OPPORTUNITY 14

SCOPE TRANSITIONAL

UNCERTAINTIES

Nature, Technology

MEGATRENDS

Saving Ecosystems

TRENDS

Artificial Intelligence
Climate tech
International Collaboration
Open data
Restoration

SECTORS IMPACTED

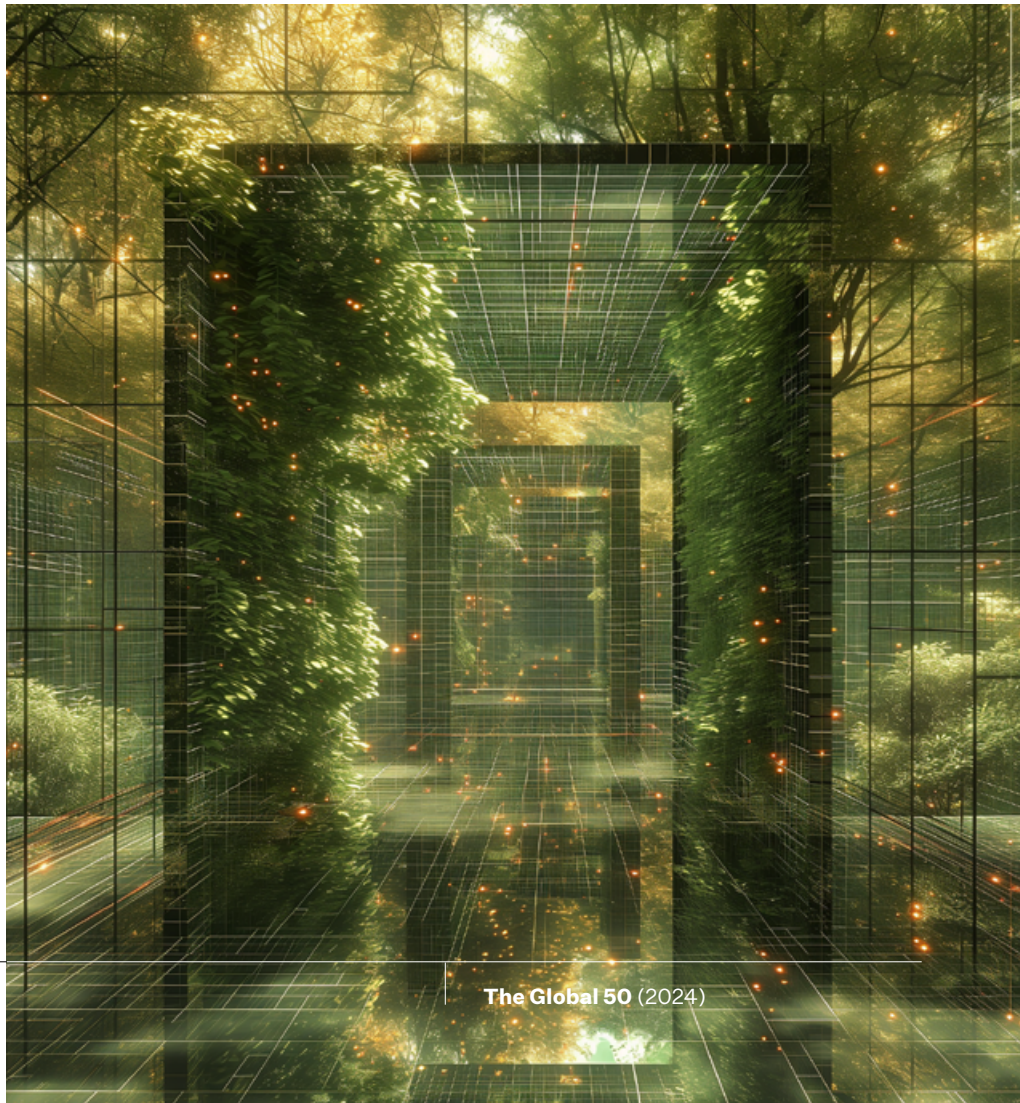
Agriculture & Food
Automotive, Aerospace & Aviation
Chemicals & Petrochemicals
Consumer Goods, Services & Retail
Data Science, AI & Machine Learning
Education
Energy, Oil, Gas & Renewables
Financial Services & Investment
Government Services
Health & Healthcare
Infrastructure & Construction
Manufacturing
Materials & Biotechnology
Travel & Tourism

What if digital biodomes shaped eco-policies?

