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## EDITED BY

Gilles Colinet,  
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Xiaoming Wan,  
Chinese Academy of Sciences (CAS), China  
Tamer A. Elbana,  
National Research Centre, Egypt

## \*CORRESPONDENCE

Quentin Styc,  
✉ quentin.styc@sydney.edu.au

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# Aroura – the soil and soil security think tank

Quentin Styc<sup>1,2\*</sup>, Sandra J. Evangelista<sup>1,2</sup>, David Watt<sup>1,2</sup>, Penelope Wensley<sup>3,4,5,6</sup>, Irene Heuser<sup>6,7</sup>, Julio C. Pachón Maldonado<sup>1,2</sup>, Julia Feeth<sup>1,2</sup>, Nicolas Francos<sup>1,2</sup>, Anilkumar Hunakunti<sup>1,2</sup>, Thilini Jayasekara<sup>1,2</sup>, Pasquale Borrelli<sup>6,8,9</sup>, Damien Field<sup>1,6</sup>, Daniel Irving<sup>1,2</sup>, Budiman Minasny<sup>1,6</sup>, Fatima M. S. Moreira<sup>10</sup>, Cristine L. S. Morgan<sup>6,11,12</sup>, Wartini Ng<sup>1,2</sup>, Thomas O'Donoghue<sup>1,2</sup>, Mercedes Román Dobarco<sup>6,13</sup>, Amin Shariffar<sup>1,2</sup>, Mara Thiene<sup>6,14,15</sup>, Liesl Wiese<sup>6,16,17</sup>, Jae E. Yang<sup>6,18</sup> and Alex McBratney<sup>1,2,6</sup>

<sup>1</sup>School of Life and Environmental Sciences, The University of Sydney, Sydney, NSW, Australia, <sup>2</sup>Aroura, Soil Security Think Tank, Secretariat, The University of Sydney, Sydney, NSW, Australia, <sup>3</sup>Former National Soils Advocate of Australia, Canberra, ACT, Australia, <sup>4</sup>Global Soil Partnership, Rome, Italy, <sup>5</sup>CA4SH (Coalition of Action for Soil Health), Nairobi, Kenya, <sup>6</sup>Aroura, Soil Security Think Tank, Expert Panel, The University of Sydney, Sydney, NSW, Australia, <sup>7</sup>Specialist Group on Soil and Sustainable Agriculture Law of the World Commission on Environmental Law of IUCN (International Union for Conservation of Nature), Bonn, Germany, <sup>8</sup>Roma Tre's Environmental Modelling and Global Change Lab, Department of Science, University of Roma Tre, Rome, Italy, <sup>9</sup>Basel University, Basel, Switzerland, <sup>10</sup>Department of Soil Science, Universidade Federal de Lavras (UFLA), Lavras, Minas Gerais, Brazil, <sup>11</sup>Soil Health Institute, Morrisville, NC, United States, <sup>12</sup>Texas A&M University, College Station, TX, United States, <sup>13</sup>NEIKER-Basque Institute for Agricultural Research and Development, Basque Research and Technology Alliance (BRTA), Parque Científico y Tecnológico de Bizkaia, Derio, Spain, <sup>14</sup>Department of Land, Environment, Agriculture and Forestry (TESAF), University of Padova, Padua, Italy, <sup>15</sup>School of Economics, The University of Sydney, Sydney, NSW, Australia, <sup>16</sup>Agricultural Science and Policy, FARA, Soil Initiative for Africa, Cape Town, South Africa, <sup>17</sup>Soil Initiative for Africa, Cape Town, South Africa, <sup>18</sup>Kangwon National University, Kangwon, Republic of Korea

Soil, a fundamental resource for life on Earth, has faced increasing degradation, particularly over the past century, with its ability to support ecosystems and human wellbeing rapidly deteriorating. Despite its critical role, soil remains largely neglected in global policy agendas. In response to this urgent issue, Aroura, The Soil and Soil Security Think Tank was established to raise soil security to the forefront of global priorities. The Think Tank unites a wide range of experts from fields such as politics, law, economics, and soil science, working together to address the global need for sustainable soil management. Soil is deeply interconnected with all of Earth's life-supporting systems, playing a vital role in solving major global challenges, including biodiversity preservation, climate change mitigation, food and water security, and human wellbeing. Effective soil management can be both a challenge and a solution, depending on the approach taken. To guide effective soil management, Aroura promotes the Soil Security Assessment Framework, which includes not only the biophysical aspects of soil but also its socio-economic, cultural, and political dimensions. The Think Tank was launched in 2024, following the Inaugural Global Soil Security Summit in Sydney, Australia, attended by invited experts from six continents. The Summit participants created and signed the Soil Security Declaration and established a set of Soil Policy Principles to help shape global policies on soil. Aroura's objectives

are to: i. raise awareness of the importance of soil and the need to take urgent action to assure soil security, ii. foster cross-disciplinary collaboration and iii. advocate for evidence-based policies and laws to ensure sustainable soil management. By securing soil, Aroua aims to safeguard life itself, ensuring a resilient, thriving planet for both current and future generations.

#### KEYWORDS

soil security, environmental policy, cross-disciplinary collaboration, soil stewardship, policy guidelines

## 1 Introduction

Soil is the cornerstone of sustaining life on Earth. Securing the world's soils is integral to addressing the eight major global existential challenges we face today (food, water, soil and energy security, human health, climate change, the maintenance of ecosystem and environment, and biodiversity protection) are all intricately linked to the health and functionality of our soils (Box 1; Figure 1). Soil

#### Box 1 Definition of soil security

*The responsible management, preservation and restoration of soil to ensure its continued ability to perform vital functions, provide essential planetary services, and protect against emerging threats to support life on Earth.*

security refers to the responsible management, preservation and restoration of soil to guarantee its continued ability to perform vital functions, provide essential planetary services, and protect against emerging threats to support life on Earth (Box 1). With the exponential growth in global population and the ever-increasing demands on soil, safeguarding or restoring its security has become more critical. In our judgment, the threat to the world's soils is so severe that soil security should be acknowledged as an existential global challenge, on par with those of food, water, and energy security (McBratney et al., 2014).

In recognition of this, we initiated a series of Global Soil Security symposia to facilitate meaningful global discussions on the topic. These symposia were held in Texas (2015), Paris (2016), Sydney (2018), Seoul (2023), and Winnipeg (2025), bringing together experts from diverse fields to examine and discuss the pressing concerns surrounding soil security.

