2025

The adaptive systemic approach: equitable co-design and partnerships for sustainable multi-use rangelands in Tanzania, Ethiopia, and South Africa

Palmer, CG

Publisher XII International Rangeland Congress

XII INTERNATIONAL RANGELAND CONGRESS
AUSTRALIA 2025

PROCEEDINGS

XII INTERNATIONAL RANGELAND CONGRESS

EDITORS

SARAH MCDONALD, RON HACKER, TONY PRESSLAND, JENNIFER SILCOCK, JODIE RESEIGH AND TERRY BEUTEL

2-6 JUNE 2025

ADELAIDE, SOUTH AUSTRALIA, AUSTRALIA

Cataloguing in publication
Proceedings of the XII International Rangeland Congress
Editors: Sarah McDonald, Ron Hacker, Tony Pressland,
Jennifer Silcock, Jodie Reseigh and Terry Beutel
on behalf of the 2025 XII International Rangeland Congress
Organizing Committee
ISBN 978-0-646-72121-7
First printed in 2025

Publisher XII International Rangeland Congress

XII INTERNATIONAL RANGELAND CONGRESS ORGANISING COMMITTEE MEMBERS

Congress Co-Chairs | Treasurer
Dr. Donald Burnside, DG Burnside and Associates, Perth, Western Australia, Australia
Dr. Cathleen Waters, GreenCollar, NSW, Australia

Scientific Program Committee Chairs
Dr. Alex Baumber, University of Technology,Sydney, New South Wales, Australia
Dr. Cecile Godde, The Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

Publication Committee Chair
Dr. Sarah McDonald, New South Wales Department of Primary Industries and Regional Development, Australia

Sponsorship Committee Chair
Dr. Andrew Ash, AJ Ash and Associates, Queensland, Australia

Tour Committee Chair
Dr. John Gavin, Remarkable NRM, Queensland, Australia

Logistics Committee Chair
Dr. Pieter Conradie, Department of Agriculture and Fisheries, Queensland, Australia

Delegate & Developing Country Support, International Liaison & Publicity Committee Chairs
Dr. David Phelps, Tropical North Queensland Drought Resilience Adoption and Innovation Hub, Australia
Dr. Nicole Spiegel, Department of Agriculture and Fisheries, Queensland, Australia

Indigenous Oversight Chair
Dr. Stephen van Leeuwen, Curtin University, Western Australia, Australia

Promotion, Publicity & Social Media Chair
Alison Nicholson, Department of Primary Industries and Regions South Australia, Australia

Other Committee Members
Dr Dana Kelly, University of Queensland, Queensland, Australia
Dr Saravan Peacock, Department for Environment and Water, South Australia, Australia
Patti Sbrissa, All Occasions Group, South Australia, Australia
Sophie Stefanoff, All Occasions Group, South Australia, Australia
Chelsea O'Brien, All Occasions Group, South Australia, Australia

The assistance of many colleagues not listed here is gratefully acknowledged.

IRC SPONSORS AND SUPPORTERS

Sponsors & Exhibitors

Platinum Sponsors

Government of South Australia – Department for Environment and Water

Government of South Australia – Pastoral Board

Forest Service – U.S. Department of Agriculture

The Jornada – http://jornada.nmsu.edu – Rangeland Research Programs

USDA Agricultural Research Service

Gold Sponsors

greencollar – valuing the environment

Landscape South Australia – SA Arid Lands

SA Drought Hub

TNQ Drought Hub

Northern Hub

SQNNSW Innovation Hub

Southern NSW Innovation Hub

ILRI – International Livestock Research Institute

CGIAR

STELARR

IUCN

gef – global environment facility

INRAE – la science pour la vie, l'humain, la terre

cirad

Global Agenda for Sustainable Livestock

Australian Government – Australian Centre for International Agricultural Research

