on 14/04/2026)

² World Meteorological Organization., 'Climate Change' Available at <https://wmo.int/topics/climate-change> (Accessed on 14/04/2026)

³ Ibid

⁴ United Nations., 'What is Climate Change?' Available at <https://www.un.org/en/climatechange/what-is-climate-change> (Accessed on 14/04/2026)

⁵ Intergovernmental Panel on Climate Change., 'Climate change: a threat to human wellbeing and health of the planet. Taking action now can secure our future' Available at https://www.ipcc.ch/report/ar6/wg2/downloads/press/IPCC_AR6_WGII_PressRelease-English.pdf (Accessed on 14/04/2026)

Climate Justice in Action: Managing Rangelands through Science and Traditional Knowledge for Environmental Conservation

Climate change is therefore a major threat to the health and well-being of both people and planet. However, the impacts of climate change are not felt equally among individuals and regions. For example, it has been observed that the poor, marginalized and disadvantaged populations including indigenous peoples, local communities, women and girls and the youth are more vulnerable to the impacts of climate change⁶. Further, due to geographic and economic vulnerability, people and communities in the Global South are extremely vulnerable to climate change and its impacts⁷.

Climate justice is a concept that recognises the disproportionate impacts of climate change across individuals, communities and regions⁸. It has been observed that climate justice seeks to uphold equity, fairness, accountability and human rights in climate action by recognizing and addressing the disproportionate impacts of climate change on vulnerable individuals, communities and regions⁹. Climate justice advocates for fair, just, inclusive and equitable climate actions and solutions that prioritize the needs of those who are most affected by climate change¹⁰. Fostering climate justice is therefore important towards protecting people and planet in the midst of a worsening climate crisis.

This paper critically discusses how rangelands can be effectively managed towards securing climate justice for people and planet. The paper defines rangelands. It observes that rangelands are vast and valuable ecosystems which provide numerous benefits for both people and planet. In particular, the paper notes that rangelands are important in global efforts to confront climate change and achieve climate justice. Despite their key role in the pursuit of climate justice, the paper notes that rangelands all over the world are facing mounting challenges leading to their decline and degradation. It notes that the degradation and decline of rangelands undermines effective climate action and fuels climate injustices. Consequently, the paper argues that managing rangelands is a key global agenda in the pursuit of climate justice. The paper discusses how rangelands can be managed through science and traditional knowledge for sound environmental conservation and climate justice.

2.0 Rangelands and Climate Justice: Opportunities and Challenges

Rangelands have been described as vast, natural grasslands, shrublands, woodlands, wetlands, and deserts that support grazing and browsing mammals, domestic and/or wild¹¹. Rangelands have also been defined as extensive areas of land that are occupied by native plants, herbs or shrubby vegetation which are grazed

⁶ Climate Justice Global Alliance., Available at <https://sdgs.un.org/partnerships/climate-justice-global-alliance> (Accessed on 14/04/2026)

⁷ Giles. M., 'The Principles of Climate Justice at CoP27.' Available at <https://earth.org/principles-ofclimatejustice/#:~:text=That%20response%20should%20be%20based,the%20consequences%20of%20climate%20change> (Accessed on 14/04/2026)

⁸ Sultana. F., 'Critical Climate Justice.' Available at <https://www.farhanasultana.com/wp-content/uploads/Sultana-Critical-climate-justice.pdf> (Accessed on 14/04/2026)

⁹ World Economic Forum., 'What is Climate Justice?' Available at https://www.weforum.org/videos/climate-justice/?gad_source=1&gad_campaignid=22228224717&gbraid=0AAAAAVy5F63G-51xPZCfWH7BGSBXa909&gclid=Cj0KCOjwy_fOBhC6ARIsAHKFB7-f_LGoyvNwbnGjFgLrrT_dmP19I-82u3vFj4ys0nVW2O-l_rLH30AaAiFPEALw_wcB (Accessed on 14/04/2026)

