

A future we choose

Why investing in Earth now can lead
to a trillion-dollar benefit for all



© 2025 United Nations Environment Programme

ISBN: 978-92-807-4246-6

Job number: DEW/2728/NA

DOI: <https://doi.org/10.59117/20.500.11822/49014>

Reproduction

This publication may be reproduced in whole or in part and in any form for educational or non-profit services without special permission from the copyright holder, provided acknowledgement of the source is made. The United Nations Environment Programme would appreciate receiving a copy of any publication that uses this publication as a source.

No use of this publication may be made for resale or any other commercial purpose whatsoever without prior permission in writing from the United Nations Environment Programme. Applications for such permission, with a statement of the purpose and extent of the reproduction, should be addressed to unep-communication-director@un.org

Disclaimers

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area of its authorities, or concerning the delimitation of its frontiers or boundaries.

Mention of firm names and commercial products in this document does not imply endorsement by the United Nations Environment Programme or the authors. The use of information from this document for publicity or advertising is not permitted. Trademark names and symbols are used in an editorial fashion with no intention of infringement of trademark or copyright laws.

The views expressed in this publication are those of the authors and do not necessarily reflect the views of the United Nations Environment Programme. We regret any errors or omissions that may have been unwittingly made.

© Maps, photos and illustrations as specified

Suggested citation

United Nations Environment Programme (2025). *Global Environment Outlook 7: A future we choose – Why investing in Earth now can lead to a trillion-dollar benefit for all*. Nairobi. <https://wedocs.unep.org/handle/20.500.11822/49014>.

Production: Nairobi

URL: <https://www.unep.org/resources/global-environment-outlook-7>

Cover image: AI-generated visual created by Beverley McDonald / UNEP

A future we choose

Why investing in Earth now can lead
to a trillion-dollar benefit for all

Acknowledgements

The seventh edition of the Global Environment Outlook (GEO-7) assessment report is a product of the generous dedication and extraordinary investment of numerous individuals, whose knowledge, expertise and insight helped shape this important body of work. The United Nations Environment Programme acknowledges the contributions made by many governments, individuals, and institutions to the preparation and publication of this report. A more complete list of names of individuals and institutions involved in the assessment process is included following the annexes of this publication. Special thanks are extended to:

Assessment Co-chairs

Edgar E. Gutiérrez-Espeleta, Nyovani Madise, Ying Wang, Robert Watson

Intergovernmental and Multi-stakeholder Advisory Group (IMAG)

Arthur Eijls (Co-chair), Anna Mampye (Co-chair), Rolenas Baereleo (Vice-chair), Miroslav Havránek (Vice-chair), Ana Julieta Calvo - Obando (Rapporteur), Mohamed Abdelraouf, Zahra Abu Taha, Thuraya Said Al Sariri, Silvio Albuquerque e Silva, Djatougbe Aziaka, Leila Bendifallah, Thomas Chali, Merylene Chitharai, Ingrid Coetzee, Lisa Eriksson (Alternate), Toghrul Feyziyev, Marek Haliniak, Meri Harutyunyan, Neyra Herrera, Keri Holland (Alternate), Yi Huang, Claudia Kabel, Christina Komorski, Maha Maayta, Takashi Otsuka, Toral Patel - Weynand, Dušica Pešević, Salla Rantala, Kenset Amaury Rosales Riveiro, Modibo Sacko, Jerome Lugumira Sebadduka, Ruth Viola Spencer, Gillian Stanislaus, Jan - Gustav Strandenaes, Prem Singh Tharu, Alexandra Gurgel Valente da Costa (Alternate), Carlos Cordero Vega (Alternate), Fabian Wagner, Dominic Kailash Nath Waughray

Multidisciplinary Expert Scientific Advisory Group (MESAG)

Nicholas King (Co-chair), Maria del Mar Viana Rodriguez (Co-chair), Ervin Balázs (Vice-chair), Rosemarie Casimiro (Vice-chair), Gian Carlo Delgado-Ramos