Silver Sponsor

Government of South Australia – Department of Primary Industries and Regions

Bronze Sponsors

CSIRO

Landscape South Australia – Northern and Yorke

Supporters

Center for Collaborative Conservation

CRCNA

REGENCO – Value that grows

climate friendly

Exhibitors

Pigbaitta

IYRP 2026 – International Year of Rangelands and Pastoralists

IYRP 2026 – International Year of Rangelands and Pastoralists

CSIRO Publishing

CRCNA

mla – Meat & Livestock Australia

cibolabs

Bee Friendly Farming

IGC – International Grassland Congress – Leipzig, Germany 2027

tern – Ecosystem Research Infrastructure

SRM – Society for Range Management

Australian Rangeland Society

REVIEWERS

All papers underwent peer review by at least one reviewer and were edited prior to publication. We acknowledge the contribution of the following people for their assistance in reviewing full papers submitted to the congress.

Brianne Altmann
Karl Andersson
Andrew Ash
Mohamed Habibou Assouma
David Augustine
Warwick Badgery
Manjunatha B.L.
Derek Bailey
Jason Barnetson
Gary Bastin
Alex Baumber
Theresa Becchetti
Paul Beck
Brandon Bestelmeyer
Terry Beutel
Teshome Beza
Nagaratna Biradar
Mélanie Blanchard
Vincent Blanfort
Oscar Blumetto
Janis Boettinger
Steven Bray
Fiona Brayshaw
Joel Brown
Donald Burnside
Shane Campbell
Chris Chilcott
Pieter Conradie
Tim Cowan
Robyn Cowley
Gabriel Crowley
Greg Curran
Carlos G.H. Díaz-ambrona
Debbie Dowden
Danny Eastburn
Brandon Edwards
Marwan El Hassan
Jacqueline England
Jose (Jope) Facelli
Rod Fensham
Maria Fernandez-Gimenez
Andiswa Finca
Tamara Freitas-kirk
Margaret Friedel
John Gavin
Abule Gedda Ebro
Niilo Gobius
Ganzorig Gonchigsumlaa
Iain Gordon
F. Patrick Graz
Daryl Green
Juan Guerschman
Ron Hacker
Rachel Hay
Jacob Hennig
Madonna Hoffmann
Alexander Holm
Bernard Hubert
Lachlan Ingram
Ali Jahani
Sadeeka Jayasinghe
Peter Johnston
Srijana Joshi
Juergen Knauer
Apostolos Kyriazopoulos
Gabrielle Lebbink
John Leys
Ping Li
Nan Liu
Mounir Louhaichi
John Ludwig
Azizza Mala
Kieren McCosker
Sarah McDonald
Zsolt Molnar
Piet Monegi
Craig Morris
Said Moukrim
James Muir
Joseph Mureithi
Javier Naupari
Diep Nguyen Thi Hong
Maryam Niamir-fuller
Robyn Nicolay
Uffe Nielsen
Paul Novelly
Peter O'Reagain
Susan Orgill
David Orr
Carolyn Palmer
Beth Penrose
David Phelps
Wayne Pitchford
Jeremy Pittman
Tony Pressland
Hugh Pringle
Kate Reardon-Smith
Gordon Refshauge
Nick Reid
Matthew Rigge
Jodie Reseigh
Caroline Ruto
Manam Saaed
Nicole Sallur
Igshaan Samuels
Merilynn Schantz
Zhanhuan Shang
Abolfazl Sharifian Bahraman
Mark Silburn
Jennifer Silcock
Richard Silcock
Aaron Simmons
Awnindra Singh
Ashley Sparrow
Nicole Spiegel
Mariana Tadey
Michelle Tedder
Dean Thomas
Rebecca Trevithick
Samuel Tuffa
Wayne Vogler
John Walker
Dionne Walsh
Cathleen Waters
Ann Waters-Bayer
Ian Watson
Antony Whitbread
Wendy Williams
Megan Willis
Jessica Windh
Boyd Wright
Ben Wu
Jing Wu
Baisen Zhang

PREFACE

Rangelands cover over 56 percent of the world's land mass, and support directly about 500 million people. In Australia, they cover about 80 per cent of the land mass, and are important contributors to the nation's wealth, culture, natural resources and identity. It is fitting that the XII International Rangeland Congress was held in Adelaide, South Australia in June 2025, being the third IRC held in Australia, with preceding Congresses held in the USA (twice), France, India, South Africa, China, Argentina, Canada and Kenya.