¹⁰ Aliozi. Z., 'Climate Justice and Human Rights, in a World in Climate Emergency' Available at <https://repository.gchumanrights.org/server/api/core/bitstreams/2eba3de1-1427-481b-a2d6-07818e00a53b/content> (Accessed on 14/04/2026)

¹¹ What Exactly are Rangelands?., Available at <https://esa.org/rangeland/about/> (Accessed on 14/04/2026)

Climate Justice in Action: Managing Rangelands through Science and Traditional Knowledge for Environmental Conservation

by domestic or wild herbivores¹². Rangelands can therefore be described as ecosystems where livestock or wildlife graze¹³. It has been observed that rangelands are dominated by grasses, bushes or shrubs¹⁴.

Rangelands are some of the most valuable ecosystems on the planet. Rangelands are vast and diverse landscapes and ecosystems spanning grasslands, savannahs, deserts and shrublands which cover more than half of the Earth's land surface¹⁵. The United Nations Environment Programme (UNEP) estimates that nearly 54 per cent of the world's land surface consists of vast tracts of land covered by grass, shrubs or sparse, hardy vegetation¹⁶. Rangelands are located all over the world. For instance, it has been observed that these ecosystems cover much of Africa, most of the Middle East and the Mediterranean, Australia, large stretches of Central Asia, the Arctic region, western North America and much of southern South America¹⁷. Consequently, rangelands have been identified as massive planetary ecosystems with key benefits for both people and planet¹⁸.

It is estimated that rangelands support over 500 million people all over the world who rely on pastoralism, hunting and gathering and ranching for their livelihoods¹⁹. In particular, it has been observed that rangelands provide essential goods and services, including pasture, soil and water conservation, that support the livelihoods, resilience and cultural identity of millions of people especially pastoralist communities²⁰. In addition, rangelands have been identified as biodiversity hotspots²¹. It has been pointed out that rangelands support unique plants, large mammals and a significant portion of the world's agrobiodiversity²². Rangelands are critical in maintaining large open spaces critical for wildlife connectivity between different areas and ecosystems thus playing a key role in global biodiversity conservation efforts²³.

In addition, rangelands are crucial in strengthening the global response to climate change. It has been observed that rangelands store vast amounts of carbon thus playing an important role in climate mitigation efforts²⁴. It is estimated that rangelands capture and store nearly 30 percent of global carbon, primarily in soil, making them key carbon sinks and important global resources in the pursuit of climate justice²⁵. In

¹² Rangeland., Available at <https://www.britannica.com/science/rangeland> (Accessed on 14/04/2026)

¹³ What are Rangelands?., Available at <https://thinklandscape.globallandscapesforum.org/101185/what-are-rangelands-and-pastoralism/> (Accessed on 14/04/2026)

¹⁴ Ibid

¹⁵ Secretariat of the United Nations Convention to Combat Desertification., 'Rangelands and pastoralists' Available at <https://www.unccd.int/land-and-life/rangelands-and-pastoralists/overview> (Accessed on 14/04/2026)

¹⁶ United Nations Environment Programme., 'New atlas reveals rangelands cover half the world's land surface, yet often ignored despite threats' Available at <https://www.unep.org/news-and-stories/press-release/new-atlas-reveals-rangelands-cover-half-worlds-land-surface-yet> (Accessed on 14/04/2026)

¹⁷ Ibid

¹⁸ Ibid

¹⁹ Ibid

²⁰ Secretariat of the United Nations Convention to Combat Desertification., 'Rangelands and pastoralists' Op Cit

²¹ Ibid

²² Rangelands, Pastoralism and Biodiversity: Key messages and policy recommendations., Available at https://iyrp.info/sites/default/files/2025-06/pastoralism-document-2_2.pdf (Accessed on 14/04/2026)

²³ Ibid

²⁴ United Nations Environment Programme., 'New atlas reveals rangelands cover half the world's land surface, yet often ignored despite threats' Op Cit

²⁵ Banerjee. S., 'In a world searching for solutions to the interconnected climate, biodiversity and land degradation crises, rangelands and pastoralists are part of the answer: FAO animal production and health expert' Available at

Climate Justice in Action: Managing Rangelands through Science and Traditional Knowledge for Environmental Conservation

addition, rangelands play an important role in climate adaptation since they are located in some of the world's most extreme climates, experiencing both the hottest and coldest weather, including the savannahs of the Sahel or the grasslands of Scandinavia²⁶. Consequently, rangelands enable vulnerable communities to survive the adverse impacts of climate change by supporting livelihoods and ensuring food and water security²⁷.

