

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/368356826>

Critical Sustainability Sciences: Intercultural and Emancipatory Perspectives

Book · August 2023

DOI: 10.4324/9781003043577

CITATION

1

READS

327

3 authors, including:



Stephan Rist
Universität Bern

23 PUBLICATIONS 266 CITATIONS

[SEE PROFILE](#)



Patrick Bottazzi
Universität Bern

56 PUBLICATIONS 940 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Sustainable Governance of Food Systems [View project](#)



GOFORBO [View project](#)

Routledge Studies in Sustainability

CRITICAL SUSTAINABILITY SCIENCES

INTERCULTURAL AND EMANCIPATORY PERSPECTIVES

Edited by

Stephan Rist, Patrick Bottazzi and Johanna Jacobi

ROUTLEDGE



Critical Sustainability Sciences

This book explores Critical Sustainability Sciences, a new field of scientific inquiry into sustainability issues. It builds on a highly novel integration of elements from relational ontologies, critical theory, political ecology, and intercultural philosophy in support of emancipatory perspectives on sustainability and development.

The book *Critical Sustainability Sciences* begins by uncovering the weaknesses of mainstream sustainability science and debates on sustainable development. The new field of Critical Sustainability Sciences has grown out of a deep engagement with relational ontologies, which helps to overcome the dualist ontology underlying mainstream notions of sustainability and development. Dualist ontologies reinforce problematic anthropocentric divisions, for example, between humans and nature, subjects and objects, mind and matter, body and soul, etc. Examples from indigenous peoples in Bolivia, India, and Ghana – as well as integrative movements in Chile, Brazil, and Europe – show that relational conceptions of life, rooted in ecosophy and cosmosophy, can provide an intercultural philosophical foundation for Critical Sustainability Sciences. The book concludes by describing three key topics for exploration in Critical Sustainability Sciences: societal reorganization in view of emancipatory, existential, and cognitive self-determination; living labor and commons; and the development of new comprehensive relational scientific paradigms.

This book will be of great interest to students, scholars, and practitioners of emancipatory and intercultural approaches to sustainability and development.

Stephan Rist is Professor Emeritus of Human Geography at the Institute of Geography at the University of Bern, Switzerland.

Patrick Bottazzi is Assistant Professor at the Institute of Geography at the University of Bern, Switzerland.

Johanna Jacobi is Professor at ETH Zürich, Switzerland, where she leads the Agroecological Transitions Group.

Routledge Studies in Sustainability

Stories of Change and Sustainability in the Arctic Regions

The Interdependence of Local and Global

Edited by Rita Sorby, Tony Ghaye and Bård Kårtveit

Sustainable Living at the Centre for Alternative Technology

Radical Ideas and Practical Solutions

Stephen Jacobs

Rural Governance in the UK

Towards a Sustainable and Equitable Society

Edited by Adrienne Attorp, Sean Heron and Ruth McAreavey

The Environmental Impact of Cities

Death by Democracy and Capitalism

Fabricio Chicca, Brenda Vale and Robert Vale

Reimagining Labour for a Sustainable Future

Alison E. Vogelaar and Poulomi Dasgupta

Waste and Discards in the Asia Pacific Region

Social and Cultural Perspectives

Edited by Viktor Pál and Iris Borowy

Digital Innovations for a Circular Plastic Economy in Africa

Edited by Muyiwa Oyinlola and Oluwaseun Kolade

Critical Sustainability Sciences

Intercultural and Emancipatory Perspectives

Edited by Stephan Rist, Patrick Bottazzi, and Johanna Jacobi

Critical Sustainability Sciences

Intercultural and Emancipatory
Perspectives

Edited by Stephan Rist,
Patrick Bottazzi, and
Johanna Jacobi

 **Routledge**
Taylor & Francis Group
LONDON AND NEW YORK

earthscan
from Routledge

First published 2024
by Routledge
4 Park Square, Milton Park, Abingdon, Oxon OX14 4RN

and by Routledge
605 Third Avenue, New York, NY 10158

Routledge is an imprint of the Taylor & Francis Group, an informa business

© 2024 selection and editorial matter, Stephan Rist, Patrick Bottazzi,
and Johanna Jacobi; individual chapters, the contributors

The right of Stephan Rist, Patrick Bottazzi, and Johanna Jacobi to be
identified as the authors of the editorial material, and of the authors for
their individual chapters, has been asserted in accordance with sections
77 and 78 of the Copyright, Designs and Patents Act 1988.

All rights reserved. No part of this book may be reprinted or
reproduced or utilised in any form or by any electronic, mechanical,
or other means, now known or hereafter invented, including
photocopying and recording, or in any information storage or retrieval
system, without permission in writing from the publishers.

Trademark notice: Product or corporate names may be trademarks
or registered trademarks, and are used only for identification and
explanation without intent to infringe.

British Library Cataloguing-in-Publication Data

A catalogue record for this book is available from the British Library

ISBN: 978-0-367-48941-0 (hbk)

ISBN: 978-1-032-48797-7 (pbk)

ISBN: 978-1-003-04357-7 (ebk)

DOI: 10.4324/9781003043577

Typeset in Galliard
by Apex CoVantage, LLC

Contents

<i>List of contributors</i>	<i>vii</i>
<i>Acknowledgments</i>	<i>ix</i>
<i>Foreword by Vandana Shiva</i>	<i>x</i>
1 Why do we need critical sustainability sciences?	1
STEPHAN RIST, PATRICK BOTTAZZI, AND JOHANNA JACOBI	
2 Key areas for critical sustainability sciences	22
STEPHAN RIST, PATRICK BOTTAZZI, AND JOHANNA JACOBI	
3 A culture that understands that everything is interrelated, that nothing is divided, and nothing is outside	39
DAVID CHOQUEHUANCA CÉSPEDES AND STEPHAN RIST (COMPILATION AND TRANSLATION)	
4 Relational ontologies in health sciences and practices in India	59
DARSHAN SHANKAR	
5 Cosmovisions and critical sustainability sciences: an African ontology of “Vurr” (an energy) among the Dagara of Southwest Burkina Faso and Northwest Ghana	75
DAVID MILLAR, NIAGIA F. SANTUAH, AND MAXWELL BA-AN TENGOLZOR	
6 Contributions of the notion of cosmosophy to the formulation of critical sustainability sciences	95
JÉSSICA SEPÚLVEDA PIZARRO	

7	Toward a “nature alliance”: why sustainability must be rethought in terms of relationality	119
	BEAT DIETSCHY	
8	Society–labor–nature: the potential of conflict	146
	NORA RÄTHZEL	
9	Regenerative work: from commodity to collective action	172
	PATRICK BOTTAZZI	
10	Food, food systems, and sustainability: elements of the “real food” debate in Brazil	185
	RENATO S. MALUF	
11	Agroecology as a transformative approach to sustainable food systems	200
	FLORENCIA SPIRITO, VIVIANA BLANCO, AND RENÉ MONTALBA NAVARRO	
12	Through the veil: a relational and participatory perspective to knowledge production and sustainability	219
	HUGO MARCELO ZUNINO	
13	Goethe’s scientific method: the road not taken	233
	ISIS BROOK	
14	Sustainable design: a critique of the tripolar sustainability model, 15 years later	256
	ALAIN FINDELI	
15	Outlook and key topics for the construction of critical sustainability sciences	285
	STEPHAN RIST, BEAT DIETSCHY, PATRICK BOTTAZZI, AND JOHANNA JACOBI	
	<i>Index</i>	301

Contributors

Viviana Blanco (Ph.D., Argentina), Agronomist Engineer, is Professor-Researcher in the Faculty of Agricultural and Forestry Sciences (FCAyF), UNLP, Argentina.

Patrick Bottazzi (Ph.D., Switzerland) is Assistant Professor in the Department of Integrative Geography, Institute of Geography, University of Bern.

Isis Brook (Ph.D., United Kingdom) is Visiting Research Fellow at Bath Spa University. She taught philosophy for over 25 years.

David Choquehuanca Céspedes (Bolivia) is Vice President of the Plurinational State of Bolivia since 2020. He is a world-known leader of the Aymara nation in Bolivia. He is also Lecturer of History and Anthropology at the Universidad Mayor de San Andrés (UMSA) in La Paz.

Beat Dietschy (Ph.D., Switzerland) is a Swiss philosopher and theologian. As a collaborator of Ernst Bloch, he was involved in the publication of some of his writings.

Alain Findeli (Ph.D., Canada) was professor and researcher in design at the University of Montreal, Canada (1977–2007), and the University of Nîmes, France (2007–2017).

Johanna Jacobi (Ph.D., Switzerland) is Professor who leads the Agroecological Transitions Group at ETH Zürich. She studied Geography, Biology, and Social Anthropology.

Renato S. Maluf (Ph.D., Brazil) is Professor of the Graduate Program on Development, Agriculture and Society, Federal Rural University of Rio de Janeiro, Brazil.

David Millar (Ph.D., Ghana) is Professor and President of the Millar Institute for Transdisciplinary and Development Studies (MITDS) in Ghana.

René Montalba Navarro (Ph.D., Chile) is Professor in the Faculty of Agricultural Sciences and Environment at La Universidad de La Frontera (Chile).

Jéssica Sepúlveda Pizarro (Ph.D., Chile) is a social worker, working at the John Paul II Center for Ethics and Social Responsibility, and a member of the Nucleus of Interethnic and Intercultural Studies of the Catholic University of Temuco, Chile.

Nora Rätzel (Ph.D., Sweden) is a sociologist and professor at the University of Umeå, Sweden.

Stephan Rist (Ph.D., Switzerland) is Professor Emeritus of Human Geography at the Institute of Geography at the University of Bern.

Niagia F. Santuah (Ph.D., Ghana) is an expert in communication holding a Ph.D. in Culture and Development Studies from Millar Institute for Transdisciplinary and Development Studies (MITDS) in Ghana.

Darshan Shankar is an expert in cross-cultural knowledge in Health Sciences and Vice Chancellor of the University of Trans-Disciplinary Health Sciences and Technology (TDU) in Bangalore, India.

Florencia Spirito (PhD, Chile) is a researcher and lecturer in the Department of Natural Sciences and Technology at the Universidad de Aysén, Chile.

Maxwell Ba-an Tengolzor is in the final year of the Ph.D. program. He is Lecturer in the Department of Culture and Development Studies at Millar Institute for Transdisciplinary and Development Studies (MITDS) in Bolgatanga, Ghana.

Hugo Marcelo Zunino (Ph.D., Chile) is a full professor and researcher in the Department of Social Science at the Universidad de la Frontera (Temuco-Pucón, Chile).

Acknowledgments

This book would not have been possible without the wonderfully creative and tireless collaboration of the co-authors. Special thanks are due to the Institute of Geography and the Centre for Development and Environment of the University of Bern for granting Stephan Rist's sabbatical in 2019. We are especially grateful for the generous support and hosting of Stephan Rist's sabbatical to the Universidad de la Frontera, Chile, provided through the then Dean Rodrigo Echeverría Pezoa and the current Vice Dean René Montalba. For his wonderful facilitation of the workshop in 2019, we wish to thank the director of the Pucón Campus, Rodrigo Garrido Maldonado. For his great support in editing the language of Chapters 1, 2, and 15, we especially wish to thank Anu Lannen (Centre for Development and Environment, the University of Bern, Switzerland). For his excellent coordination of the editorial process, we are particularly thankful to Matthew Shobbrook from Routledge. And last but not least, we wish to thank the anonymous reviewers of the book proposal who gave us the motivation and strength to engage in this piece of work, knowing that they considered it to be a very timely and creative way of advancing critical perspectives on sustainability and development.

Foreword

Vandana Shiva

We face an existential crisis as humanity and as a planetary civilization. Indigenous people have been uprooted, displaced, and exterminated over 500 years of colonialism. One million species are threatened with extinction, with 200 going extinct every day. The present path humanity is on is clearly non-sustainable because it is destroying life on Earth, the very infrastructure of life. Non-sustainable systems are emerging as a threat to the very survival of the human species. Humans too are a threatened species. Why has sustainability been so elusive in spite of decades of search and research?

The book *Critical Sustainability Sciences: Intercultural and Emancipatory Perspectives*, edited by Stephan Rist, Patrick Bottazzi, and Johanna Jacobi, answers these questions in novel and comprehensive ways.

The editors show that the dominant field of sustainability science is based on the same mechanistic, reductionist and use-inspired engineering paradigm that is at the root of the multiple interconnected crises we face.

Among the fundamental critiques of sustainability science, they identify four interrelated issues: a flawed ontology of dead inert nature; epistemic reductionism that ignores the diversity and plurality of worldviews; uncritical use of the concept of “development”; and the neglect of linking sustainability science with freedom, emancipation, justice, as present in critical thinking and critical theory.

The Earth is Living. We are not separate from the Earth, we are a strand in the web of life, we are members of one Earth Family. Biodiversity, the diversity of species in mutuality and interconnectedness, creates the web of life and maintains the living planet and the infrastructure of life.

The emergencies humans face in terms of hunger and thirst, disease and pandemics are rooted in the ecological crises and the crises of injustice, inequality, and inhumanity.

Mother Earth is Terra Madre, Gaia, Pachamama, Vasundhara. Emerging critical ecological and sustainability sciences recognize her as Gaia. She is living. She gives us life. We are part of her Earth Family, *Vasudhaiva Kutumbkam*, of living, creative, diverse, intelligent sentient beings.

The phrase *Vasudhaiva Kuṭumbakam* (Sanskrit: वसुधैव कुटुम्बकम्) consists of several words: *vasudhā* (transl. “the earth”), *ēva* (transl. “is thus”), and *kuṭumbakam* (transl. “family”)

अयं निजः परो वेति गणना लघुचेतसाम्। (Ayam Nijah Paro Vetī Ganana Laghucetasam)

उदारचरितानां तु वसुधैव कुटुम्बकम्॥ (Udaracaritanam Tu Vasudhaiva Kutumbakam)

(Chapter 6 of *Maha Upanishad* VI.71–73).

“This is mine, this is yours, this is a stranger, this is a relative is the thinking of a petty mind. An evolved mind sees the whole world as one Earth Family.”

All beings are our relatives. There are no strangers, no enemies, no hierarchies, no superiority and inferiority. Oneness is the path to real sustainability and justice, to non-violence, peace, and harmony.

The petty-minded mechanistic and market paradigm has made us forget we are one Earth Family. It has created Eco-apartheid, the illusion that humans are separate from nature, that some powerful humans are masters and owners of the Earth, her resources, her biodiversity. Eco-apartheid goes hand in hand with anthropocentrism, the false assumption that humans are superior to our non-human relatives, who are mere objects and property to be manipulated for profits, or threats to human life that need to be exterminated. Apartheid as separation has made other people and other species strangers, a threat, an obstruction, a competitor who must be exterminated for one’s existence.

This is why forests have been cleared, rivers dammed, insects pushed to extinction with pesticides, plants exterminated with Roundup, organisms genetically modified (GMOs) for patents. The petty mind is a mechanical mind, an arrogant mind that drives the hubris that the Earth is dead matter, *Terra Nullius*. Colonizing, industrial, mechanical man sees himself as the “creator”. GMOs are an example of this hubris, allowing violence against the integrity of living systems, and using this violence to claim the right to ownership through patents and intellectual property. GMO in effect means “God Move Over”, since corporations are claiming to have created life and seek to become “Life Lords”, lords over life itself, collecting rents, royalties, and taxes from life’s renewal and regeneration (Vandana et al. 2020).

I call this worldview Eco-apartheid.

The multiple crises and pandemics we face today – the health pandemic, the hunger pandemic, the poverty pandemic, the climate and extinction controversies, the emergency of injustice, exclusion, and inequality, dispossession, and disposability of large numbers of humanity – are all rooted in a worldview based on the illusions of separation and superiority which deny interconnect-edness and oneness.

These false assumptions are as follows:

- 1 The transformation of *Terra Madre*, Mother Earth who is living and has rights, into *Terra Nullius*, the Empty Earth. The assumption that nature is dead inert matter, property to be owned by enclosing the commons and raw material to be extracted for profits. The denial that the Earth is Living, she is Gaia, Pachamama, Vasundhara, and that Mother Earth has no rights is the root cause of ecological destruction and violence against her.

- 2 *Eco-apartheid*, the assumption that humans are separate from Nature, are her conquerors, masters, and owners, and the denial of the fact that we are part of Nature, not separate from her. Apartheid is “apartness” or “separateness” in Afrikaans.
- 3 *Human apartheid*, based on the false assumption that colonizing man is separate from and superior to other cultures and most human beings, who are colonized, including the indigenous, the non-white and colored, women, farmers, peasants, and workers. The illusion of superiority leads to domination and discrimination based on race, gender, religion, and work. This false assumption of superiority is also used to enclose the commons that are cared for and shared by all members of a community. Enclosures allow the extraction and appropriation of resources that sustain all life, including human life.
- 4 *Anthropocentrism*, the assumption that humans are superior to other species which are reduced to objects to be owned, manipulated, and exploited for profits and control. And a denial that we are members of one Earth Family and all living beings are sentient beings with integrity and rights.

The anthropocentric assumption that humans are separate from nature and superior to other species who have no rights is not just a violation of the rights of our fellow beings but also a violation of our humanity and human rights. We are members of one Earth Family, and our being human is predicated on our relations with biodiversity and living seed, land and living soil, living waters and living food. Human rights defined on the basis of separation and superiority makes “dominance” and “exploitation” appear natural to being human, when they are in fact constructs based on illusion of dualistic separation and superiority which have contributed to both non-sustainability and injustice (Shiva 2016).

Denial of Nature’s rights leads to destruction of Nature and a threat to the very conditions of human survival. In an ecologically interconnected world, denial of the rights of Nature translates into denial of human rights. The same constructs that lead to violence against nature and her destruction become the basis of violence against fellow human beings. Non-sustainability and injustice are part of the same process.

The petty-minded worldview of dualistic separation also engenders hierarchies and the illusion of superiority – of humans as superior to other species, men as superior to women, whites as superior to blacks and all colored people, one faith as superior to the diversity of belief systems which have nourished cultural diversity. Separation and superiority create structures of violence – violence against Nature, violence against women, violence against every “other” defined as lesser beings with the objective of colonization.

Colonization is based on separation and superiority, the construction of apartheid.

The mechanistic reductionist worldview of nature as dead inert matter and mere raw material to be extracted was constructed by Descartes and Bacon to

facilitate nature's exploitation and promote colonialism and commercialization. Bacon, who is called the "father of modern science", called this shift "The Masculine Birth of Time" with a deeply patriarchal concept of the project of reductionist mechanistic science. Descartes made life and sentient beings disappear. Life is inert matter he declared: a mere machine. Locke justified the violent enclosures of the commons and the creation of private property as "improvement" of nature (Shiva 1988).

The paradigm of the "dead Earth" goes hand in hand with the scientific paradigm of mechanistic reductionism and a technological paradigm of mastery, control, and engineering instead of partnership, cooperation, and co-creativity. This ontological flaw is at the root of the failure of the dominant model of "development", "sustainable development", and sustainably science, which is more of the same.

The contributions to this volume from diverse cultures and continents, diverse disciplines and worldviews, shape Critical Sustainability Sciences, which allows us to shift from extractivism, mastery, domination, and ownership to giving, sharing, participating, and commoning the commons.

I have called this emerging paradigm and practice of participating in a living, pulsating sentient earth with all beings "Earth Democracy" (Shiva 2005), Arne Naess has referred to it as "biological equalitarianism".

Earth Democracy is a worldview, paradigm, and practice that is based on the following recognition:

- 1 The Earth is Living. The Living Earth is our Mother. She is *Terra Madre*, Mother Earth, Gaia, Pachamama, Vasundhara . . . Mother Earth has rights.
- 2 We are all members of the *One Earth Family*. We are part of the Earth, and not separate from her, not her masters. We are interconnected through the living currencies of breath, water, and nourishment. We have a duty to protect the Earth's Living Systems that provide us clean air, clean water, and clean food.
- 3 We are part of *One Humanity on One Planet*. All humans are equal. Our diversity enriches life and cannot be made the justification for inequality and injustice. Future generations have a right to enjoy the gifts of the Earth. Present generations have a duty of Earth Care to pass on the gifts of nature in their full diversity, integrity, and purity.
- 4 Earth Democracy is based on *Living Economies*, *Living Democracies*, and *Living Cultures* woven through the diversity in the web of life. Each life-form supports and sustains all others in mutuality, cooperation, and harmony. All living beings are sentient beings and have rights. All beings are creative and intelligent.

Living economies are based on co-creativity and co-production by humans as part of the Earth community, respecting the rights and integrity of all. In critical sustainability sciences, living economies are aimed at recognizing that

the maintenance of the integrity of the biological basis of life at large is the precondition of any sustainable system.

This requires a shift from commodification of nature and labor to decommodification of the Living Earth and our living labor. In Earth Democracy, the economy is a subset of ecology based on the laws of Mother Earth. We share the Earth's gifts with others. Seed, biodiversity, water, and food are commons. Participation as co-creators in the Earth's ecological processes to protect the commons and defend the common good is living democracy. Cultivating the culture of oneness with the Earth is Living Culture.

Earth Democracy is a worldview, paradigm and practice that is based on the recognition that everything is interconnected, the Earth is Living, the Earth has rights, that we have duties to care for the Earth, and regenerate her soil, seeds, and biodiversity, her water and food systems. Our rights flow like a spring from our duties.

Earth Democracy recognizes that humans are part of the Earth and related to other beings. Human Rights are therefore connected to the Rights of the Earth and the Rights of other species. The path to peace, justice, and real sustainability is paved by reclaiming the commons – our common home, the Earth, and the commons of the Earth Family, of which we are a part. Through reclaiming the commons, we can imagine possibility for our common future, that we can sow the seeds of abundance through “commoning”.

In the commons we care and share – for the Earth and each other. We are conscious of Nature's ecological limits, which ensure that her share of the gifts she creates goes back to her to sustain biodiversity and ecosystems. We are aware that all humans have a right to air, water, and food, and we feel responsible for the rights of future generations.

The ideas of the book *Critical Sustainability Sciences* and those of Earth Democracy are based on the creativity of ancient living cultures and emerging sciences of relationship and interconnectedness. They allow a shift from the dead Earth ontology to the ontology of a living intelligent Earth. They allow a shift from the epistemology of violence, referred to by Johann Wolfgang von Goethe as the “grim torture chamber of empiricism, mechanism, and dogmatism” to “delicate empiricism”, which makes itself identical with the object thereby becoming true theory. Epistemic democracy and biodiversity of knowledges is central to true sustainability. It allows a shift from Monocultures of the Mind to Biodiversities of the Mind.

It allows a shift from linear one-way extraction from Nature and society as “development” and “growth” enabled by the mechanistic reductionist paradigm to co-creativity, sympoiesis – meaning “making with”. It allows a shift from hierarchies of exclusion to biodiversity of knowledges, cultures, and economies.

The shifts emerging from Critical Sustainability Sciences are vital for our times specially when in the name of “sustainability” the Earth is being privatized and financialized, and the indigenous people who conserve 80% of the remaining biodiversity on 20% of the land that remains in their care are threatened

to be colonized and displaced by false sustainability solutions, like carbon and biodiversity offsets. The legally binding regulations of the UN environmental treaties – the Biodiversity Convention and the Climate Convention – were first eroded and transformed into voluntary commitments, falling far short of actions to be taken to reverse climate change and biodiversity loss and erosion. Deregulation has now been replaced by the polluters turning the crisis they have contributed to, into a new market opportunity for profits, control, and ownership of the earth’s resources, ecosystems, and biodiversity.

First the corporate industrial money-making machine mined for coal, drilled for oil, fracked for gas, burning up 600 million years of Nature’s work in fossilizing her carbon, ignoring nature. Now that the ecological crises created by limitless greed can no longer be denied, they want to mine the ecological functions and services of nature as “nature-based solutions”. Through the Fourth Industrial Revolution, the metaphor for mining continues to turn into reality. Data is being called the new oil. Billionaires want to mine the data from humans, including farmers, mine the data from diverse food cultures, mine the data from seeds and biodiversity, mine the data from soil and ecosystems. This is “financialization of nature”, the final assault on Nature’s integrity and Nature’s self-organized, self-sustaining, regenerative economy. While robbing Nature of her integrity, the “financialization” of Nature is being greenwashed as protecting nature and reversing the ecological crises of biodiversity loss and extinction.