Given the impact of Covid in preventing people from meeting in person in Nairobi, Kenya for the XI IRC, this Congress was the first opportunity for the international rangeland community to meet face-to-face since the X IRC, held in Saskatoon, Canada. The Organising Committee were delighted to welcome 772 delegates from 46 countries to Adelaide, who generated a robust international flavour in the presentations, discussions, tours and resolutions passed by the delegates.

Over the Congress, 292 papers were presented as keynote, full and lightning presentations. A further 192 posters were available for delegates to view. The papers are grouped into the seven sub-themes for the Congress: (1) Valuing rangelands and pastoral systems for their societal contribution; (2) Co-design, partnerships, and incorporating traditional knowledge for more enduring rangeland outcomes; (3) Technology, information systems, communication, and big data to aid monitoring and decision making; (4) Integrating rangeland ecology into management; (5) Managing risk – climate and other system shocks and trends; (6) Livestock production systems in a world of changing drivers; and (7) Multi-functional land use in rangelands – moving beyond niche opportunities.

These sub-themes and the collection of papers reflect the increasing inter-connectedness between what is happening in the rangelands and what is happening in the rest of the world's economies, social systems and governance. They also recognise the need to integrate trends in technology, artificial intelligence and communication into the day-to-day lives of rangeland decision makers and residents. Finally for too long the traditional indigenous knowledge of long-established rangeland cultures is receiving its rightful attention and recognition.

As well as the formal sessions of the Congress, pre-congress workshops dealing with traditional Indigenous knowledge, global rangeland standards in certification and monitoring, and the role of pastoral multifunctionality in contributing to growing societal challenges attracted approximately 150 participants. Over 200 delegates enjoyed celebrating 50 years of the Australian Rangeland Society. Over 60 delegates participated in pre-Congress Tours arriving in Adelaide from Perth, Alice Springs, Longreach and Sydney. Six mid-Congress tours learned about Indigenous culture, water management in the Murray-Darling Basin, research and development in dryland farming, the rangelands to the east of Adelaide, the scenic attractions in the Adelaide Hills, and the world-renowned wineries in the McLaren Vale.

The Chairs of the Organising Committee for the XII International Rangeland Congress from 2021 to 2025 acknowledge the tremendous contributions of Dr Sarah McDonald (Chair, Publications Sub-Committee) and her team of people who reviewed papers; and Dr Alex Baumber (Chair, Program Sub-Committee) and his team who sorted Abstracts and arranged the Program for the Congress. We offer our grateful thanks. We thank also Pieter Conradie, Chair, Australian Organising Committee, 2021-2022; Dr Nicole Spiegel and Dr Andrew Ash, Co-Chairs, Australian Organising Committee, 2022-2024 for their contributions over the last five years. We are also very grateful for the excellent support and advice provided by Ann-Marie Quinn and her team at All Occasions Group, especially Patti Sbrissa, Sophie Stefanoff and Chelsea O'Brien.

We commend the contents of these proceedings to all those interested in and committed to progressing the science and art of rangeland management across the many domains in the world. We look forward to continuing this important work at the XIII International Rangeland Congress in Ulan Baator, Mongolia in August 2029.

Dr Donald Burnside and Dr Cathleen Waters, Co-Chairs, XII international Rangeland Congress.

TABLE OF CONTENTS

PLENARY PAPERS

11

The adaptive systemic approach: equitable co-design and partnerships for sustainable multi-use rangelands in Tanzania, Ethiopia, and South Africa

Palmer, CG[1]; Senga, MA[2]; Woldu, Z[3]; Bantider, A[4]; Gusha, B[1]; Norbert, J[5]; Tanner, JL[1]

[1] Institute for Water Research, ARUA Water Centre of Excellence, Rhodes University, South Africa; [2]Department of Sociology and Anthropology, University of Dar es Salaam, Tanzania, ARUA Water CoE; [3]Department of Botany, Addis Ababa University, ARUA Water CoE; [4]Land and Water Resources Centre, Addis Ababa University, ARUA Water CoE; [5]Institute of Resource Assessment, University of Dar es Salaam, Tanzania, ARUA Water CoE.