Rangelands are therefore key ecosystems in the quest towards climate justice. By absorbing and storing vast amounts of carbon, rangelands protect people and planet from the adverse impacts of climate change²⁸. In addition, rangelands ensure the resilience of vulnerable groups including pastoralists, indigenous peoples and local communities in the face of climate change²⁹.

Despite their vital importance for people and planet, it has been observed that rangelands have been sidelined in climate action undermining the pursuit of climate justice³⁰. For instance, most climate plans focus on forests, with less importance given to rangelands, leaving these valuable ecosystems exposed to a wide range of threats³¹. Consequently, rangelands are exposed to numerous threats including unsustainable grazing patterns, invasive species, conversion to croplands, fires and poor management policies³². In addition, adverse climatic events including droughts and floods are causing rangelands to lose their productivity due to insufficient precipitation while also fuelling biodiversity loss in rangelands³³. The foregoing threats affect the livelihoods of vulnerable communities, undermine ecosystem services provided by rangelands including food and water security, and fuel global biodiversity loss in rangelands³⁴. Further, it has been observed that the degradation of rangelands releases carbon stored in these ecosystems, a situation that worsens the climate crisis³⁵.

In light of the foregoing, there is need to effectively manage rangelands in order to ensure sound environmental conservation towards climate justice.

3.0 Managing Rangelands through Science and Traditional Knowledge

Rangelands provide numerous benefits for people and planet in the pursuit of climate justice. These vast ecosystems support the livelihoods of millions of people all over the world including pastoralists, small-

<https://www.preventionweb.net/news/world-searching-solutions-interconnected-climate-biodiversity-and-land-degradation-crises> (Accessed on 14/04/2026)

²⁶ Ibid

²⁷ Ibid

²⁸ United Nations Environment Programme., 'New atlas reveals rangelands cover half the world's land surface, yet often ignored despite threats' Op Cit

²⁹ Secretariat of the United Nations Convention to Combat Desertification., 'Rangelands and pastoralists' Op Cit

³⁰ United Nations Environment Programme., 'New atlas reveals rangelands cover half the world's land surface, yet often ignored despite threats' Op Cit

³¹ Ibid

³² Ibid

³³ Banerjee. S., 'In a world searching for solutions to the interconnected climate, biodiversity and land degradation crises, rangelands and pastoralists are part of the answer: FAO animal production and health expert' Op Cit

³⁴ United Nations Environment Programme., 'New atlas reveals rangelands cover half the world's land surface, yet often ignored despite threats' Op Cit

³⁵ Ibid

Climate Justice in Action: Managing Rangelands through Science and Traditional Knowledge for Environmental Conservation

scale herders, ranchers and farmers³⁶. In addition, rangelands are the heart of biodiversity conservation supporting a rich variety of fauna and flora and supplying natural forage for animals that graze and browse³⁷. Further, rangelands are crucial in the global response towards climate change by capturing and storing nearly 30 percent of global carbon emissions³⁸. Healthy and productive rangelands are therefore important for people and planet. However, rangelands all over the world are facing mounting threats including overgrazing, conversion to crop lands, invasive species and climate change leading to their decline and degradation and undermining their value for people and planet³⁹.

Managing rangelands is therefore important for sound environmental conservation and climate justice. Rangeland management involves the sustainable use and governance of various types of rangelands including grasslands, drylands and shrublands for people and planet⁴⁰. It has been observed that effective rangeland management is key in maintaining vegetation, soil health, biodiversity, supporting livelihoods and bolstering climate action⁴¹.