Wall street and the financial asset companies are seeing a \$4,000 trillion fictitious economy of finance by extracting profits from goods and services from “Nature’s assets”. This commodification is an enclosure of the commons of life as whole. When the last river, forest, and land will be enclosed as an asset, the custodians will be displaced people, without access to land, forests, and water and their earth-centered livelihoods. It is misleading to call the latest stage of colonial commerce “Nature’s Economy” as the Intrinsic Exchange Group (IEG) refers to it. The Natural Asset Companies (NAC) have been created by the IEG which is the Rockefeller Foundation, the New York Stock Exchange, and the Latin American Development Bank.

New proposals to address the ecological emergencies based on the old paradigm that reduces life in common to private property and money are neither sustainable nor just. They deny both the ontology of the living earth and the right of Mother Earth and human rights of free and autonomous beings and communities, indigenous people, farmers, fisherfolk, women, working people and the poor, the children, and future generations. They are blind to the diversities of ontologies and related ways of knowing that are relational and lead to living knowledges.

The rich contributions of this book about Critical Sustainability Sciences shape another worldview. It allows us to be “reborn from the death of egocentrism, anthropocentrism, eurocentrism”. The contributions shine a light to help us move from darkness, hopelessness, despair, greed, and enclosures

of the commons to a living future with all life on earth, cultivating hope, life, care, harmony, solidarity, and a reclaiming of the commons.

References

- Shiva, V., 1988. *Staying Alive: Women, Ecology, and Survival in India*. New Delhi: Kali for Women; London: Zed Books.
- Shiva, V., 2005. *Earth Democracy: Justice, Sustainability and Peace*. London: Zed Books.
- Shiva, V., 2016. *Biopiracy – The Plunder of Nature and Knowledge*. Berkeley, CA: North Atlantic Books.
- Vandana, S., et al., 2020. *Gates to a Global Empire: Over Seeds, Food, Health, Knowledge . . . and the Earth: A Global Citizen’s Report*. <https://navdanyainternational.org/wp-content/uploads/2020/10/GATES-TO-A-GLOBAL-EMPIRE-REPORT-SYNTHESIS-13.10.2020-3.pdf> (Accessed 26.12.2022).

1 Why do we need critical sustainability sciences?

*Stephan Rist, Patrick Bottazzi, and
Johanna Jacobi*

Sustainable development: between hope and despair

In the 1960s, increasing numbers of people around the world began to realize how economic growth, industrialization, and technification were associated with rapidly increasing degradation of human and environmental health. As a result, new or rejuvenated social–environmental movements emerged that called for humankind to reshape its relationship with nature. Rachel Carson’s book *Silent Spring* (2015), first published in 1962, was highly influential at the time, and is often credited with spurring the rise of ‘modern’ environmental movements. The book begins by describing how bird populations were decreasing due to massive use of the first modern synthetic insecticide DDT. Carson goes on to trace how DDT was spreading through the food chains, also posing threats to human health and life in a widening toxic cycle. The book is considered by many to have played a key role in DDT eventually being banned for agricultural use in the early 1970s in many countries.

The debates inspired by Carson’s book opened people’s eyes to the rising levels of contamination of food, water, soils, and air resulting from industrial development. Corresponding movements began to demand greater restrictions on polluting practices and industries and called for recognition of the intrinsic values of nature as well as for reflection on humankind’s responsibility for nature. Social–environmental movements such as the “1968” movement also articulated fundamental critiques of Western lifestyles. They argued that war, capitalism, consumerism, and “modernism” in Western countries were incompatible with peaceful coexistence between humans and all other beings forming the web of life on earth.

The environmental dimension of these critical movements became more prominent in 1972 when the Club of Rome originally published *The Limits to Growth* (Meadows 1972). While the authors of the report were not explicit on the links to capitalism, other contemporary observers put the limits to growth into a more critical perspective. Galtung (1973), for example, stated:

Concretely, capitalism is based on the idea that capital, nature in the form of raw materials, and labor in the form of “raw” and skilled labor,

are moved towards points of accumulation, “poles of growth”. These accumulation points become the centers of the system; the rest becomes the periphery. Depletion, pollution, and uneven accumulation are immediate consequences.

(Galtung 1973:107)

Parallel to their engagement in political activism, members of the growing social–environmental movements – mainly in industrialized countries – began striving to live according to their professed ideals, under the banner of “practice what you preach”. This gave rise to the organization of rural communities, for example, composed mainly of people intentionally leaving urban areas. They sought to draw practical lessons from the radical questioning of Western lifestyles that emerged up through the early 1970s. Using terms like “back to the land” and “deep ecology”, members of these movements began experimenting with new forms of life rooted in principles of self-reliance, self-sufficiency, self-determination, freedom, and fraternity (Wilbur 2013).

Meanwhile, in 1973, Arne Naess added a spiritual dimension to the definition of key claims and practices of environmental movements with his concept of deep ecology. Devall (1980) summarizes deep ecology as based on the following:

(1) *A new cosmic/ecological metaphysics which stresses the identity (I/thou) of humans with non-human nature is a necessary condition for a viable approach to building an eco-philosophy* [italics of the original text]. In deep ecology, the wholeness and integrity of person/planet together with the principle of what Arne Naess calls “biological equalitarianism” are central and integral part of nature, not over or apart from nature. Man is a “plain citizen” of the biosphere, not its conqueror or manager. There should be a democracy of all “God’s creatures” according to St. Francis; or as Spinoza said, man is a “temporary and dependent mode of the whole of God/Nature”. Man flows with the system of nature rather than attempting to control all of the rest of nature. The hand of man lies lightly on the land. Man does not perfect nature, nor is man’s primary duty to make nature more efficient.

(Devall 1980:310)

Consequently, these movements injected a new critical, self-reflective element into the ongoing development of Western societies. There began a radical rethinking of the dominant forms of creating and distributing economic wealth through the varying forms of capitalism. This was done not only in view of distributive justice, but also by promoting a shift away from private capitalist – or centrally planned – creation of economic growth toward a “living economy” (Galtung 1986). This living economy called for wealth creation that acknowledged maintenance of the integrity of the biophysical basis of life at large as

a precondition for any sustainable economic system. By the mid-1980s, an inspiring debate about the “spiritual dimension of green politics” was established (Spretnak 1986).

In summary, in the period from roughly 1960 to 1985, members of the growing social–environmental movements were engaged in highly diverse attempts at reorganizing personal, social, and economic lifestyles. A common thread running through this phase was the search for new practices and theories of life rooted in ideals of self-determination, inter- and transcultural spiritual growth, and a desire to reach beyond materialism,¹ capitalism, and other Western notions of progress or “development”.

Situating the emergence of environmental movements at the start of consumer societies in the West raises the question of whether or not such movements are a “luxury phenomenon” of rich industrialized countries. At the latest since Martinez-Alier’s (2002) groundbreaking work on the environmentalism of the poor, we know that the answer to this is clearly “No”: Martinez-Alier shows convincingly that environmental movements led by the poor already existed at the start of the colonial period and have continued up until the present. These movements have resisted the destruction of their social and ecological foundations due to Western or imperial concepts of development.

Regarding social–environmental movements in so-called developing countries of the Global South, the “spiritual dimension” of people’s view of the environment was already well established, in contrast to Western countries. Indeed, spiritual perspectives on nature formed the bedrock on which social movements of the Global South built their struggles. Among other things, it enabled them to identify capitalist modes of economic development as the root causes of poverty and environmental destruction. Persons and people demonstrating the force and the far-reaching impact of cultural and spiritual motivations and actions can be found throughout global history in many places and moments. Outstanding examples include Mahatma Gandhi from India, Nelson Mandela from South Africa, Thomas Katari or Bartolina Sisa from Bolivia-Peru, Wladimir Sergejewitsch Solowjew from Russia, or recent environmental and sustainability-related accounts of Daoist traditions in China (Miller 2017), etc. In the late 20th century, the increasingly shared concern of Northern and Southern people and nations for the “spiritual dimension of the environment” helped to build a bridge between movements, heightening the relevance of intercultural learning and cooperation among participants on all sides, including the diverse forms of approaching spirituality.

As we will see in the following sections, this open, creative, and critical attitude of social–environmental movements was gradually transformed in parallel to the consolidation and official recognition of the notion of

1 For more on our specific understanding of materialism, see page 15 of this chapter.

sustainable development by governments and influential political actors in civil society.

Notably, in this first phase, concerns about environmental consequences were not seen as an end in itself. On the one hand, environmental movements in the Global North sought to overcome ego-centered, material-growth-oriented lifestyles and economies; on the other hand, environmental movements in the Global South sought to resist the destruction of their socio-ecological and cultural foundations in the name of “modern development”. In both cases, people of these movements viewed humans as holistic living beings, possessing a physical body that harbours life, soul, and spirit. In both the Global North and Global South, early environmentalists sought to harmonize the needs of their body, soul, and spirit with the material and spiritual needs of nature.

Recognition by states

In the late 1980s, the concerns of the era’s social–environmental movements began to resonate with civil society, including political parties, green NGOs, and, in part, religious organizations. In 1987, the UN organized the first World Commission on Environment and Development (WCED). It was the first moment in which governmental representatives from all around the world launched the idea of sustainable development. It was presented as a global economic development trajectory aimed at balancing “the needs of humans and the environment”. The so-called Brundtland Report summarized the key postulates of the WCED. This report provided the often-cited definition of sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED 1987:6).

Official commitments made by many governments to implement novel policies for sustainable development served to inspire numerous critical social–environmental movements to participate in the joint construction of corresponding concepts and strategies with governments, business, and civil society. This process was further enabled by a new openness among UN organizations to work more closely with civil society.

The next landmark conference was the United Nations Conference on Environment and Development (UNCED) in Rio in 1992. It served as a platform for UN bodies to debate – in a rather unique broad-based collaboration with key social actors (e.g., social–environmental movements, academia, politics, and business) – about how to advance toward sustainable development, as proposed in 1987.

Carruthers (2001) took a closer critical look at the rationales behind the declaration of the Rio conference and identified three crucial elements:

- First, by relating environmental degradation to the large number of people still living in poverty, the declaration emphasized economic growth as solution to poverty and stressed poverty eradication over environmental

concerns. Economic growth was represented as a precondition for mitigating poverty and environmental problems. Meanwhile, the fact that environmental problems are not mainly caused by poor people, but rather by the 20% of rich and industrialized countries, was conveniently relegated to the background, avoiding criticism of Western lifestyles embedded in capitalist, industrialized, and consumer-based economies.

- Second, emphasizing the “tradeoff” between trade and environmental protection, the latter was framed as a luxury. According to this logic, environmental protection could be afforded only when higher economic wealth was made available to the large numbers of people still living in relative or absolute poverty. Here, free trade was represented as a precondition for creation of economic growth, entrepreneurship, and competitive markets.
- Third, the Rio Declaration and corresponding action plan framed the biophysical limits to poverty alleviation, economic growth, and free trade as possible to overcome by means of enhanced administrative and technological innovation. In this way, biophysical limitations were not presented in absolute terms, but rather as a relative constraint to economic growth defined in relation to technological innovation and capacity.

In essence, the 1992 Rio conference “erased the line between ‘sustainable development’ and ‘sustained growth’ . . . sustainability had come full circle, back to an essential belief that open-ended growth will lift all boats” (Carruthers 2001:100). Against this background, it becomes clearer how concerns about sustainable development were gradually channeled into a rather neoliberal agenda. As a result, the following UN conferences dealing with sustainable development – in 1997, 2002, and 2012 – framed the challenge as that of reconciling the supposed need for economic growth with ecological and social concerns.

Until the UN conference Rio+20, in 2012, openly critical views about the contradictions between economic growth and biophysical limits were virtually absent. Instead of developing the concept of sustainable development further, policymakers, scientists, and representatives of civil society engaged in broad debates about how to define the most adequate operational objectives and indicators to measure progress toward the – now taken-for-granted – neoliberal understanding of sustainable development. In the conference report – dubbed “The Future We Want” – priority was given to issues like how to develop measurable sustainable development goals (SDGs) on behalf of policies for “green” and growth-oriented economies (United Nations Conference on Sustainable Development 2012).

In the aftermath of the 2012 conference, private and public corporations increasingly collaborated and consolidated their power more directly toward shaping policies, goals, and targets of sustainable development. This was mainly done through the establishment of Public–Private Partnerships (PPP). They served to link national governments and many international

bodies of the UN system closely to transnational companies and other private actors, including NGOs, philanthropic foundations, and think tanks. They committed to define and implement concrete goals and targets of sustainable development in a common agenda. PPPs increased their influence on markets and policies, particularly by managing and steering significant financial flows to NGOs, think tanks, and like-minded governmental bodies (Elsig and Amalric 2008).

Within multilateral organizations, the PPP model went hand in hand with the emerging phenomenon of “philanthrolateralism”. It refers to a new dynamic binding the agenda of sustainable development to the rise of funds flowing from private firms, individuals, and their foundations. In this way, the views and interests of private players enter the national and international policy arenas. Seitz and Martens (2017:46) observed that “private funding runs the risk of turning UN agencies, funds and programs into contractors for bilateral or public-private projects, eroding the multilateral character of the system and undermining democratic global governance”.

Similarly, the trend of “philanthrocapitalism” arose at about the same time. Commonly associated with sectors like education, international development, healthcare, and agriculture, philanthrocapitalism has also gained prominence in the fields of science and sustainable development. Haydon et al. (2021:353), describes this trend as operating mainly through three cultural frames: “(1) development challenges being framed as scientific problems; (2) beneficiaries being framed as productive entrepreneurs; and (3) philanthropy being framed as social investment”.

2030 Agenda: global consolidation of growth-based sustainable development

In 2015, all governments represented in the UN approved a declaration called “Transforming Our World: The 2030 Agenda for Sustainable Development”. Large sections of global civil society, the business community, and religious leaders applauded the 2030 Agenda, which received the endorsement of all UN member states. Given major heterogeneity and asymmetries in the global distribution of human, technological, and natural resources – and equally diverse interests, values, and worldviews – this overwhelming agreement on the 2030 Agenda was indeed a surprising achievement.

A new feature of the 2030 Agenda was definition of 17 sustainable development goals, or SDGs, along with 169 targets and 232 indicators, ostensibly designed to monitor progress toward implementation of the SDGs. The responsibility of the private sector is repeatedly emphasized in many SDGs and targets, mainly in view of the massive investments needed to implement the 2030 Agenda.

The 2030 Agenda is based on the belief that economic growth can be made environmentally sustainable. This will supposedly be made possible by

means of “decoupling” and “resource efficiency” as key technological solutions. However, according to Parrique et al. (2019:4):

The validity of the green growth discourse relies on the assumption of an absolute, permanent, global, large and fast enough decoupling of economic growth from all critical environmental pressures. The literature reviewed clearly shows that *there is no empirical evidence for such a decoupling currently happening*. This is the case for materials, energy, water, greenhouse gases, land, water pollutants, and biodiversity loss for which decoupling is either only relative, and/or observed only temporarily, and/or only locally. In most cases, decoupling is relative. When absolute decoupling occurs, it is observed only during rather short periods of time, concerning only certain resources or forms of impact, for specific locations, and with very small rates of mitigation . . . Considered all together, *the hypothesis that decoupling will allow economic growth to continue without a rise in environmental pressures appears highly compromised, if not clearly unrealistic*.

(emphasis in the original)

A similar critique is made regarding the definition of goals, targets, and indicators. For example, SDG 8 seeks to “Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all”. While essentially social and economic targets and indicators are generally well-defined, “the environmental elements in many targets were not included in indicators, or the indicators lacked ambition, or were watered down” (Elder and Olsen 2019:70). The same authors relate this to a structural difficulty in defining and articulating cross-sectorial indicators that integrate socio-economic and environmental aspects: “Nevertheless, despite expanded stakeholder participation, the fact remained that no one had measured before what many targets sought to capture. Therefore, many indicators could not adequately capture some environmental aspects or integration among the goals” (Elder and Olsen 2019:80).

With the global endorsement of the 2030 Agenda, we face a dilemma. On the one hand, we witness surprisingly high support for the so-called sustainable development, decoupling growth from environmental externalities, and providing a basis for “green growth”. On the other hand, we confront a political agenda which, from a critical scientific perspective, is not consistent or feasible in conceptual, empirical, or political terms.

Moreover, if we compare the concept of sustainable development of the 2030 Agenda with its origins in environmental movements, we must acknowledge that the gap was never wider. Previously fundamental issues that are now glaringly absent include the need to further emancipate people from oppression and domination by economic, political, social, religious, or other power groups and associated mechanisms; efforts to relate environmental issues with

spiritual growth at personal and community levels; and the creation of social and economic forms of life capable of overcoming capitalist or centrally planned state-based exploitation of humans and other beings in nature.

Additional justification for our critical view of the dominant ideas, concepts, and strategies for advancing sustainable development is provided by the completely insufficient progress to date in implementing the SDGs according to the timeline of the 2030 Agenda. It begs the question: What went wrong? Why did sustainability science fail to see that the notion of sustainable development underpinning the 2030 Agenda and the SDGs is virtually impossible to achieve?

Moving backward on implementation of the 2030 agenda and the SDGs

Progress toward implementation of the SDGs has been woefully inadequate, especially considering that there are only seven years remaining until 2030. The “Sustainable Development Goals Report 2022” (United Nations 2022) shows that only three SDGs – concerning well-being for all (health), inclusive and equitable education, and safe and sustainable cities – are still likely to be met by 2030. Three goals show insufficient progress, namely, those aimed at no poverty, gender equality, and access to energy. Alarmingly, very poor progress – or even backward trends – are evidenced regarding 11 SDGs: end hunger; water availability and sanitation; inclusive economic growth; infrastructure and sustainable industrialization; inequality within and among countries; sustainable consumption; combatting climate change; sustainable use of oceans and marine resources; protection of forests and biodiversity; peace and accountable institutions; and global economic partnerships for sustainable development (United Nations 2022).

In their recent volume, Sachs et al. (2022) offer a deep dive into the possible explanations for the sobering lack of progress toward the SDGs. They conclude:

For the second year in a row, the world is no longer making progress on the SDGs. The average SDG Index score slightly declined in 2021, partly due to slow or nonexistent recovery in poor and vulnerable countries. Multiple and overlapping health and security crises have led to a reversal in SDG progress.

Against this background, it becomes clear that the problems of implementation are not specific to just one issue or just one year, but rather represent a concerning trend occurring on various fronts – namely, that of moving *backward*.

At the same time, we witness increasingly extreme inequality in terms of the distribution of wealth and financial resources. In 2021, the poorest half of the global population owned only 2% of global wealth, while the richest 10% of the global population owned 76% of all wealth (Chancel et al. 2022).

What went wrong?

In the search for answers for what went wrong, we first look at the explanations offered by the field of sustainability science. The sustainability science community collaborated extensively with the “Open Working Group”, organized by the UN Division for Sustainable Development (DSD), which was responsible for drafting the text of the SDGs beginning in 2014. We can therefore assume that they had a direct influence on key propositions of the 2030 Agenda.

More of the same

Within the sustainability science community, answers to the question of what went wrong tend to be framed pragmatically. There is little or no critical reflection on the community’s apparent inability to recognize the impossibility of achieving the SDGs, in particular based on the cognitive and epistemological nature of sustainability science itself. Of course, scholars of sustainability science generally recognize that progress toward the 2030 Agenda is insufficient. But rather than critically reviewing the science–policy interactions that birthed the 2030 Agenda, prominent members of this scientific community pin their hopes on swift mobilization of unprecedented levels of funding, peace, diplomacy, and international cooperation in order to overcome delays and reboot the necessary radical transformation of the world (Sachs et al. 2022).

We do not have faith in this “pragmatic”, overly optimistic perspective on sustainable development and its potential to make up for lost time. In the following sections, we therefore seek to shed light on the main features of sustainability science itself. This analysis helps to reveal specific shortcomings of sustainability science that must be addressed to move forward. Overcoming them will also delineate the topical fields that must be considered to transform sustainability science into the broader, more critical and comprehensive field of scientific inquiry; we propose – that is, *critical sustainability sciences*.

Emergence and development of sustainability science

As introduced earlier, the concept of sustainable development has its roots in the social–environmental movements of the 1960s. In the late 1980s, the concerns of these movements finally began receiving attention from certain Western governments. This led to further development of the concept of sustainable development, based on relatively close collaboration between social movements, national governments, UN institutions, and – increasingly – civil society organizations and business actors.

In this historical perspective, it is interesting to note that, despite the plethora of scientific literature on sustainable development published over the years, its core concepts are rooted in the ideas of individuals and groups who had little direct interaction with the sciences. Mitlin (1992) identifies the year 1987, marked by publication of Brundtland report “Our Common

Future”, as the moment when the scientific community began to engage more significantly with topics of sustainable development. The start was made by researchers mainly from natural sciences, but this group was rapidly complemented by social scientists concerned with the “development” side of sustainable development.

From 1987 to 2000, research on sustainable development was mainly subdivided into disciplinary fields, increasingly interacting among themselves through multi- and interdisciplinary coordination. From 2000 to 2006, research on sustainable development was so abundant, and demand from policymakers was so high, that it was granted its own formal space within global academia. Under the name *sustainability science*, this type of research became an institutionalized field of scientific inquiry, consolidating itself with the establishment of the journal *Sustainability Science* in 2006 (Clark and Harley 2019).

But what are the main features, concepts, methods, practices, strengths, and limitations of sustainability science? In the following sections, we offer answers to these questions, helping to cast the contours of sustainability science in sharper relief.

The nature of sustainability science

Sustainability science emphasizes use of concepts, methods, and tools aimed at understanding the links between human societies and the ecosystems in which they are embedded; this is done with a performative goal of promoting sustainable development. Sustainability science is rooted in a rather broad basis of disciplines, often interacting in inter- and transdisciplinary research projects (Clark and Harley 2019). Sustainability science is, not only concerned with scientific theories and concepts, but also situates itself at complex interfaces between academia and actors engaged in influencing policies and politics of “sustainable development”, including governments, social movements, political parties, NGOs, practitioners, think tanks, religious organizations, and a host of private and public corporations.

According to the pioneers of sustainability science (Kates et al. 2001), until the successful establishment of sustainability science in academia, the agenda of sustainable development was mainly a societal and political agenda, much less concerned with the need for empirical evidence. Sustainability scientists have tried to change this with increasing efforts toward collaboration, emerging from international scientific programs, the world academies, and independent networks of scientists (Kates et al. 2001:641).

Further, the authors identify the purpose of sustainability science as that of studying relations between nature and society, taking account of interactions across scales of time and space. Here, natural and social systems are understood as complex, self-organizing systems with high levels of uncertainty. Importantly, it is assumed that social systems belong to natural systems and cannot be considered as separate entities. Based on the high complexity, uncertainty, and “unintended consequences of scientific progress, participatory

procedures involving scientists, stakeholders, advocates, active citizens, and users of knowledge are critically needed” (Kates et al. 2001:641).

According to Kates et al. (2001), sustainability science addresses the following core questions:

- How can the dynamic interactions between nature and society – including lags and inertia – be better incorporated into emerging models and conceptualizations that integrate the Earth system, human development, and sustainability?
- How are long-term trends in environment and development, including consumption and population, reshaping nature–society interactions in ways relevant to sustainability?
- What determines the vulnerability or resilience of the nature–society system in particular kinds of places and for types of ecosystems and human livelihoods?
- Can scientifically meaningful “limits” or “boundaries” be defined that would provide effective warning of conditions beyond which the nature–society systems incur a significantly increased risk of serious degradation?
- What systems of incentive structures – including markets, rules, norms, and scientific information – can most effectively improve social capacity to guide interactions between nature and society toward more sustainable trajectories?
- How can today’s operational systems for monitoring and reporting on environmental and social conditions be integrated or extended to provide more useful guidance for efforts to navigate a transition toward sustainability?
- How can today’s relatively independent activities of research planning, monitoring, assessment, and decision support be better integrated into systems for adaptive management and societal learning (Kates et al. 2001:642)?
- Another feature of sustainability science is that it is “primarily use-inspired, as are agricultural and health sciences, with significant fundamental and applied knowledge components, and commitment to moving such knowledge into societal action” (Kates 2011:19449).