Key words: complex social-ecological systems; rangeland co-operation; strategic adaptive management.

Abstract

Building effective equitable partnerships and implementing co-designed projects and/or interventions to sustain multi-use rangelands, takes time, sustained commitment, and resources. There are pitfalls. Teams in three African countries used the collaboratively developed Adaptive Systemic Approach (ASA) to navigate these processes. We present a summary of the ASA and findings from its application. Key ASA strengths included: partnership building; enabling co-design; and capacity building through transformative social learning (explicitly respecting and integrating different knowledge forms: academic, practice-based, indigenous). We identify pitfalls: inadequate capacity building across academic disciplines, patchy facilitation skills, process discontinuities (e.g. changing representative participants), inattention to language and translation, power imbalances, and experiences of disrespect. We present adaptations to mitigate pitfalls. In all three contexts we aimed to move towards increased capacity for participatory governance, and an increased likelihood of improved rangeland condition and sustainable livelihoods. 1) The Great Ruaha River catchment (Tanzania), exemplifies challenges related to unequal water resources sharing, and ongoing contestation among competing water users, including communal livestock farmers, crop farmers and other community members. ASA engagements included these marginalised groups, addressed longstanding power imbalances, and set the groundwork for future collaborations. 2) Current vegetation cover in the Upper Blue Nile River basin (Ethiopia) reflects a complex interplay of human activities including grazing, cultivation, and selective fodder cutting; interwoven with the influences of climate, soil, and geology. A long-term restoration initiative in the Aba Gerima and Debre Yaqob catchments focusses on managing vegetation cover and the balance of woody plants and grasses. Using the ASA, communities in the two catchments co-developed strategies for rangeland and livelihood sustainability. 3) In the Tsitsa River catchment (South Africa) the appointment of eco-rangers, and early steps towards agreements for rotational grazing of multi-owned herds, in the degraded free-range communal rangeland, emerged from participatory ASA processes.

Introduction

Across Africa, rangelands are used by people with livestock for cultural, economic and food production purposes (Homewood 2004). As competition for rangeland use increases, contestation emerges (Samuels et al. 2021). It takes time, sustained commitment, and resources to build effective equitable partnerships and implement co-designed projects and/or interventions that catalyse change towards social justice and ecological sustainability - social-ecological justice (Wolff et al. 2019). There are pitfalls. We consider contexts in three African countries, two where livestock grazing has impacted vegetation cover, rangeland health and livelihoods, and one where livestock owners are scapegoated for water scarcity problems. In each context we applied the Adaptive Systemic Approach (ASA)(Palmer et al. 2023, Palmer and Tanner 2024). We qualitatively evaluated the indicators: partnership building; enabling co-design; effective communication; and developing participatory governance capacity and capabilities through transformative social learning. We discuss the implications of practising the ASA in rangeland management and restoration.

Methods

The Adaptive Systemic Approach (Palmer et al. 2023) (Figure 1) emerged from the literature on Adaptive Management (Allen and Garmestani 2015), the emergence of Strategic Adaptive Management (SAM) (Rogers and Luton 2011), and practice in the Tsitsa River catchment (Cockburn et al, 2018) - that included participatory monitoring, evaluation, reflection, and learning (Rosenberg and Kotschy 2020).

