Part B

UNTAPPED
Collective Intelligence for Climate Action

Co-building the Accelerator Labs as a joint venture with:

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DEUTSCHE ZUSAMMENARBEIT

QATAR FUND FOR DEVELOPMENT
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UNDP Core Partners

UNTAPPED: Collective Intelligence for Climate Action

About the UNDP Accelerator Labs

The United Nations Development Programme (UNDP) Accelerator Labs is the world's largest and fastest learning network on wicked sustainable development challenges. Co-built as a joint venture with the Federal Ministry for Economic Cooperation and Development of Germany and the Qatar Fund for Development, along with Partners at Core for UNDP, the Italian Ministry of Environment and Energy Security as action partner, and the Japan Cabinet, the Network covers 115 countries, and taps into local innovations to create actionable intelligence and reimagine sustainable development for the 21st century. Learn more at acceleratorlabs.undp.org or follow us at @UNDPAccLabs.

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Nesta's Centre for Collective Intelligence Design helps create new ways for communities to use technology to harness their insights, ideas and power to act on the problems that matter to them and create the futures they want. We design tools and projects that allow communities to respond collectively to challenges, and that help public and voluntary sector institutions strengthen trust and collaboration with citizens.

We use rigorous research methods to test, learn and evaluate each solution. Our flagship Collective Intelligence Design Playbook helped to define the field and is used by practitioners around the world. We have worked with organizations from the UN to the BBC.

To learn more, visit nesta.org.uk/project/centre-collective-intelligence-design or email the team at collective.intelligence@nesta.org.uk

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Design

Ahoy Studios

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All photos featured in the report were obtained with participants' informed consent.

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Part B

Evolving collective intelligence practice

R&D frontiers to build the future of climate action

Designing collective intelligence for enhanced impact on climate action

The impacts of collective intelligence initiatives are often under-researched, measured in an anecdotal way or only report changes for individual participants rather than wider outcomes.[106]

This is especially true for exploratory and early-stage initiatives, and initiatives in the Global South. This report discusses impact drawing on the available evidence from case study analysis as well as from the literature at large, including evidence from initiatives deployed in the Global North. The recommendation is for greater attention to impact reporting for future initiatives, particularly in Global South contexts.

The available evidence indicates that while some impacts are targeted to the specific climate problem the initiatives have been designed to address, others are broader and can be felt at the individual, community or wider ecosystem levels. For example, the most commonly reported impact of collective intelligence projects is greater awareness, interest and understanding of climate issues for participants. This individual level learning is normally specific to the issues being addressed by a given collective intelligence initiative but sometimes spills over into other related climate topics.[107] These broader impacts are discussed on pages 83-97.

We find that the impacts of collective intelligence initiatives depend on how successfully they navigate three main challenges. The first is participation: the ability to engage enough people to achieve critical mass and high quality outcomes. The second is data utility: even with high levels of participation, initiatives may fail to produce useful knowledge and data. The third challenge is their ability to shift from understanding towards action: even if initiatives produce useful knowledge, decision makers fail to act upon it. On pages 98-101, we argue that design tactics can help collective intelligence initiatives navigate these challenges, so they deliver larger impacts of both the targeted and broader kinds.

106
Peter, M., Diekötter, T., Kremer, K. 2019. Participant outcomes of biodiversity citizen science projects: a systematic literature review. Sustainability, 11, 2780, May 15, 2019. https://www.mdpi.com/2071-1050/11/10/2780.

107
Ibid.

Designing for impact at different levels

Some collective intelligence initiatives are starting to demonstrate impacts at one or more of these levels: individual, group, institutional and ecosystems **(Figure 3)**.

Figure 3:
The different levels of impact of collective intelligence climate initiatives.

Individual-level

Table 4: Summary of individual-level impacts and factors that contribute to them

KEY IMPACTS	COLLECTIVE INTELLIGENCE DESIGN FEATURES THAT SUPPORT THESE IMPACTS
Improved understanding of specific environmental issues and adoption of pro-environmental behaviors	■ Gamification to make learning about climate action fun and memorable ■ Tailored information provision about the issue
Increase in perceived self-efficacy of climate action	■ Tailored information mapping the link between individual contributions and collective impact
Skills development	■ Project wikis to share standardized protocols and resources to support new volunteers with tasks ■ Regular in-person onboarding and skills training ■ Communication and advocacy training for participants

As mentioned, collective intelligence projects breed greater awareness, interest and understanding of climate issues for participants. For example, interest in the climate crisis rose by 15 percent among participants in the Global Climate Assembly, convened for the Conference of Parties in 2020. There is also evidence that participating in data gathering or more experiential initiatives like simulations can help sensitize people to the importance and urgency of climate change and in some cases, leads to adoption of more pro-environmental behaviors. These impacts are typically reported by citizen science initiatives that work with young people where there is a big emphasis on learning.

Participating in data collection and analysis can also help individuals develop useful digital skills and build a critical understanding of how to use data as evidence for action. Beyond these technical competencies, collective intelligence initiatives often offer additional opportunities for skill development, for example in communication or advocacy. For example, the Plant-for-the-Planet project has trained over 95,000 young people worldwide in advocacy skills through a combination of online and in person workshops (Case Study 3). The COLLECT project, which focuses on tracking marine litter, has also supported young people to develop new skills through tailored resources such as step-by-step manuals and YouTube tutorials.

Finally, although relatively few collective intelligence initiatives measure it consistently, a few have reported that involving people in monitoring biodiversity increases their belief in the efficacy of climate action at individual level. Research suggests that this is an important prerequisite to pro-environmental behavior change.[108]

GAMIFICATION HELPS YOUNG PEOPLE LEARN LINKS BETWEEN INDIVIDUAL ACTIONS AND CLIMATE CHANGE

Bumi Kita is a mobile app aimed at helping children learn about climate-related disasters that affect Indonesia, primarily tsunamis and earthquakes. Young people can build their understanding and resilience through the interactive game, “How if,” which teaches them how to prevent and face impending disaster events. Users can both report and track hazards on the app’s crowdsourced map, helping them to better plan their response as hazards unfold.