These features of sustainability science remain valid today. In a review of the state-of-the-art and future challenges of sustainability science, Clark and Harley (2019) confirm these dominant themes. However, compared to the initial articulation of sustainability science in 2001, the focus today is slightly broader in terms of two aspects: first, sustainability science situates itself in the concept of the Anthropocene, meaning to consider the issues of uncertainty, adaptation, lack of predictability, and non-linear relations between social and ecological systems; this means, second, that sustainability research involves six key capacities, that is, the capacity to (1) measure sustainable development; (2) promote equity in the pursuit of sustainable development; (3) adapt to shocks and surprises that threaten sustainable development; (4) transform unsustainable pathways of development; (5) link knowledge with action; and

(6) devise governance arrangements that support collective action in view of sustainability (Clark and Harley 2019:3).

Sustainability and the Anthropocene

A second group of scholars dealing with sustainability has sought to go beyond the rather narrow, implicit, and fuzzy epistemological foundations of sustainability science. In recent years, the sustainability sciences have confronted two rather destabilizing concepts. The first is that of the “Anthropocene”, credited to Crutzen (Steffen et al. 2007) in early 2000. The concept refers to a distinct geological epoch marked by humankind’s modification of biogeochemical terrestrial processes to such an extreme extent that radical shifts in the climate, biodiversity, and Earth’s habitability are imminent.

The notion of the Anthropocene became an important reference point, mainly concerning the nature and shape of the so-called planetary boundaries, beginning in 2009. A total of nine – biophysical, and hence natural science based – environmental limits were defined, which, if respected, humanity could safely operate within (Steffen et al. 2015). This concept, extensively detailed and increasingly complemented by sustainability science, received wide recognition in the global community concerned with policies of sustainable development. The main conceptual change introduced by this theory is that of systemic, irreversible human impact on the planet. Prominent proponents of sustainability science integrated the notions of the Anthropocene into a new integrative framework, thought to guide further research on sustainability (Clark and Harley 2019).

Despite its sober analysis, the concept of Anthropocene has been criticized. For example, it implicitly assumes that all humans have the same level of responsibility for today’s socio-environmental problems, when in fact only part of the planet, the industrialized world – particularly the private or state-based capitalist features of these societies – are responsible for the lion’s share of the problems. As a result, some observers prefer calling this new period a “capitalocene” (Moore 2016). At the same time, the concept of the Anthropocene maintains the idea that we can “purposefully manage” the crisis by developing particular capacities, albeit with great concerns about unknowns and the need for ongoing adaptation.

The limitations of current sustainability science

As the previous sections show, without a critical revision of current sustainability science, we risk misusing the massive amounts of money, goodwill, skills, and hopeful expectations of all the dedicated individuals and groups today who are eager to make changes and to change themselves. However, due to the constraints of today’s prevailing systems, progress is not happening. There is an urgent need for critical reflection on the existing shortcomings of sustainability science, as outlined in the following sections.

A growing body of research is examining the weaknesses of sustainability science. These efforts generally come from research fields lying outside sustainability science, including strands of critical thinking rooted in the philosophy of science, intercultural philosophy, critical theory, post-development, decolonial studies, feminism, political economy and ecology, and others.

Among the fundamental critiques of sustainability science, we find five interrelated issues. They concern (1) lack of critical reflection on the ontology that is underpinning sustainability science; (2) insufficient engagement with critical thinking on private or state-based forms of capitalist wealth creation; (3) unreflected methods of knowledge production in contexts of plural world-views; (4) uncritical use of the concept of “development”; and (5) neglect of linking sustainability science with the normative orientations of emancipation, autonomy, and resistance to asymmetric, oppressive power relations.

One reason why such key issues are widely absent in sustainability science concerns the lack of more systematic integration of sociological theories and concepts, for example, relating to social construction, critical realism, structure and agency, historical specificities, and more appropriate conceptualizations of collective action and issues of biocultural diversity (Longo et al. 2021). There is also a lack of integration of key debates on sustainability from other scholars and fields, including the philosophy of science (Nagatsu et al. 2020), post-developmentalism (Shiva 2018). Further, there is a lack of engagement with new notions of development, such as “Living Well”, which go beyond the Western lifestyles associated with the “green economy” (Bell 2016; see also the statements about “Vivir Bien” in Chapter 3), and not enough concern for culturally sensitive notions of development and emancipation (Leff 2015). The latter includes the need to reorganize societal institutions and economic life in view of self-governance, deliberation, and the reinvention of economic activities, shifting from commodified “dead” to de-commodified “living labor” (Bond 2002).

In the following, we review these critical issues of sustainability science. We believe that identifying these limitations can provide a basis for proposing the contours and basic concepts, methods, and practices of a broader field of scientific inquiry that we call *critical sustainability sciences*. Critiquing current notions of sustainability science can enable us to identify the building blocks for our new envisioned field, drawing on relational ontologies; comprehensive research methods that consider the irreducible interactions of material, psychological, and spiritual realms of human life and the lives of other beings; intercultural notions of emancipation; and new forms of societal and economic organization.

Dualist ontology of sustainability science and disregard of critical thinking

The most fundamental critique of sustainability science concerns the lack of elucidating the limitations of its ontological, epistemological, methodological, and normative foundations. With ontology, we refer to the basic assumptions

of any form of knowledge about what exists, prior to human perception. We understand epistemology as the criteria used in different fields of science to define truth claims and related standards of “scientific validity”.

The dualist ontology underpinning sustainability science assumes that we live in a twofold world which is constituted, first, by material objects and their real interactions that exist independent of human perception; and, second, the universe of subjective ideas, concepts, thoughts, and feelings that are only believed to exist in the consciousness of human beings. The two systems are thought to be “coupled”. However, because of the subjective or “socially constructed” character of human knowledge, we cannot know for certain to what degree we are able to capture the objective world as such.

In the context of sustainability science, adherence to a dualist ontology means viewing humans and nature as being separated, into a subjective social world and an objective natural world. Here, the relation between humans and nature is embedded in an anthropocentric worldview, in which nature is seen as instrumental for the creation of wealth and security (Kenter and O’Connor 2022)

West et al. (2020) demonstrate that sustainability science, underpinned by a dualist ontology, assumes a substantialist separation between the social and ecological dimensions of life. This dualist ontology results in the social sciences and humanities emphasizing investigation of the socially constructed, human, subjective world, on the one hand, and the natural sciences emphasizing investigation of the materiality of the supposed objective world, on the other hand. While sustainability science purports to put interaction of “coupled social and ecological systems” at the center of analysis, its scholars have yet to explain on which grounds the two opposing ontologies can be bridged or integrated. This might explain why sustainability science appears to forge ahead in an effort to overcome substantialist positions. Yet its emphasis on “coupled social and natural systems” continues to sustain, perhaps unintendedly, the separation it seeks to repair (West et al. 2020).

The dualist ontologies underpinning today’s prevailing natural and social sciences also imply distinct epistemologies. Regarding the natural sciences, these epistemologies assume replicability, empirical accuracy, statistical significance, predictability, and generality of explanations of phenomena. Regarding the social sciences and humanities, they assume scientific truth claims are based on systematic qualitative research methods, according to one or another theories of interpretation (hermeneutics). Scientific validity is derived from peer-based intersubjective validations of the interpretations made by a given researcher. These peers must be able to logically follow the conceptual chain, linking the human expression that was analyzed – for example, artifacts, written documents, arts, symbolic or religious expressions – with the interpretation made by the researcher. A key objective of social science and the humanities is that of coming to an *understanding* of the world by means of the subjective reasoning of human beings; natural sciences, by contrast, generally aim at *explaining* the world through objective knowledge, codified in natural laws.

Sustainability science assumes the validity of ontology/epistemology of both the social sciences and the natural sciences. In practice, however, because of a failure to articulate the basis upon which the different ontologies are interlinked, sustainability science tends to reproduce a hierarchy, privileging the natural sciences over the social sciences: in the social organization of academia – and even more so in policymaking – the existence and use of “objective” scientific evidence, derived from positivist natural or economic science, is clearly afforded greater weight than the “subjective knowledge” derived from the social sciences and the humanities.

Moreover, in practice, the assumed equal validity of both ontologies often falls apart when inevitably pulled between two different worldviews, namely, materialism – emphasized in the natural sciences – and constructivism or idealism – emphasized in the social sciences and humanities. The natural sciences claim to produce knowledge about the “real” world, made up of matter, fitting easily with materialist worldviews. Today’s more neurologically based materialism basically views the social world of ideas, feelings, and the will as resulting from material biophysical processes of the human body (Roth and Grün 2006).

Materialism is a wide field of different ontological positions that cannot be comprehensively addressed here. According to Bunge (2012), materialism is an ambiguous concept, linked at the same time to moral doctrine, a philosophy, and an entire worldview. Moral materialism is related to hedonism, playing an important role in private or state-based forms of capitalism. Philosophical materialism states that the real world is only composed of matter. From the 19th century on, materialist philosophy was embraced – in a “philosophically naïve” way (Bunge 2012) – by the “modern” natural sciences. This gave rise to a type of “scientific materialism” of natural sciences. This view assumes that all phenomena in the universe, including the human mind, have a material basis, and are therefore subject to the same physical laws, to be uncovered by scientific analysis

In this sense, when we speak of “materialism” – especially in Chapters 1 and 2 – we refer to this specific form of “philosophically naïve” ontological materialism, represented by natural science. Moreover, this type of “scientific materialism” has gained currency in society at large. In particular, this is because it can be easily linked to hedonism (important for the functioning of modern consumerism) and serves the ongoing “naturalizing” of asymmetric power relations and hierarchies, based on our supposed “egoist human nature”. This also serves to turn the “struggle of the fittest” into quasi “natural laws” that cannot be changed.

More recently, this concept of “scientific materialism” and the supposed “unchangeable” nature of human beings have fed into the ideology of transhumanism: it concerns the presumed failures of human beings in addressing the converging socio-ecological and cultural crisis; however, it emphasizes “fixing human nature” by means of new neurological devices, digitalization, and artificial intelligence. However, we agree with Frodeman (2019) that the

idea of “human enhancement” relates human evolution to a set of pathologies that are

rooted in, or a reaction to, the ethos of “more”. It’s a cultural love affair with excess, which is prompted by the libertarian standards of our cultural productions. But the attempt to live at the speed of an electron is destined for failure.

(Frodeman 2019:2)

Problematizing this specific notion of “scientific materialism” does not mean ignoring other important branches of materialist philosophy, for example, as offered by critical theory and its expansion by Karl Marx, Enrique Dussel, or Ernst Bloch, which are indeed part of critical sustainability science, as shown in Chapters 1, 2, 7, and 8. Indeed, critical sustainability science has an ontologically open and evolving character. However, valuing the contributions of critical theories based on philosophical materialism does rule out moving beyond materialism, as shown in Chapter 7 on Ernst Bloch’s thinking (Dietschy 2023). Through the dialogue with relational ontologies, explicitly stating that matter is an expression of immaterial forces, critical sustainability science leaves open the possibility that materialism takes a “cosmosophic turn”; this would mean viewing the material side of things simply as the outer edge of inner forces related to spirituality (see Chapters 3–6 on indigenous ontologies and cosmosophy) or to “living ideas” as shown in Goethean science (see Chapters 12–14).

In modern dualism, the social sciences and humanities are essentially constructivist. This implies that ideas, concepts, values, visions, feelings, and related patterns of action and behavior are seen as subjectively constructed, and the degree to which they are related to an objective reality is regarded as unknowable. In this way, the constructivist ontology shares the view that the natural world is essentially separated from the human world. Social constructivism contrasts with materialism, assuming that a recognized object is socially constructed by the observer through the process of recognition. While constructivism is a diverse field of philosophical inquiry, its various strands generally assume the impossibility of definite knowledge about the relations of the social and natural world.

More recently, limitations of dualist, materialist, and constructivist ontologies in sustainability science – and elsewhere – are increasingly discussed. The tacit ignorance and ambiguity of sustainability science, in dealing with its dualist underpinnings, motivates Nagatsu et al. (2020) to identify three key areas in which philosophers of science can help to overcome the lack of clarity of sustainability science with respect to its cognitive foundations. These key areas concern the clarification of the essentially dualist ontology of sustainability sciences; the implications this has for dealing with epistemological, conceptual, and methodological criteria used for justifying specific truth claims; and the treatment of normative and ethical issues.

Hamilton (2002) offers an excellent analysis of the nature and the implications of the dualism of sustainability science. He reveals the dualist character at its core by distinguishing intuitive and rational knowledge. This results in the marginalization and trivialization of intuitive knowledge, despite its centrality to the inner worlds of human beings, birthing our original relationship to the natural world. According to Hamilton, the rise of the scientific-industrial revolution meant not only banishing intuitive knowledge, but also making instrumental scientific rationality the basis of modern development – replicated in sustainability science.

Meanwhile, the transition from intuitive to rational scientific knowledge meant shifting from a participating to a non-participating consciousness, heralding new modes “of self-awareness, an isolated ego existing ‘inside’ the body, and an acute psychological loss. The consciousness of non-participation meant that the natural world was now seen as essentially dead. It could therefore be exploited for the material benefit of humans” (Hamilton 2002:89).

As pointed out in the foreword of this book by Vandana Shiva (2024), the separation of humans from nature has given rise to what she calls “eco-apartheid”. This phenomenon originated in

the minds of the powerful. Its contemporary seeds were sown when the living Earth was transformed into dead matter to facilitate the industrial revolution. Reductionism replaced holism, monocultures replaced diversity and complexity, “raw material” and “dead matter” replaced a constantly renewing and vibrant Earth. As the dominant neoliberal paradigm and capitalist worldview take over the minds of governments and citizens, we give up our sovereignty and freedoms in the name of “growth”, of “progress”, of “development”. Those who have no illusions of growth and development are the communities whose land and forests, water and biodiversity are grabbed for corporate profits, whose very sustenance is destroyed in a massive, global resource grab.

(Shiva 2013:2)

Eco-apartheid is closely associated with two other macro-tendencies. On the one hand, it refers to the rise of authoritarian capitalism in the 21st century (Bloom 2016). This author points to a growing number of people adhering to the idea that authoritarian rule is required for ensuring the survival of modern forms of capitalism. This thinking is essentially based in

an appeal to an array of affective political fantasies. Here concrete policies of privatization and corporate-led development are linked appealing narratives of progress directly championing explicitly authoritarian regimes as well as the authoritarian policies of otherwise conserved democratic governments.

(Bloom 2016:vi)

On the other hand, it refers to the rise of ecologically motivated authoritarianism or the “coming authoritarian ecology” (Flipo 2018). This strand of thinking had flourished during the 1970s; under the banner of “neo-Malthusianism”, scientists and politicians were claiming

that governments should not act as central planners but should nevertheless be granted to carry out public programs and to intervene in the personal and economic activities of citizens, without having to abide by limitations emerging from citizens’ private and democratic rights.

(Shahar 2015:346–347)

This discourse was losing force, with the collapse of the Soviet Union. But more recently, it reemerged in the shape of modern-day China, from where it slowly moves also into societies, considered as liberal democracies (Beeson 2010). Trends toward eco-authoritarian thinking are appearing in several domains of environmental policies, for example, related to the “fortress conservation of biodiversity” (Pemunta 2019), the so-called nature-based solutions in managing climate change in sustainable development (Mabon et al. 2022), or works linking the failures in tackling climate change with “the failure of democracy” (Shearman and Wayne Smith 2007).

Against this background, it becomes clear that the biggest challenge facing sustainability science today is the question of how to shift away from dualist ontologies and move on toward meaningful engagement with relational ontologies. The latter is at the center of non-dualist, holistic worldviews and can be integrated into sustainability science by means of engagement with various long-running strands of critical thinking in the social sciences and humanities. This will contribute to finding creative ways of transforming the ontological and epistemic “monoculture of the mind” of sustainability science, which is echoing “modern” sciences, through the development of *critical sustainability sciences*.

In the following chapters of this book, we demonstrate that this is not only possible, but also highly rewarding. In Chapter 2, we summarize key areas or “building blocks” for the construction of *critical sustainably sciences*. These key areas essentially concern the need for engagement with the long and rich tradition of critical thinking, hitherto neglected by mainstream sustainability science. Specifically, we demonstrate how engagement with relational ontologies, ideas of emancipation and autonomy, intra- and intercultural dialogues, political economy, and ecology can help to overcome various limitations of sustainability sciences.

Given the importance of engaging with relational ontologies, in Chapters 3–5, authors from Bolivia, India, and Africa, respectively, present the key features of the diverse relational ontologies that constitute their lifeworlds and sociocultural practices. The authors also reflect on the conditions under which these ontologies could be engaged with, and the contributions they might make to *critical sustainability sciences*.

In Chapters 6–14, we further explore key issues of *critical sustainability sciences*. Chapter 6 presents basic ideas of a cosmosophy that could orient the integration of core elements resulting from intercultural dialogues between dualist and relational ontologies. Chapter 7 expands on the prospect of a cosmosophical turn in the sustainability sciences. The author presents novel ideas for rethinking sustainability in terms of a “nature alliance”, drawing on intercultural philosophy, post-development, and decolonial thinking. Chapters 8 and 9 introduce innovative ways for social movements to overcome the fictitious commodity character of labor. Chapters 10 and 11 demonstrate how struggles for “real food” in Brazil and the emancipatory concepts of agroecology build a food-, health-, and nutrition-related core of *critical sustainability sciences*, gaining expression in social movements, emancipatory sciences, and practices.

Finally, Chapters 12 and 13 present novel ways of incorporating relational ontologies and corresponding epistemologies. They serve the construction of *critical sustainability sciences* by developing key features of non-dualist – that is, *relational* – natural and social sciences. Chapter 14 presents a novel radical critique and creative expansion of the tripolar model of sustainability. It shows how relational thinking could help reorganize our societies, considering the threefold nature of a living cosmos, in which human and non-human beings are seen as possessing matter, soul, and spirit. In this perspective, societal organization would benefit from three semi-autonomous, self-determined, but interrelated realms of life: a cultural or spiritual realm of life, based on individual freedom (including creative pursuits, the arts, education, science, healthcare and medicine, media, religion, spirituality); an associative economic realm of life, based on collaboration and fraternity; and a legal realm of life, guaranteeing equality of all people, based on democratically determined political, social, and cultural rights.

References

- Beeson, M., 2010. The coming of environmental authoritarianism. *Environmental Politics*, 19(2), 276–294.
- Bell, K., 2016. Green economy or living well? Assessing divergent paradigms for equitable eco-social transition in South Korea and Bolivia. *Journal of Political Ecology*, 23, 71–92.
- Bloom, P., 2016. *Authoritarian Capitalism in the Age of Globalization*. Glos: Edward Elgar Publishing.
- Bond, P., 2002. ‘Something for Nothing’ in the Discourses of ‘Sustainable Development’. Paper presented to the Eighth Critical Methods Conference, Unisa Sunnyside Campus, Pretoria, September 5, 2002, Club of Rome.
- Bunge, M., 2012. *Scientific Materialism*. Dordrecht: D. Reidel Publishing Company.
- Carruthers, D., 2001. From opposition to orthodoxy: The remaking of sustainable development. *Journal of Third World Studies*, 18(2), 93–112.
- Carson, R., 2015. *Silent Spring*. Routledge (originally published in 1962). Greenwich, CT: Fawcett Publications, Inc.

- Chancel, L., Piketty, T., and Saez, E., 2022. *World Inequality Report 2022*. Cambridge, MA: Harvard University Press.
- Clark, W., and Harley, A., 2019. *Sustainability Science: Towards a Synthesis*. Sustainability Science Program Working Paper 2019-01, John F. Kennedy School of Government, Harvard University, Cambridge, MA.
- Devall, B., 1980. The deep ecology movement. *Natural Resources Journal*, 20, 299.
- Dietschy, B., 2023. Towards a “nature alliance” – Why sustainability must be rethought in terms of relationality. In: Rist, S., Bottazzi, P., and Jacobi, J., eds. *Critical Sustainability Sciences: Intercultural and Emancipatory Perspectives*. London: Routledge.
- Elder, M., and Olsen, S. H., 2019. The design of environmental priorities in the SDGs. *Global Policy*, 10, 70–82.
- Elsig, M., and Amalric, F., 2008. Business and public – private partnerships for sustainability: Beyond corporate social responsibility? *Global society*, 22(3), 387–404.
- Flipo, F., 2018. *The Coming Authoritarian Ecology*. Hoboken, NJ: Wiley.
- Frodeman, R., 2019. *Transhumanism, Nature, and the Ends of Science*. London: Routledge.
- Galtung, J., 1973. ‘The limits to growth’ and class politics. *Journal of Peace Research*, 10(1–2), 101–114.
- Galtung, J., 1986. Towards a new economics: On the theory and practice of self-reliance. In: *The Living Economy: A New Economics in the Making*. London: Routledge.
- Hamilton, C., 2002. Dualism and sustainability. *Ecological Economics*, 42(1–2), 89–99.
- Haydon, S., Jung, T., and Russell, S., 2021. ‘You’ve been framed’: A critical review of academic discourse on philanthrocapitalism. *International Journal of Management Reviews*, 23(3), 353–375.
- Kates, R. W., 2011. What kind of a science is sustainability science? *Proceedings of the National Academy of Sciences*, 108(49), 19449–19450.
- Kates, R. W., et al., 2001. Sustainability science. *Science*, 292(5517), 641–642.
- Kenter, J. O., and O’Connor, S., 2022. The life framework of values and living as nature; towards a full recognition of holistic and relational ontologies. *Sustainability Science*, 17(6), 2529–2542.
- Leff, E., 2015. Encountering political ecology: Epistemology and emancipation. In: *The International Handbook of Political Ecology*. Cheltenham: Edward Elgar Publishing, 44–56.
- Longo, S. B., et al., 2021. Sociology for sustainability science. *Discover Sustainability*, 2(1), 1–14.
- Mabon, L., et al., 2022. Whose knowledge counts in nature-based solutions? Understanding epistemic justice for nature-based solutions through a multi-city comparison across Europe and Asia. *Environmental Science & Policy*, 136, 652–664.
- Martinez-Alier, J., 2002. *The Environmentalism of the Poor: A Study of Ecological Conflicts and Valuation*. Northampton, MA: Edward Elgar Publishing.
- Meadows, D., 1972. *The Limits to Growth; a Report for the Club of Rome’s Project on the Predicament of Mankind*. New York: Universe Books.
- Miller, J., 2017. *China’s Green Religion: Daoism and the Quest for a Sustainable Future*. New York, NY: Columbia University Press.
- Mitlin, D., 1992. Sustainable development: A guide to the literature. *Environment and Urbanization*, 4(1), 111–124.
- Moore, J. W., 2016. *Anthropocene or Capitalocene?: Nature, History, and the Crisis of Capitalism*. Vestal, NY: Binghamton University—SUNY, PM Press.
- Naess, A., 1973. The shallow and the deep, long-range ecology movement. A summary. *Inquiry*, 16(1–4), 95–100.

- Nagatsu, M., et al., 2020. Philosophy of science for sustainability science. *Sustainability Science*, 1–11.
- Parrique, T., et al., 2019. Decoupling debunked. *Evidence and Arguments Against Green Growth as a Sole Strategy for Sustainability. A Study Edited by the European Environment Bureau EEB*. Available from: <https://www.almendron.com/tribuna/wp-content/uploads/2019/11/decoupling-debunked.pdf> (Accessed 12 April 2023).
- Pemunta, N. V., 2019. Fortress conservation, wildlife legislation and the Baka Pygmies of southeast Cameroon. *GeoJournal*, 84(4), 1035–1055.
- Roth, G., and Grün, K.-J., 2006. *Das Gehirn und seine Freiheit: Beiträge zur neurowissenschaftlichen Grundlegung der Philosophie*. Göttingen: Vandenhoeck & Ruprecht.
- Sachs, J., et al., 2022. *Sustainable Development Report 2022*. Cambridge: Cambridge University Press.
- Seitz, K., and Martens, J., 2017. Philanthrolateralism: Private funding and corporate influence in the United Nations. *Global Policy*, 8, 46–50.
- Shahar, D. C., 2015. Rejecting eco-authoritarianism, again. *Environmental Values*, 24(3), 345–366.
- Shearman, D., and Wayne Smith, J., 2007. *The Climate Change Challenge and the Failure of Democracy*. Santa Barbara, CA: Praeger.
- Shiva, V., 2013. From eco-apartheid to earth democracy. In: *Yes Naturally: How Art Saves the World*, Netherlands: Niet Normaal Foundation, 94–99.
- Shiva, V., 2018. Development, ecology, and women. In: *Living with Contradictions*. London, Routledge, 658–666.
- Shiva, V., 2024, Forword. In: Rist, S., Bottazzi, P., and Jacobi, J., eds. *Critical Sustainability Sciences: Intercultural and Emancipatory Perspectives*. London: Routledge, x–xvi.
- Spretnak, C., 1986. *The Spiritual Dimension of Green Politics*. Santa Fe: Bear & Company.
- Steffen, W., Crutzen, P. J., and McNeill, J. R., 2007. The anthropocene: Are humans now overwhelming the great forces of nature. *AMBIO: A Journal of the Human Environment*, 36(8), 614–621.
- Steffen, W., et al., 2015. Planetary boundaries: Guiding human development on a changing planet. *Science*, 347(6223), 1259855.
- United Nations, 2022. *The Sustainable Development Goals Report*. Available from: <https://unstats.un.org/sdgs/report/2022/The-Sustainable-Development-Goals-Report-2022.pdf> (Accessed 12 April 2023).
- United Nations Conference on Sustainable Development, 2012. *Declaration of Rio – The Future We Want. Outcome document*. Rio de Janeiro, Brazil.
- West, S., et al., 2020. A relational turn for sustainability science? Relational thinking, leverage points and transformations. *Ecosystems and People*, 16(1), 304–325.
- Wilbur, A., 2013. Growing a radical ruralism: Back-to-the-land as practice and ideal. *Geography Compass*, 7(2), 149–160.
- World Conference on Environment and Development (WCED), 1987. *Report of the World Commission on Environment and Development: Our Common Future*. United Nations, New York.