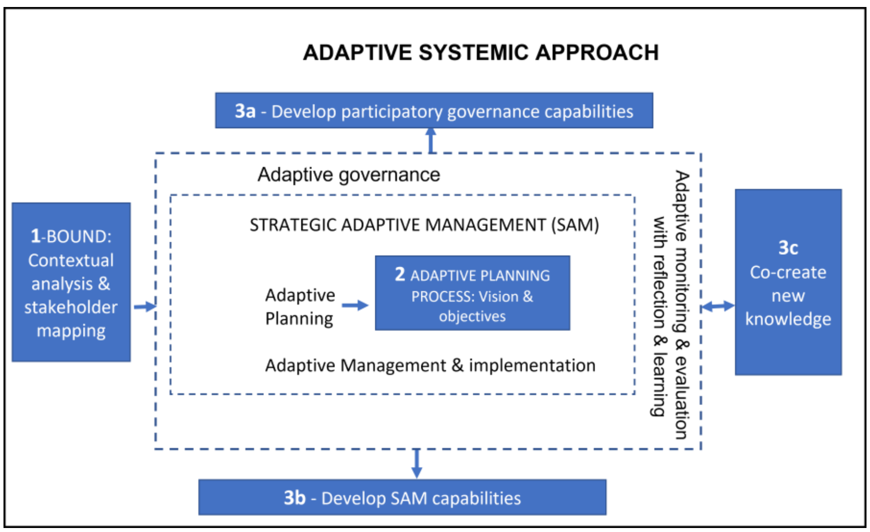

Figure 1. The Adaptive Systemic Approach (ASA) (1-3) begins with a contextual analysis termed “Bound” because systems have porous boundaries, influencing and being influenced by neighbouring systems. The Bound phase **(1)** includes early stakeholder mapping and engagement. Strategic Adaptive Management (SAM) was built on the tradition of adaptive management, with strategy conferred by an Adaptive Planning Process (APP) **(2)**. When the ASA was developed, SAM did not include governance, or monitoring and evaluation with reflection and learning. The first participatory ASA event is a facilitated SAM Adaptive Planning Process (APP) workshop **(2)**, where stakeholders experience participation, and begin a journey of participatory governance capability development **(3a)**. The APP gives rise to an objectives hierarchy – the blueprint for strategically and adaptively managing a system. SAM can be used to manage a problem being faced collectively by stakeholders, and also in the management of their home institutions. The ASA initiates the development of SAM capabilities **(3b)**. Concurrently, additional research into the collective problem may be undertaken, and in all participatory engagement stakeholders learn from each other (transformative social learning) – fostering the ongoing co-creation of new knowledge **(3c)**. Adaptive monitoring and evaluation, with reflection and learning is applied in each of the ASA activities, including facilitation planning and debriefing.

The full ASA was applied in Tanzania and Ethiopia. In South Africa, it was applied in the earlier Tsitsa River catchment forum (Cockburn et al. 2018). Detailed engagement data are curated at the Institute for Water Research, Rhodes University, South Africa. Here, we qualitatively assessed the key features of ASA practice claimed by Palmer et al. (2023): *Partnership building, Developing participatory governance capacity and capabilities, Transformative social learning and Enabling co-design;* in the three country-based case studies. Outcome achievement was judged as 1) minimal, 2) moderate, or 3) substantive.

Results

Tanzania: Ruaha River catchment in the Rufiji River basin

The Ruaha River catchment, Tanzania, is characterised by inequitable water sharing, and ongoing conflict among competing water users that include expanding towns, large- and small-scale farmers in the Usangu plains; pastoralists and fisherfolk in seasonal wetlands and in the Ihefu permanent swamps; and the wildlife ecosystems of the Ruaha National Park. The Ruaha River also sustains electricity production at the Mtera and Kidatu hydropower plants, with new hydropower development planned. Among these, small-holder irrigation and mobile pastoralists were blamed for reduced streamflow.

Partnership building, Developing participatory governance capacity and capabilities, and Transformative social learning were moderate among the wide spectrum of participating stakeholders. Analysis of participant reflections indicated intractable power differences despite evident co-learning and knowledge exchange among stakeholders. Continued application of the ASA would aim for slow trust-building, and data sharing to demonstrate the level of inequity, and the low level of threat from smaller resource users, in comparison to large-scale agriculture and hydropower. In the Ruaha, water-use conflict is more intense than rangeland-use conflict for livestock owners, and delinking grazing impact from water use would be helpful. *Enabling co-design* was minimal in the timeframe of the research engagement.