108
Fritsche I., Barth M., et al. 2018. A social identity model of pro-environmental action (SIMPEA). Psychological Review, March 2018 125(2):245-269. Epub 2017 December 21, 2017. https://pubmed.ncbi.nlm.nih.gov/29265852/.

Group-level

Table 5: Summary of group-level impacts and factors that contribute to them

KEY IMPACTS	COLLECTIVE INTELLIGENCE DESIGN FEATURES THAT SUPPORT THESE IMPACTS
Shifts in social norms and collective behavior	■ Online forums for contributors, direct peer-to-peer feedback, to increase awareness of social norms ■ Deliberation and collective decision making ■ Financial rewards to reinforce climate-positive behaviors
Increased community resilience and local collective action	■ Capacity building, training and information provision, delivered by local organizations or trusted individuals within the community ■ Social forums and in-person events to facilitate follow-on activities
Decreased polarization and tension	■ High-quality moderation of online and in-person discussions

There is also evidence that collective intelligence initiatives lead to group-level impacts that reveal more coordinated and cohesive collective action. Evidence from climate-smart monitoring initiatives or citizen science projects with farmers shows that being involved in data collection about agricultural impacts means they are more likely to adopt new behaviors. For example, evaluations of the Seeds for Needs project have found that participating farmers went on to use a wider variety of seeds which increased their crop yields and helped them recover more quickly from climate shocks. This may suggest that when digital solutions have a critical mass of farmers from a given region, the aggregated changes they make could result in a significant shift in behavior at the group level.

There is evidence that financial incentives play an important part in encouraging sustained changes to behavior[109] and can provide a critical level to enable participation when communities receive payments directly. The Vietnam Forests and Deltas programme from Winrock Capital is an example of community-based adaptation: automated payments are used to reinforce community actions that lead to positive environmental impacts. Using their phones, communities log actions they have taken towards restoring the local forest ecosystem and are rewarded immediately after the activity is verified.[110] Pre-payment to incentivize action may improve adoption of pro-environmental behaviors. A trial with rice farmers in Punjab demonstrated an 8 to 11.5 percent reduction in crop burning, a significant contributor to air pollution in the region, as a result of upfront payments.[111]

Several collective intelligence solutions facilitate peer-to-peer interactions through digital forums or allow people to learn about differences in attitudes directly from each other through deliberation. This gives individuals direct insight into how climate attitudes and behaviors are changing among their peers and neighbors. Research has shown that observing shifts in behavior among peers or anyone from a familiar "in-group" is more likely to trigger the adoption of new behaviors by individuals.[112]

Community-based monitoring health-surveillance projects such as the Zika Premise project and DengueChat also demonstrated the value of collective intelligence for building community resilience to crises. As a result of citizen-led monitoring and actions taken by residents to eliminate mosquito breeding sites, there was a 27 percent reduction in high risk "hotspots" for the yellow fever mosquito. An evaluation of DengueChat in Nicaragua showed 90 percent reduced transmission of mosquito-borne diseases in five intervention neighborhoods compared to a 400 percent increase in areas without intervention. Through tailored training sessions and information provision they increased the capacity of communities to take action themselves to prevent the spread of vector-borne diseases. Importantly, in the DengueChat project, monitoring and information provision is delivered by local young people who are trusted by others in the community. Another example of community monitoring — in this case of water sources in times of drought — is an initiative developed by the UNDP Kenya Accelerator Lab (see Case Study 6).

Another key group-level impact of collective intelligence is reduced polarization and increased understanding between groups with different priorities and values. This outcome has been reported by projects that use participatory modeling to help different stakeholder groups negotiate and plan coordinated adaptation actions. People who take part in citizen assemblies and Deliberative Polling®, where diverse groups of individuals come together to discuss policies,[113] have also expressed the importance of listening to those who have different opinions than their own. For example, a Deliberative Poll® to discuss the future of California including policies on climate issues showed that participants feel more warmly towards individuals from opposing political parties after deliberation.[114]

109
A meta-analysis of climate-positive incentives found that financial approaches are one of the most effective tools for encouraging climate mitigation behavior: Bergquist, M., Thiel, M., Goldberg, M.H. and van der Linden, S. 2023. Field interventions for climate change mitigation behaviors: A second-order meta-analysis. PNAS 120 (13), March 21, 2023. https://www.pnas.org/doi/10.1073/pnas.2214851120.

110
Winrock International Institute for Agricultural Development. Vietnam Forests and Deltas Program Final Report. https://winrock.org/wp-content/uploads/2021/06/VFD-final-report_distribution.pdf.

111
Jack, K., Jayachandran, S., Kala N., Pande R. 2023. Reducing air pollution: Evidence from payments to reduce crop burning in India. VoxDev, March 28, 2023. https://voxdev.org/topic/energy-environment/reducing-air-pollution-evidence-payments-reduce-crop-burning-india. Accessed February 9, 2023.

112
Bergquist, M., Thiel, M., Goldberg, M.H. and van der Linden, S. 2023. Field interventions for climate change mitigation behaviors: A second-order meta-analysis. PNAS 120 (13), March 21, 2023. https://www.pnas.org/doi/10.1073/pnas.2214851120.

113
Both citizen assemblies and Deliberative Polling® require participation samples that are representative of the population of interest.

114
California 100, UC Berkeley's Goldman School of Public Policy, Stanford University's Deliberative Democracy Lab. 2023. California Considers: policy deliberations for our long-term success. April, 2023. https://caconsiders.org/wp-content/uploads/2023/04/California-Considers-Report-FULL-FINAL.pdf.

Case Study 6

Tapping into community knowledge to map water sources in Kenya's Tana River county

GAPS ADDRESSED

Data Gap

Doing Gap

What problem were they solving?