Why do we need critical sustainability sciences?

- Beeson, M. , 2010. The coming of environmental authoritarianism. *Environmental Politics*, 19(2), 276–294.
- Bell, K. , 2016. Green economy or living well? Assessing divergent paradigms for equitable eco-social transition in South Korea and Bolivia. *Journal of Political Ecology*, 23, 71–92.
- Bloom, P. , 2016. *Authoritarian Capitalism in the Age of Globalization*. Glos: Edward Elgar Publishing.
- Bond, P. , 2002. 'Something for Nothing' in the Discourses of 'Sustainable Development'. Paper presented to the Eighth Critical Methods Conference, Unisa Sunnyside Campus, Pretoria, September 5, 2002, Club of Rome.
- Bunge, M. , 2012 . *Scientific Materialism*. Dordrecht: D. Reidel Publishing Company.
- Carruthers, D. , 2001. From opposition to orthodoxy: The remaking of sustainable development. *Journal of Third World Studies*, 18(2), 93–112.
- Carson, R. , 2015. *Silent Spring*. Routledge (originally published in 1962). Greenwich, CT: Fawcett Publications, Inc.
- Chancel, L. , Piketty, T. , and Saez, E. , 2022. *World Inequality Report 2022*. Cambridge, MA: Harvard University Press.
- Clark, W. , and Harley, A. , 2019. *Sustainability Science: Towards a Synthesis*. Sustainability Science Program Working Paper 2019–01, John F. Kennedy School of Government, Harvard University, Cambridge, MA.
- Devall, B. , 1980. The deep ecology movement. *Natural Resources Journal*, 20, 299.
- Dietschy, B. , 2023. Towards a “nature alliance” – Why sustainability must be rethought in terms of relationality. In: Rist, S. , Bottazzi, P. , and Jacobi, J. , eds. *Critical Sustainability Sciences: Intercultural and Emancipatory Perspectives*. London: Routledge.
- Elder, M. , and Olsen, S. H. , 2019. The design of environmental priorities in the SDG s. *Global Policy*, 10, 70–82.
- Elsig, M. , and Amalric, F. , 2008. Business and public – private partnerships for sustainability: Beyond corporate social responsibility? *Global society*, 22(3), 387–404.
- Flipo, F. , 2018. *The Coming Authoritarian Ecology*. Hoboken, NJ: Wiley.
- Frodeman, R. , 2019. *Transhumanism, Nature, and the Ends of Science*. London: Routledge.
- Galtung, J. , 1973. 'The limits to growth' and class politics. *Journal of Peace Research*, 10(1–2), 101–114.
- Galtung, J. , 1986. Towards a new economics: On the theory and practice of self-reliance. In: *The Living Economy: A New Economics in the Making*. London: Routledge.
- Hamilton, C. , 2002. Dualism and sustainability. *Ecological Economics*, 42(1–2), 89–99.
- Haydon, S. , Jung, T. , and Russell, S. , 2021. 'You've been framed': A critical review of academic discourse on philanthrocapitalism. *International Journal of Management Reviews*, 23(3), 353–375.
- Kates, R. W. , 2011. What kind of a science is sustainability science? *Proceedings of the National Academy of Sciences*, 108(49), 19449–19450.
- Kates, R. W. , 2001. Sustainability science. *Science*, 292(5517), 641–642.
- Kenter, J. O. , and O'Connor, S. , 2022. The life framework of values and living as nature; towards a full recognition of holistic and relational ontologies. *Sustainability Science*, 17(6), 2529–2542.
- Leff, E. , 2015. Encountering political ecology: Epistemology and emancipation. In: *The International Handbook of Political Ecology*. Cheltenham: Edward Elgar Publishing, 44–56.
- Longo, S. B. , 2021. Sociology for sustainability science. *Discover Sustainability*, 2(1), 1–14.
- Mabon, L. , 2022. Whose knowledge counts in nature-based solutions? Understanding epistemic justice for nature-based solutions through a multi-city comparison across Europe and Asia. *Environmental Science & Policy*, 136, 652–664.
- Martinez-Alier, J. , 2002. *The Environmentalism of the Poor: A Study of Ecological Conflicts and Valuation*. Northampton, MA: Edward Elgar Publishing.
- Meadows, D. , 1972. *The Limits to Growth; a Report for the Club of Rome's Project on the Predicament of Mankind*. New York: Universe Books.
- Miller, J. , 2017. *China's Green Religion: Daoism and the Quest for a Sustainable Future*. New York, NY: Columbia University Press.

- Mitlin, D. , 1992. Sustainable development: A guide to the literature. *Environment and Urbanization*, 4(1), 111–124.
- Moore, J. W. , 2016. *Anthropocene or Capitalocene?: Nature, History, and the Crisis of Capitalism*. Vestal, NY: Binghamton University—SUNY, PM Press.
- Naess, A. , 1973. The shallow and the deep, long-range ecology movement. A summary. *Inquiry*, 16(1–4), 95–100.
- Nagatsu, M. , 2020. Philosophy of science for sustainability science. *Sustainability Science*, 1–11.
- Parrique, T. , 2019. Decoupling debunked. Evidence and Arguments Against Green Growth as a Sole Strategy for Sustainability. A Study Edited by the European Environment Bureau EEB. Available from: <https://www.almendron.com/tribuna/wp-content/uploads/2019/11/decoupling-debunked.pdf> (Accessed 12 April 2023).
- Pemunta, N. V. , 2019. Fortress conservation, wildlife legislation and the Baka Pygmies of southeast Cameroon. *GeoJournal*, 84(4), 1035–1055.
- Roth, G. , and Grün, K.-J. , 2006. *Das Gehirn und seine Freiheit: Beiträge zur neurowissenschaftlichen Grundlegung der Philosophie*. Göttingen: Vandenhoeck & Ruprecht.
- Sachs, J. , 2022. *Sustainable Development Report 2022*. Cambridge: Cambridge University Press.
- Seitz, K. , and Martens, J. , 2017. Philanthrolateralism: Private funding and corporate influence in the United Nations. *Global Policy*, 8, 46–50.
- Shahar, D. C. , 2015. Rejecting eco-authoritarianism, again. *Environmental Values*, 24(3), 345–366.
- Shearman, D. , and Wayne Smith, J. , 2007. *The Climate Change Challenge and the Failure of Democracy*. Santa Barbara, CA: Praeger.
- Shiva, V. , 2013. From eco-apartheid to earth democracy. In: *Yes Naturally: How Art Saves the World*, Netherlands: Niet Normaal Foundation, 94–99.
- Shiva, V. , 2018. Development, ecology, and women. In: *Living with Contradictions*. London, Routledge, 658–666.
- Shiva, V. , 2024. Forword. In: Rist, S. , Bottazzi, P. , and Jacobi, J. , eds. *Critical Sustainability Sciences: Intercultural and Emancipatory Perspectives*. London: Routledge x–xvi.
- Spretnak, C. , 1986. *The Spiritual Dimension of Green Politics*. Santa Fe: Bear & Company.
- Steffen, W. , Crutzen, P. J. , and McNeill, J. R. , 2007. The anthropocene: Are humans now overwhelming the great forces of nature. *AMBIO: A Journal of the Human Environment*, 36(8), 614–621.
- Steffen, W. , 2015. Planetary boundaries: Guiding human development on a changing planet. *Science*, 347(6223), 1259855.
- United Nations , 2022. *The Sustainable Development Goals Report*. Available from: <https://unstats.un.org/sdgs/report/2022/The-Sustainable-Development-Goals-Report-2022.pdf> (Accessed 12 April 2023).
- United Nations Conference on Sustainable Development , 2012. *Declaration of Rio – The Future We Want*. Outcome document. Rio de Janeiro, Brazil.
- West, S. , 2020. A relational turn for sustainability science? Relational thinking, leverage points and transformations. *Ecosystems and People*, 16(1), 304–325.
- Wilbur, A. , 2013. Growing a radical ruralism: Back-to-the-land as practice and ideal. *Geography Compass*, 7(2), 149–160.
- World Conference on Environment and Development (WCED) , 1987. *Report of the World Commission on Environment and Development: Our Common Future*. United Nations, New York.

Key areas for critical sustainability sciences

- Asher, K. , and Wainwright, J. , 2019. After post-development: On capitalism, difference, and representation. *Antipode*, 51(1), 25–44.
- Becci, I. , Monnot, C. , and Wernli, B. , 2021. Sensing ‘Subtle Spirituality’ among environmentalists: A Swiss study. *Journal for the Study of Religion, Nature & Culture*, 15(3).

- Bertelsen, B. E. , and Bendixsen, S. , 2016. Recalibrating alterity, difference, ontology: Anthropological engagements with human and non-human worlds. In: *Critical Anthropological Engagements in Human Alterity and Difference*. Cham, Switzerland: Palmgrave McMillan, Springer, 1–40.
- Blaser, M. , 2009. Political ontology. *Cultural Studies*, 23(5–6), 873–896.
- Boff, L. , 2011. *Ecología: grito de la tierra, grito de los pobres*. Trotta Madrid, Traducido: Herranz, Juan Carlos Rodríguez.
- Bohman, J. , 2005. Critical theory [online]. In: Zalta, E. N. , ed. *The Stanford Encyclopedia of Philosophy* (Spring 2021 ed.). <https://plato.stanford.edu/archives/spr2021/entries/critical-theory/> (Accessed 12.12.2022).
- Boltanski, L. , 2011. *On Critique: A Sociology of Emancipation*. Malden, MA: Polity.
- Brook, I. , 2021. A new science from a historical figure: Goethe as holistic scientist. In: *Subtle Agroecologies*. New York, NY: CRC Press, Taylor & Francis, 71–79.
- Bulle, R. J. , 1995. Environmentalism and human emancipation. In: *Social Movements*. London: Palgrave Macmillan, 309–328.
- Caldas, M. M. , 2015. Endogenizing culture in sustainability science research and policy. *Proceedings of the National Academy of Sciences*, 112(27), 8157–8159.
- De Castro, E. B. V. , 2003. After-Dinner Speech Given at Anthropology and Science, the 5th Decennial Conference of the Association of Social Anthropologists of the UK and Commonwealth. Department of Social Anthropology, University of Manchester.
- Choquehuanca Céspedes, D. , and Rist, S. , 2024. The great disruption – A culture that understands that everything is interrelated, that nothing is divided, and nothing is outside. In: Rist, S. , Bottazzi, P. , and Jacobi, J. , eds. *Critical Sustainability Sciences: Intercultural and Emancipatory Perspectives*. London: Routledge.
- Delgado, F. , 2012. Knowledge dialogues for sustainable endogenous development: Reforming higher education and research in Bolivia. In: Haverkort, B. , eds. *Towards Co-Creation of Sciences. Building on the Plurality of Worldviews, Values and Methods in Different Knowledge Communities*. Bangalore: CAPUTRED, IAMI, UDS, UMSS. Nimby Books, India, 186–233.
- Dietschy, B. , 2015. *Hacia una ecología de saberes¿ Cómo superar el colonialismo epistemológico? Pasos*, 166, 20–30.
- Doyle, T. , and Doherty, B. , 2006. Green public spheres and the green governance state: The politics of emancipation and ecological conditionality. *Environmental Politics*, 15(5), 881–892.
- Dussel, E. , 2011. *Filosofía de la liberación*. Mexico City: Fondo de cultura económica.
- Escobar, A. , 2016. Thinking-feeling with the Earth: Territorial struggles and the ontological dimension of the epistemologies of the South. *AIBR. Revista de Antropología Iberoamericana*, 11(1).
- Esteva, G. , 2019. Autonomy. In: Kothari, A. , eds. *Pluriverse: A Post-Development Dictionary*. Delhi, India: Tulika Books and Authorsupfront, 99–102.
- Fraser, N. , and Jaeggi, R. , 2018. *Capitalism: A Conversation in Critical Theory*. Cambridge: Polity, John Wiley & Sons.
- Gambon, H. , and Bottazzi, P. , 2021. The political ontology of protected area co-management: Worlding and nature perceptions among stakeholders. *Journal of Political Ecology*, 28(1), 646–662.
- Gottschlich, D. , and Bellina, L. , 2017. Environmental justice and care: Critical emancipatory contributions to sustainability discourse. *Agriculture and Human Values*, 34(4), 941–953.
- Grindsted, T. S. , 2018. Geoscience and sustainability – In between keywords and buzzwords. *Geoforum*, 91, 57–60.
- Hamilton, C. , 2002. Dualism and sustainability. *Ecological Economics*, 42(1–2), 89–99.
- Kohler, F. , 2019. Embracing diverse worldviews to share planet Earth. *Conservation Biology*, 33(5), 1014–1022.
- Kothari, A. , eds., 2019. *Pluriverse: A Post-Development Dictionary*. Delhi, India: Tulika Books and Authorsupfront.
- Leff, E. , 2015. Encountering political ecology: Epistemology and emancipation. In: *The International Handbook of Political Ecology*. Cheltenham: Edward Elgar Publishing, 44–56.
- Luke, T. W. 2005. Neither sustainable nor development: Reconsidering sustainability in development. *Sustainable Development*, 13(4), 228–238.
- Menton, M. , 2020. Environmental justice and the SDGs: From synergies to gaps and contradictions. *Sustainability Science*, 15(6), 1621–1636.

- Millar, D. , Santuah, N. , and Ba-An, M. , 2024. Cosmovisions and critical sustainability sciences – an African ontology of “Vurr” (an energy) amongst the Dagara of Southwest Burkina Faso and Northwest Ghana. In: Rist, S. , Bottazzi, P. , and Jacobi, J. , eds. *Critical Sustainability Sciences: Intercultural and Emancipatory Perspectives*. London: Routledge.
- Moser, K. , 2018. Rethinking the essence of human and other-than-human communication in the anthropocene epoch: A biosemiotic interpretation of Edgar Morin's “complex thought”. *Humanities*, 7(2), 57.
- Munter, K. D. , and Note, N. , 2009. *Cosmopraxis and contextualising among the contemporary Aymara*. In: *Worldviews and Cultures*. Frankfurt: Springer, 87–102.
- Nandy, A. , 1988. *Science, Hegemony and Violence: A Requiem for Modernity*. Delhi: Oxford University Press.
- Odora Hoppers, C. , 2021. Research on Indigenous knowledge systems: The search for cognitive justice. *International Journal of Lifelong Education*, 40(4), 310–327.
- Pohl, C. , 2010. Researchers' roles in knowledge co-production: experience from sustainability research in Kenya, Switzerland, Bolivia and Nepal. *Science and Public Policy*, 37(4), 267–281.
- Rist, S. , and Dahdouh-Guebas, F. , 2006. Ethnoscience – A step towards the integration of scientific and non-scientific forms of knowledge in the management of natural resources for the future. *Environment, Development and Sustainability*, 8(4), 467–493.
- Rist, S. , 2011. Endogenous knowledge: Implications for sustainable development. In: Wiesmann, U. , Hurni, H. , and with an international group of co-editors , eds. *Research for Sustainable Development: Foundations, Experiences, and Perspectives. Perspectives of the Swiss National Centre of Competence in Research (NCCR) North-South*. Berne: University of Bern, Bern, Switzerland: Geographica Bernensia, 119–146.
- Ruwhiu, D. , 2022. Enhancing the sustainability science agenda through Indigenous methodology. *Sustainability Science*, 17(2), 403–414.
- Shankar, D. , 2024. Relational Ontologies in health sciences and practices in India. In: Rist, S. , Bottazzi, P. , and Jacobi, J. , eds. *Critical Sustainability Sciences: Intercultural and Emancipatory Perspectives*. London: Routledge.
- Shiva, V. , 2001. *Monocultures of the mind. Creative Management and Development*, 199.
- Shiva, V. , 2019. *ONENESS vs the 1%: Shattering Illusions, Seeding Freedom*. New Internationalist.
- Siena, S. D. , 2005. *Cosmosophy. World Futures*, 61(6), 409–440.
- Spivak, C. , 1988. *Can the Subaltern Speak? Marxism and the Interpretation of Culture*. Urbana: University of Illinois Press.
- Telleria, J. , and Garcia-Arias, J. , 2022. The fantasmatic narrative of ‘sustainable development’. A political analysis of the 2030 global development agenda. *Environment and Planning C: Politics and Space*, 40(1), 241–259.
- West, S. , 2020. A relational turn for sustainability science? Relational thinking, leverage points and transformations. *Ecosystems and People*, 16(1), 304–325.

A culture that understands that everything is interrelated, that nothing is divided, and nothing is outside

- Choquehuanca Céspedes, D. , 2016. Presentación. In: Delgado, F. , and Rist, S. , eds. *Ciencias, diálogo de saberes y transdisciplinariedad. Aportes teórico-metodológicos para la sustentabilidad alimentaria y del desarrollo*. La Paz, Bolivia: CLACSO, AGRUCO-UMSS, CDE University of Berne, 13–16.
- Choquehuanca Céspedes, D. , 2017. *Manifiesto del Vivir Bien. Our World is Possible*. La Paz, Bolivia: Cancillería del Estado Plurinational State of Bolivia.
- Choquehuanca Céspedes, D. , 2020. *Speech of Assumption of the Vice Presidency of the Plurinational State of Bolivia. La Paz: Vicepresidency of the Plurinational State of Bolivia*.
- Dürr, H. P. , 2009. *Warum es ums Ganze geht: Neues Denken für eine Welt im Umbruch [Why Everything is at Stake: New Thinking for a Changing World]*. München: oekom Verlag.
- Escobar, A. , 2016. Thinking-feeling with the Earth: Territorial struggles and the ontological dimension of the epistemologies of the South. *Revista de Antropología Iberoamericana*, 11(1), 11–32.

Fals Borda, O. , and Moncayo, V. M. , 2009. Una sociología sentipensante para América Latina. Bogotá: CLACSO, e-libro, Corp.

Juan de Santa Cruz Pachacuti Yamqui Salcamaygua , 1613. Relación de las Antigüedades de Este Reino del Perú (1613): Cosmology of the IncaJuan Santa Cruz Pachacuti. Source: Public domain, via Wikimedia: Commons, https://commons.wikimedia.org/wiki/File:Santa_Cruz_Pachacuti_Yamqui_es.gif#/media/File:Santa_Cruz_Pachacuti_Yamqui_es.gif (Accessed 15.12.2022).

Quiroga Canaviri, León J. , and Zaiduni Salazar, Eduardo M. , 2022. La métrica del vivir bien: Construcción de un índice de reconciliación y equilibrio. *Revista Enfoques*, 6(21), 79–105.

Siena, S. D. , 2005. *Cosmophy. World Futures*, 61(6), 409–440.

Relational ontologies in health sciences and practices in India

Bhore, J. , 1946. Indigenous systems of medicine. In: Bhore, J. , ed. Report of the Health Survey and Development Committee ('Bhore Committee Report'). Delhi: Govt. of India Press

Charaka , n.d. Charaka Samhita. Varanasi, India: Chowkhamba Publication.

Charaka , n.d. Vimana sthana (Cs.vl.6.4) (tatra vyādhayō' aparisañkhyēyā bhavanti). In: Acharya, Y. T. , ed. Charaka Samhita. Varanasi, India: Chaukhamba Prakashan.

Crawford, D. G. , 1901. Notes on the history of the Bengal medical service. *The Indian Medical Gazette*, 36(1), 1.

Darshan Shankar, A. 2021. Roadmap for Ayurveda education in modern India. In: Sarangapani, P. M. , and Pappu, R. , eds. *Handbook of Education Systems in South Asia*. Singapore: Springer.

Darshan Shankar , 2022. Breaking silos: Can the emerging field of Ayurvedic biology contribute to the advancement of Indian health science. *Current Science*, 122(3).

Darshan Shankar, Vijay B , Singh, G. , Vishnuprasad, C. N. , Godbole, A. , and Kumar, S. , 2022. Breaking silos: Can the emerging field of Ayurvedic biology contribute to the advancement of Indian health science. *Current Science*, 122(3).

Darshan Shankar . The Unfinished Agenda of Modernization. In: Claude Alvares , editor. *Multicultural Knowledge and the University* [Internet]. Other India Press; 2014 [Cited 2022 Feb 17]. p. 120–127. Available from: <https://otherindiabookstore.com/books/1-multicultural-knowledge-and-the-university> (Accessed 12 April 2023).

Deutsche Nationalbibliothek, Dharampal , 1971. Indian Science and Technology in the Eighteenth Century: Some contemporary European Accounts. Other India Press Mapusa 403 507 Goa, India Available from: <https://shikshantar.org/sites/default/files/PDF/1DharampalJiCollectedWritings-Indian-science-and-technology.pdf> (Accessed 12 April 2023).

Escobar, A. , 2016. Thinking-feeling with the Earth: Territorial struggles and the ontological dimension of the epistemologies of the South. *AIBR Revista de Antropología Iberoamericana*, 11(1), 11–32.

FRLHT and NMPB , 2010. Indian Medicinal Plants Database [online]. <http://medicinalplants.in/> (Accessed 17.12.2021).

Hankey, A. , 2005. CAM modalities can stimulate advances in theoretical biology. *Evidence-Based Complementary and Alternative Medicine: eCAM*, 2(1), 5–12.

Harari, Y. , 2015. *Sapiens: A Brief History of Humankind*. Random House UK, Penguin (Vintage).

Hopkins, A. L. , 2008. Network pharmacology: The next paradigm in drug discovery. *Nature Chemical Biology*, 4(11), 682–690.

Houghton, P. J. , Howes, M. J. , Lee, C. C. , and Steventon, G. , 2007. Uses and abuses of in vitro tests in ethnopharmacology: Visualizing an elephant. *Journal of Ethnopharmacology*, 110(3), 391–400. <http://www.stsinfrastructures.org/content/visualization-and-cognition-thinking-eyes-and-hands>

Kumbhar, K. , 2019. How the 1835 Calcutta Medical College Catalyzed the Ascendancy of Biomedicine in India. *Caring for India*.

Latour, B. , 1984. *Visualisation and cognition: Thinking with eyes and hands*. In: *Knowledge and Society: Studies in the Sociology of Culture Past and Present*. JAI press INC

Lipphardt, V. , and Ludwig, D. , 2011. Knowledge transfer and science transfer. Notes.

Longhurst, C. A. , Harrington, R. A. , and Shah, N. H. , 2014. A “green button” for using aggregate patient data at the point of care. *Health Affairs (Project Hope)*, 33(7), 1229–1235.

Meulenbeld, G. J. , 2017. *History of Indian Medical Literature* (Groningen: Forsten, 1999–2020). ISBN 9069801248 9789069801247. Five volumes in three parts, 1A, 1B, 2A, 2B, 3.

Ministry of Health and Family Welfare , 2017. *National Health Policy, 2017*. <https://www.india.gov.in/national-health-policy-2017>

Murray, C. J. , 2022. Global burden of bacterial antimicrobial resistance in 2019: A systematic analysis. *The Lancet*, 399(10325), 629–655.

