The perspective of youth: Envisioning transformative pathways and desirable futures for people and nature

Supplementary Information A. Ideas for each group

Table S2. Distribution of ideas for each category, horizon, and group.

	Nature for Culture/Nature for Society		***Nature for Nature***		***Nature for Society***		***Nature for Culture***	
Categories	***Vision***	***Pathway***	***Vision***	***Pathway***	***Vision***	***Pathway***	***Vision***	***Pathway***
Biodiversity	*4*	*0*	*2*	*0*	*0*	*1*	*0*	*0*
Culture & heritage	*0*	*0*	*0*	*0*	*0*	*0*	*4*	*0*
Economy	*3*	*1*	*1*	*1*	*3*	*5*	*3*	*0*
Governance	*7*	*7*	*2*	*1*	*3*	*12*	*6*	*6*
Knowledge & education	*5*	*2*	*1*	*1*	*2*	*3*	*3*	*0*
Livability, health, etc.	*0*	*1*	*1*	*0*	*5*	*3*	*1*	*2*
Resource extraction	*5*	*1*	*5*	*2*	*2*	*3*	*5*	*0*
Social structures, norms, etc.	*11*	*1*	*2*	*0*	*0*	*2*	*3*	*0*
Spatial planning	*2*	*0*	*3*	*1*	*1*	*0*	*3*	*1*
Technology	*4*	*0*	*3*	*2*	*0*	*3*	*3*	*0*
Total per horizon	*41*	*13*	*20*	*8*	*16*	*32*	*31*	*9*
Total per group		*54*		*28*		*48*		*40*

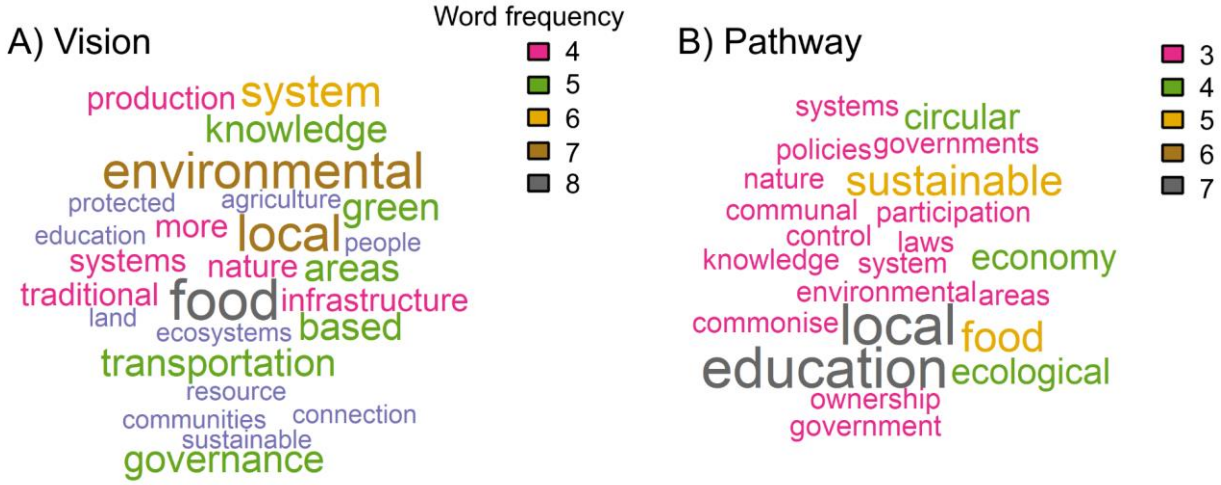

Figure S1. Word clouds showing the words used to describe the ideas (all groups included) for A) visions and B) pathways.

Supplementary Information B. Self-description of each group's vision

The description of each group's vision reflects the influence of the pre–discussion narrative, their understanding of biodiversity, and their chosen methods of presentation. These elements provide a comprehensive view of how the groups approached the exercise.