(Rapporteur), Ousséni Arouna, Dolores Armenteras Pascual, Alberto Santos Capra, Lorenzo Ciccicarese, Sandra Bibiana Correa, Eric Davidson, Nagwa El Karawy, Tambe Honourine Enow, James D. Ford, Catherine Ganzleben, Razieh Ghayoumi, Joyeeta Gupta, Tatiana Kuznetsova, Yonglong Lu, Mónica Moraes R., Amal Moufarreh, Janez Potocnik, Nijavalli Ravindranath, Majid Shafie pour Motlagh, Belay Simane, Asha Singh, Inna Stecenko, Shau Hwai Aileen Tan, Alban Thomas

Coordinating Lead Authors (CLAs)

Tamiru A. Abiye, Ana Paula Aguiar, Peter Alexander, Barbara Amon, Apoorva Arya, Ghassem Asrar, Lindsay Beevers, Medani Bhandari, Meena Bohara, Gillian Bowser, David Broadstock, Monday Businge, Donovan Campbell, Kateřina Černý Pixová, Lynette Cheah, Leila Dagher, Vassilis Daioglou, Jonathan Davies, Mark Elder, Parfait M. Eloundou-Enyegue, Pierre Failler, Pedro Fidelman, Shinichiro Fujimori, Erica Brown Gaddis, Keisha Garcia, Sarah Green, Andres Guhl, Gladys Cecilia Hernandez-Pedraza, Susie Ho, Min Hu, Madhav Bahadur Karki, Monica Kerretts-Makau, Mizanur Khan, Andrei Kirilenko, Kyung Ah Koo, Joanna Kulczycka, Debora Ley, Jianguo Liu, Paul Lucas, Clever Mafuta, Sarah-Lan Mathez-Stiefel, Karina Miglioranza, Ruben Mnatsakanian, Rachid Mrabet, Kevin Nnanye Nwaigwe, Alice Odingo, S. Nadia Ouedraogo, Jacob Park, Jan Plesnik, Riya Rahiman, Adina Manuela Relicovschi, Henri Rueff, Aibek Samakov, Tek Sapkota, Heinz Schandl, Patrick Schröder, Jeff Seadon, Binaya Raj Shivakoti, George Florin Staicu, Paul Sutton, Gail Taylor, Catalina Turcu, Bruno Turnheim, Detlef van Vuuren, Sotiris Vardoulakis, Karen Helen Wiltshire, Xiyan Xu, Fang Yu, Pandi Zdruli, Eric Zusman

Lead Authors

Fagr Abdel-Gawad, Adolf Acquaye, Susana Beatriz Adamo, Kofi Akamani, Adenike Akinsemolu, Alaa Al Khourdajie, Aliyu Aliyu, Maryam Alkharusi, Farshad Amiraslani, Steve Arquitt, Quosay Awad Ahmed, Janelle Baker, Aistė Balžekienė, Aliyu Salisu Barau, Ricardo O. Barra, Claudio Belis, Lorenzo Benini, Hester Biemans, Fiffy Hanisdah Binti Saikim, Elliot Boateng, Souhila Bouilouta,