Nandy, A. , 1983. *The Intimate Enemy: Loss and Recovery of Self Under Colonialism*. Oxford: Oxford University Press.

NHP CC DC , 2015. Bhole Committee, 1946 – National Health Portal of India 2015.

Patwardhan, B. , 2015. In search of roots: Tracing the history and philosophy of Indian medicine. *Indian Journal of History of Science*, 50(4), 629–641.

Sarukkai, S. , 2005. *Indian Philosophy and Philosophy of Science*. Motilal Banarsidass Publishers

Sarvepalli Radhakrishnan , 1923. *Indian Philosophy*, 2nd ed. Oxford: Oxford University Press.

Shankar, D. , 2020. Roadmap for Ayurveda education in modern India. In: Sarangapani, P. M. , and Pappu, R. , eds. *Handbook of Education Systems in South Asia*. Singapore: Springer, 1–20.

Shankar, D. , and Unnikrishnan, P. M. , 2004. Challenging the Indian medical heritage. (book) In: *Challenging the Indian Medical Heritage*, 1–241. Chapter Alternative Macro Visions. 10.1017/UPO9788175968752.005.

S Saraf, R. P. , 2006. Sushruta: The first Plastic Surgeon in 600 B.C. *The Internet Journal of Plastic Surgery*, 4(2).

Swami Vivekananda , 2015. Raja yoga – appendix. In: Patanjali Yoga-Sutra. Mumbai: Bharati Vidya Bhavan.

Tricoci, P. , Allen, J. M. , Kramer, J. M. , Califf, R. M. , and Smith, S. C. , 2009. Scientific evidence underlying the ACC/AHA clinical practice guidelines. *JAMA*, 301(8), 831–841.

Twitchett, D. O. , 1955. *Joseph Needham: Science and civilization in China. Volume 1. Introductory orientations*. xxxviii, 318 pp, 36 illustrations. Cambridge: University Press, 1954, 52s. 6d. *Bulletin of the School of Oriental and African Studies*, 17(2), 383–385.

Valiathan, M. S. , 2013. *An Introduction to Ayurveda*. Delhi: Orient Blackswan.

Wake Forest School of Medicine , 2022. *Wake Forest Institute for Regenerative Medicine (WFIRM)* [online]. <https://school.wakehealth.edu/Research/Institutes-and-Centers/Wake-Forest-Institute-for-Regenerative-Medicine> (Accessed 18.2.2022).

Cosmovisions and critical sustainability sciences

Al-Hassan, S. , 2011. The savannah accelerated development authority and poverty reduction in Northern Ghana: What are the people's expectations? In: Center for Continuing Education and Inter-disciplinary Research (CCEIR) 5th Harmattan School Conference Proceedings, February 2011, University for Development Studies, Tamale.

Apusigah, A. A. , and Millar, D. , eds., 2010. Endogenous knowledge and African development: Issues, challenges and options. *Proceedings of the First Africa Regional Conference on Endogenous Development*, p. 36. Bolgatanga, Ghana: CAPTURED Africa.

Azongo, T. B. , 2014. *The Role of Divination in Health Seeking Behaviour Practices in the Talensi-Nabdam District of Northern Ghana*. Atlanta, GA: Scholar's Press.

Azongo, T. B. , Yidana, A. , and Der, E. M. , 2015. Soothsaying as health seeking behaviour: Implications for medical treatment of diseases perceived to be supernatural. *Asian Journal of Humanities and Social Studies*, 3(1). *Asian Online Journals* (www.ajouronline.com).

Beauregard, M. , 2014. Manifesto for a post-materialist science. *Guest Editorial Explore*, 10(5), 272–274. Elsevier. www.sciencedirect.com/science/article/abs/pii/S1550830714001165 [Accessed 13 Feb 2022].

- Black, M. , 1952. The identity of indiscernible. *Mind*, 61(242), 153–164.
- Bormann, F. H. , and Kellert, S. R. , eds., 1991. *Ecology, Economics, Ethics: The Broken Circle*. Binghamton.
- Brundtland, G. H. , and Mansour, K. , 2010. *World Commission on Environment and Development (WCED), 1987. Bonn, Germany: Our Common Future*.
- Chalk, J. P. , 2006. *Genesis 1–11 and the African Worldview: Conflict or Conformity?* Thesis (PhD), Pretoria: University of South Africa.
- Champagne, D. , 2015. Centering Indigenous nations within Indigenous methodologies. *Wicazo Sa Review*, 30(1), 57–81.
- Cornwall, A. , and Jewkes, R. , 1995. What is participatory research? *Social Science Medicine*, 41, 1667–1676.
- Creswell, J. W. , and Creswell, J. D. , 2005. *Mixed Methods Research: Developments, Debates, and Dilemma*. Oakland, CA: Berrett-Koehler Publishers.
- Delgado, F. , 2007. Ancestral guidance in Africa's every day life. *COMPAS. Endogenous Development Magazine*. No. 1, December 2007.
- Dewitt, R. , 2004. *Worldviews: An Introduction to the History and Philosophy of Science*. Oxford: Blackwell Publishers.
- Fann, D. , Neuhauser, L. , and Gibbs, P. , eds., 2018. *Transdisciplinary Theory, Practice and Education: The Art of Collaborative Research and Collective Learning*. Berlin: Springer.
- Filho, L. W. , 2018. *Handbook of Sustainability Science and Research*. Berlin: Springer.
- Gehman, R. J. , 1999. *Who Are the Living-Dead?* Nairobi: Evangel Publishing House.
- Honderich, T. , 2005. *Ontology. The Oxford Companion of Philosophy*. Oxford: Oxford University Press.
- Hunt, F. , and Thornsby, S. , 2014. Facilitating transdisciplinary research in an evolving approach to science. *Open Journal of Social Sciences*, 2(4).
- Imasogie, O. , 1983. *Guidelines for Christian Theology in Africa*. Ibadan, Nigeria: University Press Limited.
- Jancar, B. , 1966. *The Philosophy of Aristotle*. In: Barrett, D. B. (Ed). (1982). *World Christian Encyclopedia*. Nairobi: Oxford University Press.
- Kabisch, N. , Qureshi, S. , and Haase, D. , 2015. Human – environment interactions in urban green spaces – A systematic review of contemporary issues and prospects for future research. *Environmental Impact Assessment Review*, 50, 25–34.
- Kates, R. W. , 2011. What kind of science is sustainability science? *Proceedings of the National Academy of Sciences*, 1087(49).
- Kirk, J. , and Miller, M. L. , 1986. *Understanding the Validity of Qualitative Research*. Girard, KS: Little Blue Book.
- Laan, D. , and Vander, A. , 1997. The ontology of impossible worlds. *Notre Dame Journal of Formal Logic*, 38(4), 597–620.
- Lang, D. J. , and Wiek, A. , 2012. Transdisciplinary research and sustainability science: Practice, principles, and challenges. *Sustainability Science*, 7, 25–43.
- Laszlo, E. , 2006. A holistic worldview for a planetary civilization. In: Haverkort, B. , and Reijntjes, C. , eds. *Moving Worldviews: Reshaping Sciences, Policies and Practices for Endogenous Sustainable Development* (pp. 95–98). Leusden: COMPAS Series on Worldviews and Sciences 4.
- Levin, S. A. , and Clark, W. C. , 2010. *Toward a Science of Sustainability*. Center for International Development. Working Papers 196. Cambridge, MA: Kennedy School of Government. Harvard University.
- Lewis, C. S. , 1952. *Mere Christianity*. www.samizdat.qc.ca/vc/pdfs/MereChristianity_CSL.pdf (Accessed 16.8.2016).
- Lütteken, A. , and Hagedorn, K. , 1999. Concepts and issues of sustainability in countries in transition-an institutional concept of sustainability as a basis for the network. In: *Central and Eastern European Sustainable Agriculture Network First Workshop Proceedings* (vol. 61). Rome: REU Technical Series, 26–36.
- Massari, M. , and Pellegrino, V. , 2019. Emancipatory social science today: Presentazione. *Quaderni di teoria sociale*, 1, 11–18.
- Maxwell, J. A. , 1992. Understanding the validity of qualitative research. *Harvard Education Review*, 62(3).

- Mbiti, J. S. , 1969. *African Religions and Philosophy*. Garden City, NJ: Anchor Books.
- McKenzie, B. , and Morrisette, V. , 2003. Social work practice with Canadians of Aboriginal background: Guidelines for respectful social work. In: Al-Krenawi, A. , and Graham, J. R. , eds. *Multicultural Social Work in Canada: Working with Diverse Ethno-Racial Communities*. Don Mills Ontario, Canada: Oxford University Press, 251–282.
- Millar, D. , 2004. *Interfacing Two Knowledge Systems: Local Knowledge and Science in Africa*. Paper for the Compas panel in the conference: *Bridging Scales and Epistemologies*: March 2004. Tamale: Centre for Cosmvision and Indigenous Knowledge.
- Millar, D. , 2005. Endogenous development: Some issues of concern. *Ghana Journal of Development Studies*, 2(1).
- Millar, D. , 2018. *Farmers Experimentation: An Alternative Logic*. Accra, Ghana: AIT Consult.
- Millar, D. , and Derbile, E. K. , 2018. *Operational Methodologies for Endogenous Development Research*. Accra, Ghana: AIT Consult.
- Nicolescu, B. , 2002. *Manifesto of Transdisciplinarity*. Translated from French by Karen-Claire Voss . New York, NY: State University of New York.
- Note, N. , 2006. Reflections about worldviews, the western worldview and intercultural polylogues. In: Haverkort, B. , and Reijntjes, C. , eds. *Moving Worldviews: Reshaping Sciences, Policies and Practices for Endogenous Development*. COMPAS Series on Worldviews and Sciences 4, Tamale: COMPAS, 83–94.
- Olsen, M. E. , Lodwick, D. G. , and Dunlap, R. E. , 1992. *Viewing the World Ecologically*. Boulder, CO: Westview Press. Volume: 13 (issue: 4), page(s): 245–246. Issue published: August 1, 1993. <https://doi.org/10.1177/027046769301300491>.
- Opoku, K. A. , 1978. *West African Traditional Religion*. Accra, Ghana: FEP International Private Limited.
- Parrinder, E. G. , 1969. *Africa's Three Religions*. London: Sheldon Press.
- Patton, M. Q. , 2002. *Two Decades of Development in Qualitative Enquiry: A Personal Experience Perspective*. Sagepb.com.
- Pobee, J. S. , 1979. *Toward an African Theology*. Nashville, TN: Abingdon.
- Richmond, Y. , and Gestrin, P. , 1998. *Into Africa: Intercultural Insights*. Yarmouth, ME: Intercultural Press.
- Rigolot, C. , 2020. Transdisciplinarity as a discipline and a way of being: Complementarities and creative tensions. *Humanities and Social Sciences Communications*, 7, 100.
- Rist, S. , Bottazzi, P. , and Jacobi, J. , eds., 2019. *Rethinking Sustainability Science: Critical, Intercultural and Emancipatory Perspectives*. Temuco (unpublished report).
- Sackey, B. , 2006. *New Directions in Gender and Religion: The Changing Status of Women in African Independent Churches*. Accra: Rowman & Littlefield Publication.
- Smart, N. , 1983. *Worldviews: Crosscultural Explorations of Human Beliefs*. New York: Charles Scribner's Sons.
- Subramanian, S. M. , and Pisupati, B. , eds., 2010. *Traditional knowledge in policy and practice: Approaches to development and human well-being*. pp. 272–293.
- ThM, P. D. , 2009. *Understanding the Importance of Worldviews*. Christian Apologetics Project. <http://capro.info/understanding-the-importance-of-worldviews/> (Accessed 21.3.2018).
- Wright, E. O. , 2007. *A Framework for an Emancipatory Social Science*. Madison: University of Wisconsin.
- Zhang, Z. , Li, J. , Zhu, P. , Zhao, H. , and Liu, G. , 2018. *Modeling Multi-Turn Conversation with Deep Utterance Aggregation*. arXiv preprint arXiv:1806.09102.

Contributions of the notion of cosmosophy to the formulation of critical sustainability sciences

- Aillapan, L. , and Rozzi, R. , 2004. Una etno-ornitología mapuche contemporánea: poemas alados de los bosques nativos de Chile. *Ornitología Neotropical*, 15, 419–434.
- Aristotle, 2008. *Metafísica*. Introducción. Traducción y notas de Tomás Calvo Martínez. Madrid: Gredos.

- Bernabé, A. , 2010. Fragmentos Presocráticos de Tales a Demócrito. Introducción, traducción y notas de Alberto Bernabé. Madrid: Alianza.
- Brague, R. , 2008. La Sabiduría del mundo. Historia de la experiencia humana del universo. Madrid: Encuentro.
- Buber, M. , 2006. Yo y Tú y otros ensayos. Buenos Aires: Lilmod.
- Byung-Chul, H. , 2020. La desaparición de los rituales. Barcelona: Herder.
- Callicot, J. , 2017. Cosmovisiones de la Tierra. Un estudio multicultural de éticas ecológicas desde la cuenca del Mediterráneo hasta el desierto australiano. Madrid: Plaza y Valdés.
- Calvo Martínez, T. , 2000. La noción de Physis en los orígenes de la filosofía griega. *Revista de filosofía*, 21, 21–38.
- Chihuailaf, E. , 2014. Recado confidencial a los chilenos. Santiago, Chile: LOM Ediciones.
- Choquehuanca Céspedes, D. , and Rist, St. , 2024. A culture that understands that everything is interrelated, that nothing is divided, and nothing is outside. In: Rist, S. , Jacobi, J. , and Bottazzi, P. , eds. *Critical Sustainability Sciences: Intercultural and Emancipatory Perspectives*. London: Routledge.
- Curivil, R. , 2007. La Fuerza de la religión de la tierra. Una herencia de nuestros antepasados. Santiago, Chile: Ediciones Universidad Católica Silva Henríquez.
- Curivil, R. , 2020. Cultura mapuche: Un antiguo ideal de persona para una nueva historia. *Utopía y praxis latinoamericana*, 25(88), 41–54.
- Eliade, M. , 2017. Lo sagrado y lo profano. Barcelona: Paidós.
- Emerson, R. , 1836. *Nature*. Metcalf, Torry, and Ballou: Cambridge Press.
- Emerson, R. , 2008. *Naturaleza y otros escritos de juventud*. Madrid: Biblioteca Nueva, S.L.
- Escobar, A. , 2014. *Sentipensar con la tierra. Nuevas lecturas sobre desarrollo, territorio y diferencia*. Medellín: UNAULA.
- Estermann, J. , 2013. Ecosofía andina: Un paradigma alternativo de convivencia cósmica y de Vivir Bien. *Revista FAIA*, 2(9–10), 21 págs.
- Fornet-Betancourt, R. , 2007. ¿Es la sostenibilidad una perspectiva interculturalmente sostenible? Elementos para la crítica de un concepto bien intencionado, pero insuficiente. *Pasos*, 129, 8–14.
- Gómez-Heras, J. , 2010. *En armonía con la naturaleza. Reconstrucción medioambiental de la filosofía*. Madrid: Biblioteca Nueva.
- González, J. , 2004. *Teorías de la vida*. España: Síntesis.
- Hathaway, M. , and Boff, L. , 2014. *El tao de la liberación. Una ecología de la transformación*. Madrid: Trotta.
- Le Bonniec, F. , and Payas, G. , 2021. Entender la justicia y las injusticias en Wallmapu a través los estudios interculturales como propuestas de con-vivir. In: Samaniego (ed.). *Estudios interculturales desde el sur. Procesos, debates y propuestas*. Santiago de Chile: Ariadna, 37–64.
- Leopold, A. , 2005. *Una Ética de la Tierra*. Madrid: Catarata.
- Lovelock, J. , 2000. *Gaia a New Look at Life on Earth*. Oxford: Oxford University Press.
- Manifiesto por la vida por una ética para la sustentabilidad , 2002. *Ambiente & Sociedad*, 10, 1–14.
- Manque, C. , 2016. Pilmaikén: la fuerza espiritual del kintuante frente a las hidroeléctricas. In: Colectivo Editorial Mapuexpress , eds. *Resistencia Mapuche al extractivismo*. Santiago de Chile: Quimantú, 47–57.
- Naess, A. , 2007. Los movimientos de la ecología superficial y la ecología profunda: un resumen. *Revista Ambiente y Desarrollo de CIPMA*, 23(I), 98–101.
- Naess, A. , 2018. *Ecología, comunidad y estilo de vida. Esbozos de una ecosofía*. Buenos Aires: Prometeo.
- Panikkar, R. , 1990. *Sobre el diálogo intercultural*. Salamanca: San Esteban.
- Panikkar, R. , 1996. *El silencio del Buddha. Una introducción al ateísmo religioso*. España: Siruela.
- Panikkar, R. , 1999. *La intuición cosmoteándrica. Las tres dimensiones de la realidad*. Madrid: Trotta.
- Panikkar, R. , 2007. *De la Mística. Experiencia plena de la Vida*. Barcelona: Herder.
- Panikkar, R. , 2008. *Ecosofía*. www.grupotortuga.com/Ecosofia (Accessed 7.6.2022).

- Panikkar, R. , 2012. El Ritme de L'Ésser. Les Gifford Lectures. Col·lecció: Opera Omnia Raimon Panikkar. Vol. X/TOM I. Barcelona: Fragmenta.
- Plato , 2010. Timeo. Edición bilingüe de José María Zamora. Notas y anexos de Luc Brisson. Madrid: Abada Editores.
- Rozzi, R. , 2019. ¡Chovinismo Taxonómico, No Más! Antídotos de Hume, Darwin y la Ética Biocultural. *Environmental Ethics*, 41(9998), 73–112.
- Sepúlveda, J. , 2021. Sustentabilidad e interculturalidad: Avanzar hacia un nuevo modo de habitar la tierra. In: Samaniego , ed. *Estudios interculturales desde el sur. Procesos, debates y propuestas*. Santiago de Chile: Ariadna, 65–181.
- Sheldrake, R. , 1994. El Renacimiento de la Naturaleza. La nueva imagen de la ciencia y de Dios. Barcelona: Paidós Ibérica.
- Shiva, V. , 2001. Biopiratería. El saqueo de la naturaleza y del conocimiento. Barcelona: Icaria.
- Shiva, V. , 2006. Manifiesto para una Democracia de la Tierra. Justicia, sostenibilidad y paz. Barcelona: Paidós.

Toward a “nature alliance”

- Acosta, A. , 2015. El Buen Vivir o sumak kawsay – Una oportunidad para construir otros mundos. In: Stöckli, B. , ed. *Questioning Development, Repenser le développement. Repensar el desarrollo. Entwicklung neu denken*. Bern and Lucerne: dialogue4change, 9–16, <https://repository.globethics.net/handle/20.500.12424/228857>.
- Alimonda, H. , ed. 2011. La naturaleza colonizada. Ecología política y minería en América Latina. Buenos Aires: CLACSO.
- Arteta Melgarejo , Ximena Carolina , 2021. Colonialidad de la naturaleza: Aspectos decoloniales para el debate sobre el Desarrollo Sostenible. *Revista de Ciencias Humanas, Teoría Social y Pensamiento Crítico*, 14, 288–300.
- Bacon, F. , 1902. *Novum Organon*. New York: Collier.
- Balibar, E. , 2013. *La philosophie de Marx*. Paris: La découverte.
- Bloch, E. , 1959. *Das Prinzip Hoffnung*, Bd. 1–3. Frankfurt/M: Suhrkamp.
- Bloch, E. , 1970. *Tübinger Einleitung in die Philosophie*. Frankfurt/M: Suhrkamp.
- Bloch, E. , 1972. *Das Materialismusproblem, seine Geschichte und Substanz*. Frankfurt/M: Suhrkamp.
- Bloch, E. , 1975. *Experimentum Mundi. Frage, Kategorien des Herausbringens, Praxis*. Frankfurt/M: Suhrkamp.
- Bloch, E. , 1990. *Heritage of Our Times*. Translated by Neville Plaice and Stephen Plaice . Berkeley: University of California.
- Bloch, E. , 1995. *The Principle of Hope. Vols. I–III*. Translated by Neville Plaice and Stephen Plaice , and Paul Knight . Cambridge, MA: MIT Press.
- Bloch, E. , 2000. *Logos der Materie. Eine Logik im Werden*. Aus dem Nachlass 1923–1949. Edited by G. Cunico . Frankfurt/M: Suhrkamp.
- Brand, U. , and Wissen, M. , 2017. *Imperiale Lebensweise. Zur Ausbeutung von Mensch und Natur im globalen Kapitalismus*. München: oekom.
- Choquehuanca Céspedes, D. , 2020. *Speech of Assumption of the Vice Presidency of the Plurinational State of Bolivia*. La Paz: Vicepresidency of the Plurinational State of Bolivia.
- Coronil, F. , 1996. Beyond Occidentalism: Toward nonimperial geohistorical categories. *Cultural Anthropology*, 11(1), 51–87.
- Daxner, M. , 1981. Vorwort. In: Daxner, M. eds. *Andere Ansichten der Natur*. Arbeitskreis Naturqualität. Münster: SDZ.
- Delgado, F. , and Rist, S. , eds. 2016. *Ciencias, diálogo de saberes y transdisciplinariedad. Aportes teórico-metodológicos para la sustentabilidad alimentaria y del desarrollo*. La Paz, Bolivia: CLACSO, AGRUCO-UMSS, CDE University of Berne.
- Dietschy, B. , 1993. Das Niemandsland *oder* die Entdecker-Utopie Europas. In: Greive, W. , ed. *Alexander von Humboldt. Die andere Entdeckung Amerikas*. Loccum: Loccumer Protokolle 10/92, 179–194.

- Dietschy, B. , 2007. Ohne Ungleichzeitigkeit keine Zukunft. Indigene Versuche, eine andere mögliche Welt zu bauen. *Concordia. Internationale Zeitschrift für Philosophie*, 71, 3–14.
- Dietschy, B. , 2014. Von der Monokultur zum Multiversum der Erkenntnis. In: Fernet-Betancourt, R. , ed. *Gerechtigkeit, Erkenntnis und Spiritualität*, Aachen: Wissenschaftsverlag Mainz, 65–78.
- Dietschy, B. , 2021. Vom Band zum Bund. Wie Bloch zur Naturallianz fand. *VorSchein. Jahrbuch der Ernst-Bloch-Assoziation*, 37, Nürnberg: Antogo, 77–97.
- Dürr, H.-P. , and Panikkar, R. , 2008. *Liebe – Urquell des Kosmos. Ein Gespräch über Naturwissenschaft und Religion*. Freiburg: Herder.
- Dussel, E. , 1995. *The Invention of the Americas: Eclipse of “the Other” and the Myth of Modernity*. New York: The Continuum.
- Escobar, A. , 2005. *Depois da Natureza. Passos para uma Ecologia Política Antiessencialista*. In: Parreira, C. , and Alimonda, H. , eds. *Políticas Públicas Ambientais Latinoamericanas*. Brasília: Abaré, 17–64.
- Escobar, A. , 2011. *Ecología política de la globalidad y la diferencia*. In: Alimonda, H. ed. *La naturaleza colonizada*. Buenos Aires: CLACSO, 61–92.
- Escobar, A. , 2014. *Sentipensar con la tierra. Nuevas lecturas sobre desarrollo, territorio y diferencia*. Medellín: CLACSO.
- Escobar, A. , 2016. *Thinking-feeling with the Earth: Territorial struggles and the ontological dimension of the epistemologies of the South*. *Revista de Antropología Iberoamericana*, 11(1), Madrid, 11–32.
- Escobar, A. , 2020. *Pluriversal Politics. The Real and the Possible*. Durham: Duke University Press.
- Esteva, G. , 2010. *Development*. In: Sachs, W. , ed. *The Development Dictionary*, London: Zed, 1–23.
- Esteva, G. , 2014. *Aprender a escuchar. ¿Cómo imaginar un mundo en que quepan muchos mundos?* In: Fernet-Betancourt, R. , ed. *Gerechtigkeit, Erkenntnis und Spiritualität*, Aachen: Wissenschaftsverlag Mainz, 35–44.
- Fals Borda, O. , 1988. *Por un conocimiento vivencial*. *Concordia, Internationale Zeitschrift für Philosophie*, 12, 97–105.
- Fernet-Betancourt, R. , 2000. *Interculturalidad y globalización. Ejercicios de crítica filosófica intercultural en el contexto de la globalización neoliberal*. Frankfurt/M: IKO.
- Fernet-Betancourt, R. , 2007. *Interkulturalität in der Auseinandersetzung*. London: IKO.
- Fernet-Betancourt, R. , 2010. *Teoría y praxis de la filosofía intercultural*. *Ricerca. Revista de pensament i anàlisi*, 10, 13–34.
- Fernet-Betancourt, R. , 2012. *Interculturalidad, Crítica y liberación*. Aachen: Wissenschaftsverlag Mainz.
- Fernet-Betancourt, R. , ed., 2014a. *Gerechtigkeit, Erkenntnis und Spiritualität, Dokumentation des XVII. Internationalen Seminars des Dialogprogramms Nord-Süd*. Aachen: Wissenschaftsverlag Mainz.
- Fernet-Betancourt, R. , 2014b. *Thesen zur interkulturellen Transformation der Vernunft*. *VorSchein*, 32, Nürnberg: Antogo, 85–98.
- Fernet-Betancourt, R. , 2015a. *La philosophie interculturelle et les défis pour la rationalité philosophique traditionnelle ou eurocentrique*. In: Stöckli, B. , ed. *Questioning Development. Repenser le développement. Repensar el desarrollo. Entwicklung neu denken*. Bern and Lucerne: dialogue4change, 37–41.
<https://repository.globethics.net/handle/20.500.12424/228857>
- Fernet-Betancourt, R. , 2015b. *Zur Geschichte und Entwicklung der Interkulturellen Philosophie*. Aachen: Wissenschaftsverlag Mainz.
- Fernet-Betancourt, R. , 2017a. *Elementos para una crítica intercultural de la ciencia hegemónica*. Aachen: Wissenschaftsverlag Mainz.
- Fernet-Betancourt, R. , 2017b. *Ist der Entwicklungsbegriff kolonialistisch? Elemente einer interkulturellen Kritik*. In: Estermann, J. , ed. *Das Unbehagen an der Entwicklung. Eine andere Entwicklung oder anders als Entwicklung? Dokumentation der Debatte zum Entwicklungsbegriff bei COMUNDO, 2015–2017*. Aachen: Wissenschaftsverlag Mainz, 37–46.
- Fernet-Betancourt, R. , 2017c. *Introduction*. In: Fernet-Betancourt, R. , and Senent de Frutos, J. A. , eds. *Spiritualities and Religions: Their contribution to Justice and Knowledge in the Global Society*. Aachen: Wissenschaftsverlag Mainz, 13–16.