The Tana River County is one of Kenya's most important wetlands, providing farmland and dry season pastures for local communities. In the Tana River basin, the frequency of severe floods and droughts has increased, resulting in devastating impacts on the local communities who rely on the river for drinking water, irrigation and fishing. The droughts also trigger livestock migration as the cattle move in search of water and new pastures. This in turn causes friction between cattle herders and farmers. Sustainable water governance and resource management require multi-stakeholder engagement as the issues are highly complex, urgent and contested. There are significant data gaps around water levels, use and access to water points. Plugging these gaps could enable decision makers in government and the private sector to anticipate, monitor and adapt to water scarcity. The data could also help herding communities to advocate for allocation of water infrastructure projects. Ensuring that herders have access to the data, can also support better planning of migratory routes and more efficient management of the resources during extreme weather events. When water is scarce this could enable herders to take their cattle to water points where tensions with farming communities are less likely.

What did they do?

The UNDP Accelerator Lab in Kenya worked with Tana River county and national government officials to develop a collaborative community mapping platform. The platform combines data on the water infrastructure in Tana River County collected by "water scouts" from herder communities with other existing datasets.[115] 43 community data stewards (scouts) were recruited and trained to collect the data using the Open Data Kit (ODK) mobile app.[116] The data is imported from the mobile app to the KoboToolbox platform where it can be analyzed by officials from the county government. This data collection process was co-designed with 100 people from the Kipini West Ward and Wayu Ward, including representatives from herder communities, farmers, government officials and the private sector.

In the long-term, data will be accessible through a public dashboard managed by the County Chief Officer for Water and Energy[117] so it can be used by decision makers at national and county levels and by citizens to advocate for water infrastructure projects. The Lab is also planning to scale the approach to other counties.

What was the benefit of using collective intelligence for this issue?

During the pilot, the scouts mapped 1,243 existing water sources and 684 social amenities in fifteen different wards across the county. They also collected rich qualitative data about community perceptions on climate change from villages in the area, including insights into the effects of water scarcity on relationships between herders, farmers and the government. Involving the water scout network from the outset and co-designing the data collection process helped overcome some of the existing tensions over resources. The prototype was successful in the way it mobilized tacit knowledge of the area's water points to plug a pervasive data gap. For example, when looking at water quality, this initiative unearthed local practices whereby households treat it with plant extracts from indigenous trees. The Kenya Water Institute is now validating the efficacy of this method as a sustainable non-toxic alternative to chemical coagulants.

115
Data on the platform will include satellite data, hydrometeorological data, ethnographic data from the community, and other relevant data sets from related Government agencies.

116
Open Data Kit is a mobile application that supports data collection in resource-limited settings. https://getodk.org/

117
Quantitative data about functional and non-functional water resources will be openly available; and qualitative data will be available on request.

118
For example, some communities preferred to work with paper maps rather than ODK for their data collection.

COLLECTIVE INTELLIGENCE USE CASE
Anticipating, monitoring and adapting to systemic risk

IPCC CATEGORY
Adaptation, Disaster risk management

COUNTRIES
Kenya

COLLECTIVE INTELLIGENCE METHODS
Participatory mapping, combining datasets, co-design

PEOPLE
Young people, farmers, herders, Tana River County Government, National Drought Management Authority, Pwani University, Kenya Water Institute, Kenya Community Support Centre and Vox Radio.

DATA
Geospatial data, satellite data, crowdsourced observations, ethnographic data

TECHNOLOGY
Open Data Kit (ODK), KoboToolbox, WhatsApp, mobile phones, dashboard

Working with local scouts led to faster data collection because of their good knowledge of the local area. This in turn, has generated interest of county governments in mobilizing community networks to collect data on issues beyond water infrastructure, for example, supporting a planned livestock census.

Public data on the location and status of water sources will also support herders and farmers to make better decisions during droughts and floods — and therefore reducing the doing gap. For example, the data could help scouts select new locations for the herd that require shorter migratory routes to support the survival of weaker livestock.

What does this experience tell us about collective intelligence for climate action?

This is a story of climate change problems that affect different communities differently, exacerbate trust levels in a context of diminishing resources, and point to the potential of collective intelligence to lead to synergies instead of trade-offs. Two key challenges emerged early on — varying data literacy levels amongst local communities[118] and a historical lack of trust in institutions. To address these challenges, the UNDP Kenya Lab developed a protocol that could be easily deployed using the most appropriate technologies for the local context, including several free, open source tools. For example, ODK allows for offline data collection, so the scouts could map water points in regions with poor connectivity. The Lab recruited and maintained engagement of the water scouts by tapping into existing communication channels on WhatsApp. Bringing together herders, farmers and county government officials at several points during the design and prototyping process, has allowed groups to openly discuss differences where dialogue and data might reduce tensions related to scarcity and climate adaptation in the future.

Institutional level

Table 6: Summary of institutional impacts and factors that contribute to them

KEY IMPACTS	COLLECTIVE INTELLIGENCE DESIGN FEATURES THAT SUPPORT THESE IMPACTS
Increased satisfaction, legitimacy and support for climate policy	■ Facilitation (in-person or automated) to support high-quality deliberation ■ Direct feedback from decision makers to participants about outcomes of the process
Affects trust between institutions and citizenry	■ Transparency about intentions to act on public recommendations ■ Co-design of process
More appropriate and feasible policy programs, with buy-in from local stakeholders	■ Visualizing future impacts through modeling ■ Participatory design of models ■ Commitments to locally relevant actions

Impact reporting on outcomes related to institutions is rare and mostly limited to projects that directly involve government actors or policy discussions. There is evidence that when these processes are well designed and enable good quality deliberation, participants experience high levels of satisfaction with outcomes, even if recommendations do not fully reflect their own personal views. Evaluations of climate assemblies have also shown that they are perceived to have high legitimacy by the public, which is especially important for countries where trust in institutions is declining.[119] This suggests that if decision makers use collective intelligence methods they can retain public support even when making difficult choices, giving governments a strong mandate for bold climate action.