In order to effectively manage rangelands, it is imperative to apply science. It has been observed that science is key in ensuring sound management of rangelands since it enables sound understanding of indicators and threats such as changes to total vegetation cover, changes in total vegetation diversity, presence of invasive species, changes in biodiversity including wild animals, insects, birds and native species, changes in seed stock in the soil, and loss of soil nutrient⁴². Science is therefore crucial in managing rangelands since it generates data and provides information on the status and threats to rangelands thus guiding conservation and protection efforts⁴³.

In addition to science, traditional knowledge provides valuable solutions towards sound management of rangelands. It has been pointed out that effective rangeland management involves combining traditional/local knowledge with modern scientific knowledge⁴⁴. For instance, it has been observed that communities including pastoralists are important stewards of rangelands who have for millennia been guided by traditional knowledge and have worked with nature to ensure food and water security, conserve biodiversity and preserve soil and vegetation in rangelands⁴⁵. Pastoralists and rangeland communities have

³⁶ Food and Agriculture Organization of the United Nations., 'Everything you ever wanted to know about rangelands and pastoralists' Available at <https://www.fao.org/newsroom/story/everything-you-ever-wanted-to-know-about-rangelands-and-pastoralists/en> (Accessed on 14/04/2026)

³⁷ Ibid

³⁸ Ibid

³⁹ United Nations Environment Programme., 'New atlas reveals rangelands cover half the world's land surface, yet often ignored despite threats' Op Cit

⁴⁰ International Union for Conservation of Nature., 'Sustainable Rangeland Management Toolkit for Resilient Pastoral Systems' Available at https://iucn.org/sites/default/files/2023-06/2_compressed.pdf (Accessed on 14/04/2026)

⁴¹ Ibid

⁴² International Union for Conservation of Nature., 'Sustainable Rangeland Management Toolkit for Resilient Pastoral Systems' Op Cit

⁴³ Food and Agriculture Organization of the United Nations., 'Sustainable Land Management in Rangeland and Grasslands' Available at <https://openknowledge.fao.org/server/api/core/bitstreams/bce0d9d7-75b0-4863-977b-98a05a61c740/content> (Accessed on 14/04/2026)

⁴⁴ Ibid

⁴⁵ Food and Agriculture Organization of the United Nations., 'Everything you ever wanted to know about rangelands and pastoralists' Op Cit

Climate Justice in Action: Managing Rangelands through Science and Traditional Knowledge for Environmental Conservation

a unique and deeply rooted relationship with rangelands utilising their knowledge systems for sound environmental conservation⁴⁶. For example, pastoralists and rangeland communities practice sustainable grazing, soil and water management and forage and resource conservation⁴⁷. Working with pastoralists and rangeland communities is therefore key towards harnessing traditional knowledge for environmental conservation⁴⁸.

4.0 Conclusion

There is need to effectively manage rangelands in order to foster climate justice. These ecosystems strengthen climate mitigation by absorbing and storing huge quantities of carbon while also fostering climate adaptation by enhancing the resilience of pastoralists and rangeland communities⁴⁹. Effective rangeland management involves applying science to enhance access to data and information on status and threats to rangelands⁵⁰; and harnessing traditional knowledge for sustainable, local, culturally-appropriate and context-specific conservation techniques⁵¹. Managing rangelands through science and traditional knowledge is a crucial and achievable global ideal towards sound environmental conservation and climate justice.

⁴⁶ Secretariat of the United Nations Convention to Combat Desertification., 'Rangelands and pastoralists' Op Cit

⁴⁷ International Union for Conservation of Nature., 'Sustainable Rangeland Management Toolkit for Resilient Pastoral Systems' Op Cit

⁴⁸ Ibid

⁴⁹ United Nations Environment Programme., 'New atlas reveals rangelands cover half the world's land surface, yet often ignored despite threats' Op Cit

⁵⁰ Food and Agriculture Organization of the United Nations., 'Sustainable Land Management in Rangeland and Grasslands' Op Cit