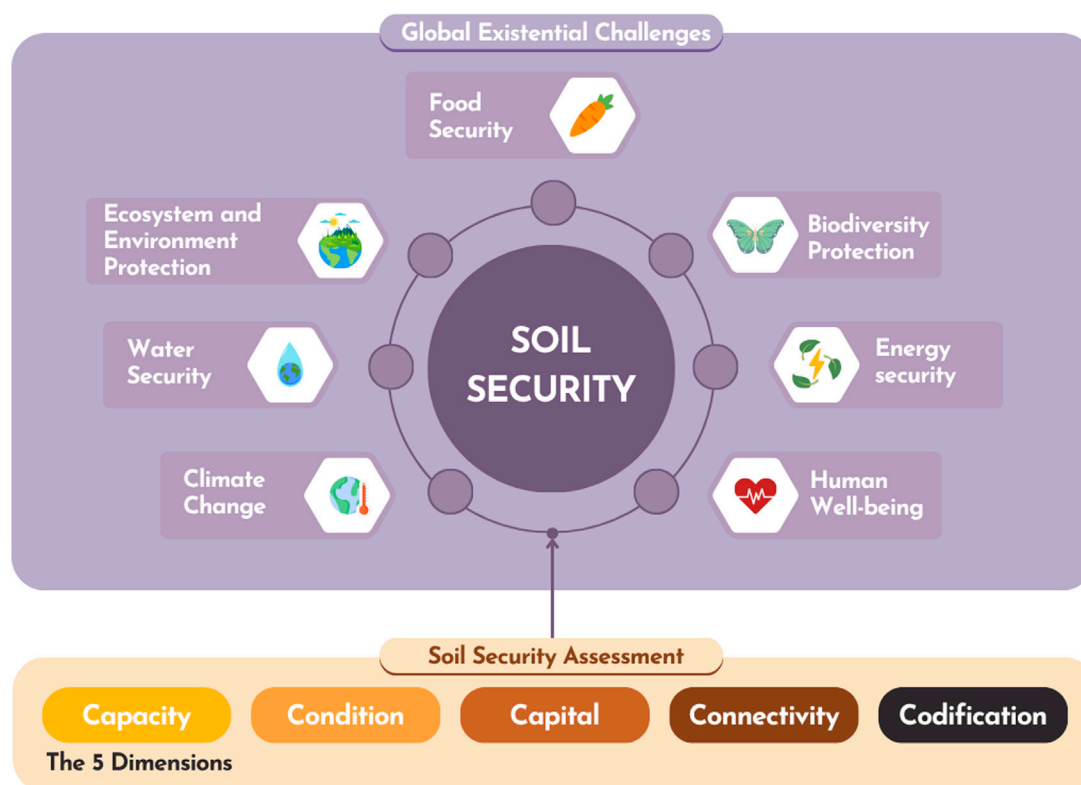


FIGURE 1

Soil Security is an existential challenge underlying all other global existential challenges. There are five dimensions to assess soil security: capacity, condition, capital, connectivity, and codification (adapted from Pozza and Field, 2020).

While the value and importance of soil is well understood within the scientific community, it struggles for attention in the political and legal arena (Koch et al., 2013). In recent decades, soil has gained attention with the 2015 United Nations International Decade of Soils and its integration to some degree in guidelines for greenhouse gas assessment in the Intergovernmental Panel on Climate Change (IPCC) reports. Improvements have also been made in the legal protection of soil at the national level, while voluntary cooperation mechanisms have been introduced at the international level, particularly in connection with the 2030 Agenda for Sustainable Development. Nevertheless, despite its vital importance, soil remains not sufficiently considered in environmental policy. The Rio Conventions (United Nations Framework Convention on Climate Change (UNFCCC), Convention on Biological Diversity (UNCBD), and Convention to Combat Desertification (UNCCD)) do not include sufficient legal elements to ensure the sustainable protection and management of soil, nor to safeguard it for future generations. Without effective soil governance, we will fail to secure the future of our soil. One of the central challenges is ensuring that soil and soil security are prioritised in political decisions regarding sustainable management practices. Current soil protection policies and, even more so, legislation are often weak, overlooking the full suite of soil functions, services, and threats, and often have a strong “silo-thematic” focus; therefore, failing to address the fundamental role of soil in supporting life. These policies and laws overlook soil’s multifunctionality, its heterogeneity, and its critical influence on global challenges. As a result, the current trajectory of soil-related governance is insufficient to meet the pressing existential challenges facing the planet.

In 2024, recognising the need for a more structured and independent approach to soil security, we established Aroua, the Soil and Soil Security Think Tank. Named after the Greek term for fertile land, Aroua is dedicated to advancing soil security through interdisciplinary collaboration (<https://arourasoil.com>). The Think Tank creates a space where scientists, policymakers, legal experts, economists, and educators can come together to address soil-related challenges and develop innovative, evidence-based solutions.

The Inaugural Global Soil Security Summit marked a significant milestone in launching the first Think Tank dedicated to soil, advancing global dialogue and action on soil security. By working to move soil security higher up the global policy agenda, Aroua aims to foster the development of actionable strategies that will protect this vital resource and ensure a resilient future for all.

## 2 Aroua—the soil and soil security think tank

Aroua was established to lead the subjects of soil and soil security up the global policy agenda. Although soil’s role in food security, climate change mitigation and biodiversity conservation is gradually gaining greater attention from policymakers, most notably in the multilateral forums dealing with these issues, soil is not itself a central focus. It remains on the periphery, viewed only through a narrow lens. A new approach is needed, one that brings soil awareness to a new level and makes securing soil a global priority.

Aroua follows a new paradigm that is both holistic and soil centric. This means recognising soil in its own right, not only as a resource for human use. By considering the multiple roles of soil, we can identify

where and what action is most urgent, while also ensuring completeness in addressing soil’s diverse functions. Protecting the soil from threats safeguards their functioning, and therefore, the soil services it provides. Put simply: threats to soil are threats to ourselves.

The Soil Security approach also integrates interdisciplinary tools in conjunction to the physical management of soil. Although based on soil science, we equally draw on knowledge from other disciplines to ensure lasting security. Soil security is not only about restoring soil condition but also protecting it against future threats. By incorporating perspectives not traditionally used in soil science, such as more socio-economical and governance focused sectors, we can expand the knowledge base and reshape how soil is understood and managed. This interdisciplinary approach is essential for securing soil not just now but also into the future.

In doing so, we build on the work of others who have pioneered the advocacy for soil, for example, the FAO’s Global Soil Partnership, with its fundamental focus on education, and the EU Mission for Soil, with its emphasis for soil condition/health. Aroua adds value by going further: providing a policy-oriented, globally coordinated framework that places soil security at the centre.

Our language aims to be accessible across disciplines, integrating terms and perspectives beyond soil science, especially those related to socio-economic and governance sectors. This inclusive vocabulary helps bridge gaps between science, policy and society.

What makes Aroua unique is its independence and global reach. Unlike initiatives tied to specific organisations or governments, Aroua draws on the expertise of a worldwide network of experts to provide evidence-based policy input.

Aroua was founded with the mission to leverage the value and importance of soil in the global policy agenda by placing soil security at the forefront of global discourse (Box 2).