Edward Byers, Shaneel Chandra, Kalpana Chaudhari, Joanne Clarke, Salud Deudero Company, Jan Cools, Hancheng Dai, Loïc De Weerd, Danielle Mendes Thame Denny, Sybil Derrible, Leila Devia, Jagath Premakumara Dickella Gamaralalage, Jonathan Doelman, Peter Edwards, Sibel Eker, Isa Olalekan Elegbede, Eduardo Erazo Acosta, Jessica Fanzo, Vinicius F. Farjalla, Dulce Flores-Renteria, Michele Fontefrancesco, Panagiotis Fragkos, Bonmwa Fwangkwai, Elisabeth Gilmore, Alex Godoy-Faundez, Mariana Guttieres-Paz, Taylor Hanna, Stephan Harrison, Maryna Henrysson, Rozana Himaz, Beata Houšková, Saleemul Huq, Ekhtekharul Islam, Efitre Jackson, Nandakumar Janardhanan, Kejun Jiang, Modupe O. Jimoh, Mulako Kabisa, Miho Kamei, Joanna Kámiche Zegarra, Govind Kelkar, Peter King, Mahdi Kolahi, Vojtech Kotecky, Lydie-Stella Koutika, Jyotsna Krishnakumar, Pankaj Kumar, Sigrid Kusch-Brandt, Juliana Subtil Lacerda, Annamaria Lammel, Tao Lin, Jinlong Liu, Melisa Ljusa, David Lopez-Carr, Yolanda López-Maldonado, Christian Löwe, Simone Lucatello, Patricia Maccagno, Nomanesi Madikizela-Madiya, William Armand Mala, Aynur Mammadova, Olena Maslyukivska, Alma Mendoza-Ponce, Juliana Merçon, Jonathan D. Moyer, Indu K Murthy, Veronica Mwangi, Ravendra Naidu, Didacus Namanya, Valerie Nelson, Thang Nguyen Trung, Jaee Nikam, Karachepone Ninan, Judit Oláh, Simon Høiberg Olsen, Jean Pierre Ometto, Evans Osabuohien, Nkechi Owoo, Leonidas Paroussos, Leisa Perch, Laura Pereira, Ramon Pichs-Madruga, József Popp, Joana Portugal Pereira, Svetlana Radionova, Graciela Raga, Kamal Kumar Rai, Stefan Reis, Chao Ren, Kamaljit K Sangha, Sanchit Saran Agarwal, Pallavi Saxena, Ronaldo Seroa Da Motta, Kalim Shah, Fangxia Shen, Fred Steward, Roopesh Kevin Sungkur, Elias Symeonakis, Natalia Tarasova, Audrone Telesiene, Thomas Thornton, Maria Cristina Tirado-von der Pahlen, Sandra Torrusio, Stella Tsani, Chiara Varazzani, Maria Virginia Vilariño, Samanta Villegas, Ken Webster, Jianhua Xu, Le Yu, Carol Zavaleta-Cortijo, Xianlai Zeng

Contributing Authors

Adedoyin Adeleke, Rob Alkemade, Michel Bakkenes, Sofia Belardinelli, Arthur Beusen, Suruchi Bhadwal, Bhabananda Biswas, Tanya Brodie Rudolph, Tatenda Dalu, Kenel Delusca, Catia Motta Domingues, Alan Feest, Steven Fletcher, Rose Foster, Dimitris Fragiadakis, Dimistris Fragiadakis, Jessica Fuller, Sabine Fuss, Sandya Gunasekara, Henry Häkkinen, Julia Hamann, Britta Denise Hardesty, Tomoko Hasegawa, Chenmin He, Olga Illarionova, Mengxing Li, Yingying Lu, Stephen

Maycock, Troy McGee, Estee Miltz, Amy Molotoks, Jiayi Ng, Yuki Ochi, Ken Oshiro, Paul Overduin, Daniel Alejandro Pacheco Rojas, Ruben Prutz, Hareenanden Ramasawmy, Lucia Reisch, Savio Rousseau Rozario, Arthur Silva, Helen Spence-Jones, Kazuaki Tsuchiya, Kaj-Ivar van der Wijst, Laszlo Vreedenburgh, Michaela Werning, Leila Zamani, Shaneica Lester