Trust is a key factor in ensuring public support of institutional actions. Evidence about the impact of participation on trust is mixed and can be affected by the willingness of institutions to take public recommendations on board. Deliberative Polling® in the United States has shown that even though participation significantly increases trust in both local and state-level government, the baseline levels of trust remain low (between 40-45 percent). Other collective intelligence methods have been more successful at increasing support for institutions. For example, a study of marine and coastal citizen science projects demonstrated that almost 90 percent of participants increased their support for marine science, and official coastal restoration or management policies.[120]

There is some evidence that collective intelligence processes lead to decisions and plans that are more feasible and appropriate in the long term because they are based on realistic assessments of diverse priorities and needs. For example, when stakeholders came together to discuss land management strategies in Zimbabwe using participatory modeling, community members reported that the process helped them understand the systemic effects of various behaviors. This led to changes in local land use policies and commitments from groups including local Chiefs and village heads to take the collective action necessary to improve outcomes for everyone in the long run (see pages 70-71, Better modeling to inform climate policy decision gaps). The Urban Heat Island Mapping project is another good example where working with local communities to collect granular data about extreme heat has led to locally tailored adaptation planning by municipalities in cities from Honolulu to Cincinnati. A pilot initiative by the UNDP Mozambique Accelerator Lab on collaborative mapping to increase resilience to climate-related extreme weather showed that the local government's responsiveness increased substantially when the authorities accepted to participate in data collection alongside local communities.

In some cases, collective intelligence initiatives can be steered towards a direct contribution to plans or decisions sanctioned by law, but that national or local governments do not have the resources to invest in. This, for example, is the case of initiatives developed by the UNDP Accelerator Labs in the Maldives (see Case Study 7) and Bolivia (see Case Study 8).

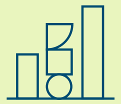
119
Global Assembly. 2022. Report of the 2021 Global Assembly on the Climate and Ecological Crisis. November 2022. https://globalassembly.org/resources/downloads/GlobalAssembly2021-ExecutiveSummary.pdf.

120
Dean, A.J., Church, E.K., et al. 2018. How do marine and coastal citizen science experiences foster environmental engagement? Journal of Environmental Management, Vol. 213, 2018. https://www.sciencedirect.com/science/article/abs/pii/S0301479718301932. Accessed October 9, 2023.

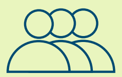
Case Study 7

Participatory mapping for multi-hazard resilience in the Maldives

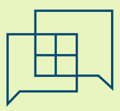
GAPS ADDRESSED



Data Gap



Doing Gap



Decision-making Gap

What problem were they solving?

The Maldives islands are one of the lowest-lying countries in the world. Like other large ocean island states, they are vulnerable to a range of climate change impacts: rising sea levels and extreme weather events which are becoming more frequent and intense. These changes threaten the islands' infrastructure, erode shorelines and contaminate freshwater sources. They also pose a risk to livelihood areas including tourism, fisheries and farming.

The archipelago has come up with decentralized strategies for disaster risk planning, but has not produced detailed local plans for each of its over 200 inhabited islands. The National Disasters Management Authority (NDMA) works with the local councils to plan for disaster risk management at the national level, however, granular data about vulnerable building infrastructure and community assets is not always available at the island level. This lack of high-quality information available at the place and time of need — a *data gap* — can result in poor coordination between the central authority in charge of disaster risk planning and the communities in the smaller islands — a *doing gap*. Islanders are aware of, and concerned about, extreme weather events, yet many feel unprepared and helpless when it comes to disaster preparedness and response.

What did they do?

The UNDP Accelerator Lab in Maldives prototyped a participatory mapping approach to try to fill the *data gap* about vulnerability to extreme weather. Working with the local council of the Maafaru island in the Noonu atoll, the Accelerator Lab engaged 12 local residents[121] to create a map of island infrastructure to be used for more effective disaster management. To do this, volunteers realized they first needed to improve the base layers of the map, including Maafaru's detailed road network and building footprints. This base layer was then used to develop what is known as a Hazard, Vulnerabilities and Capacities (HVCA map). Like many islands in the archipelago, Maafaru did not have a detailed GIS baseline map.

Recruiting volunteers through social media and local networks like NGOs and island women development committees, enabled higher levels of engagement from young people and women. Using easily accessible digital tools like Mapillary and OpenStreetMap alongside paper maps, they collected data on basic infrastructure to inform and develop a basemap of the island.[122] In addition to the infrastructure basemap, they also created a HVCA map to visualize risk exposure, locally available physical and human resources, for example, stronger buildings to act as assembly points. The UNDP Accelerator Lab aims to scale their methodology to other islands to institutionalize the approach within government. In the meantime, the existing maps are used to formulate island-level disaster management plans and shared with stakeholders. This open dataset can also be used to support more accurate risk modeling and loss and damage projections by others.

What was the benefit of using collective intelligence for this issue?

The data from the participatory mapping activities helped to identify household-level risks, which is informing local disaster response plans. Involving community members in data collection and validation improved the granularity and accuracy of data. Participants not only drew the exact building polygons but were able to add additional attributes like building material, which gives an indication of household vulnerability. Using local knowledge to capture information about exposure to multiple different hazards (tropical storms, swells, beach erosion), they added to the dataset's versatility. The data collection and validation was achieved in the space of two days by local residents: they already had most information, and used the time to encode it on the map and validate it.

The approach laid the foundation for stronger connections between local institutions and communities. This can help improve coordination between officials and residents during future emergencies as well as developing trust and building capacity amongst local residents to take more appropriate actions, which are vital for reducing *doing gaps*. In particular, the volunteers involved in data collection can act as leaders in future emergency response efforts.

What does this experience tell us about collective intelligence for climate action?

This experience demonstrates the challenges around matching locally relevant information to effective local planning. Its participatory approach ensured that the data collected were in principle useful for decision makers at both the local and national levels, as well as local residents; and it attempted to help build the internal capacity of local authorities to deliver and sustain these types of initiatives. In reality, many island councils in Maldives lack the technical capacity to work with GIS data. They use maps of their islands which are not compatible with GIS applications, nor integrated into national systems for risk planning. This lack of capacity risks making locally collected data irrelevant: closing the data gap does not automatically translate into shrinking the *decision-making gap*.