### Box 2 Aroua’s Mission

*Addressing the critical gap made by the absence of soil on the global policy agenda by placing soil security at the forefront of global discourse.*

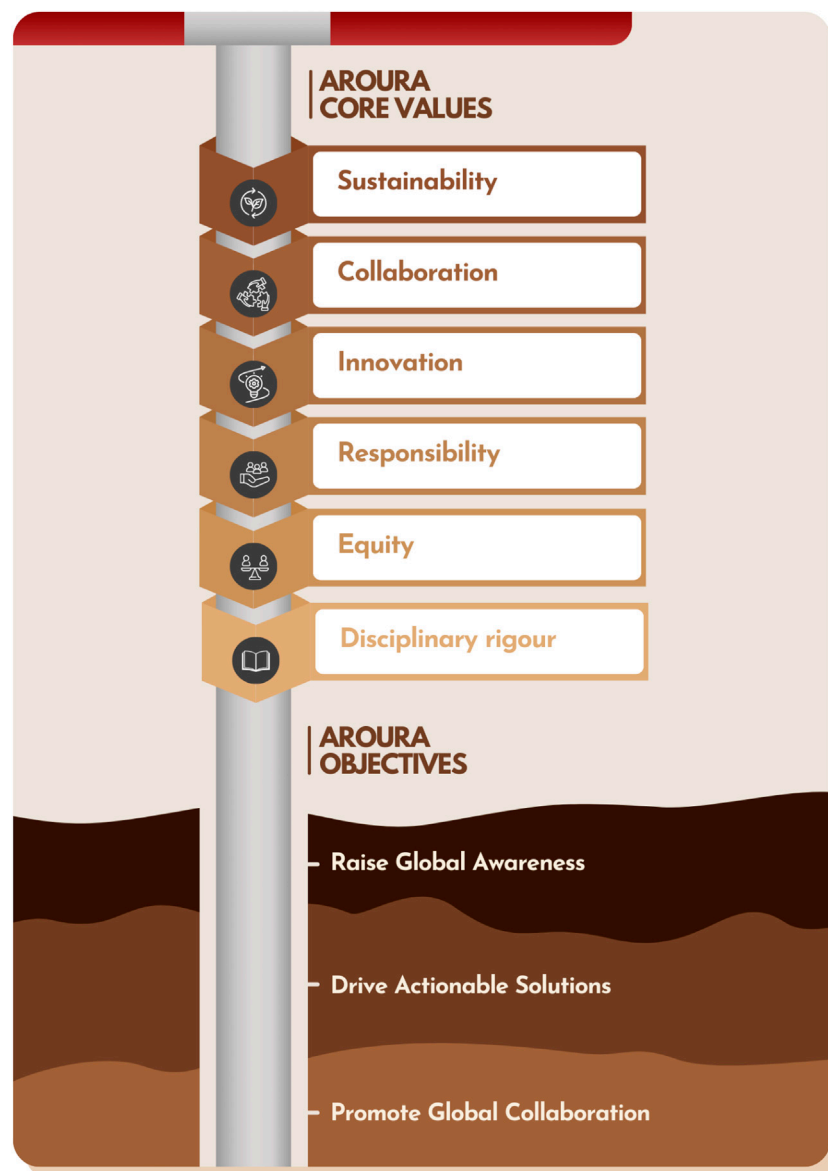
## 2.1 The core values of Aroua

Just as an auger allows soil scientists to dig deep and uncover what lies beneath the surface, Aroua’s core values and joint commitment provide the strength and direction to reach its objectives to secure soil. The Think Tank is dedicated to promoting soil-centric governance through awareness, action, and collaboration. Its goal is to ensure that soil security becomes a global priority and is integrated into policy, law, science, and sustainable and regenerative practices worldwide.

Aroua is guided by six fundamental values that shape its mission and inform its approach (top panel of Figure 2):

### 1. Sustainability

Soil security is the cornerstone of sustainable ecosystems, food security, and climate resilience. Aroua’s work aims to ensure



**FIGURE 2**  
Aroua core values, like an auger, drive through and reach the layered objectives.

that soil is preserved and restored for future generations by integrating long-term sustainability strategies into policy and legal frameworks and soil management practices.

## 2. Collaboration

Aroua will bring together scientists, policymakers, legislators, farmers, industries, and communities across the globe to co-develop solutions. By fostering inclusive, cross-sector engagement, the Think Tank aims to unite diverse stakeholders in the shared pursuit of soil protection.

## 3. Innovation

Addressing soil security demands innovative solutions. Aroua advocates for forward-thinking strategies in soil management, restoration, and policy and law reform. Whether through regenerative agriculture, advanced monitoring technologies, or governance changes, the

Think Tank champions cutting-edge approaches to safeguard soil.

## 4. Responsibility

Soil is a finite and irreplaceable resource. The decisions we make today will shape the world for future generations. Aroua advocates for policies that recognise soil's critical role in sustaining ecosystems and human wellbeing, ensuring that soil protection is treated as a collective global responsibility.

## 5. Equity

Soil security must be accessible and beneficial to all, especially to vulnerable communities that depend on soil for their livelihoods, food security, and resilience to climate change. Aroua strives to promote fair and just soil policies, and legal rights, especially for marginalised groups and indigenous

communities, to ensure equity, social justice, and sustainable development for all.

#### 6. Disciplinary rigour

The Think Tank upholds the highest standards of disciplinary rigour, including in all scientific research, socio-economic, and policy, legal and political endeavours. Through transparent methodologies, reproducible results, and evidence-based insights, it will ensure that its work advances soil security with credibility and impact.

By embedding these values into its mission, Aroura will drive global action to secure soil for a resilient and sustainable future.

## 2.2 The objectives of Aroura

The Think Tank pursues three core objectives to advance soil security on a global scale (bottom panel of [Figure 2](#)):

#### 1. Raising Global Awareness

Despite some recent progress, soil remains significantly underrepresented in global environmental and policy discussions. It is perceived through a limited lens predominantly as a medium for growing food, rather than recognised as a critical foundation for climate mitigation, biodiversity preservation, and for addressing other existential global challenges. To shift this narrative, Aroura is committed to:

- Bridging the knowledge gap by ensuring soil is recognised as a finite, life-supporting resource.
- Engaging the public, policymakers, legislators and industries to integrate soil into global sustainability efforts.
- Encouraging a fundamental shift in mindset, emphasising that soil is not just about fertility, but about sustaining long-term ecosystem functions and services as well as resilience.

By fostering stronger connections between people and soil, we aim to convert awareness into action, ensuring that soil security is given higher priority in decision-making processes worldwide.

#### 2. Driving Actionable Solutions

Raising awareness is only the beginning; Aroura is dedicated to translating knowledge into concrete actions ([Pachón Maldonado et al., 2024](#)). Soil security requires a comprehensive framework that not only identifies key issues but also provides clear solutions. Our approach includes:

- Supporting science-based policy development, guided by the soil policy principles (detailed further in [Section 4](#)), to ensure that soil governance is both effective and regionally tailored.
- Promoting sustainable soil management practices that incorporate regenerative agriculture, conservation techniques, and responsible land-use planning.

- Developing innovative and effective legal frameworks for securing soil and its functions and services.

Equipping policymakers with actionable tools that address soil's biophysical, socio-economic and governance dimensions.

Soil security is a commitment to real change. It assesses and further develops:

- The impact of soil management practices and the necessary actions to restore or prevent soil degradation.
- The economic and social costs of soil function loss and ways to engage stakeholders in sustainable practices.
- The role of legal frameworks in incentivising and enforcing soil stewardship measures.

By integrating scientific knowledge or effective governance and economic incentives, we aim to ensure that soil is not only safeguarded but managed for long-term sustainability.