Ethiopia: Aba Gerima and Debre Yacob sub-catchments in the Upper Nile River basin

Landscape restoration activities, with restricted grazing and delivery of rangeland forage by "cut and carry" enabled livestock production and rangeland recovery (Feoli et al. 2002). Restoration practices were more rigorously maintained in Aba Gerima. The ASA Adaptive Planning Process workshop enabled the two catchment communities to meet, collaborate and learn from each other. They co-developed a vision and objectives that included a renewed commitment to cut and carry, to support livestock and rangeland improvement in both sub-catchments.

Partnership building, Developing participatory governance capacity and capabilities, Transformative social learning and Enabling co-design were all substantive at the scale of communities in the two sub-catchments interacting with each other and with researchers. These indicators were progressed in the preparation for, and facilitation of the Adaptive Planning Process workshop. Clear objectives for community livestock and landscape restoration and sustainable management were agreed. Progress in all these indicators was minimal at the scale of community-government engagement. The most immediate reason was the civil conflict in the region. However, researcher-government engagement was slow, and deepening research-government relationships, and extending these to include communities, would have required more extensive trust-building and communities travelling to the capital, Addis Ababa, for a "learning words" process prior to government engagement (Palmer et al. 2022, Palmer and Tanner 2024).

In engaged, transdisciplinary sustainability research, time frames are crucial (Palmer and Tanner 2024). Aba Gerima and Debre Yacob catchment had been the focus of Ethiopian research engagement over decades, and the success of landscape restoration was already evident (Feoli et al. 2002). The three-year ASA project came in as a facilitated intervention to encourage and renew sustainable pastoral grazing when cut and carry efforts had flagged in one of the catchments. It effectively catalysed renewed sustainability practice.

South Africa: Tsitsa River catchment in the Mzimvubu River basin

The Tsitsa River catchment is a strategic water resource in South Africa. However, historical land-use practice has resulted in extensive erosion and vegetation cover loss which threaten the effectiveness of any dam development (Powell et al. 2018). Water resource development needs motivated investment in landscape restoration. The seven-year Tsitsa Project (Cockburn et al. 2018) constellated many of the ASA elements and the Tsitsa River catchment was a learning catchment for the Tanzanian and Ethiopian cases.

Partnership building, Developing participatory governance capacity and capabilities (Palmer et al 2022), Transformative social learning (Weaver et al. 2023) and Enabling co-design (Fry et al 2024) were substantive. The research had time to facilitate the development of community livelihoods, with a focus establishing nurseries to grow the plants used in landscape restoration, and the employment of eco-rangers to control free-range livestock movement. This is an alternative to the "cut and carry" methods used in Ethiopia. The timeframe of the Tsitsa catchment intervention was not long enough to measure vegetation cover increases, so the appointment of the eco-rangers was the measurable impact on the rangeland of the engaged research.

Discussion

The ASA provides natural and social scientists with the conceptual and practice tools to effectively engage with natural resource users (like pastoralists) and managers, civil society, powerful private enterprise, and government agencies, with the purpose of moving rangelands towards social-ecological justice and sustainability. However, the reality of engaged transdisciplinary work is hard (Palmer and Tanner 2024). As we advocate for rangeland researchers, managers, and governments to use the ASA, we highlight one lesson from all our experience: the fundamental importance of epistemic justice – fairness in relation to knowing. The two core aspects of epistemic justice in transdisciplinary participatory engagements are, that all participants i) experience being equally and well respected, and ii) have sufficient understanding and vocabulary to both understand and contribute to participatory knowledge exchange. Engagement planning and facilitation style are key in achieving this. Early engagement in the Tsitsa River catchment revealed that while facilitation skills such as eliciting input from participants randomly (rather than preferencing those with higher perceived status or power) and writing participant input on sheets that everyone could see, in exactly the words used, resulted in experiences of being respected. It was harder to build equitable knowledge and vocabulary, and respect for a range of knowledge forms. Knowledge was unevenly held and respected. In the Ruaha and Tsitsa River catchments formally educated participants were impatient, and discounted the value of local knowledge, while local communities needed time, were sensitive to disrespect and could be easily silenced. It was hard to overcome entrenched gender and racial prejudice. The development of the Learning Words processes in the Tsitsa project (Palmer et al. 2022) was crucial: stakeholder participants who are residents in the landscape meet with researchers the day before a general stakeholder workshop. Their local knowledge is elicited, and they are exposed to how deep their knowledge is, and that other stakeholders know far less. They are encouraged to share their knowledge in the engagement to come. Researchers then introduce any specialist vocabulary likely to be used the following day. Very often residents understand the concept – but may have a different set of words – for example not all languages have a direct word for "catchment" or "landscape. Learning Words workshops need to be routinely incorporated into the ASA process. In all our case studies engagement with local communities was undertaken in their local language, with translation for participants who only spoke English. (A sound colonialism push-back.) Adaptation to the pitfalls of practising the ASA included working to expose both specialist natural and social scientists to foundational ASA concepts such as complex social-ecological systems, transdisciplinarity and transformative social learning. We exposed the depth of gap between the social and natural sciences and the need for work on conceptual similarities with different vocabulary, methodological differences, and engendering sufficient respect for researchers to take the time collaborate effectively. We exposed the need for training in epistemic justice-sensitive facilitation.