VIRTUAL NATURE

GenAI

Digital biodomes, simulated using advanced machine intelligence, provide a basis for policies where nature conservation and restoration are a priority for the future, aligning human activities with nature's health.



WHY IT MATTERS TODAY

Nature is valued worldwide for many reasons: its economic resources, health benefits, beauty, and intrinsic value.[414] Despite this, global conservation action is lacking in some cases.[415]

Biodiversity is declining – there are more than 157,100 species on the International Union for Conservation of Nature Red List of Threatened Species, with more than 44,000 of those threatened with extinction.[416] Deforestation is also a serious conservation concern. Tropical primary forest loss in 2022 totalled 4.1 million hectares of forest. This produced 2.7 gigatonnes of carbon dioxide emissions, equivalent to India's annual fossil fuel emissions.[417] A better understanding of how valuable nature is to society and the planet is more urgent than ever.[418]

A biome is an area (e.g. tropical rainforest, desert) with unique conditions (e.g. temperature, soil, light, water) that hosts specific species within different ecosystems.[419] A biodome is a self-contained, self-sustaining, human-made biome replicating one or more ecosystems.[420] As an active laboratory of nature, this enclosed space can contain flora and fauna from a particular biome.

The University of Arizona's biodome, Biosphere 2, the world's largest, is a controlled environment dedicated to understanding the impacts of climate change.[421] The Montreal, Canada, biodome exposes people to nature and carries out various research and conservation initiatives in five ecosystems: a tropical rainforest, marine life, a maple forest, an Atlantic Ocean coast, and islands just north of the Antarctic.[422] Other examples include Burgers' Zoo, in Arnhem, the Netherlands,[423] and the Eden Project in Cornwall, in the United Kingdom.[424]

Besides the Green Planet in Dubai, a self-sustaining rainforest ecosystem in the desert city,[425] the UAE is building, as part of Mars 2117, the Mars Science City, which will include biodomes that simulate the ecosystem on Mars.[426]

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OPPORTUNITY

Virtual biodomes could guide conservation strategies that allow both nature and society to thrive harmoniously. Using virtual AI-simulated biodomes, which are more affordable than physical biodomes, yet still have a major impact, policymakers, businesses, and scientists alike can experiment with different variables to consider the needs, behaviours, and interactions of every living and non-living component. This approach would enable sustainable development to accommodate the needs of biodiverse organisms and align with climate goals.

Data from simulated biodomes could form the quantitative basis for economic and financial tools, such as taxes, funds, and bonds, that invest in nature[427] and both inform and become a mechanism of various nature-related scientific research around the world. Data and tools, adapted for the public, could also aid narratives that aim at encouraging society to adopt more sustainable mindsets, in line with the academic community, which recognises the importance of nature for human well-being.[428]

BENEFITS

AI-simulated biodomes provide a basis for environmentally sustainable decision-making and enable a greater appreciation of nature's intrinsic and extrinsic value. Shared output data aid diverse scientific communities by providing essential information for research on nature and climate.

RISKS

Limited funding and flawed biome models lead to misrepresented biological, ecological, and environmental behaviours, impacting on output quality and limiting updates to virtual biodomes. Analysis of virtual biodomes provides business intelligence that may encourage negative exploitation of nature.

There are more than

150,300 species

on the International Union for Conservation of Nature Red List of Threatened Species, with more than

42,100

of those threatened with extinction