- Fornet-Betancourt, R. , 2018. Del conocimiento teórico contemplativo al saber dominador y destructor. *Valenciana*, 21, 321–346.
- Fornet-Betancourt, R. , 2021. *Tradition, Dekolonialität, Konvivenz. Themenfelder zur Erprobung Interkultureller Philosophie*. Aachen: Wissenschaftsverlag Mainz.
- Fornet-Betancourt, R. , and Senent de Frutos, J. A. , eds., 2017. *Spiritualities and Religions: Their Contribution to Justice and Knowledge in the Global Society*. Aachen: Wissenschaftsverlag Mainz.
- Gronemeyer, M. , 2015. Conviviality. In: Bollier, D. , and Helfrich, S. , eds. *Patterns of Commoning*. Amherst, MA: The Commons Strategies Group, 50–52.
- Grosfoguel, R. , 2012. Decolonizing Western universalisms: Decolonial pluriversalism from Aimé Césaire to the Zapatistas. *Transmodernity. Journal of Peripheral Cultural Production of the Luso-Hispanic World*, 1(3).
- Horkheimer, M. , and Adorno, T. W. , 2002. *Dialectic of Enlightenment: Philosophical Fragments*. Stanford: Stanford University.
- Icaza, R. , and Vázquez, R. , 2017. Notes on decolonizing development. In: Estermann, J. , ed. *Das Unbehagen an der Entwicklung. Eine andere Entwicklung oder anders als Entwicklung? Dokumentation der Debatte zum Entwicklungsbegriff bei COMUNDO, 2015–2017*. Aachen: Wissenschaftsverlag Mainz, 47–62.
- Kothari, A. , eds., 2019. *Pluriverse. A Post-Development Dictionary*. New Delhi: Tulika Books.
- Lozano Lerma, B. R. , 2019. Latin American and Caribbean feminisms. In: Kothari, A. , eds. *Pluriverse*, New Delhi: Tulika Books, 228–230.
- Lugones, M. , 2008. Colonialidad y género: hacia un feminismo descolonial. In: Mignolo, W. , ed. *Género y descolonialidad*. Buenos Aires: Ediciones del signo, 13–54.
- Lugones, M. , 2016. The coloniality of gender. In: Harcourt, W. , ed. *The Palgrave Handbook of Gender and Development. Critical Engagements in Feminist Theory and Practice*. London: Palgrave Macmillan, 13–33.
- Mariátegui, J. C. , 1970. *Peruanicemos al Perú. Obras completas*, 11. Lima: Biblioteca Amauta.
- Marx, K. , 1843. Contribution to the critique of Hegel's philosophy of law. Introduction, Marx Engels Collected Works (MECW)3. London: Lawrence & Wishart.
- Marx, K. , 1844. Economic and Philosophic Manuscripts of 1844. MECW, 3. London: Lawrence & Wishart.
- Marx, K. , 1845. *Theses on Feuerbach*. MECW, 5, London: Lawrence & Wishart.
- Marx, K. , 1863. *Theories of Surplus-Value (1861–63)*. www.marxists.org/archive/marx/works/1863/theories-surplus-value/
- Marx, K. , 1982. *Capital. A Critique of Political Economy, Vol. 1*. Harmondsworth: Penguin.
- Mignolo, W. , 2011. Epistemic disobedience and the decolonial option: A manifesto. *Transmodernity. Journal of Peripheral Cultural Production of the Luso-Hispanic World*, 1(2). <https://doi.org/10.5070/T412011807>
- Park, S.-W. , 2015. A new ecumenical journey – Towards life-enhancing civilization. In: Stöckli, B. , ed. *Questioning Development, Repenser le développement. Repensar el desarrollo. Entwicklung neu denken*. Bern and Lucerne: dialogue4change, 85–99. <https://repository.globethics.net/handle/20.500.12424/228857>
- Quijano, A. , 2007. Coloniality and modernity/rationality. *Cultural Studies*, 21(2), 168–178.
- Quijano, A. , and Ennis, M. , 2000. Coloniality of power, Eurocentrism, and Latin America. *Nepantla: Views from South*, 1(3), 533–580. www.muse.jhu.edu/article/23906
- Rehmann, J. , 2018. Ernst Bloch als Philosoph der Praxis. *Das Argument*, 60(1), 9–30.
- Rist, S. , 2015. Klar, ohne Befreiung geht das nicht – Gedanken zur “grossen Transformation” in der Nachhaltigkeitsdebatte. In: Stöckli, B. , ed. *Questioning Development. Repenser le développement. Repensar el desarrollo. Entwicklung neu denken*. Bern and Lucerne: dialogue4change, 100–119. <https://repository.globethics.net/handle/20.500.12424/228857>
- Sachs, W. , ed., 2010a. *The Development Dictionary. A Guide to Knowledge as Power (2nd ed.)*. London: Zed Books.
- Sachs, W. , 2010b. Introduction. In: Sachs, W., ed. *The Development Dictionary*, London: Zed Books, XV–XX.
- Sachs, W. , 2010c. Environment. In: Sachs, W., ed. *The Development Dictionary*, London: Zed Books, 24–37.
- Salleh, A. , 2019. Earth system governance. In: Kothari, A., ed. *Pluriverse*, New Delhi: Tulika Books, 40–43.

- Schelling, F. W. J. , 1988. Ideas for a Philosophy of Nature as Introduction to the Study of This Science. Cambridge: Cambridge University Press.
- Sedley, D. , 2002. Zeno's Definition of *phantasia katalêptikê* . In: Scaltsas, T. and Mason, A. S. , eds. The Philosophy of Zeno. Zeno of Citium and His Legacy. Larnaca, 135–154.
- Sepúlveda Pizarro, J. , 2021. Sustentabilidad e interculturalidad: avanzar hacia un nuevo modo de habitar la tierra. In: Samaniego Sastre, M. , ed. Estudios interculturales desde el Sur. Procesos, debates y propuestas. Santiago de Chile: Ariadna, 165–181.
- Svampa, M. , 2019. Neo-Extractivism in Latin America. Socio-Environmental Conflicts, the Territorial Turn, and New Political Narratives. Cambridge: Cambridge University Press.
- Svampa, M. , 2020. Die Grenzen der Rohstoffausbeutung. Umweltkonflikte und ökoterritoriale Wende in Lateinamerika. Bielefeld: Transcript.
- Tlostanova, M. , and Mignolo, W. , 2012. Learning to Unlearn. Decolonial Reflections from Eurasia and the Americas. Columbus: Ohio State University.
- Truman, H. S. , 1949. Inaugural Address. www.bartleby.com/124/pres53.html
- UN , 1987. Report of the World Commission on Environment and Development: Our Common Future. New York: World Commission on Environment and Development.
- Walsh, C. , 2006. Interculturalidad y colonialidad del poder. Un pensamiento y posicionamiento otro desde la diferencia colonial. In: Walsh eds. Interculturalidad, descolonización del Estado y del conocimiento. Buenos Aires: Ediciones del signo, 21–70.
- Walsh, C. , 2014. Decolonialidad, Interculturalidad, Vida desde el Abya Yala-Andino. Notas pedagógicas y senti-pensantes. In: Borsani, M. E. , and Quintero, P. , eds. Los desafíos decoloniales de nuestros días. Neuquén: Educo, 47–78.
- Walsh, C. , 2015. Life, nature and gender otherwise: Feminist reflections and provocations from the Andes. In: Harcourt, W. , and Nelson, I. L. , eds. Practising Feminist Political Ecologies. Moving Beyond the 'Green Economy'. London: Zed, 101–130.
- WCRC , 2014. The Accra Confession. Hannover: World Communion of Reformed Churches. <http://wcrch.ch/accra/the-accra-confession>.
- Ziai, A. , 2006. Zwischen Global Governance und Post-Development. Entwicklungspolitik aus diskursanalytischer Perspektive. Münster: Westfälisches Dampfboot.
- Zimmermann, R. , n.d. The Philosophy of Ernst Bloch. www.annette-schlemm.de/gast/bloch.htm

Society–labor–nature

- Adam, B. , and Groves, C. , 2011. Futures tended: Care and future-oriented responsibility. Bulletin of Science, Technology & Society, 31(1), 17–27.
- Barad, K. M. , 2007. Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning. Durham: Duke University Press.
- Bennett, J. , 2010. Vibrant Matter: A Political Ecology of Things. Durham: Duke University Press.
- Bloch, E. , 1973. Das Prinzip Hoffnung 3 3. Frankfurt am Main: Suhrkamp.
- Castree, N. , and Braun, B. , 2001. Social Nature. Theory, Practice and Politics. London: Wiley-Blackwell.
- Choquehuanca Céspedes, D. , and Rist, S. , 2023. The great disruption – A culture that understands that everything is interrelated, that nothing is divided, and nothing is outside. In: Rist, S. , Jacobi, J. , and Bottazzi, P. , eds. Critical Sustainability Sciences: Intercultural and Emancipatory Perspectives. London: Routledge.
- FAO and Filac , 2021. Forest Governance by Indigenous and Tribal Peoples. An Opportunity for Climate Action in Latin America and the Caribbean. Santiago. FAO. <https://doi.org/10.4060/cb2953en>
- Haraway, D. J. , 2008. When Species Meet. Minneapolis: University of Minnesota Press.
- Haraway, D. J. , 2016. Staying with the Trouble: Making Kin in the Chthulucene. Durham: Duke University Press.
- Haug, F. , 2005. Gender relations. Historical Materialism, 13(2), 279–302.
- Haug, F. , 2015. Marxistische Refundierung des Feminismus, feministische des Marxismus. In: Wege des Marxismus-Feminismus. Hamburg: Argument Verlag, 517–526.

- Holzkamp, K. , 2013. *Psychology from the Standpoint of the Subject: Selected Writings of Klaus Holzkamp*. Basingstoke: Palgrave Macmillan.
- International Labour Office , 2018. *Care Work and Care Jobs for the Future of Decent Work*. https://www.ilo.org/global/publications/books/WCMS_633135/lang--en/index.htm
- Krech, S. , 2005. Reflections on conservation, sustainability, and environmentalism in Indigenous North America. *American Anthropologist*, 107(1), 78–86.
- Latour, B. , 2000. When things strike back: A possible contribution of 'science studies' to the social sciences. *The British Journal of Sociology*, 51(1), 107–123.
- Mancuso, S. , Viola, A. , Benham, J. , Pollan, M. , and Mancuso, S. , 2015. *Brilliant Green: The Surprising History and Science of Plant Intelligence*. Washington, DC: Island Press.
- Martinez-Alier, J. , 2002. *The Environmentalism of the Poor: A Study of Ecological Conflicts and Valuation*. Cheltenham: Elgar.
- Martínez-Alier, J. , 2012. Environmental justice and economic degrowth: An alliance between two movements. *Capitalism Nature Socialism*, 23(1), 51–73.
- Martínez-Alier, J. , Temper, L. , Del Bene, D. , and Scheidel, A. , 2016. Is there a global environmental justice movement? *The Journal of Peasant Studies*, 43(3), 731–755.
- Marx, K. , 1998. *Capital. A Critique of Political Economy (1887th ed.)*. London: ElecBook.
- Marx, K. , 2011. *Economic and Philosophic Manuscripts of 1844. (1844th ed.)* Blacksburg, VA: Wilder Publications.
- Moore, J. W. , 2015. *Capitalism in the Web of Life: Ecology and the Accumulation of Capital (1st ed.)*. New York: Verso.
- Moore, J. W. , 2016. *Anthropocene or Capitalocene? Nature, History, and the Crisis of Capitalism*. Oakland, CA: PM Press.
- Prieur, J. , and Pika, S. , 2020. Gorillas' (*Gorilla g. gorilla*) knowledge of conspecifics' affordances: Intraspecific social tool use for food acquisition. *Primates*, 61(4), 583–591.
- Räthzel, N. , 2021a. Society-labour-nature: How to think the relationship? In: *The Palgrave Handbook of Environmental Labour Studies*. Cham, Switzerland: Palgrave Macmillan, 793–814.
- Räthzel, N. , 2021b. Trade union perceptions of the labour – Nature relationship. *Environmental Sociology*, 7(4), 267–278.
- Räthzel, N. , Mulinari, D. , and Tollefsen, A. , 2014. *Transnational Corporations from the Standpoint of Workers*. Basingstoke and New York: Palgrave Macmillan.
- Räthzel, N. , Stevis, D. , and Uzzell, D. L. , eds., 2021. *The Palgrave Handbook of Environmental Labour Studies*. Cham, Switzerland: Palgrave Macmillan.
- Räthzel, N. , and Uzzell, D. , 2019. The Future of work defines the future of humanity and all living species. *International Journal of Labour Research*. ILO, 9(1–2), 145–171.
- Salleh, A. , 2017. *Ecofeminism as Politics: Nature, Marx and the Post Modern (2nd ed.)*. London: Zed Books.
- Salleh, A. , 2020. Ecofeminism as (Marxist) sociology. In: *Marxist-Feminist Theories and Struggles Today*. London: Zed Books, 367.
- Sennett, R. , 2008. *The Craftsman*. New Haven: Yale University Press.
- Stengers, I. , 2010. *Cosmopolitics*. Minneapolis: University of Minnesota Press.
- Stengers, I. , 2015. In *Catastrophic Times: Resisting the Coming Barbarism*. Open Humanities Press. http://openhumanitiespress.org/books/download/Stengers_2015_In-Catastrophic-Times.pdf.
- Swyngedouw, E. , 1999. Modernity and hybridity: Nature, *Regeneracionismo*, and the production of the Spanish waterscape, 1890–1930. *Annals of the Association of American Geographers*, 89(3), 443–465.
- Tran, D. , 2021. A comparative study of women environmental defenders' antiviolent success strategies. *Geoforum*, 126, 126–138.
- Tran, D. , Navas, G. , Martinez-Alier, J. , and Mingorria, S. , 2020. Gendered geographies of violence: A multiple case study analysis of murdered women environmental defenders. *Journal of Political Ecology*, 27(1).
- Yuval-Davis, N. , 1997. *Gender & Nation*. London and Thousand Oaks, CA: Sage Publications.

Regenerative work

- Andress, H.-J. , and Lohmann, H. , 2008. *The Working Poor in Europe: Employment, Poverty and Globalisation*. Cheltenham; Northampton, MA: Edward Elgar Publishing.
- Béraud, P. , Du Castel, V. , and Cormerais, F. , 2012. Open innovation, economy of contribution and the territorial dynamics of creative industries. *Journal of Innovation Economics & Management*, 10(2), 81–105.
- Berkes, F. , 2017. *Sacred Ecology*. New York and London: Routledge.
- Bottazzi, P. , 2019. Work and social-ecological transitions: A critical review of five contrasting approaches. *Sustainability*, 11(14), 3852.
- Bottazzi, P. , and Boillat, S. , 2021. Political agroecology in Senegal: Historicity and repertoires of collective actions of an emerging social movement. *Sustainability*, 13(11), 6352.
- Ceballos, G. , and Ehrlich, P. R. , 2002. Mammal population losses and the extinction crisis. *Science*, 296(5569), 904–907.
- De Angelis, M. , and Harvie, D. , 2014. The commons. In: *The Routledge Companion to Alternative Organization*. London: Routledge, 304–318.
- Descola, P. , 2014. *Les lances du crépuscule*. Paris: Plon.
- Dubuisson-Quellier, S. , Lamine, C. , and Le Velly, R. , 2011. Citizenship and consumption: Mobilisation in alternative food systems in France. *Sociologia Ruralis*, 51(3), 304–323.
- Escobar, A. , 1996. Construction nature: Elements for a post-structuralist political ecology. *Futures*, 28(4), 325–343.
- Fath, B. D. , 2019. Measuring regenerative economics: 10 principles and measures undergirding systemic economic health. *Global Transitions*, 1, 15–27.
- Ferguson, J. , 2015. *Give a Man a Fish: Reflections on the New Politics of Distribution*. Durham, NC: Duke University Press.
- Frayne, D. , 2016. Stepping outside the circle: The ecological promise of shorter working hours. *Green Letters*, 20(2), 197–212.
- Gerber, J.-D. , and Gerber, J.-F. , 2017. Decommodification as a foundation for ecological economics. *Ecological Economics*, 131, 551–556.
- Gollain, F. , 2004. *A Critique of Work: Between Ecology and Socialism*. London, UK: IIED.
- Gomberg, P. , 2007. *How to Make Opportunity Equal: Race and Contributive Justice*. Malden, MA: John Wiley & Sons.
- Gonzalez de Molina, M. , 2013. Agroecology and politics. How to get sustainability? About the necessity for a political agroecology. *Agroecology and Sustainable Food Systems*, 37(1), 45–59.
- Gorz, A. , 2015. *Le fil rouge de l'écologie*. Paris: Éditions EHESS, 95–96.
- Gorz, A. , and Turner, C. , 1999. *Reclaiming Work: Beyond the Wage-Based Society*. Cambridge: Polity Press.
- Graeber, D. , and Wengrow, D. , 2021. *The Dawn of Everything: A New History of Humanity* London: Penguin.
- Hopkins, R. , 2008. *The Transition Handbook*. Devon: Green Books.
- Laville, J.-L. , 2010. The solidarity economy: A plural theoretical framework. *Economic Sociology: The European Electronic Newsletter*, 11(3), 32–35.
- Martinez-Alier, J. , 2012. Environmental justice and economic degrowth: An alliance between two movements. *Capitalism Nature Socialism*, 23(1), 51–73.
- Méda, D. , 1996. New perspectives on work as value. *International Labour Review*, 135, 633.
- Méda, D. , 2010. *Le Travail. une valeur en voie de disparition?* Paris: Flammarion.
- Méda, D. , 2017. L'emploi et le travail dans une ère post-croissance. In: Cassiers, I. , Maréchal, K. , and Méda, D. , eds. *Vers une société post-croissance. Intégrer les défis écologiques, économiques et sociaux*. La Tour d'Aigues: Edition de l'Aube, 35–75.
- Meillassoux, C. , 1982 [1975]. *Femmes, greniers et capitaux*. Paris: Maspéro.
- Mitchell, T. , 2011. *Carbon Democracy. Political Power in the Age of Oil*. London: Verso.
- Morseletto, P. , 2020. Restorative and regenerative: Exploring the concepts in the circular economy. *Journal of Industrial Ecology*, 24(4), 763–773.

Ostrom, E. , 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge: Cambridge University Press.

Partap, U. , and Ya, T. , 2012. The human pollinators of fruit crops in Maoxian County, Sichuan, China: A case study of the failure of pollination services and farmers' adaptation strategies. *Mountain Research and Development*, 32(2), 176–186.

Polanyi, K. , 1957. *The Great Transformation*. Boston: Beacon Press.

Rabhi, P. , 2010. *Vers la sobriété heureuse*. Paris: Acte Sud.

Rifkin, J. , 1995. *The End of Work*. New York, NY: G.P. Putnam's Sons.

Robbins, P. , 2012. *Political Ecology: A Critical Introduction* (2nd ed.). Oxford: John Wiley & Sons.

Rockström, J. , 2009. A safe operating space for humanity. *Nature*, 461(7263), 472.

Ryle, M. , and Soper, K. , 2016. Introduction: The ecology of labour. *Green Letters*, 20(2), 119–126.

Sahlins, M. , 1972. *Stone Age Economics*. Chicago, IL: Aldine-Atherton.

Timmermann, C. , and Felix, G. F. , 2015. Agroecology as a vehicle for contributive justice. *Agriculture and Human Values*, 32(3), 523–538.

Vázquez, A. M. , and Gallo, G. S. , 2021. Sustainability and immaterial commons: Rentier appropriation and intermediation in the artisanal fishing space of southern Chile. *Journal of Cultural Economy*, 14(2), 209–224.

Food, food systems, and sustainability

Azevedo, E. , 2014. Alimentação saudável: uma construção histórica. *Revista Simbiótica*, 7(1), 83–111.

Burlandy, L. , 2021. Reflections on ideas and disputes in the context of promoting healthy eating. *Reports on Public Health*. Rep. Public Health 37 (1:e00195520), 1–20.

Cadieux, K. V. , and Slocum, R. , 2015. What does it mean to do food justice? College of Liberal Arts All Faculty Scholarship. Paper 3. http://digitalcommons.hamline.edu/cla_faculty/3 (Accessed 9.2.2022).

Carolan, M. S. , 2011. *Embodied Food Politics*. Abingdon: Routledge.

Castro, J. , 1946. *Geografia da fome. O dilema brasileiro: pão ou aço*. R. Janeiro: O Cruzeiro.

CONSEA , 2007. *Relatório Final da 3ª Conferência Nacional de Segurança Alimentar e Nutricional*. Brasília, DF: CONSEA.

CONSEA , 2015. *Relatório Final da 5ª Conferência Nacional de Segurança Alimentar e Nutricional*. Brasília, DF: CONSEA.

CSM (Civil Society and Indigenous People Mechanism) , 2020. *Voices from the Ground – From COVID-19 to Radical Transformation of Our Food Systems*. Rome: CSM/WG.

Dardot, P. , and Laval, C. , 2019. *Common – On Revolution in the 21st Century*. London: Bloomsbury Academic.

Dubois, V. , 2021. Os espaços sociais para a produção de políticas públicas – a noção de campo como ferramenta da sociologia da ação pública. In: Olivera, O. P. , and Hassenteufel, P. , eds. *Sociologia política da ação pública: teorias, abordagens e conceitos*. Brasília, DF: Enap, 135–152.

Fraser, N. , and Honneth, A. , 2003. *Redistribution or Recognition? A Political-Philosophical Exchange*. London and New York: Verso.

Gilson, E. , and Kenihan, S. , eds., 2018. *Food, Environment, and Climate Change: Justice at the Intersections*. London: Rowman & Littlefield International.

Goodman, M. K. , and Sage, C. , 2014. Food transgressions: Ethics governance and geographies. In: Goodman, M. K. , and Sage, C. , eds. *Food Transgressions: Making Sense of Contemporary Food Politics*. Surrey: Ashgate Publishing, 1–14.