Group Nature For Society

Ujamaa is a conservation philosophy that emphasizes the practical benefits, direct and indirect values, and concrete services that nature and ecosystem services provide to society. It is based on the idea that community-hood and the crucial role of various members of society in connection to the environment are essential for sustainable development. Ujamaa relies heavily on technological advancements and innovations to various facets of human living, including agriculture, food systems, transportation, conservation and protection of biological and ecological resources, and even on socio-economic and political systems. Biodiversity and the nature concept in general revolve on the benefits and services that are being used and enjoyed by human communities. The whole context of the nature for society framework was framed on a utopian-like and technologically-advanced future where innovations on science, technology, and engineering were harnessed to "sustainably" manage available resources for societies to use. Altogether, Ujamaa was conceptualized to maximize and leverage technology and the inputs of human societies, to manage ecological resources, build resilience, mitigate risks, and build a sustainable economy and healthy environment.

In Ujamaa, biodiversity and nature meant an undisturbed ecosystem where people coexist peacefully with nature. Where there are no boundaries to separate humans from nature and vice versa. In Ujamaa everyone takes care of biodiversity/nature and lives with it. The Ujamaa Vision was presented in the form of a TV show dubbed the "The Conservation Conversation" which is a TV show/panel with experts about the future that we want.

Group Nature For Nature

For the first part of the exercise, which consisted of looking at the narrative given to the group and imagining how the future could look like, the main observations were that the group envisioned a world where humans put biodiversity at the center of life. The whole scenario seemed very utopian, even though it felt like a very extreme scenario. The first image that popped out in our heads is the glass dome above the area where people live, and everything else is left to Nature - pure and untouched. Basically, no interaction between nature and people - both elements seemed to be very independent. In other words, humans exist independently from nature. Also, another thing caught our attention - there is no personal privacy, and urban security is more valued through the laws and regulations.

For the second part of the exercise, the GAIA group focused on the main barriers to achieving that future which had to do with our current broken relationship with nature and the systemic problems like racism, corruption, and poverty that prevail. The main points of the exercise can be categorized under the main group such as green energy transition, strengthening biodiversity conservation, transforming food systems, inclusive and transparent governance, building capacity and improving/increasing environmental consciousness and education, and a self-sustaining economy focused on livelihood/well-being. We have focused on the seeds and the current issues which cause climate and biodiversity crises during the workshop. The links between seeds and issues were used to decide the group categories. However, our seeds which were categorized after the workshop by the analysis team, taking place under different categories decided by a comprehensive categorization

analysis work. As a result, after analysis teamwork, technology, spatial planning, and resource extractions, and then biodiversity is mostly highlighted by the group of Nature for Nature for all sections. So, the main findings of the team are not corresponding with the main points that are highlighted in the workshop especially when we compare them in terms of frequencies. For instance, the governance which is used as a category in the workshop has the rarest frequency according to the analysis of categorization. Governance is an almost nonexistent category.

According to the statements of participants of the GAIA team, biodiversity has different meanings. First of all, it is basically the keystone in human life that the GAIA team referred to. As they say, biodiversity is a resource in human life such as food, drink, medicine, and much more. It also shapes the human lifestyle in every corner of the Earth. Understanding of biodiversity means perceiving human history at the same time. On the other hand, it gives us hope. Biodiversity means life on Earth in all sizes, forms, shapes, and interactions with the environment. It means the unexplored/unknown, but always visible. It is the source of inspiration and creativity of wonder. Humans refer to it with different words giving different meanings and value it differently. Biodiversity is around all of us and connects all of us. We need to protect it at all costs.
The results of the exercise were presented creatively. The group came up with an idea to make it more interactive – an open air museum in 2050. The purpose of the museum was to show the young generation that lives in 2050 how the world was in 2022. They wanted to show a contrast of what was happening in 2022 and how things were different from 2050 where people live in a different world where nature is respected.