⁵¹ International Union for Conservation of Nature., 'Sustainable Rangeland Management Toolkit for Resilient Pastoral Systems' Op Cit

Climate Justice in Action: Managing Rangelands through Science and Traditional Knowledge for Environmental Conservation

References

Aliozi. Z., 'Climate Justice and Human Rights, in a World in Climate Emergency' Available at <https://repository.gchumanrights.org/server/api/core/bitstreams/2eba3de1-1427-481b-a2d6-07818e00a53b/content>

Banerjee. S., 'In a world searching for solutions to the interconnected climate, biodiversity and land degradation crises, rangelands and pastoralists are part of the answer: FAO animal production and health expert' Available at <https://www.preventionweb.net/news/world-searching-solutions-interconnected-climate-biodiversity-and-land-degradation-crisis>

Climate Justice Global Alliance., Available at <https://sdgs.un.org/partnerships/climate-justice-global-alliance>

Food and Agriculture Organization of the United Nations., 'Everything you ever wanted to know about rangelands and pastoralists' Available at <https://www.fao.org/newsroom/story/everything-you-ever-wanted-to-know-about-rangelands-and-pastoralists/en>

Food and Agriculture Organization of the United Nations., 'Sustainable Land Management in Rangeland and Grasslands' Available at <https://openknowledge.fao.org/server/api/core/bitstreams/bce0d9d7-75b0-4863-977b-98a05a61c740/content>

Giles. M., 'The Principles of Climate Justice at CoP27.' Available at <https://earth.org/principles-of-climate-justice/#:~:text=That%20response%20should%20be%20based,the%20consequences%20of%20climate%20change>

Intergovernmental Panel on Climate Change., 'Climate change: a threat to human wellbeing and health of the planet. Taking action now can secure our future' Available at https://www.ipcc.ch/report/ar6/wg2/downloads/press/IPCC_AR6_WGII_PressRelease-English.pdf

International Union for Conservation of Nature., 'Sustainable Rangeland Management Toolkit for Resilient Pastoral Systems' Available at https://iucn.org/sites/default/files/2023-06/2_compressed.pdf

Rangeland., Available at <https://www.britannica.com/science/rangeland>

Rangelands, Pastoralism and Biodiversity: Key messages and policy recommendations., Available at https://iyrp.info/sites/default/files/2025-06/pastoralism-document-2_2.pdf

Secretariat of the United Nations Convention to Combat Desertification., 'Rangelands and pastoralists' Available at <https://www.unccd.int/land-and-life/rangelands-and-pastoralists/overview>

Sultana. F., 'Critical Climate Justice.' Available at <https://www.farhanasultana.com/wp-content/uploads/Sultana-Critical-climate-justice.pdf>

United Nations Environment Programme., 'Climate Action' Available at <https://www.unep.org/topics/climate-action>

Climate Justice in Action: Managing Rangelands through Science and Traditional Knowledge for Environmental Conservation

United Nations Environment Programme., 'New atlas reveals rangelands cover half the world's land surface, yet often ignored despite threats' Available at <https://www.unep.org/news-and-stories/press-release/new-atlas-reveals-rangelands-cover-half-worlds-land-surface-yet>

United Nations., 'What is Climate Change?' Available at <https://www.un.org/en/climatechange/what-is-climate-change>

What are Rangelands?., Available at <https://thinklandscape.globallandscapesforum.org/101185/what-are-rangelands-and-pastoralism/>

What Exactly are Rangelands?., Available at <https://esa.org/rangeland/about/>

World Economic Forum., 'What is Climate Justice?' Available at https://www.weforum.org/videos/climate-justice/?gad_source=1&gad_campaignid=22228224717&gbraid=0AAAAoVy5F63G-51xPZCfWH7BGSBXa909&gclid=Cj0KCQjwy_fOBhC6ARIsAHKFB7-f_LGoyvNwbnGjFgLrrT_dmPI9I-82u3vFJ4ys0nW2O-I_lrLH30AaAifPEALw_wcB

World Meteorological Organization., 'Climate Change' Available at <https://wmo.int/topics/climate-change>