NDMA, which has this capacity, is better positioned to translate the data into disaster management plans. For this reason, the Lab designed the process so that local collective intelligence would be mobilized to contribute to decision making at the national level, and to engage the existing administrative pipeline for processing the data. This case study exemplifies the value of positioning collective intelligence where it can generate the highest impact, rather than assuming that better information will automatically lead to better decisions.

COLLECTIVE INTELLIGENCE USE CASE
Anticipating, monitoring and adapting to systemic risk

IPCC CATEGORY
Adaptation, Disaster risk management

COUNTRIES
Maldives

COLLECTIVE INTELLIGENCE METHOD
Participatory mapping

PEOPLE
Local residents, local councils

DATA
Geospatial data, crowdsourced observations

TECHNOLOGY
Mapillary, Open Street Map (OSM), QGIS

121
Out of a total population of 1000.

122
The base map captures information on resources, roads, building materials (to estimate vulnerability levels), land use features and other infrastructure.

Ecosystem level

Table 7: Summary of ecosystem impacts and factors that contribute to them

KEY IMPACTS	COLLECTIVE INTELLIGENCE DESIGN FEATURES THAT SUPPORT THESE IMPACTS
Market shifts in the focus of innovation	■ Targeted funding calls and Challenge Prizes focusing on specific issues, technologies or geographies ■ Community-managed data assets
Empowerment of Indigenous Peoples and overlooked groups for land governance	■ Participatory design ■ Using icons and multiple languages to improve accessibility of digital tools ■ Community-defined indices of inclusivity
Improved security and reduced corruption	■ E-payments sent directly to individuals and communities

The final category of impacts demonstrated by collective intelligence projects relates to changes at the ecosystem level, where they are disrupting traditional structures of power and influencing market dynamics.

This is most clearly seen through the influence of open innovation projects that help to shift the trajectory of climate technology development or stimulate the market to generate data and solutions about a particular topic. For example, the eligibility criteria for the Million Cool Roofs Challenge and the Cooling Prize ensured that solutions had to be affordable, inclusive and appropriate for the Global South. This is a marked difference from most technology innovation that is driven by market priorities and interests in the Global North.

The digitization of community-managed assets like seedbanks, as seen in the Bioleft project, is another way that collective intelligence is disrupting existing market dynamics. By creating a new database of diverse, locally cultivated seeds for the benefit of local smallholders, the project is helping to challenge international extraction and the pressures of agricultural monocultures.

A final important impact that can be seen in several projects is how they come up with creative ways to connect actors across the value chain to directly exchange services and payments. Clean City Africa and BaKhabar Kissan are two projects where digital platforms are directly connecting producers to distributors and suppliers to improve coordination. This is helping to reduce transaction costs and opportunities for corruption, as well as helping local markets to operate more efficiently.

Several collective intelligence projects are also using technology to shift traditional lines of power within land governance and ecosystem management. For example, the Sapelli project co-designed a data collection tool for forest management, with Indigenous Baka communities in Cameroon to ensure that it was easily understood by participants.[123] The CyberTracker tool for biodiversity and ecosystem management was also co-developed with communities in Namibia. Like the Sapelli tool, it uses pictograms to enable Indigenous trackers in the Nyae Nyae Conservancy in the Kalahari to capture data. The LANDex platform crowdsources people-centered indices and data on land ownership, to advocate for the rights of women, men and communities "who live on and from the land." In Nepal, government representatives have committed to exploring the use of the LANDex tool for official data collection.[124] These tools provide groups that are typically overlooked in local land management disputes with the means to build an evidence base to help them make their case with decision makers or other stakeholders.

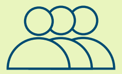
123
Moustard, F., Haklay, M. et al. 2021. Using Sapelli in the Field: Methods and Data for an Inclusive Citizen Science. Frontiers, Vol. 9, July 1, 2021. https://www.frontiersin.org/articles/10.3389/fevo.2021.638870/full.

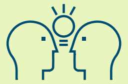
124
International Land Coalition. 2019. Nepal officials choose Landex as a tool for national processes. International Land Coalition, June 17, 2019. https://www.landcoalition.org/fr/newsroom/nepal-officials-choose-landex-tool-national-processes/. Accessed October 9, 2023.

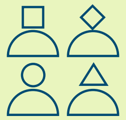
Case Study 8

Including Indigenous Peoples’ perspectives in adaptation planning for the Bolivian Amazon

GAPS ADDRESSED


Doing Gap


Distance Gap


Diversity Gap

What problem were they solving?

The Global Climate Risk Index, 2021, places Bolivia as the 10th most vulnerable country in the world, experiencing cyclical droughts, forest fires and floods. In the last four years, forest fires and agricultural burning have affected more than 15 million hectares, damaging biodiversity, ecosystems and livelihoods of rural communities.[125] Yet adaptation planning in some of the most affected regions such as the Amazon, Chiquitania and Chaco is complex due to priorities of local people who rely on the land for their homes and livelihoods. The national government has tried to address this challenge by introducing “Lifesystems plans”[126], a mechanism for Indigenous Peoples to plan for their territorial development and provide inputs to the official climate adaptation planning process carried out by local governments, the Territorial Integral Development Plan (PTDI). Despite these efforts, some communities’ views remain underrepresented in the development of Lifesystems plans, particularly those of Indigenous groups, further exacerbating the *distance gap* between traditional and official knowledge. The main reason for these climate action gaps is that the Plurinational Authority of Mother Earth, the government organization responsible for climate action and compliance with the Bolivia’s Nationally Determined Commitments, lacks resources to work closely with Indigenous communities to help them develop Lifesystems plans, and that there isn’t a process for integrating hyperlocal planning with the PTDIs and the national climate strategy.

What did they do?