Group Nature As Culture

For our group, nature and society are not independent. In our vision these two components evolve together and only by strengthening the link between nature, culture, and socio-economic development can a sustainable future be achieved. As the workshop was held two years after the start of the COVID-19 pandemic, it represented the first trip and/or scientific meeting for several of the participants, which strongly influenced our group work. The pandemic allowed us to reflect on the link between our lifestyle, climate change, culture, the way we relate to people and our environment. Our group perceived the present as a moment of transformation where crises are driving changes in way of life and values.
Our vision of transformation involves people seeking contact with nature. For instance, it motivates people to organize and build cities in a new way, with a focus on biodiversity and sustainability. We envision a world in which people will migrate to the countryside, in search of a greater connection with nature and a safer environment.
The future we envision has three major pillars: governance, education and technology. Ecosystem-based forms of governance will emerge, representing a major shift in the way human societies and the natural world relate, without the dominance of a nation state. It would mean that the protection of ecosystems would be a top priority for decision-makers, and that the rights of nature and wildlife would have the same weight as those of people.
Widespread adoption of nature-based education would also have far-reaching implications. Children would spend more time outdoors, connecting with nature and learning in a more hands-on and experiential way, leading to more imaginative play and reducing conflict. This leads to a more environmentally conscious and responsible generation, with a deeper understanding of the natural world and a greater appreciation of its value.

Before diving into group work, we individually read a narrative of a positive future in which people mutually care for each other and the environment. Relational values are the foundation of the peoples' relationship with nature. This also led us to discuss a visionary future each, inspired by the movie

Avatar, where all forms of life are connected and there is mutual respect that contributes to the balance of the ecosystem. For example, digital connections have played a major role in our discussions. They have the potential to overcome geographic, cultural, and language barriers, allowing people to share knowledge and work toward common goals. In addition, technology will play a fundamental role in the control and management of natural resources and ecosystems. The use of advanced sensors, virtual reality, and machine learning algorithms will help to better understand the natural world and make informed decisions to protect it. Technological developments will also function as tools to enable sustainable lifestyles (efficient means of transportation, reduction of waste production, new forms of energy).

We believe that a key factor to achieve changes in society is communication. Therefore, we presented our results with humor simulating a newscast, presenting potential TV news of the future including about governmental, social, educational and technological changes. These showed our visions as well as the transformations necessary to get there.

Group Nature As Culture/Nature For Society

Living is organized in human-ecological communities/units. World governance is organized at the scale of these ecosystem units, with ubiquitous citizen participation leading decisions with regular and multiple scale (from river to small seas to continent for example) assemblies, driven by intersectional local and indigenous knowledge. The biggest inspiration was the thinking of the governance system. We did not keep their focus on adaptive life (nomadic) or on technologies/energies/infrastructures. Our meaning of biodiversity/nature was influenced by nature being a precondition for human life. It is life to be respected for life itself and intersectional for health, education, civil participation, food production, culture, identity and more. Biodiversity is holistic and integral to the world.

We used jokes to symbolize capitalism and social classes behaviors and choices, using an object everybody knows and relies on to live: potatoes. When we compared our imaginary to others, ours was not futuristic as a society ruled by technological advances. Contrary ours was to return to our communities and live happily: house in the middle of the forest. It was very community-based.
We offered the group to join a role play of a citizen assembly for the communities of what is in our current Earth world the Baltic Sea. A decision had to be made about the quantity of sand extracted throughout the sea. We created different names of regions, and created a sense of community with an imaginary hymn, dancing together. We wanted to highlight the main revolution of our world: the democratic decision-making is run by citizens, representing their community's interest (instead of countries/political parties) and based on shared and co-created knowledge (not only "science") background. Each citizen participated in the decision and presented results and advances from their unit. We gave one example through the announcement of the creation of the Digital Platform for Indigenous Knowledge.
The governance system is well represented (but the "protected areas co-managed with governments" does not make sense given our world, governments are not a thing anymore). The importance of knowledges, food sovereignty, education, and values such as empathy are well represented. We did not particularly highlight cities nor new technology. The Digital Platform for Indigenous Knowledge was a platform led by Indigenous Peoples to add their knowledge systems (songs, stories, plants, etc) to prevent erasure of those knowledge systems. A safe space against biopiracy. We talked about technology to ensure different knowledges are preserved and can be used transversally.