Fellows

Aseel Ibrahim Mohammed Abo-Taleb, Ayodeji Stephen Adekanbi, Tarik Alkharusi, Raphael Villela Almeida, Nadege Amizero, Alison Amoussou, Francis Boafo Asamoah, Zoe Barr, Marianna Baslandze, Sofia Belardinelli, Acasia Broomes, Ruijun Chen, Victoria Del Pilar Chicmana Zapata, Maryam Eqan, Tegan Evans, Laura Fanciulli, Rose Foster, Emmanuelle Freitas, Slobodan Gnjata, Zhuang Han, Qian Jia, Christina Karakizi, Gabriela Kreutzberger, Shaneica Lester, Astride Messaga Maffo, Jan Matuščík, Claude Mbarga Ella, Estee Miltz, Fanni Moilanen, Amy Molotoks, Botho Bahumi Motlhanka, Katie Noble, Iryna Ponedelnik, Jimena Reyes Sanchez, Martina Rotolo, Michael Ruggeri, Arthur Silva, Eleni Sofik, Helen Spence-Jones, Sénanckpon Stéphane Marcel Tcheton, Ekaterina Terenteva, Pushp Raj Tiwari, Kelo Uchendu, Soham Vaidya

Review Editors

Ahmed Abdelrehim (Lead Review Editor), Bettina Hedden-Dunkhorst (Lead Review Editor), Kofi Akamani, Ramia Al Bakain, Chandani Appadoo, Amanullah Bahriuloom, William Balée, Suruchi Bhadwal, Miranda Boettcher, Ashok Das, Naa Dodua Doodoo, Oswaldo dos Santos Lucon, Timothy Dube, Paul Dumble, Samia Elfitouri Grimida, Miguel Equihua, Gabriela Fernandez, Elsa Galarza, Nadezhda Gaponenko, Konstantin Gongalsky, Wame Lucretia Hambira, Shan Hu, Arnulf Jaeger-Waldau, Rumiana Jeleva, Injy Johnstone, Joni Jupesta, Lian Pin Koh, Anil Markandya, David McCollum, Nibedita Mukherjee, Adetoun Mustapha, Alick Bulala Muvundika, Leonard Nurse, Eni Oko, Robert Onyeneke, Jiesper Pedersen, Dimitris Poursanidis, Kálmán László Rajkai, Kilaparti Ramakrishna, Abdulkarim Rashed, Ariana Rossen, Mayar Sabet, Georg Schiller, Faizi Shahul Hameed, Diogo Silva, Tannecia Stephenson, Saritha Sudharma Vishwanathan, Miguel Angel Taboada, Ram Devi Tachamo Shah, Goran Trbic, Oksana Volosko-Demkiv, Fei Wang, Sarah Whitmee, Lucia Helena Xavier, Xinzhu Zheng, Malgorzata Zimniewska

Donors and partners

Producing an assessment of this scale requires many generous contributions. The following Member States and organizations provided funding directly or indirectly to the seventh edition of Global Environment Outlook: The European Union, Governments of Austria, Canada, China, Germany, Italy, Jordan, Norway, Republic of Korea, Netherlands (Kingdom of the), Sweden, and United Kingdom of Great Britain and Northern Ireland, and Asia Indigenous Peoples Pact, Korea Environment Institute, Society of Entrepreneurs and Ecology Foundation, Tongji University. Together with UNEP's Environment Fund and Regular Budget, these contributions allowed the production of GEO-7 and its accompanying Executive Summary, as well as subsequent outreach activities.



Co-funded by
the European Union

Federal Ministry
Innovation, Mobility
and Infrastructure
Republic of Austria

This project is funded in part
by the Government of Canada
Ce projet est financé en partie
par le gouvernement du Canada

Canada



Federal Ministry
for the Environment, Climate Action,
Nature Conservation and Nuclear Safety