Inclusion of epistemic justice, the methods of Learning Words, and the wider framework of the ASA can contribute to several *IYRP themes*: The ASA provides a purposeful mechanism for *connectivity* and building social-ecological *resilience.* The ASA focuses on building a shared fair, sustainable future and supports *biodiversity* retention of the *ecosystem services* related to *soils, water and land-use*. Learning Words workshops forefront *indigenous and local knowledge,* and ASA facilitation methods enable fair inclusion of *women and youth*. It is vital to understand that sustainable rangeland restoration and management involves respectful engagement. Above all, to recognise that engagement processes take time, and that respect and trust building are the foundational levels of transformation.

Acknowledgements
We acknowledge UK Research and Innovation Grant/Award Numbers: ES/T003731/1, ES/T015330/1

References

Allen CR, Garmestani AS (2015) Adaptive management. In: Allen CR, Garmestani AS (Eds), Adaptive Management of Social-Ecological Systems. Berlin: Springer. Pages 1-10.

Cockburn J. (202) Knowledge integration in transdisciplinary sustainability science: Tools from applied critical realism. *Sustainable Development*, 1-17, https://doi:10.1002/sd.2279.

Feoli, E., Vuerich, L.G. and Woldu Z., 2002. Evaluation of environmental degradation in northern Ethiopia using GIS to integrate vegetation, erosion, and socio-economic factors. *Agriculture, Ecosystems & Environment*, *9*, 313-325.

Homewood K (2004) Policy, environment, development in African rangelands. *Environment Science Policy* 7, 125-143.

Palmer, C. G., Fry, A., et al. (2022). Engaging society and building participatory governance in a rural landscape restoration context. Anthropocene, 37 1100320.

Palmer C, Tanner J, et al. (2023) The Adaptive Systemic Approach: catalysing more just and sustainable outcomes from sustainability and natural resources development research. *River Research and Applications* 26, 1–15.

Palmer CG, Tanner J. (2024) What does practising the Adaptive Systemic Approach offer engaged sustainability science? *South African Journal of Science* 120, 9-10.

Powell M., Biggs HC and Braack M. (2018). Ntabelanga ecological infrastructure project. *A Better World*, 3, 83–87.

Rogers KH and Luton R. 2011. Strategic adaptive management as a framework for implementing integrated water resource management in South Africa: Report to the Water Research Commission, Pretoria.

Rosenberg, E. and Kotschy, K., 2020. Monitoring and evaluation in a changing world: A Southern African perspective on the skills needed for a new approach. *African Evaluation Journal* 8(1): 10.

Samuels I, Allsopp N, Hoffman, T M. (2021). Changes in pastoral mobility in a semi-arid montane region of South Africa: The role of policy and legislation. *African Journal of Range & Forage Science*, *38*, 1–13.

Wolff, M. G., Cockburn, J. J., et al. (2019). Exploring and expanding transdisciplinary research for sustainable and just natural resource management. *Ecology and Society*, 24(4).