The UNDP Accelerator Lab in Bolivia saw an opportunity to support Kaami, one of the Indigenous Peoples in the Chaco region to contribute to their local Lifesystems plan. The Municipality of Camiri expressed its willingness to connect the Kaami Lifesystem plan with its municipal planning and, as a result, allocated a budget for it. The UNDP Bolivia Accelerator Lab prototyped a crowdsourcing process to understand the Indigenous communities’ climate adaptation needs. Through deliberative workshops with representatives of 16 Indigenous communities and municipal decision makers, they surfaced perspectives on the causes of climate change and the adaptation needs of the local forests and water bodies. These were used as the basis of a simple digital survey, where participants were asked to prioritize between different climate issues and adaptation strategies. The qualitative insights from deliberation and the results of the community survey were visualized in a co-designed 3D climate adaptation map, which will contribute to the territorial planning being developed by the Municipality of Camiri. UNDP has started socializing the Lifesystems plan with decision makers from the Plurinational Authority of Mother Earth to ensure its use as an input into the national planning cycle.[127]

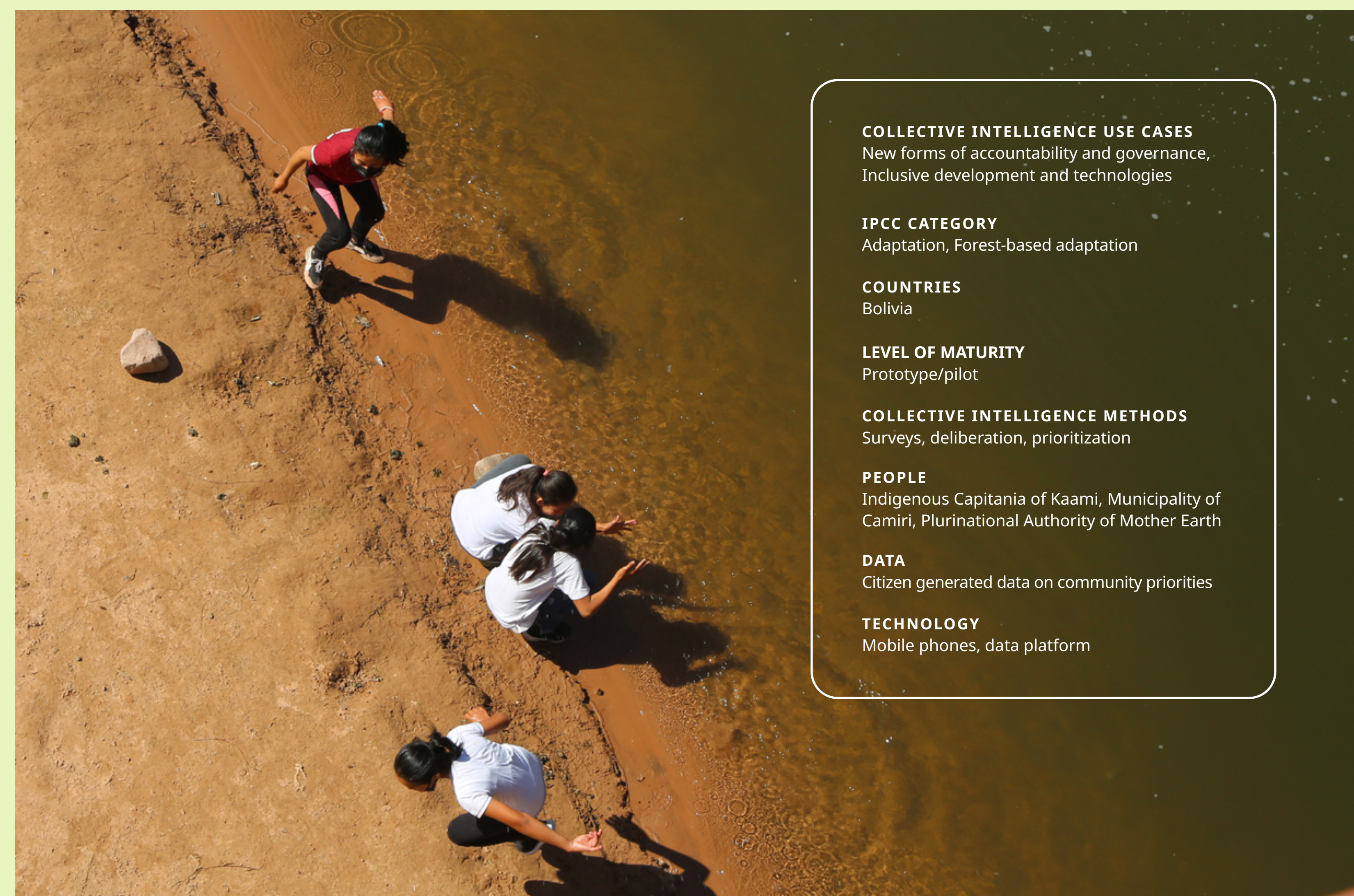
What was the benefit of using collective intelligence for this issue?

This collective intelligence prototype has demonstrated the viability of developing highly localized, inclusive climate adaptation land use plans as a means of empowerment of Indigenous and overlooked groups to feed into national planning by the Plurinational Authority. Bringing together 16 of the 19 Indigenous communities from the Chaco region, with representatives of the municipal government and the Plurinational Authority of Mother Earth, helped to build mutual understanding and bridge the gap between traditional and official knowledge. For example, communities were unaware of the high rate of deforestation in the country, especially within their territories. It came as a surprise to them when they learnt that on average, 33 soccer fields of forest were being deforested every hour from 1975 to 2019. The Indigenous representatives from the Kaami reported that taking part helped them develop a deeper understanding of interactions in the local ecosystem, which would improve their ability to actively preserve the environment in the future.

What does this experience tell us about collective intelligence for climate action?

This experience suggests that collective intelligence can mitigate gaps in climate adaptation planning, in particular by creating alternative forms of dialogue to formulate land use plans. By co-designing the ways of presenting data, UNDP ensured the results are more accessible to community members. For example, Likert scales with numbers rather than text were better for presenting data about the perceived state of natural resources in the digital survey. Using a 3D map of the trees and water sources in the local territory helped increase understanding of how different parts of the ecosystem interact to cause extreme weather.