MINISTERO DELL'AMBIENTE
E DELLA SICUREZZA ENERGETICA



Norad

Ministry of
Environment

Government of the Netherlands

Sida
SWEDISH INTERNATIONAL
DEVELOPMENT COOPERATION AGENCY

UK Government



KEI 한국환경연구원
Korea Environment Institute

SEE基金会
Society of Entrepreneurs and Ecology Foundation

同济大学
TONGJI UNIVERSITY

Technical Partners

GEO-7 also benefited from the generous contributions of several technical partners, including: Brazilian National Institute for Space Research, Center for Environment and Development for the Arab Region and Europe (CEDARE), Chenjiang Laboratory, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Energy and Resources Institute, the Environmental Pulse Institute, European Commission Joint Research Centre, E3 Modelling, Frederick S. Pardee Institute for International Futures, GRID-Arendal, Institute for Global Environmental Strategies (IGES), International Institute for Applied Systems Analysis (IIASA), International Research Center of Big Data for Sustainable Development Goals, Kyoto University, Laboratory of Energy & Environmental Economics and Policy (LEEPP), Millennium Institute, National Autonomous University of Mexico, PBL Netherlands Environmental Assessment Agency, SENDAS Association Civil, Tyndall Centre for Climate Change Research, and Wageningen University & Research.



GEO-7 Secretariat

Ignacio Sánchez Díaz (Acting Head GEO Unit), Maarten Kappelle (Acting Head GEO Secretariat), Pierre Boileau (Former GEO Head), Hilary Allison, Atina Aliyeva, Sunny Beyene, Matthew Billot, Yunting Duan, Muthoni Kangethe, Caroline Kaimuru, Paula Kawka, Rachel Kosse, Allan Lelei, Ruoxi Li, Caroline Mureithi, Birgita Ohanga, Franklin Odhiambo, Grace Odhiambo, Adele Roccato, Pinya Sarasas, Martha Stokes, Ying Wang, Edoardo Zandri

UNEP Chapter Coordinators

Hilary Allison, Atina Aliyeva, Sunny Beyene, Pierre Boileau, Kilian Christ, Yunting Duan, Melchior Elsler, Valentin Foltescu, Francesco Gaetani, Sophia Groll, Muthoni Kangethe, Caroline Kaimuru, Rachel Kosse, Allan Lelei, James Lomax, Ruoxi Li, Cheikh Tidjane N'dongo, Nada Matta, Llorenç Milà i Canals, Grace Odhiambo, Adele Roccato, Julia Rugo, Ignacio Sánchez Díaz, Romanas Savickas, Sudhir Sharma, Martha Stokes, Feng Wang, Ying Wang, Jinhua Zhang

Peer-review System

Mina Elnagar (CEDARE), Mayar Sabet (CEDARE), Samir Sayed (CEDARE)

GEO-7 Workspace

Stian Grønning (Egde), Andy Harrison (Egde), Christian Knarvik (Crayon), Oddmar Lid (Egde), Miles Macmillan-Lawler (GRID-Arendal), Clever Mafuta (GRID-Arendal), Marco Vinaccia (GRID-Arendal), Pål Andre Ropstad (Crayon), Håvard Setra Sørvik (Crayon), Martin Størkson (Egde)

Editorial Team

Alexandra Horton (Editor), Catherine P. McMullen (Science Editor), Nora Mžavanadze (Glossary Editor), Ekaterina Bessonova (Editor), Lene Søjberg (Project management, Phoenix Aid Design), GRID-Arendal

Maps and Graphics

blossom.it, Fang Chen (CBAS/Chenjiang Laboratory), Jane Muriithi (UNEP), Carlos Reyes (Reyes Work Studio), Audrey Ringler (UNEP), Lei Wang (CBAS), Liang Xiao (Chenjiang Laboratory), Bo Yu (CBAS), Haiying Zhang (CBAS)

Design and Layout

blossom.it, Virginia Njoroge (UNEP), Reagan Sirengo (UNEP)

Media and Launch Support

Daniel Cooney, Nicolien Delange, Carlota Estalella Alba, Iman Fasla, Florian Fussstetter, Miranda Grant, Nancy Groves, Anastasia Isyuk, Gabrielle Lipton, Michael Logan, Beverly McDonald, Gregory Mwara, Virginia Njoroge, Michael Onyiego, Moses Osani, Andrew Raven, Keishamaza Rukikaire, Amina Said, Mila Shopova, Reagan Sirengo, Nandita Surendan, Yahan You, Ahmed Yusuf

Special thanks are also extended to

Jordan Harold (Tyndall Centre for Climate Change Research), Andrea Hinwood (UNEP), Florence Kahiho (UNEP), Gladys Karanja (UNEP), Raees Khan (UNEP), Tito Kimathi (UNEP), Jian Liu (UNEP), Irene Lorenzoni (Tyndall Centre for Climate Change Research), Peter Muriithi (UNEP), Kelly West (UNEP).