Gottlieb, R. , and Joshi, A. , 2010. *Food Justice*. Cambridge, MA: MIT Press.

Herring, R. J. , 2015. How is food political? Market, state, and knowledge. In: Herring, R. J. , ed. *The Oxford Handbook of Food, Politics, and Society*. Oxford: Oxford University Press.

Intergovernmental Panel on Climate Change-IPCC , 2019. *Climate Change and Land. Summary for Policymakers*. www.ipcc.ch/report/srccl/ (Accessed 9.2.2022).

International Panel of Experts on Sustainable Food Systems-IPES-Food , 2017. Unravelling the Food – Health Nexus: Addressing Practices, Political Economy, and Power Relations to Build Healthier Food Systems. Geneva, Switzerland: The Global Alliance for the Future of Food and IPES-Food.

Jacobi, J. , 2020. A new understanding and evaluation of food sustainability in six different food systems in Kenya and Bolivia. *Nature Scientific Reports*, 10(1), 1–14.

Kaljonen, M. , 2021. Justice in transitions: Widening considerations of justice in dietary transition. *Environmental Innovation and Societal Transition*, 40, 474–485.

La Via Campesina (LVC) , 2020. Annual Report 2019. Zimbabwe.

Maluf, R. S. , 2021a. Decentralized food systems and eating in localities: A multi-scale approach. *Revista de Economia e Sociologia Rural*, 59(4), e238782.

Maluf, R. S. , 2021b. Participação social e política dos alimentos no Brasil: elementos para uma reflexão a partir do CONSEA. In: Schubert, M. N. , Schneider, S. , and Tonin, J. , eds. *Desafios e tendências da alimentação contemporânea: consumo, mercados e ação pública*. P. Alegre : Ed. UFRGS, 61–88.

Maluf, R. S. , 2022. Sustainability, justice and equity in food systems: Ideas and proposals in dispute in Brazil. *Environmental Innovation and Societal Transitions*, 45, 183–199.

Martinelli, S. S. , and Cavalli, S. B. , 2018. Alimentação saudável e sustentável: uma revisão narrativa sobre desafios e perspectivas. *Ciência & Saúde Coletiva*, 24(11), 4251–4261.

Mialon, M. , Swinburn, B. , and Sacks, G. , 2015. A proposed approach to systematically identify and monitor the corporate political activity of the food industry with respect to public health using publicly available information. *Obesity Reviews*, 16(1), 519–530.

Ministério da Saúde (Brasil) , 2014. Guia alimentar para a população brasileira. Brasília, DF: Ministério da Saúde (Brasil).

Mouffe, C. , 2005. *On the Political*. Abingdon: Routledge.

Nestle, M. , 2013. *Food Politics – How the Food Industry Influences Nutrition and Health* (3rd ed.). Berkeley, CA: University of California Press.

Paarlberg, R. , 2010. *Food Politics – What Everyone Needs to Know*. Oxford: Oxford University Press.

Schlosberg, D. , 2013. Theorising Environmental Justice: The Expanding Sphere of a Discourse. *Environmental Politics* 22 (1): 37–55.

Swinburn, B. A. , 2019. The global syndemic of obesity, undernutrition, and climate change: The Lancet Commission report. *The Lancet* – published on line, 27 January.

Thompson, E. , Harper, A. M. , Kraus, S. , 2008. *Think globally-Eat Locally: San Francisco Foodshed Assessment*. Available at:

<http://www.farmland.org/programs/states/ca/Feature%20Stories/document/ThinkGloballyEatLocally-FinalReport8-23-08.pdf>

Tribaldos, T. , Jacobi, J. , and Rist, S. , 2018. Linking sustainable diets to the concept of food system sustainability. *Future of Food: Journal on Food, Agriculture and Society*, 6(1), 71–84.

Vivero-Pol, J. L. , 2017. The idea of food as commons or commodity in academia. A systematic review of English scholarly texts. *Journal of Rural Studies*, 53, 182–201.

Vivero-Pol, J. L. , 2018. Alimentos como bens comuns: uma nova perspectiva sobre a narrativa do sistema alimentar. In: Correa, L. , ed. *Diálogos sobre direito humano à alimentação adequada*. Juiz de Fora, MG: Fac. Direito/Universidade Federal de Juiz de Fora, 1–40.

Willett, W. , Rockström, J. , Loken, B. , and Springmann, M. , 2019. Food in the anthropocene: The EAT – lancet commission on healthy diets from sustainable food systems. *The Lancet*, 393(2), 447–492.

Agroecology as a transformative approach to sustainable food systems

Altieri, M. A. , 1989. Agroecology: A new research and development paradigm for world agriculture. *Agriculture, Ecosystems & Environment*, 27(1–4), 37–46.

Altieri, M. A. , and Funes-Monzote, F. R. , 2012. The paradox of Cuban agriculture. *Monthly Review*, 63(8), 23–33.

Altieri, M. A. , and Nicholls, C. I. , 2012. Agroecología: única esperanza para la soberanía alimentaria y la resiliencia socioecológica. *Agroecología*, 7(2), 65–83.

- Altieri, M. A. , and Toledo, V. M. , 2011. The agroecological revolution in Latin America: rescuing nature, ensuring food sovereignty and empowering peasants. *Journal of Peasant Studies*, 38(3), 587–612.
- Andreotti, G. , 2018. Glyphosate use and cancer incidence in the agricultural health study. *JNCI: Journal of the National Cancer Institute*, 110(5), 509–516.
- Ascuasati, A. A. , 2012. *Plagas Domésticas: Historia Patologías Plaguicidas Control*. España: Palibrio.
- Bennett, J. , 2016. Global ecological crisis: Structural violence and the tyranny of small decisions. In: Brauch, H. G. , Spring, U. O. , Bennett, J. , and Serrano Oswald, S. E. , eds. *Addressing Global Environmental Challenges from a Peace Ecology Perspective*. Cham: Swiss, Springer, 55–75.
- Boltanski, L. , 2011. *Sociology of Emancipation*. Cambridge: Polity.
- Borda, O. F. , and Moncayo, V. M. , 2009. *Una sociología sentipensante para América Latina*. Bogotá: Siglo del hombre.
- Burnard, T. , and Garrigou, J. , 2016. *The Plantation Machine: Atlantic Capitalism in French Saint-Domingue and British Jamaica*. Philadelphia: University of Pennsylvania Press.
- Caporal, F. R. , and Petersen, P. , 2011. Agroecología e políticas públicas na América Latina: O caso do Brasil. *Agroecología*, 6, 63–74.
- Capra, F. , 1999. *La trama de la vida. Una perspectiva de los sistemas vivos*. Barcelona: Editorial Anagrama.
- Carpintero , 2006. *La bioeconomía de Georgescu Roegen*. Barcelona: Montesinos.
- Carrasco Aquino, R. , 2006. La naturaleza y sus formas de apropiación en contradicción. *Revista Mundo Siglo XXI*, 2(6), 55–65.
- Castillo Sarmiento, A. , Surarez Gelvez, J. , and Mosquera Tellez, J. , 2017. Naturaleza y sociedad: relaciones y tendencias desde un enfoque eurocéntrico. *Revista Luna Azul*, 44, 348–371.
- Ceballos, G. , Ehrlich, P. R. , and Dirzo, R. , 2017. Biological annihilation via the ongoing sixth mass extinction signaled by vertebrate population losses and declines. *Proceedings of the National Academy of Sciences*, 114(30), E6089–E6096.
- Chrispeels, M. J. , Sadava, D. E. , and Mulligan, B. , 1994. *Plants, Genes, and Agriculture* (No. 04; SB123. 57, C4). Boston: Jones and Bartlett Publishers.
- De Sousa Santos, B. , 2011. Introducción: las epistemologías del sur. IV Training Seminar en Dinámicas Interculturales, 26–28 January 2011 Barcelona.
- Dubois, L. , and Turits, R. L. , 2019. *Freedom Roots: Histories from the Caribbean*. Chapel Hill, NC: UNC Press Books.
- Escobar, A. , 2014. *Sentipensar con la tierra. Nuevas lecturas sobre desarrollo, territorio y diferencia*. Medellín: Ediciones UNAULA.
- Escobar, A. , 2015. Territorios de diferencia: la ontología política de los “derechos al territorio”. *Cuadernos de Antropología Social*, 41, 25–38.
- Escobar, A. , 2020. Sentipensar with the Earth: Territorial struggles and the ontological dimension of the epistemologies of the South. In: Escobar, A. , ed. *Pluriversal Politics*. Durham, NC: Duke University Press, 67–83.
- Estebanez, M. E. , Turkenich, M. , and Sued, G. , 2013. Tecnología y género. Aportes de la sociología de la innovación al análisis de la agricultura familiar. X Jornadas de Sociología, 1–6 July 2013, Facultad de Ciencias Facultad de Ciencias Sociales, Universidad de Buenos Aires, Argentina.
- Giraldo, O. F. , 2014. *Utopías en la era de la supervivencia: una interpretación del buen vivir*. Ciudad de México: Editorial Itaca.
- Giraldo, O. F. , and Rosset, P. M. , 2018. Agroecology as a territory in dispute: Between institutional and social movements. *The Journal of Peasant Studies*, 45(3), 545–564.
- Giraldo, O. F. , and Rosset, P. M. , 2021. Principios sociales de las agroecologías emancipadoras. *Desenvolvimento e Meio Ambiente*, 58, 708–732.
- Gliessman, S. R. , 1990. Agroecology: Researching the ecological basis for sustainable agriculture. In: Gliessman, S. R. , ed. *Agroecology*. New York: Springer, 3–10.
- González Márquez, E. , 2020. *Crisis civilizatoria: hacia una transformación profunda*. Diálogos ambientales, 1(1), 17–22.
- González Reyes, L. , 2020. *Colapso del capitalismo global y transiciones hacia sociedades ecocomunitarias, mirando más allá del empleo*. Bilbao: Manu Robles Arangiz Fundazioa.

- Gros, F. , 2018. *Desobedecer*. Brasilia: Taurus.
- Grosfoguel, R. , 2016. Caos sistémico, crisis civilizatoria y proyectos descoloniales: pensar más allá del proceso civilizatorio de la modernidad/colonialidad. *Tabula Rasa*, 25, 153–174.
- Gupta, N. , 2020. *Women in Science and Technology: Confronting Inequalities*. Thousand Oaks, CA: Sage Publications Pvt. Limited.
- Guzmán, G. I. , 2018. The agrarian metabolism as a tool for assessing agrarian sustainability, and its application to Spanish agriculture (1960–2008). *Ecology and Society*, 23(1).
- Hadorn, G. H. , 2006. Implications of transdisciplinarity for sustainability research. *Ecological Economics*, 60(1), 119–128.
- Herrero López, Y. , and Rodríguez Muñoz, V. M. , 2017. Un nuevo currículo para afrontar la crisis civilizatoria. *Cuadernos de Pedagogía*, 477, 62–65.
- Holt-Giménez, E. , and Altieri, M. A. , 2013. Agroecology, food sovereignty, and the new green revolution. *Agroecology and Sustainable Food Systems*, 37(1), 90–102.
- Huergo, J. , 2012. Desafíos de la Extensión desde la perspectiva cultural. *Revista Dialoguemos*, 8(14), 11–15.
- Jacobi, J. , and Llanque, A. , 2018. “When we stand up, they have to negotiate with us”: Power relations in and between an agroindustrial and an Indigenous food system in Bolivia. *Sustainability*, 10(11), 4001.
- Jain, H. K. , 2010. *Green Revolution: History, Impact and Future*. Houston: Studium Press LLC.
- Kunin, J. R. , 2019. *El poder del cuidado: mujeres y agencia en la pampa sojera argentina*. Thesis (PhD). Universidad Nacional de San Martín.
- La Vía Campesina , 2011. Obtenido de. <http://viacampesina.org/es/index.php/temas-principales-mainmenu-27/soberanalimentarycomercio-mainmenu-38/314-que-es-la-soberania-alimentaria>
- La Vía Campesina , 2015. *Agroecología campesina, por la soberanía alimentaria y la madre tierra: experiencias de La Vía Campesina*. Zimbabwe: La Vía Campesina. Recuperado de. <https://viacampesina.org/es/wp-content/uploads/sites/3/2015/11/CUADERNO>, 207
- Larrañaga, A. , 2021. *Aplicación del enfoque de género en el análisis de la percepción de la peligrosidad del uso de pesticidas en la región hortícola platense*. Thesis (Undergraduate). Universidad Nacional de La Plata.
- Latham, J. , 2021. The myth of a food crisis. In: Kassam, A. , and Kassam, L. , eds. *Rethinking Food and Agriculture*. Sawston: Woodhead Publishing, 93–111.
- Leff, E. , 2012. Pensamiento ambiental latinoamericano: patrimonio de un saber para la sustentabilidad. *Environmental Ethics*, 34, 97–112.
- Le Tran, D. , Martínez-Alier, J. , Navas, G. , and Mingorria, S. , 2020. Gendered geographies of violence: A multiple case study analysis of murdered women environmental defenders. *Journal of Political Ecology*, 27(1), 1189–1212.
- Lewis, S. L. , and Maslin, M. A. , 2015. Defining the anthropocene. *Nature*, 519, 171–180.
- Linsalata, L. , 2020. ¡Nuestra lucha es por la vida! Apuntes críticos sobre la reorganización capitalista de la condición de interdependencia. *Trabalho necessário*, 18(36), 44–68.
- Maffi, L. , 2007. Biocultural diversity and sustainability. In: Pretty, J. , Ball, A. S. , Benton, T. , Guivant, J. S. , Lee, D. R. , Orr, D. , Pfeffer, M. J. , and Ward, H. , eds. *The Sage Handbook of Environment and Society*. Thousand Oaks, CA: SAGE Publications Ltd, 267–277.
- Martínez Alier, J. , 2001. Ecological economics. *International Encyclopedia of the Social and Behavioural Sciences*, 4(9).
- Martínez Alier, J. , 2005. *El ecologismo de los pobres: conflictos ambientales y lenguajes de valoración*. Barcelona: Editorial Icaria.
- Martínez Alier, J. , and Roca, J. J. , 2000. *Economía ecológica y Política Ambiental*. Ciudad de México: Fondo de Cultura Económica.
- Max-Neef, M. A. , 2005. Foundations of transdisciplinarity. *Ecological Economics*, 53(1), 5–16.
- Medellín-Milán, P. , Avalos-Lozano, J. A. , and Nieto-Caraveo, L. M. , 2011. Más allá de la Economía Ecológica, la construcción de nichos de sostenibilidad. *Polis*, 10(29), 227–259.
- Mier y Terán Giménez Cacho, M. , 2018. Bringing agroecology to scale: Key drivers and emblematic cases. *Agroecology and Sustainable Food Systems*, 42(6), 637–665.
- Montalba, R. , 2015. Determinación de los niveles de riesgo socioecológico ante sequías en sistemas agrícolas campesinos de La Araucanía chilena. Influencia de la diversidad cultural y la agrobiodiversidad. *Papers. Revista de Sociologia*, 100(4), 607–624.

- Moore, J. W. , 2020. *El Capitalismo en la Trama de la Vida. Ecología y Acumulación de Capital*. Madrid: Traficantes de Sueños.
- Morales Jasso, G. , 2016. La apropiación de la naturaleza como recurso. Una mirada reflexiva. *Revista Gestión y Ambiente*, 19(1), 141–154.
- Naredo, J. M. , 1994. Fundamentos de la economía ecológica. In: Aguilera Klink, F. , and Alcántara, V. , eds. *De la Economía Ambiental a la Economía Ecológica*. Barcelona: Fuhem e Icaria, 231–252.
- Navarro, M. L. , and Gutiérrez Aguilar, R. , 2018. Claves para pensar la interdependencia desde la ecología y los feminismos. *Revista Bajo el Volcán*, 28, 45–57.
- Nicholls, C. I. , Altieri, M. A. , and Vazquez, L. , 2017. Agroecological principles for the conversion of farming systems. In: Wezel, A. , ed. *Agroecological Practices for Sustainable Agriculture: Principles, Applications, and Making the Transition*. Singapur, NJ: World Scientific, 1–18.
- Nosedá, C. , 2018. *Lógica y saberes campesinos en la zona norte del Alto Paraná, Misiones y su aporte a una propuesta de desarrollo rural sostenible*. Thesis (Master). Universidad Nacional de La Plata.
- Osorio Pérez, F. E. , 2008. Forced displacement among rural women in Colombia. *Latin American Perspectives*, 35(6), 29–40.
- Pengue, W. A. , 2009. Agrofuels and agrifoods: Counting the externalities at the major crossroads of the 21st century. *Bulletin of Science, Technology & Society*, 29(3), 167–179.
- Pengue, W. , 2018. *Eco-agri-food systems: Today's realities and tomorrow's challenges*. In: *TEEB for Agriculture & Food: Scientific and Economic Foundations*. Geneva: UN Environment, 57–109.
- Petersen, P. F. , 2022. Agroecología política: crítica de la ecología política al capitalismo agroalimentario. *Agrociencia Uruguay*, 26(NE3), 972.
- Pingali, P. L. , 2012. Green revolution: Impacts, limits, and the path ahead. *Proceedings of the National Academy of Sciences*, 109(31), 12302–12308.
- Porter, J. R. , Howden, M. , and Smith, P. , 2017. Considering agriculture in IPCC assessments. *Nature Climate Change*, 7(10), 680–683.
- Price, S. J. , Ford, J. R. , Cooper, A. H. , and Neal, C. , 2011. Humans as major geological and geomorphological agents in the Anthropocene: The significance of artificial ground in Great Britain. *Philosophical Transactions of the Royal Society of London*, A369, 1056–1084.
- Restrepo, E. , and Rojas, A. , 2010. *Inflexión decolonial: Fuentes, conceptos y cuestionamientos*. Popayán: Editorial Universidad del Cauca.
- Rogers, E. M. , 1958. Categorizing the adopters of agricultural practices. *Rural Sociology*, 23(4), 346–354.
- Rogers, E. M. , 2003. *Diffusion of Innovations*. New York: Free Press.
- Rosset, P. M. , and Altieri, M. A. , 2017. *Agroecology: Science and Politics*. London: Practical Action Publishing.
- Rosset, P. M. , and Barbosa, L. P. , 2021. Autonomía y los movimientos sociales del campo en América Latina: un debate urgente. *Aposta: Revista de Ciencias Sociales*, 89, 8–31.
- Rosset, P. M. , Barbosa, L. P. , Val, V. , and McCune, N. , 2021. Pensamiento Latinoamericano Agroecológico: The emergence of a critical Latin American agroecology? *Agroecology and Sustainable Food Systems*, 45(1), 42–64.
- Rosset, P. M. , Machin Sosa, B. , Jaime, A. M. , and Lozano, D. R. A. , 2011. The campesino-to-campesino agroecology movement of ANAP in Cuba: Social process methodology in the construction of sustainable peasant agriculture and food sovereignty. *Journal of Peasant Studies*, 38(1), 161–191.
- Royero-Benavides, B. , 2019. Desarrollo y buena vida en la mixteca alta: El caso de una organización campesina oaxaqueña. *Agricultura, sociedad y desarrollo*, 16(1), 19–41.
- Sandhu, H. , 2019. The future of agriculture and food: Evaluating the holistic costs and benefits. *The Anthropocene Review*, 6(3), 270–278.
- Sarandón, S. J. , 2019. Potencialidades, desafíos y limitaciones de la investigación agroecológica como un nuevo paradigma en las ciencias agrarias. *Revista de la Facultad de Ciencias Agrarias de la Universidad Nacional de Cuyo*, 51(1), 383–394.
- Sarandón, S. J. , 2021. *Agroecología: una revolución del pensamiento en las ciencias agrarias*. *Ciencia, Tecnología y Política*, 4(6), 55.

- Sarandón, S. J. , and Flores, C. C. , 2014. *Agroecología*. La Plata: Universidad Nacional de La Plata (EDULP).
- Servigne, P. , and Stevens, R. , 2015. *Comment tout peut s'effondrer. Petit manuel de collapsologie à l'usage des générations présentes*. Paris: Éditions du Seuil.
- Sevilla Guzmán, E. , and Soler Montiel, M. , 2010. *Agroecología y Soberanía alimentaria: alternativas a la globalización alimentaria*. In: Instituto Andaluz del Patrimonio Histórico , ed. *Patrimonio Cultural en la nueva ruralidad andaluza*. Sevilla: Junta de Andalucía, 191–217.
- Sevilla Guzmán, E. , and Woodgate, G. , 1997. *Sustainable rural development: From industrial agriculture to agroecology*. In: Redclift, M. , and Woodgate, G. , eds. *The International Handbook of Environmental Sociology*. Chaltenham: Edward Elgar, 83–100.
- Shiva, V. , 2000. *Stolen Harvest. The Hijacking of the Global Food Supply*. Cambridge: South End Press.
- Soler, M. , Pérez, D. , Siliprandi, E. , and Zuluaga, G. , 2014. *Alimentación, agroecología y feminismo: superando los tres sesgos de la mirada occidental*. In: Siliprandi, E. , and Zuluaga, G. , eds. *Género, agroecología y soberanía alimentaria*. Barcelona: Icaria, 17–40.
- Steffen, W. , 2018. *Trajectories of the Earth system in the Anthropocene*. *Proceedings of the National Academy of Sciences*, 115(33), 8252–8259.
- Steffen, W. , Grinevald, J. , Crutzen, P. , and McNeill, J. , 2011. *The anthropocene: Conceptual and historical perspectives*. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 369(1938), 842–867.
- Svampa, M. , 2012. *Resource extractivism and alternatives: Latin American perspectives on development*. *Journal fur Entwicklungspolitik*, 28(3), 43–73.
- Svampa, M. , 2019. *Las fronteras del neoextractivismo en América Latina: conflictos socioambientales, giro ecoterritorial y nuevas dependencias*. Bielefeld: Bielefeld University Press.
- Toledo, V. M. , 2022. *Agroecology and spirituality: Reflections about an unrecognized link*. *Agroecology and Sustainable Food Systems*, 46(4), 626–641.
- Torres, M. E. M. , and Rosset, P. M. , 2016. *Diálogo de saberes en la vía campesina: soberanía alimentaria y agroecología*. *Revista Espacio Regional*, 1(13), 23–36.
- Val, V. , 2019. *Agroecology and La Via Campesina I. The symbolic and material construction of agroecology through the dispositive of "peasant-to-peasant" processes*. *Agroecology and Sustainable Food Systems*, 43(7–8), 872–894.
- Zalasiewicz, J. , 2016. *The geological cycle of plastics and their use as a stratigraphic indicator of the Anthropocene*. *Anthropocene*, 13, 4–17.

Through the veil

- Agrawal, A. , 1995. *Dismantling the divide between indigenous and scientific knowledge*. *Development and Change*, 26(3), 413–439.
- Aikenhead, G. , y Ogawa, M. , 2007. *Indigenous knowledge and science revisited*. *Cultural Studies of Science Education*, 2(3), 539–620.
- Ash, J. , y Simpson, P. , 2014. *Geography and post-phenomenology*. *Progress in Human Geography*, 40(1), 48–66.
- Bacon, F. , 2009 [1620]. *Novum Organum. Aforismos sobre la interpretación de la naturaleza y el reino del hombre*. Madrid: Tecnos.
- Baugh, B. , 1992. *Transcendental empiricism: Deleuze's response to Hegel*. *Man and World*, 25, 133–148.
- Brook, I. (1998). *Goethean science as a way to read landscape*. *Landscape Research*, 23(1), 51–69.
- Cajete, G. 2004. *Philosophy of native science*. En: Waters, A. , ed. *American Indian Thought*. London and New York: Routledge, 45–57.
- Carabante, J. , 2018. *Mayo del 68: claves filosóficas de una revuelta posmoderna*. Madrid: Ediciones Rialp.
- Comte, A. , 1965 [1844]. *Discurso sobre el espíritu positivo*. Madrid: Alianza Editorial.