#### 3. Promoting Global and Internal Collaboration

Soil security requires a unified, multi-level response. Aroura fosters both external and internal collaboration to maximise impact: Externally, we aim to work across sectors to:

- Unite scientists, policymakers, industries, farmers, and communities in developing collaborative, global solutions.
- Foster coordinated global efforts on soil security, sharing best practices, research, and resources.
- Amplify diverse voices to make soil governance more inclusive and representative.

Internally, we prioritise foundational research and knowledge-building, enabling the development of foundational papers (as outlined in [Section 2.3](#)). The objectives of these papers include:

- Establishing a solid scientific and policy foundation for soil security.
- Providing strategic direction for sustainable soil management, policy and law.
- Guiding future research, advocacy, and policy efforts.

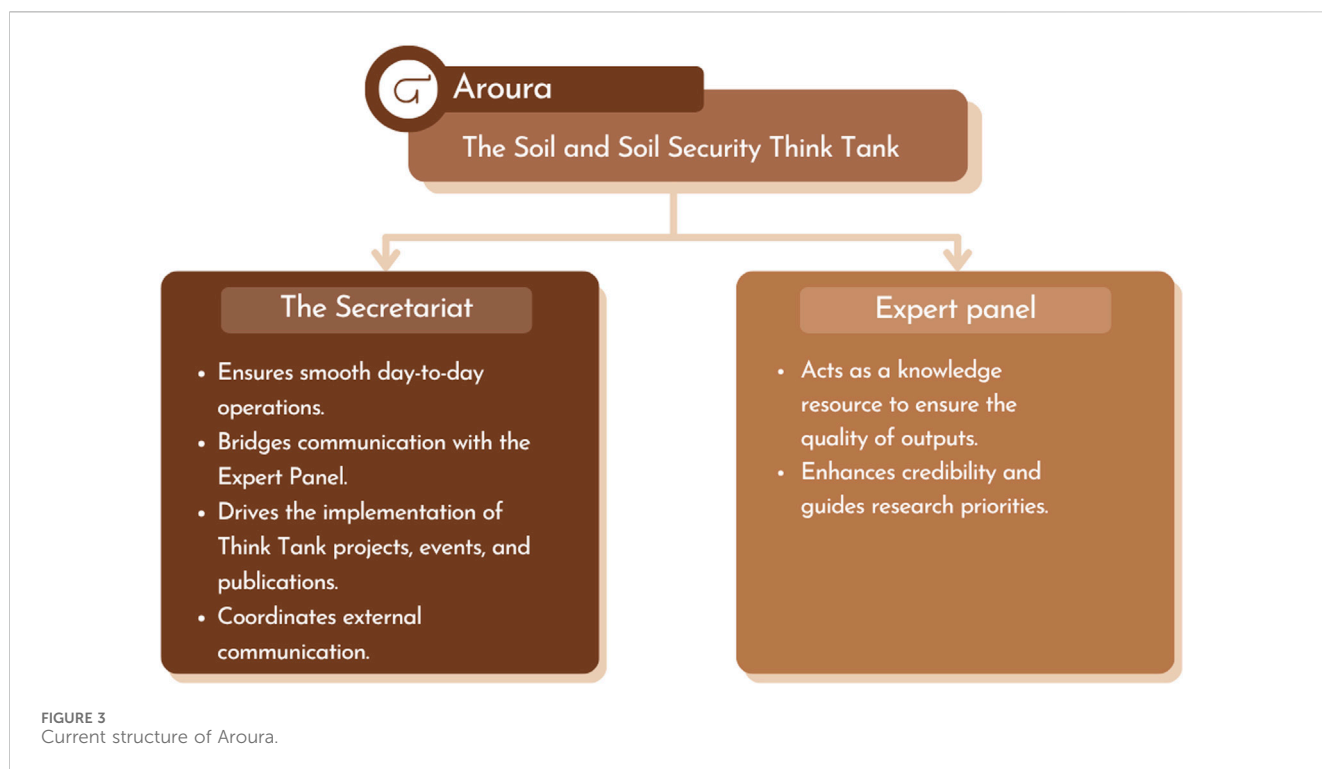
Through strategic partnerships, advocacy, legislation, and knowledge exchange, we strive for long-term change to ensure that soil is preserved and managed sustainably for generations to come.

## 2.3 Organisation

Aroura is currently structured into two key entities: the Secretariat and the Expert Panel, each playing an essential role in advancing the Think Tank's mission of promoting soil security on a global scale ([Figure 3](#)).

The Secretariat is responsible for the day-to-day operations, ensuring the smooth and efficient functioning of the Think Tank. Acting as the central coordination hub, the Secretariat facilitates communication and oversees the





implementation of key projects, such as the Inaugural Global Soil Security Summit (see [Section 3](#)), events and meetings and the production of publications.

In addition to coordinating operations, the Secretariat plays a key strategic role in guiding research priorities. It is also responsible for promoting soil security and the Think Tank's initiatives through various communication channels, including social media, public outreach, and digital engagement strategies. These efforts help broaden the awareness of soil security, engage global audiences, and advocate for its prioritisation in sustainability discussions. Through proactive communication, the Secretariat aims for the Think Tank's research, events, and policy contributions to reach key stakeholders, policymakers, and the wider public.

The Expert Panel are experts from diverse disciplines and from six continents recruited to form Aroua. They serve as the Think Tank's knowledge backbone, providing scientific and technical expertise towards research outputs, refining findings, and ensuring the highest quality outputs. Composed of leading experts from around the world in soil science, policy, economics, law, and other relevant fields, the Expert Panel provides the multidimensional perspective necessary for addressing complex soil security challenges. This diversity strengthens the Think Tank's capacity to produce comprehensive, well-informed, and impactful research. The Expert Panel plays a critical role in developing innovative concepts and advancing the Think Tank's mission, guaranteeing that its work is both scientifically rigorous and policy-relevant.

Together, the Secretariat and the Expert Panel form a dynamic and collaborative structure, designed to enable the Think Tank to