Table of contents

Acknowledgements	iv
Foreword.....	xxix
Preface by GEO-7 Co-Chairs.....	xxx
Part A: Overview and Context	2
Indigenous Knowledge and Local Knowledge Chapeau A	4
1 Introduction.....	9
1.1 Acting now for a healthy planet: initiating transformative change.....	10
1.2 A solution-focused approach for sustainability transformations.....	12
1.3 Realizing transformative change: solution pathways and driving the transformation.....	15
1.4 Structure of GEO-7	17
Appendix 1.1 Key findings from previous global environmental assessments since 2019.....	21
Reference	25
2 Historical, current, and projected drivers and pressures of environmental change	29
Chapter Summary	30
2.1 Introduction.....	34
2.2 Drivers of Change	34
2.3 Pressures that Affect the Global Environment	56
2.4 Drivers, Pressures, and the Global Environmental Crises: Connecting the Dots	69
References.....	73
Part B: State and Trends of the Environment	84
Global Environment Crises Chapeau	86
Indigenous Knowledge and Local Knowledge Chapeau B	108
3 Air	113
Chapter summary	114
3.1 Introduction.....	117
3.2 State and trends of atmospheric composition.....	119
3.3 Connections between the atmosphere and biodiversity loss and land degradation	126
3.4 Impacts on human systems.....	131
3.5 Progress towards the goals of global agreements	141
References.....	146
4 Land and Soils	159
Chapter summary	160
4.1 Introduction.....	163
4.2 Pressures on land and soils.....	164
4.3 State and trends of the land.....	167
4.4 Impacts of natural ecosystems on human well-being and human systems	190
4.5 Progress towards internationally agreed environmental goals.....	192
4.6 Indigenous as well as Local Knowledge in land and soil management.....	196
References.....	199

5 Oceans and Coasts	213
Chapter summary	214
5.1 Introduction	217
5.2 State and trends	218
5.3 Human systems	238
5.4 Progress towards internationally agreed goals	242
References	250
6 Freshwater	261
Chapter Summary	262
6.1 Introduction	265
6.2 Pressures on freshwater systems	265
6.3 Water resources	271
6.4 Water quality	275
6.5 Freshwater biodiversity	278
6.6 Impacts of freshwater system changes on human well-being and human systems	283
6.7 Progress towards meeting internationally agreed-upon freshwater goals	291
References	293
7 Implication of Environmental Crises on the Socioeconomic Dimensions of the Sustainable Development Goals	305
Chapter Summary	306
7.1 Introduction	309
7.2 Implications of the global environmental crises on the socioeconomic dimensions of individual SDGs	310
7.3 Common Themes	332
7.4 Conclusion	334
References	337
8 Interlinkages Across Environmental Changes, Scales and Geographic Regions and Subregions	349
Chapter Summary	350
8.1 Introduction	354
8.2 Africa and subregions	356
8.3 Asia and the Pacific and subregions	369
8.4 Eastern Europe and subregions	378
8.5 Latin America and the Caribbean and subregions	391
8.6 Western Europe and Others Group and subregions	407
8.7 Telecoupling	424
References	430
Part C: System Transformations and Outlooks	458
Indigenous Knowledge and Local Knowledge Chapeau C	460
9 Scenario Methodology: Current Trends and Transformation Pathways	465
Chapter Summary	466
9.1 Introduction	468
9.2 Explorative and target-seeking scenarios	468
9.3 Internationally agreed goals used in the scenario analysis	471
9.4 Process of building the narratives for the target-seeking scenarios	473
9.5 Models used to quantify the scenarios	475
9.6 Challenges and limitations of the scenario approach	477
9.7 Presentation of results	478