- Dahlin, B. , 2013. Gloves of ice or free hands? A nomadic reading of Rudolf Steiner and Bergson and Deleuze and others on knowledge as nonrepresentational and the importance of aesthesis. *Other education. The Journal of Educational Alternatives*, 2(2), 67–89.
- De La Cadena, M. , 2010. Indigenous cosmopolitics in the Andes. Conceptual reflections beyond “politics”. *Cultural Anthropology*, 25(2), 334–370.
- Deleuze, G. , 1994. *Difference and Repetition*. New York: Columbia University Press.
- Deleuze, G. , 1995. *Negotiations Gilles Deleuze*. New York: Columbia University Press.
- Deleuze, G. , 2007. La inmanencia: una vida. In: Giorgi, G. , y Rodríguez, F. , eds. *Ensayos sobre biopolítica Excesos de vida*. Buenos Aires, Argentina: Paidós, 35–40.
- Deleuze, G. , y Guattari, F. , 1993. *¿Qué es la filosofía?* Barcelona, España: Editorial Anagrama.
- Deleuze, G. , y Guattari, F. , 2009. *Anti-Oedipus: Capitalism and Schizophrenia*. Minnesota: University of Minnesota Press.
- Descartes, R. , 2010 [1637]. *Discurso del método*. Quito, Ecuador: Editorial Bolgspot.
- De Sousa, M. L. , 2012. Challenging heteronomous power in a globalized world. In: Krätke, S. , Wildner, K. , and Lanz, S. , eds. *Transnationalism and Urbanism*. New York: Routledge, 172–196.
- Escobar, A. , 2005. El “postdesarrollo” como concepto y práctica social. In: Mato, D. , ed. *Políticas de economía, ambiente y sociedad en tiempos de globalización*. Caracas, Venezuela: Universidad Central de Venezuela, 17–31.
- Escobar, A. , 2011. ¿“Pachamámicos” versus “modernicos”? *Tabula Rasa*, 15, 265–273.
- Escobar, A. , 2015. *Sentipensar con la Tierra: Las Luchas Territoriales y la Dimensión Ontológica de las Epistemologías del Sur*. *Revista de Antropología Iberoamericana*, 11(1), 11–32.
- Fals Borda, O. , 2009. *Una sociología sentipensante para América Latina*. Buenos Aires, Argentina: Consejo Latinoamericano de Ciencias Sociales (Clacso).
- Fornssler, B. , McKenzie, H. A. , Dell, C. A. , Laliberte, L. , and Hopkins, C. , 2014. I got to know them in a new way rela (y/t) ing rhizomes and community-based knowledge (Brokers’) transformation of western and indigenous knowledge. *Cultural Studies ↔ Critical Methodologies*, 14(2), 179–193.
- Foucault, M. , 1988a. *Tecnologías del Yo y otros textos afines*. Buenos Aires, Argentina: Paidós.
- Foucault, M. , 1988b. El sujeto y el poder. *Revista Mexicana de Sociología*, 50(3), 3–20.
- García-Flores, J. , 2008. La Problemática del horizonte de sentido entre la modernidad y la postmodernidad. *Temas de Ciencia y Tecnología*, 12(34), 57–70.
- Goethe, J. W. , 2007. *Teoría de la Naturaleza*. Estudio preliminar, traducción y notas de Diego Sánchez Meca. Madrid: Tecnos.
- Goh, I. , 2006. The question of community in Deleuze and Guattari: Anti-community. *Symplokē*, 14(1/2), 216–231.
- Gudynas, E. , 2011. Buen vivir: Germinando alternativas al desarrollo. *América Latina en Movimiento*, ALAI, 462, 1–20.
- Haraway, D. , 1995. *Ciencia, Cyborgs y Mujeres: La Reinención de la Naturaleza*. Madrid: Ediciones Cátedra.
- Haseman, B. , 2006. A manifesto for performative research. *Culture and Policy*, 118, 98–106.
- Herzogenrath, B. , 2009. Nature|geophilosophy|machinics|cosophy. In: Herzogenrath, B. , ed. *Deleuze|Guattari & Ecology*. Hampshire: Palgrave Macmillan, 1–23.
- Jones, O. , y Cloke, P. , 2002. *Tree Cultures: The Place of Trees and Trees in their Place*. Oxford: Berg Publisher.
- Kant, I. , 2002. *Crítica de la razón pura*. Madrid: Tecnos.
- Kaplan, A. , 2015. *Artistas de lo invisible*. Buenos Aires, Argentina: Editorial Antroposófica.
- Leff, E. , 2004. *Racionalidad ambiental la reapropiación social de la naturaleza*. Buenos Aires, Argentina: Siglo XXI editores.
- Lipovetsky, G. , 1986. *La era del vacío*. Ensayo sobre el individualismo contemporáneo. Barcelona: Anagrama.
- Lytard, J. F. , 1979. *La condición postmoderna Informe sobre el saber*. Buenos Aires, Argentina: Editorial Rei.
- Mathew, F. , 2006. Beyond modernity and tradition: A third way for development. *Ethics & the Environment*, 11(2), 85–113.

- Mignolo, W. , 2002. El potencial epistemológico de la historia oral: algunas contribuciones de Silvia Rivera Cusicanqui. In: Mato, D. , ed. Estudios y otras prácticas intelectuales latinoamericanas en cultura y poder. Caracas, Venezuela: CLACSO, Consejo Latinoamericano de Ciencias Sociales, 14–32.
- Mignolo, W. , 2003. Historias locales/disenños globales: colonialidad, conocimientos subalternos y pensamiento fronterizo. Madrid: Akal.
- Ñanculef Huaquino, J. , 2016. Tayin Mapuche Kimuñ. Epistemología mapuche – Sabiduría y conocimiento. Santiago: Universidad de Chile, Facultad de Ciencias Sociales.
- Neira, Z. , Alarcón, A. , Jelves, I. , Ovalle, P. , Conejeros, A. , y Verdugo, V. , 2012. Espacios ecológicos-culturales en un territorio mapuche de la Región de la Araucanía en Chile. Chungará. Revista de Antropología Chilena, 44(2), 313–323.
- Nietzsche, F. , 2012. Así Hablaba Zaratustra. Madrid: Brontes.
- Pinillos, J. L. , 1996. La mentalidad postmoderna. Psicothema, 8(1), 229–240.
- Protevi, J. , 2012. Deleuze and life. En: Smith, D. , and Somers-Hall, H. , eds. The Cambridge Companion to Deleuze. Cambridge: Cambridge University Press, 239–264.
- Raffin, M. , 2008. El pensamiento de Gilles Deleuze y Michel Foucault en cuestión: las ideas en torno del poder, el sujeto y la verdad. Lecciones y Ensayos, 85, 17–44.
- Restrepo, E. , y Rojas, A. , 2010. Inflexión decolonial: fuentes, conceptos y cuestionamientos. Popayán, Colombia: Editorial Universidad del Cauca.
- Robbins, P. , 2006. Research in theft: Environmental inquiry in a postcolonial world. In: Aitken, S. , and Valentine, G. , eds. Approaches to Human Geography. New York: Sage, 311–324.
- Rodríguez, S. , 2016. Toward a methodology of death: Deleuze's "event" as method for critical ethnography. Critical Questions in Education, 7(3), 232–248.
- Rose, M. , y Wylie, J. , 2006. Animating landscape. Environment and Planning D: Society and Space, 24, 475–479.
- Ruddick, S. , 2010. The politics of affect. Spinoza in the work of Negri and Deleuze. Theory, Culture & Society, 27(4), 21–45.
- Seamon, D. , 2012. Place, identity and phenomenology: A triadic interpretation. In: Caskin, H. , Bernardo, F. , Dubai, A. , and Bentham, A. E. , eds. The Role of Place Identity in the Perception Understanding, and Design of Built Environments. Sharjah. U.A.E.: Bentham Books, 3–22.
- Seamon, D. , and Zajonc, A. , 1998. Goethe's Way of Science: A Phenomenology of Nature. Albany, NY: State University of New York Press.
- Shiva, V. , 1995. Abrazar la vida. Mujer, ecología y desarrollo. Madrid, España: Editorial Horas y Horas.
- Shiva, V. , 2001. Biopiratería. El saqueo de la naturaleza y del conocimiento. Valencia, España: Icaria Editorial.
- Simms, E. M. , 2005. Goethe, Husserl, and the crisis of the European sciences. Janus Head, 8(1), 160–172.
- Stahel, A. , 2013. Alternativas a la crisis desde una perspectiva fenomenológica y antroposófica. Càtedra UNESCO de Sostenibilitat, 14, 25–44.
- Steiner, R. , 1981. Thruth and Knowledge. New York: SteinerBooks.
- Vattimo, G. , 1986. El fin de la Modernidad. Barcelona: Gedisa.
- Wahl, D. , 2005. "Zarte Empirie": Goethean science as a way of knowing. Janus Head, 8(1), 58–76.
- Walsh, C. , 2009. Interculturalidad, estado, sociedad: luchas (de)coloniales de nuestra época. Quito: Universidad Andina Simón Bolívar.
- Walsh, C. , 2010. Development as Buen Vivir: Institutional arrangements and (de) colonial entanglements. Development, 53(1), 15–21.
- Walsh, K. , 2007. ¿Son posibles unas ciencias sociales/culturales otras? Reflexiones en torno a las epistemologías decoloniales. Nómadas, 26, 102–113.
- Zaffaroni, E. , 2011. La Pachamama y lo humano. Buenos Aires, Argentina: Ediciones Madres de la Plaza de Mayo.

Goethe's scientific method

- Amrine, F. , Zucker, F. , and Wheeler, H. , eds., 1987. *Goethe and the Sciences: A Reappraisal*. Dordrecht: D. Reidel Publishing Co.
- Arber, A. , 1950. *The Natural History of Plant Form*. Cambridge: Cambridge University Press.
- Arber, A. , 1954. *The Eye and the Mind*. Cambridge: Cambridge University Press.
- Bockemühl, J. , 1985. Elements and ethers: Modes of observing the world. In: J. Bockemühl , ed. *Towards a Phenomenology of the Etheric World*. New York: Anthroposophic Press Inc, 1–67.
- Bortoft, H. , 1996. *The Wholeness of Nature: Goethe's Way of Science*. Edinburgh: Floris Books.
- Brook, I. , 1998. Goethean science as a way to read landscape. *Landscape Research*, 23(1), 51–69.
- Colquhoun, M. , and Ewald, A. , 1996. *New Eyes for Plants*. Edinburgh: Hawthorn Press.
- Davidson, M. , 2014. Rights to ecosystem services. *Environmental Values*, 23(4), 465–483.
- Day, C. , 2003. *Consensus Design: Socially Inclusive Process*. Oxford: Architectural Press.
- Deliège, G. , and Neuteleers, S. , 2015. Should biodiversity be useful? Scope and limits of ecosystem services as an argument for biodiversity conservation. *Environmental Values*, 24(2), 165–182.
- Douglas-Klotz, N. , 2005. *The Sufi Book of Life*. London: Penguin Compass.
- Fink, K. , 1991. *Goethe's History of Science*. Cambridge: Cambridge University Press.
- von. Goethe, J. W. , 1989. *Goethe: Italian Journey*. Edited by T. Saine and J. Sammons . Translated by R. Heitner . New York: Suhrkamp Publishers.
- von. Goethe, J. W. , 1995. *Goethe: Scientific studies*. Translated and ed by D. Miller . New York: Suhrkamp Publishers.
- Gómez-Baggethun, E. , and Ruiz-Pérez, M. , 2011. Economic valuation and the commodification of ecosystem services. *Progress in Physical Geography*, 35(5), 613–628.
- Gray, R. , 1952 *Goethe the Alchemist: A Study of Alchemical Symbolism in Goethe's Literary and Scientific Works*. Cambridge: Cambridge University Press.
- Heinemann, F. , 1934. Goethe's phenomenological method. *Philosophy*, 9(33), 67–81.
- Hoffmann, N. , 2007. *Goethe's Science of Living Form*. New York: Adonis Press.
- Holdrege, C. , 2005. *Doing Goethean science*. Janus Head, 8, 1.
- Holdrege, C. , 2013. *Thinking Like a Plant: A Living Science for Life*. Great Barrington, MA: Lindisfarne Books.
- Jensen, A. , 2019. Johann Wolfgang von Goethe. *Internet Encyclopaedia of Philosophy*. www.iep.utm.edu/goethe/#H4 (Accessed 5.9.2022).
- Magee, J. , 2007. Alexander von Humboldt: A vision of the unity of nature. In: Huxley, R. , ed. *The Great Naturalists*. London: Thames and Hudson, 224–232.
- Merchant, C. , 1980. *The Death of Nature: Women, Ecology and the Scientific Revolution*. New York: Harper and Row.
- Nisbet, H. B. , 1972. *Goethe and the Scientific Tradition*. London: Institute of Germanic Studies.
- Rutishauser, R. , and Isler, B. , 2001. Developmental genetics and morphological evolution of flowering plants especially bladderworts (*Utricularia*): Fuzzy Arberian morphology complements classical morphology. *Annals of Botany*, 88, 1173–1202.
- Seamon, D. , and Zajonc, A. , 1998. *Goethe's Way of Science: A Phenomenology of Nature*. New York: SUNY Press.
- Sepper, D. , 1988. *Goethe Contra Newton*. Cambridge: Cambridge University Press.
- Sheldrake, R. , 1990. *The Rebirth of Nature*. London: Century.
- Steiner, R. , 1978. *A Theory of Knowledge: Implicit in Goethe's World Conception*. Translation by O. Wannamaker . New York: The Anthroposophic Press.
- Steiner, R. , 1985. *Goethe's World View*. Translation by W. Linderman . New York: Mercury Press.
- Stephenson, R. H. , 1995. *Goethe's Conception of Knowledge and Science*. Edinburgh: Edinburgh University Press.
- Tantillo, A. , 2002. *The Will to Create: Goethe's Philosophy of Nature*. Pittsburgh: University of Pittsburgh Press.
- Washington, H. , 2020. Ecosystem services -A key step forward or anthropocentrism's 'Trojan Horse' in conservation?. In: H. Kopina , H. Washington , eds. *Conservation: Integrating Social*

Sustainable design

- Boutaud, A. , 2006. Le développement durable: penser le changement ou changer le pansement? Thesis (PhD). Saint-Etienne: École des Mines et Université Jean-Monnet.
- Brunel, S. , 2004. Le développement durable. Paris: PUF.
- Citton, Y. , 2021. Faire avec. Conflits, coalitions, contagions. Paris: Les Liens qui libèrent.
- Descola P. , 2021. Les Formes du visible, Paris: Seuil.
- Descola, P. , 2005. Par-delà nature et culture. Paris: Gallimard.
- Findeli, A. , 1999/2000. The Bauhaus project: An archetype for design education in the 21st century. *The Structurist*, 39/40, 36–43.
- Findeli, A. , 2004. Die projektgeleitete Forschung: eine Methode der Designforschung. In: Michel, R. (ed.). *Erstes Design Forschungssymposium*. Zurich: Swiss Design Network, 40–50.
- Findeli, A. , 2010. Searching for Design Research Questions. A Conceptual Clarification. In: Rosan Chow , Wolfgang Jonas and Gesche Joost (eds), *Questions, Hypotheses and Conjectures*. Berlin: iUniverse, 286–303.
- Findeli, A. , 2018. The metamorphosis of the designer. A prerequisite to social transformation by design. In: Förster, M. , Hebert, S. , Hofmann, M. , and Jonas, W. (eds), *Uni/Certain Futures*. Bielefeld: [transcript] Verlag, 104–114.
- Glasl, F. , 1980 (10th ed. 2011). *Konfliktmanagement. Diagnose und Behandlung von Konflikten in Organisationen (= Organisationsentwicklung in der Praxis, Band 2)*. Bern and Stuttgart: Haupt Verlag.
- Gowdy, J. and Erickson, J. , 2005. The approach of ecological economics. *Cambridge Journal of Economics*, 29, 207–222.
- Holland, A. , 2008. Joseph Beuys & Rudolf Steiner. *Imagination, Inspiration, Intuition*. Melbourne: National Gallery of Victoria (exhib. Catalog).
- Jullien, F. , 2004. *Du mal/Du négatif*. Paris: Seuil.
- Lalonde, P. , 2007. Structuration de l'espace agissant de la pratique de la gestion de projet. Thesis (PhD). Montréal: Ecole Polytechnique.
- Morizot, B. , 2020. *Manières d'être vivant: Enquêtes sur la vie à travers nous*. Paris: Babel.
- Nouyrit, H. , 2004. *Fraternité, Égalité et Liberté. Actualité de la pensée sociale de Rudolf Steiner*. Laboussière: Triades.
- Rosa, H. , 2016. *Resonanz: Eine Soziologie der Weltbeziehung*. Berlin: Suhrkamp.
- Scharmer, O. 2007. *Theory U: Leading from the Emerging Future*. San Francisco: Berrett-Koehler.
- Scharmer, O. , 2018. *The Essentials of Theory U: Core Principles and Applications*. San Francisco: Berrett-Koehler Publishers.
- Scharmer, O. and Käufer, K. 2013. *Leading from the Emerging Future: From Ego-System to Eco-System Economies*. San Francisco, Berrett-Koehler Publishers.
- SEKEM , 2010. *Report on Sustainable Development*. Cairo, Egypt: Cairo-Belbeis, 5.
- Sotamaa, Y. , Salmi, E. , and Anusionwu, L. , 2006. *Nantes Cumulus Working Papers*. Helsinki: UIAH University of Art and Design, 9–15.
- Splash, C. , 2011. Social Ecological Economics: Understanding the Past to See the Future. *American Journal of Economics and Sociology*, 70(2), 340–375.
- Steiner, R. , 1985. *Fondements de l'organisme social (GA 23–24)*. Genève: Ed. Anthrop. Romandes.
- Steiner, R. , 2009. (German original ed. 1904). *Imagination, Inspiration, and Intuition*. Hudson (NY): Steiner Books. Also published as *The Gates of Knowledge* (2012). London/New York: Putnam & Sons.
- Tischner, U. , 2000. *How to Do Ecodesign? A Guide for Environmentally and Economically Sound Design*. Frankfurt: Verlag form.
- Wironen, M. and Erickson, J. , 2020. A critically modern ecological economics for the Anthropocene. *The Anthropocene Review*, 7(1), 62–76.

Outlook and key topics for the construction of critical sustainability sciences

- Alacovska, A. , 2018. Informal creative labour practices: A relational work perspective. *Human Relations*, 71(12), 1563–1589.
- Boff, L. , 2011. *Ecología: grito de la tierra, grito de los pobres*. Trotta Madrid, Traducido: Herranz, Juan Carlos Rodríguez.
- Bottazzi, P. , 2024. Regenerative work: From commodity to commons. In: Rist, S. , Bottazzi, P. , and Jacobi, J. , eds. *Critical Sustainability Sciences: Intercultural and Emancipatory Perspectives*. London: Routledge.
- Brook, I. , 2024. Goethe's scientific method: The road not taken. In: Rist, S. , Bottazzi, P. , and Jacobi, J. , eds. *Critical Sustainability Sciences: Intercultural and Emancipatory Perspectives*. London: Routledge.
- Brooke, J. H. , 1991. *Science and Religion: Some Historical Perspectives*. Cambridge: Cambridge University Press.
- Cabaluz, F. D. , and Torres López, T. T. , 2020. El concepto de trabajo vivo desde el marxismo latinoamericano. Notas a partir de la obra de Enrique Dussel y Álvaro García Linera. *Izquierdas*, 49, 1397–1423.
- Choquehuanca Céspedes, D. , 2017. *Manifiesto del Vivir Bien. "Nuestro mundo es posible"*. La Paz: Canillería del Estado Plurinacional de Bolivia.
- Dietschy, B. , 2024. Towards a "nature alliance" – Why sustainability must be rethought in terms of relationality. In: Rist, S. , Bottazzi, P. , and Jacobi, J. , eds. *Critical Sustainability Sciences: Intercultural and Emancipatory Perspectives*. London: Routledge.
- Dussel, E. , 2018. *Lebendige Arbeit*. In: Haug, W. F. , eds. *Historisch-kritisches Wörterbuch des Marxismus 8/I*. Bonn: Rosa Luxembourg Stiftung, 746–747.
- Escobar, A. , 2016. Thinking-feeling with the Earth: Territorial struggles and the ontological dimension of the epistemologies of the South. *AIBR. Revista de Antropología Iberoamericana*, 11(1).
- Findeli, A. , 2008. Sustainable design: A critique of the current tripolar model. *The Design Journal*, 11(3), 301–322.
- Findeli, A. , 2024. Sustainable design: A critique of the tripolar sustainability model. 15 years later. In: Rist, S. , Bottazzi, P. , and Jacobi, J. , eds. *Critical Sustainability Sciences: Intercultural and Emancipatory Perspectives*. London: Routledge.
- Fraser, N. , 2013. A triple movement. *New Left Review*, 81.
- Kloepfer, M. , 1994. Is there the threat of an authoritarian ecological state. *European Energy and Environmental Law Review*, 3, 112.
- Maluf, R. , 2024. Food, food systems and sustainability: Elements of the "real food" debate in Brazil. In: Rist, S. , Bottazzi, P. , and Jacobi, J. , eds. *Critical Sustainability Sciences: Intercultural and Emancipatory Perspectives*. London: Routledge.
- Millar, D. , Santuah, N. , and Ba-An, M. , 2024. Cosmovisions and critical sustainability sciences – An African ontology of "Vurr" (an energy) amongst the Dagara of Southwest Burkina Faso and Northwest Ghana. In: Rist, S. , Bottazzi, P. , and Jacobi, J. , eds. *Critical Sustainability Sciences: Intercultural and Emancipatory Perspectives*. London: Routledge.
- Negri, A. , 2018. Starting again from marx. *Radical Philosophy*, 2(3).
- Panikkar, R. , 2008. *Ecosofía*. www.grupotortuga.com/Ecosofia (Accessed 18.1.2023).
- Polanyi, K. , 2001 [1944]. *The Great Transformation*. Boston, MA: Beacon Press.
- Räthzel, N. , 2024. Society – Labor – Nature: The potential of conflict. In: Rist, S. , Bottazzi, P. , and Jacobi, J. , eds. *Critical Sustainability Sciences: Intercultural and Emancipatory Perspectives*. London: Routledge.
- Rothkopf, D. , and Medish, M. , 2008. *Superclass: The Global Power Elite and the World They are Making*. Carnegie Endowment for International Peace. Transcript by Federal News Service, Washington, DC.
- Scharmer, O. , 2018. *The Essentials of Theory U: Core Principles and Applications*. Berrett-Koehler Publishers.
- Sepúlveda Pizarro, J. , 2024. Contributions of the notion of cosmosophy to the formulation of critical sustainability sciences. In: Rist, S. , Bottazzi, P. , and Jacobi, J. , eds. *Critical Sustainability Sciences: Intercultural and Emancipatory Perspectives*. London: Routledge.

- Shahar, D. C. , 2015. Rejecting eco-authoritarianism, again. *Environmental Values*, 24(3), 345–366.
- Shankar, D. , 2024. Relational Ontologies in health sciences and practices in India. In: Rist, S. , Bottazzi, P. , and Jacobi, J. , eds. *Critical Sustainability Sciences: Intercultural and Emancipatory Perspectives*. London: Routledge.
- Shiva, V. , 2005. *Earth Democracy: Justice, Sustainability and Peace*. London: Zed Books.
- Shiva, V. , 2010. Earth democracy: Beyond dead democracy and killing economies. *Capitalism Nature Socialism*, 21(1), 83–95.
- Shiva, V. , 2024. Foreword. In: Rist, S. , Bottazzi, P. , and Jacobi, J. , eds. *Critical Sustainability Sciences: Intercultural and Emancipatory Perspectives*. London: Routledge.
- Spirito, F. , Blanco, V. , and Montalba, R. , 2024. Agroecology as a transformative approach to sustainable food systems. In: Rist, S. , Bottazzi, P. , and Jacobi, J. , eds. *Critical Sustainability Sciences: Intercultural and Emancipatory Perspectives*. London: Routledge.
- Steiner, R. , 1985 [1919]. *Renewal of the Social Organism*. Interlochen, MI: SteinerBooks.
- Woiwode, C. , 2021. Inner transformation to sustainability as a deep leverage point: Fostering new avenues for change through dialogue and reflection. *Sustainability Science*, 16(3), 841–858.
- Wright, J. , 2021. *Subtle Agroecologies: Farming with the Hidden Half of Nature*. London, New York: CRC Press.
- Zunino, H. , 2024. Through the veil: A relational and participatory perspective to knowledge production and sustainability. In: Rist, S. , Bottazzi, P. , and Jacobi, J. , eds. *Critical Sustainability Sciences: Intercultural and Emancipatory Perspectives*. London: Routledge.