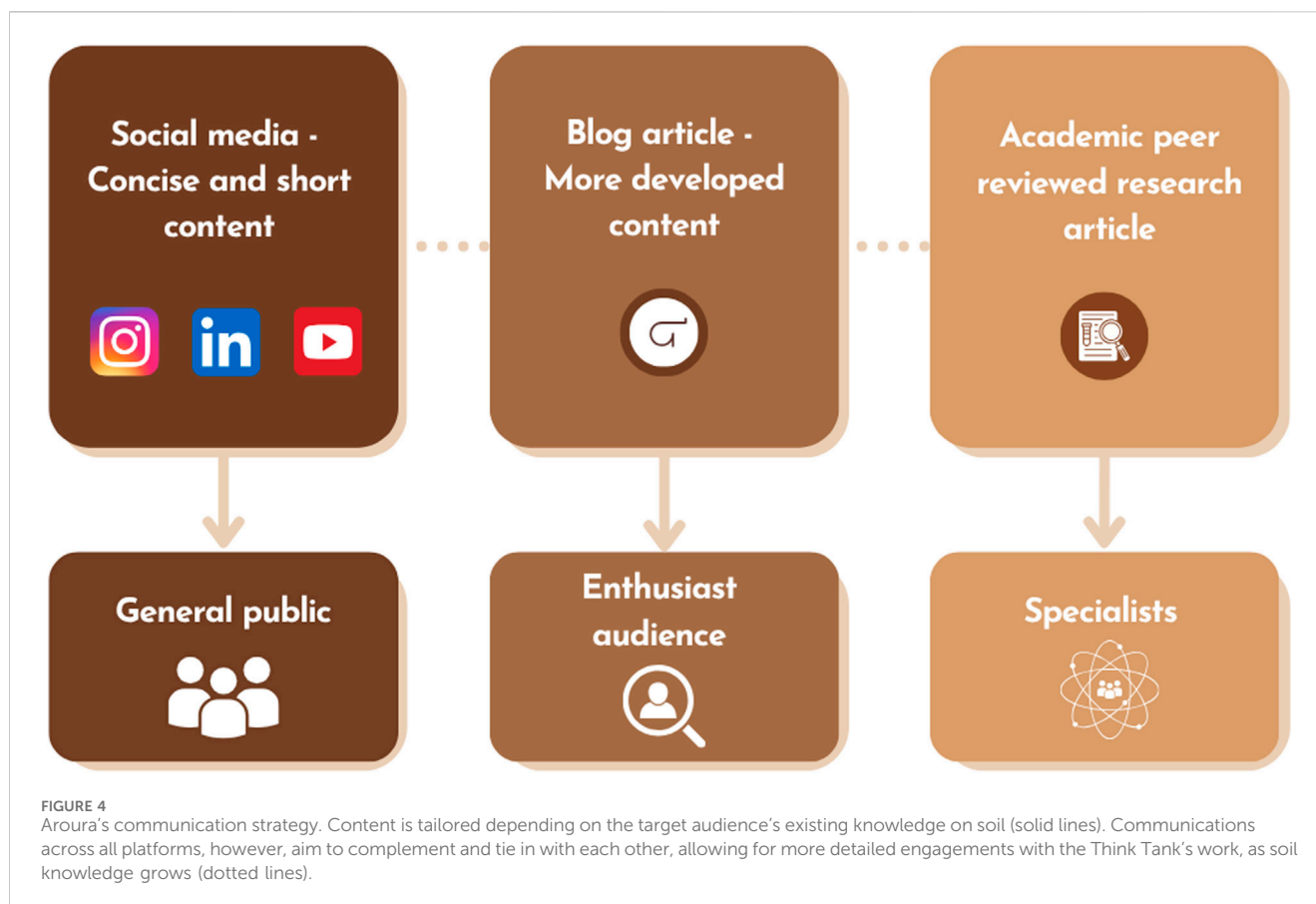
operate efficiently, while maintaining the highest standards of scientific rigour and policy relevance.

Looking ahead, a key aspect of the Think Tank's future development is the establishment of a membership program. This initiative will expand the Think Tank's reach and impact by bringing together researchers, policymakers, practitioners, and other any further relevant figures committed to advancing soil security, further strengthening global collaboration on this critical issue.

## 2.4 Communication

One of the Aroua's core values is *equity*. Soil insecurity affects people from walks of life—scientists, policymakers, industry leaders, and communities alike. To address this, Aroua is committed to enhancing soil literacy through a comprehensive communication strategy that utilises diverse platforms. The Think Tank not only publishes scientific papers to establish its intellectual foundation but also leverages social media to engage a broader audience, including those who may not have direct access to scientific literature or who feel disconnected from the technical language of academic work. Given that soil security is an integrated approach to addressing several existential global challenges, it is essential that knowledge surrounding it is equally unified and accessible to all.

The foundational papers produced by the Think Tank set the stage for policy development ([Shariffar et al., 2025](#)) and the conceptual integration of soil health within soil security ([Styc et al., 2025](#)). The first paper provides a framework for soil policy,



offering guidelines grounded in soil science, which are further enriched by the concept of soil security (further developed in Section 4). The second paper examines alternative conceptual approaches to evaluating soil, particularly focusing on soil health. While the health metaphor has proven effective in raising awareness about soil, drawing parallels between soil and human wellbeing, it also has limitations. These include inconsistent definitions across regions and a lack of a holistic framework that considers not only the biophysical, but also its socio-economic and governance aspects. The paper concludes that while soil health is widely recognised as an indicator of soil condition and human impact on soil, a more comprehensive approach to soil stewardship and restoration is needed through the lens of soil security. This integrated framework, encompassing economic, legal, and social factors, will provide a more sustainable and effective way forward.

Beyond these foundational papers, a significant milestone for Aroura was the publication of the Soil Security Declaration (see Section 5). Introduced on World Soil Day 2024, this declaration marked the beginning of a broader global communication initiative. To expand the reach beyond the scientific community, the Soil Security Declaration was made available on the Aroura website (<https://arourasoil.com>), launched on the same day. The website serves as a portal to Aroura's social media platforms where simplified, yet informative, messages about soil and soil security are shared with a wide audience. Recognising that social media may not appeal to all audiences, Aroura has launched a blog section on its

website to bridge the gap between scientific research and general readership. These articles present engaging, well-informed, and easily digestible content on topics such as soil security, policy and law, and sustainable soil management. The blog aims to communicate the complexities of soil security in a way that is understandable to a wider audience, while maintaining scientific rigour.

By making scientific knowledge both engaging and accessible, Aroura seeks that soil security is not merely a concern for experts but a shared responsibility and priority for all individuals and communities (Figure 4).

### 3 The inaugural global soil security summit

Professor Alexander McBratney was awarded the 2021 Australian Research Council Laureate Fellowship with the goal of ensuring that soil is secured for future generations while positioning Australia at the vanguard of soil assessment and restoration. A key component of this Fellowship is the development of a new generation of leaders capable of working across the interdisciplinary fields of soil security. As part of this vision, doctoral and postdoctoral researchers at the University of Sydney were selected to provide leadership for this effort by performing the secretariat role described previously. Specifically, the Secretariat organised the Inaugural Global Soil

Security Summit, held from October 15–17th, 2024. This event brought together a diverse and multidisciplinary group of experts from around the globe to address the issue of soil security. Instead of formal presentations, discussions were conducted face to face and structured around a series of key topics, with each session summarised into consensus points reflecting the collective views of participants. The Summit aimed to catalyse collective action and foster global collaboration, with the following objectives:

- Develop a shared understanding of soil security: The Summit sought to bridge gaps between disciplines and establish a common language to help integrate soil security into both scientific research and policy discussions.
- Translate soil security concepts into actionable policies and laws: The Summit aimed to develop clear policy principles and strategic action plans that could drive tangible change in soil management practices worldwide.
- Establish a global collaborative framework for action: One of the key outcomes of the Summit was the formation of a Think Tank dedicated to advancing soil security, fostering ongoing dialogue and collaboration across borders.

Through these objectives, the Summit emphasised the urgency of soil security, aiming to elevate it to the same level of international concern as climate change and biodiversity conservation. The event underscored the essential role soil plays in addressing global challenges, creating momentum for its integration into the broader sustainability agenda.