Collective intelligence alone, however, cannot bridge gaps between national indicators and terms and local communities. The Lab faced challenges aligning expectations between different groups and translating between Indigenous environmental knowledge and the technical terminology used by government officials. For example, some of the words used by Indigenous communities lost their full meaning when translated into Spanish and official indicators were not suitable for capturing activity taking place at a hyperlocal level. The technicians from the Plurinational Authority of Mother Earth helped them to effectively broker dialogue between the government officials and Indigenous representatives.



COLLECTIVE INTELLIGENCE USE CASES
New forms of accountability and governance, Inclusive development and technologies

IPCC CATEGORY
Adaptation, Forest-based adaptation

COUNTRIES
Bolivia

LEVEL OF MATURITY
Prototype/pilot

COLLECTIVE INTELLIGENCE METHODS
Surveys, deliberation, prioritization

PEOPLE
Indigenous Capitania of Kaami, Municipality of Camiri, Plurinational Authority of Mother Earth

DATA
Citizen generated data on community priorities

TECHNOLOGY
Mobile phones, data platform

125
Country programme document for the Plurinational State of Bolivia (2023-2027). 2022. Executive Board of the United Nations Development Programme, the United Nations Population Fund and the United Nations Office for Project Services. December 7, 2022. https://www.undp.org/sites/g/files/zskgke326/files/2023-01/Bolivia%20CPD%202023-2027%20ENG.pdf

126
Co-creating new knowledge through joint learning on life systems for adapting territorial development plans – Wakichina. (Website). https://www.vliruos.be/en/projects/project/22?pid=3718 Accessed January 15, 2024.

127
The beginning of the next planning cycle is in 2025 which also coincides with the next general election.

Common challenges in collective intelligence for climate action — and how to overcome them through better design

Table 8 provides an overview of three overarching issues that are critical for making the most of collective intelligence climate initiatives: participation, data utility and shifting towards action. For each of these issues, we describe common challenges faced by collective intelligence and suggest design tactics to overcome them. It is not a comprehensive analysis of optimizing the design of collective intelligence.[128] Instead we focus on evidence derived from the case studies in this report.

We have prioritized challenges that can be at least partially addressed through better design rather than focusing on systemic barriers such as absence of political will, organizational culture and lack of financial support.

We hope that the practical focus on design will be useful for frontline innovators in the climate space to help them deploy collective intelligence solutions more effectively.

128
See the Collective Intelligence Design Playbook for a more comprehensive practical guide to designing collective intelligence initiatives, available here: https://www.undp.org/acceleratorlabs/publications/nesta-collective-intelligence-design-playbook.

129
For example, in Kenya smartphone penetration is 15 percent lower among women smallholders, compared to men: Raithatha, R. 2022. Empowering women smallholder farmers through digital microinsurance. African Development Bank, ADFI, Pula, July 2022. https://www.adfi.org/sites/default/files/2022-09/ADFI%20Pula%20Photo%20Essay_final.pdf.

130
Digital Women Uganda and Vodacom's Women Farmers Programme provide training in digital skills to enable uptake of digital advisory services by female-led smallholder households: Holland, F. 2022. The future of Africa: why women, technology and education are key to food security. Food Matters Live, March 11, 2022. https://foodmatterslive.com/article/future-africa-food-security-education-technology-women-agriculture/. Accessed October 9, 2023.

Table 8: Common challenges for climate collective intelligence initiatives and how to overcome them

CHALLENGES	DESIGN TACTIC
Participation — mobilizing communities for climate action	
Lack of engagement or failure to sustain engagement over time This is a common challenge for all collective intelligence initiatives and may be caused by practical considerations such as contributions or tasks that are too difficult for volunteers, or inappropriate incentives for people to take part in fully.	■ Standardize tasks and publish examples to make contributions easy. ■ Ensure technology is appropriate for the location and participants. ■ Gamify the experience so it is easy and fun to contribute. ■ Tailor incentives to differing profiles and motivations.
Low motivation to contribute due to other, more pressing, issues and concerns or participation fatigue Some issues associated with climate change may seem irrelevant or disconnected from the main sources of stress in the daily lives of target communities. People become frustrated after being asked to contribute multiple times, without evidence of concrete benefits from their engagement in the past.	■ Co-design initiatives and processes with the people taking part to make sure they respond to their interests. ■ Communicate the interconnectedness of climate adaptation with health and economic sustainability. ■ Share data with and communicate outcomes to people so they can benefit directly. ■ Provide financial incentives to enable contributions from a wider range of people.
Hopelessness and perceived lack of efficacy of climate action Only a few studies focus on the psychological impacts of climate change on people in the Global South, particularly where climate change is already causing disruption to homes or livelihoods. Early evidence suggests that the negative emotional impact of this experience may lead to mental health challenges that decrease motivation to engage.	■ Draw on local, traditional and Indigenous environmental management solutions. ■ Work with local NGOs and community leaders to broker relationships, helping to build trust, understanding and resilience over time. ■ Communicate benefits and positive outcomes associated with collective action to participants.
Lower participation from certain groups e.g. women, older people, people with disabilities In some parts of the Global South such as sub-Saharan Africa, uptake of technology such as mobile phones and use of the internet is higher among working-age men than women and older people.[129] This means that collective intelligence initiatives may struggle to engage these groups. These disparities can be difficult to quantify because collective intelligence initiatives often don't report participation data disaggregated by gender, age, disability, etc.	■ Choose technology that already has the broadest reach within target communities and specific groups, e.g. SMS. ■ Ensure technology is accessible, e.g. use pictograms to capture data and provide training[130] on how to use devices. ■ Use storytelling, drawing and other creative assets like 3D maps to make complex climate concepts more accessible to different groups. ■ Design initiatives to fit around the responsibilities and lives of target groups e.g. women, older people.