## 3.1 Major points arising from the summit

### 3.1.1 Establishing a common understanding

The vision shared by the Summit participants encompassed a broad spectrum of perspectives from science, policy, economics, and governance. These diverse viewpoints emphasised critical themes, such as the need for legal and policy frameworks, the economic valuation of soil functions, the importance of education and public engagement, and the need to encourage greater international collaboration.

Soil Security, as a conceptual framework, emerged just over a decade ago (Koch et al., 2013), developed to more comprehensively address the governance, economic, social, and biophysical dimensions of soil. This framework defines the functions, services, and threats that soil faces globally. At the Summit, the goal was to establish a shared language and clarify key concepts, enabling experts from various fields to engage effectively with the issue. While debates on specific terminology arose, the consensus was clear: the Soil Security Assessment Framework provides a comprehensive and systematic approach for both policy development and advocacy.

A significant point of discussion was the absence of a global Convention or other legally binding international instrument on soil. Experts argued that, just as the international community negotiated the three global Rio Conventions on Climate Change,

Biodiversity and Desertification, efforts should now be committed to developing a legal instrument on soil to safeguard this critical resource for future generations. Ideally, this should be in the form of a Global Convention based on the Soil Security holistic approach.

### 3.1.2 Developing a soil policy

A significant gap identified during the Summit was the lack of binding legal instruments for soil at national, regional and international levels. Existing policies often conflate land use with soil management, leading to weak and fragmented legal protections. Summit participants explored methods to strengthen soil governance, culminating in the development of a set of guiding principles for soil policy and a call for the codification of these principles into national and international law.

Given the urgency of addressing this gap, many experts endorsed the formation of the Soil and Soil Security Think Tank to provide expert recommendations for effective legal frameworks.

### 3.1.3 Economic and social valuation of soil

Summit discussions highlighted the economic dimension of soil security, stressing the need for financial frameworks that assign value to soil's functions and services. A key debate centred on the balance between market-based incentives and legal instruments for achieving soil security. Concepts like carbon credits, alongside emerging proposals for biodiversity credits, were discussed as possible mechanisms for incentivising soil protection.

There was a general consensus that market-based incentives could be effective in addressing soil degradation. However, for any financial program to succeed, robust metrics must be developed to capture the true value of soil functions and services alongside transparent and robust methodologies to have the trust of society and potential investors in the market. The Think Tank was identified as a valuable entity to guide the creation of these metrics and methodologies, to help ensure that economic incentives are effectively aligned with soil protection goals.

## 4 Summit outcomes

The Summit produced three concrete outcomes: the Soil Security Declaration, a set of soil policy principles and the establishment of Aroura, the Soil and Soil Security Think Tank.

### 4.1 The soil security declaration

The Declaration urges global recognition of the critical role soil plays for humanity and the planet and calls for global action to safeguard this essential resource.



## The Soil Security Declaration

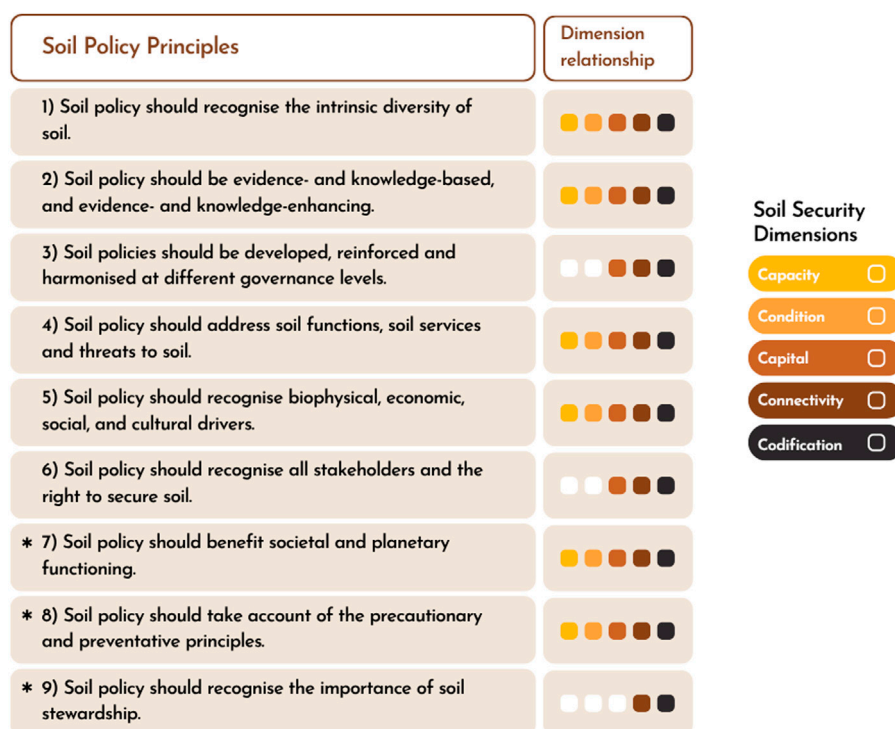
We urge the nations and peoples of the world to acknowledge the vital significance of soil for both humanity and the planet. It is imperative that we develop a comprehensive plan of action to safeguard the world's soil for the future. Soil provides an essential foundation for life and human civilisation. While its natural formation may take millennia, its degradation can occur almost instantaneously, presenting a profound challenge to our shared future. The loss of soil function poses serious risks to our food systems, economies, societies, ecosystems, and the overall stability of our global community. The UNCCD reports that we annually lose 24 billion tonnes of fertile soil, causing significant economic damage. This underscores that soil insecurity is not only an environmental concern but also a pressing economic issue.

History serves as a reminder of the far-reaching consequences of soil insecurity. The decline of great civilisations, such as the Babylonian and Mayan Empires, highlight the critical importance of soil security. Furthermore, current events—such as the devastation of vital agricultural regions in Ukraine due to conflict and the salinisation of vast tracts of soil in Central Asia—illustrate ongoing challenges. Regions that become unproductive and uninhabitable may face significant migratory pressures, which could exacerbate tensions over diminishing resources. The emergence of new threats, including the accumulation of exogenous chemicals in soil, and their unknown impacts, adds urgency to the mission of securing soil, including its regeneration.

It is essential to recognise that soil is central to addressing eight existential challenges of our time: food security, water security, energy security, climate change mitigation and adaptation, biodiversity preservation, supporting human health, sustainable ecosystems and soil security itself. Soil should not be conflated with land; it requires its own dedicated regulation and thoughtful stewardship.

To confront this pressing issue, we have developed a set of core principles to guide global efforts toward ensuring soil security. We advocate for the design and implementation of effective policies and laws that engage diverse communities through a collaborative governance model, fostering the connection between people and soil. We encourage every nation to adopt comprehensive soil strategies that recognize and harness the myriad benefits of soil for humanity and the planet. Such strategies should incorporate incentive-based approaches that encourage positive actions for sustainable soil management and usage.

As participants in the first Global Soil Security Summit, we issue this declaration—a global call to action. We urge governments, legislatures, scientists, businesses, and citizens worldwide to join forces in the vital effort to secure our soils. We aim to promote the recognition, protection, and sustainable management of soil resources.



**FIGURE 5**  
Relationship of the nine policy principles, with the five dimensions of soil security (capacity, condition, capital, connectivity, codification). \* New principles introduced by Aroura. For each principle a set of five boxes representing the five dimensions in their respective order is given. A filled box indicates that dimension is directly incorporated into the policy principle.

## 4.2 Soil policy principles

### 4.2.1 Formation of soil policy principles

In line with the Soil Security Declaration, the Summit participants developed a comprehensive set of Soil Policy Principles. Policy principles provide essential guidance for the creation of transparent, accountable, and consistent policies that integrate economic, social, and ecological considerations for long-term resilience (OECD, 2014). These principles, widely used in various sectors, serve to steer organisations towards sustainable development (Shrivastava and Berger, 2010). Despite soil's crucial role in agriculture, ecosystem health, climate regulation, and socio-economic stability (Hamidov et al., 2018; Telo Da Gama, 2023), little attention has been committed to the development of dedicated Soil Policy Principles. This gap underscores the need for a unified framework to enhance soil governance, address its degradation, refine existing policies, promote sustainable soil management, and facilitate broad stakeholder collaboration.

A recent study proposed an initial set of six Soil Policy Principles to guide structured governance (Evangelista et al., 2024). These principles were discussed and refined at the Summit. Participants focused on clarifying scope, enhancing applicability across regions and simplifying terminology and proposed the addition of three new principles (Figure 5; Sharififar et al., 2025).

The three new principles broadened the framework to encompass the societal and planetary benefits of soil, incorporate precautionary and preventative measures against degradation, and emphasise the importance of soil stewardship.

These Soil Policy Principles offer a clear, structured framework for governments and organisations to design and implement policies that promote sustainable soil management practices (Sharififar et al., 2025). Aroura will promote and advocate for the use of these principles to guide soil policy formulation in all regions and at all levels of governance (local, national, regional and international).

### 4.2.2 Soil security dimensions addressed by the soil policy principles

The Soil Policy Principles were designed to address the various dimensions of soil security, enabling a comprehensive approach to soil governance. As illustrated in Figure 5, these dimensions are interconnected, emphasising the complex and multifaceted nature of soil.

Effective soil policy requires a cohesive global governance framework, as current international soil policies remain fragmented (Bodle, 2022). While national and regional policies such as Australia's National Soil Strategy (Department of Agriculture, Water and the Environment, 2021) and the EU's Soil Deal for Europe (European Commission, 2021) recognise the critical importance of soil, there is still no unified global framework for soil security akin to those for climate change and biodiversity (Evangelista et al., 2024). The Soil Policy Principles offer a structured framework to help bridge this gap. We believe they could be applied usefully through all stages of soil policy development, implementation, and evaluation, and in different sectors, including scientific research.

Soil policy gap analysis could be done based on the inclusion of soil policy principles and addressing soil sustainability and protection aspects using the five dimensions of soil security. The policy principles can provide a base and structure for such a methodical and systematic analysis and subsequently development of soil securing policies.

## 5 Future activities of the think tank

### 5.1 Future development of soil policy using the soil policy principles

The Think Tank, as a multidisciplinary body, is committed to shaping soil policy that addresses the essential functions, services, and resilience to threats associated with soil, while recognising the biophysical, socio-economic and governance drivers influencing soil security. Aroua will promote and advocate for the use of the soil policy principles as a basis for soil policy development.

The work of Aroua, such as the soil policy principles will be advocated for utilisation in the development of future soil policy, by harnessing available existing and on-going scientific research (principle 2). For example, recent techniques developed such as the stratification of soil based on soil forming factors to group soil by inherent diversity (principle 1) (Francos et al., 2025a; 2025b; Román Dobarco et al., 2023) may be used for soil monitoring (Principle 9) and decision making for sustainable soil management and policy development. These tools could not only assist in identifying critical soil endangered by human intervention but also help to prioritise soil that should be protected. A strategy will need to be developed to encourage national and international action to secure and protect these critical soils. Long-term, a preservation policy similar to that administered by the United Nations Educational, Scientific and Cultural Organization (UNESCO) to protect world heritage sites should be considered. The development of future policy recommendations will prioritise societal and planetary wellbeing.

The Think Tank's policy strategy will emphasise soil stewardship and promote the harmonisation of soil policies at various governance levels. Initial efforts will focus on generating evidence-based knowledge and providing concrete recommendations that support the five dimensions of soil security.

### 5.2 Paving the way for a global convention on soil security

There are many international Conventions and legal instruments addressing environmental concerns. Among these are the trio of Rio Conventions, on climate change, biodiversity and desertification. However, soil has never been the central focus. We view this as a serious omission. Aroua has already started to address this issue, using the Soil Security Declaration for a global call to action, the Soil Policy Principles to guide soil-centric policy implementation and the Soil Security Assessment Framework to operationalise the concept of soil security (Evangalista et al., 2023).

One key long-term and ambitious aspiration of Aroua is to pave the way for a Global Convention on Soil Security. While recognising

the many political, diplomatic, and economic challenges it would take to bring such a convention to fruition, a dedicated convention on soil security would facilitate agreements and collaborations across government levels, ensuring efficient policy implementation while respecting national and regional considerations. Unlike other initiatives that conflate soil health with broader environmental factors, the Soil Security Assessment Framework isolates and specifically addresses soil contributions to broader sustainability goals.

At this stage, the Think Tank proposes the following stages as a possible path forward:

1. Growth of the Think Tank: Aroua brings together scientists and policymakers with diverse expertise on soil security. Through scientific papers, policy briefs, conferences, and active social media engagement, the Think Tank is gaining momentum. It is supported by early-career researchers who contribute to scientific and policy content. Regular online meetings and annual Summits provide a platform for ongoing dialogue. Further growth of the Think Tank and its activities will further soil in global discussion, building awareness of the need for an eventual Global Convention on Soil Security and for soil itself.
2. Agenda: Once the Think Tank is more established and has identified major soil challenges along with feasible solutions, it can launch public campaigns that underscore the steep cost of ignoring soil security. These efforts drive political mobilisation by spreading the message through the media to the broader public and directly to policymakers. Simultaneously, Aroua would assess which political and industry sectors are most likely to adopt its recommendations.
3. Drafting the Proposal and Agreement: Aroua aims to see the concept mature and gain traction with policymakers, eventually establishing a coalition of countries and regional authorities to draft a framework for a convention or protocol, outlining objectives, principles, and implementation mechanisms. This phase would involve diplomatic negotiations and interdisciplinary working groups focused on securing soils in line with the five key dimensions of soil security.
4. Review and Endorsement: With the proposal drafted, a comprehensive review process would be initiated. The goal of this phase is to strengthen the proposal through collective input, address any political or technical concerns, and build momentum toward formal endorsement.
5. Signature: The involved countries and/or regional authorities would be invited to sign the proposal.
6. Ratification: After a country signs the Global Convention on Soil Security, the text would be sent through its domestic approval process—typically a parliamentary vote, senate consent, or cabinet decision, depending on its constitution. Once the treaty is formally endorsed at home, the government deposits an instrument of ratification with the convention's depositary.
7. Implementation: Eventually, upon the formal adoption of the convention and domestic approval, countries would enact domestic legislation incorporating its principles. This process may be iterative, adjusting based on emerging



scientific insights and policy lessons. Financial and technical support mechanisms can be created to assist developing regions in effectively implementing these strategies.

8. Monitoring, Reporting and Compliance: At this stage the convention would be operational, and the involved governments are committed to submit national/regional reports detailing progress of the agreed soil security indicators. This event would be organised every 2–3 years. An independent scientific panel reviews these reports with sample audits and third-party studies. The cycle concludes with a public synthesis report and recommendations adopted at each Conference of the Parties, ensuring transparency, accountability and a steady tightening of standards over time.

Although the Think Tank is still in its early stages, these tentative milestones, which are subject to change, provide a possible roadmap for future actions.

### 5.3 Interactions between the think tank, policymakers, the scientific community, and the general public

Central to the Think Tank's mission is the belief that soil security can only be achieved through collective action. By fostering partnerships across disciplines and sectors, Aroura aims to enable the free exchange of knowledge and strategies among experts, policymakers, and stakeholders. We believe this collaborative approach will not only deepen understanding but will also help to drive the implementation of comprehensive, science-driven solutions to the challenges that threaten soil.

The Think Tank's communication strategy is tailored to engage different audiences, including the general public, policymakers, and the scientific community. Distinct platforms and communication approaches are employed to ensure effective outreach.

For the general public, Aroura utilises social media platforms such as Instagram, LinkedIn, YouTube, and its official website to share easily digestible content. This allows for public feedback and engagement, fostering a deeper connection between the public and soil security issues.

For policymakers and the scientific community, the Think Tank will publish scientific papers and participate in global conferences to present research and policy recommendations. Annual Summits of the Think Tank will serve as key forums for discussing soil policies and strategies.

Additionally, the Think Tank's secretariat and experts will publish monthly blogs that delve deeper into soil and soil security topics. These blogs will complement social media efforts and provide more detailed content accessible to a wide audience.

As the Think Tank grows, a membership program may be introduced, providing access to newsletters, publications, and direct engagement opportunities. Potential members may include scientists, policymakers, non-governmental organisations, and the general public.

Media coverage of the Think Tank initiative, which began in 2024, will continue to be a valuable tool for spreading awareness and promoting Aroura's mission.

With these diverse communication channels, the Think Tank anticipates a growing impact, fostering greater awareness and action for soil security globally.

## 6 Conclusion and call to action

Soil security is not merely an environmental issue, it is foundational to sustaining life on Earth and addressing the major global existential challenges that we face today. These challenges, ranging from food security and climate change to biodiversity loss and water scarcity, are all inextricably linked to the health and vitality of our soils. Without secure soils, we cannot ensure sustainable agricultural production, resilient ecosystems, or a stable climate. Therefore, soil security must be prioritised.

Aroura, the Soil and Soil Security Think Tank, driven by its commitment to collaboration, disciplinary rigour, and evidence-based policy, is determined to take a leading role in promoting the critical need to protect and secure soil. By bringing together experts from diverse disciplines along with governments, organisations, and stakeholders, the Think Tank will foster meaningful conversation and drives collective action to protect soil resources. With a focus on effective organisation, clear communication, and a shared commitment to common goals, Aroura will work to make soil security a higher priority on global agendas and in international policy discussions.

By defining a set of Soil Policy Principles, the Think Tank has created a structured and practical framework that governments, institutions, and organisations can use to develop and implement policies aimed at responsible soil management. We hope these principles will serve as a guide for aligning policy, scientific research, and practical action, ensuring that soil management practices are sustainable, equitable, and integrated across multiple sectors. This framework encourages the adoption of policies that promote soil conservation, regeneration, and the long-term protection of soil functions, ultimately fostering a more resilient and secure environment.

The work of Aroura is laying the foundation for an international legal instrument dedicated to soil, ideally a Global Convention on Soil Security. We will be prosecuting the case for this vigorously, as a means of securing international commitments and establishing legal frameworks to protect soils for future generations. We know that this is a bold ambition, but a legal instrument dedicated to soil would provide a formalised coordinated approach to soil protection, set global standards and encourage nations to collaborate to address shared challenges. Aroura believes the international community should take collective responsibility for safeguarding soils as a vital resource for the future.

Through ongoing advocacy, research, and policy innovation, Aroura, the Soil and Soil Security Think Tank is working to drive a new global conversation around soil security, one that will engage the international community and achieve meaningful change. The future of life on Earth depends on our ability to secure and protect the soil that sustains ecosystems, support agriculture, and regulate the climate. Soil insecurity is a global problem. Action is needed now to conserve and protect this vital resource. The Think Tank's commitment to advance soil security is a commitment not only to safeguard soils, but to secure a stable, sustainable future for humanity and the planet.

We invite everyone—scientists, policymakers, enthusiasts, and members of the public—to take part in the global movement for soil

security. Whether you are contributing research, shaping policy, raising awareness, or simply learning more, there is a role for you. Visit <https://arourasoil.com> to:

- Explore the Soil Security Declaration and Soil Policy Principles,
- Engage with our content on social media and share it to raise awareness in your networks,
- Join as a supporter or collaborator—membership opportunities are in development!

If you are a scientist, we welcome your input on our research priorities and collaborative projects. If you are part of the general public or an advocate, you can amplify the message, connect with local efforts, and bring soil into broader sustainability conversations.

To maintain its independence and scale its efforts globally, the Think Tank relies on sustained philanthropic support and expert volunteer contributions. Financial backing is not only a necessity, but also a form of commitment to the cause. By investing in Aroua's mission, donors help amplify the message of soil security, advance vital research, and shape policy that protects one of the planet's most essential resources.

Aroua is not a closed group, it is an open and growing community.

Help us build the momentum needed to achieve a Global Convention on Soil Security.

The movement starts with action, your action.

## Author contributions

QS: Writing – review and editing, Writing – original draft, Visualization. SE: Writing – review and editing, Writing – original draft. DW: Writing – original draft, Writing – review and editing. PW: Writing – review and editing. IH: Writing – review and editing. JP: Writing – original draft, Writing – review and editing. JF: Writing – review and editing, Writing – original draft. NF: Writing – review and editing, Writing – original draft. AH: Writing – original draft, Writing – review and editing. TJ: Writing – review and editing, Writing – original draft. PB: Writing – review and editing. DF: Writing – review and editing. DI: Writing – review and editing, Writing – original draft. BM: Writing – review and editing. FM: Writing – review and editing. CM: Writing – review and editing. WN: Writing – original draft, Writing – review and editing. TO: Writing – review and editing, Writing – original draft. MR: Writing – review and editing. AS: Writing – review and editing, Writing – original draft. MT: Writing – review and editing. LW: Writing – review and editing.

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JY: Writing – review and editing. AM: Writing – review and editing, Supervision, Writing – original draft, Validation, Resources.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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