CHALLENGES	DESIGN TACTIC
Data utility — improving usability and usefulness of collective intelligence data	
Small datasets or "patchy" data Some collective intelligence projects collect datasets that are limited to hundreds of datapoints making them unsuited for larger scale data analysis. And even when data is collected at scale it can be "patchy" meaning that there are gaps or inconsistencies in time or missing locations. This is particularly common for biodiversity data or monitoring of environmental variables like air pollution and water quality.	■ Supplement small data with insights from qualitative methods or other data to understand climate adaptation issues in context. ■ Apply emerging machine learning and statistical techniques for low-resource[131] settings that can handle small-scale datasets. ■ Be more strategic with small scale data collection to target known evidence gaps. ■ Use statistical techniques that can model distributions based on incomplete data to fill in the blanks.
Messy and inconsistent data protocols Collective intelligence initiatives often reinvent the wheel when designing their data collection process. This makes it difficult to integrate datasets between different projects working on the same topic, which limits their impact. Collection of qualitative insights or data about preferences and attitudes towards climate issues is often more ad-hoc. Data tends to be collected as free text, which becomes increasingly difficult to make sense of when participation numbers are high.	■ Embrace messiness when using data for storytelling and advocacy. ■ Standardize data collection protocols between projects to build larger and more consistent datasets. ■ Use language models[132] to cluster qualitative inputs and identify patterns in unstructured datasets.
Concerns about data quality Studies comparing citizen generated data with data collected by experts in citizen science have shown comparable quality in several citizen science environmental monitoring projects. But concerns persist among decision makers and institutions, particularly when there is no official guidance about how and when to use non-traditional data sources.	■ Integrate machine learning algorithms that authenticate data submitted by participants into data collection tools. ■ Use prizes to reward the highest quality contributions. ■ Use data for specific purposes where it is "good enough." For example, using citizen data to identify when thresholds are surpassed or new hotspots of unusual activity as a tool for targeting official data collection.

131
Contexts where there is limited internet and low digital literacy.

132
Language models are AI-based technologies that use statistics and probabilities to identify patterns in large volumes of text data. They support tasks such as speech recognition and automatic translation in addition to helping classify text into categories: Verbit Editorial. Understanding Language Models and Artificial Intelligence. https://verbit.ai/understanding-language-models-and-artificial-intelligence/. Accessed October 9, 2023.

CHALLENGES	DESIGN TACTIC
Action — shifting from "data for knowledge" towards "data for action"	
Decision makers (public and private) fail to act on citizen generated data. A lack of technical skills amongst decision makers can make it difficult for them to interpret data and models — especially when issues are complex and intersecting, for example health policy makers that need to interpret how environmental variables affect the risk of infectious disease. The data collected by citizens and outputs of models does not always match the specific interests of policy makers or comes at the wrong time in the policy cycle.[133]	■ Establish early connections between decision makers and communities to ensure data is relevant to policy gaps. ■ Ensure collective intelligence designers understand the policy process and receive advocacy training to cater their comms to policymakers. ■ Create and disseminate advocacy and communication materials as stories are often more convincing for decision makers. ■ Develop technical skills training and simple explainers for decision makers. Make data visual and tailor it to relevant policy questions. ■ Remain realistic about what is in the collective intelligence designer's sphere of influence and ultimate control and design accordingly. Plan which decisions to target based on timing throughout the year, i.e action targeting budgetary decisions needs to be taken well in advance to fit the calendar of when such decisions are taken.
Data from collective intelligence isn't shared directly with the people contributing.	■ Involve people in setting the research questions and collect data on issues that directly impact their lives. ■ Plan how feedback will be delivered and communicate results from the outset. Use communication channels that already have widespread use and work with trusted community champions. ■ Give people access to the data that is relevant to the decisions they're making. Integrate this into digital tools so individuals receive real-time information tailored to their needs.

133
Inter-American Institute for Global Change Research: IAI. 2022. Landscape mapping of software tools for climate-sensitive infectious disease modelling. Wellcome, January 24, 2022. https://wellcome.org/reports/landscape-mapping-software-tools-climate-sensitive-infectious-disease-modelling.

The Frontier: R&D opportunities for climate action

The message — and the evidence — are clear. Public participation and local expertise need to be at the forefront of climate action.

The Sixth Assessment Report from the IPCC published in 2023 championed local solutions, especially for successful adaptation in the regions most vulnerable to the climate crisis. Approximately 85 percent of the world's eight billion people live in countries of the Global South, yet only a tiny fraction of this population are involved in shaping and delivering climate initiatives. Mobilizing more money is of course a critical determinant of whether this can be achieved. But so will our ability to mobilize all the resources of intelligence, the collective skills, talents and capabilities we have at our disposal. Boosting this ability means learning to deliver collective intelligence initiatives designed by and for Global South communities. This includes optimizing technology to work in diverse contexts where data are sparse and infrastructure, including digital infrastructure, is spotty.

In **Table 9** we present nine key opportunities for R&D investment. All of them help to elevate local knowledge. These opportunities set an aspirational agenda for the future of collective intelligence for climate. Funders and institutions should use them as a basis for designing new funding and delivery programmes, making sure to evaluate progress and share lessons along the way.

Table 9: Nine key R&D opportunities categorized by three areas for action.

INCREASE UTILITY OF CITIZEN DATA FOR CLIMATE ISSUES	INVEST IN COLLECTIVE INTELLIGENCE FOR CLIMATE DECISIONS AND ACTION	DESIGN MULTI-FUNCTIONAL AND SCALABLE COLLECTIVE INTELLIGENCE TOOLS
Apply methods from citizen-led experiments in agriculture to other climate issues.	Develop accessible, creative tools and methods for collective decision-making.	Invest in crisis intelligence tools that track multiple hazards.
Enhance the evidentiary value of crowdsourced data in climate adaptation.	Involve more diverse groups of people in oversight of government climate commitments.	Develop data standards for qualitative and citizen-generated data.
Develop new approaches to compensate for sparse data in disaster risk and biodiversity management.	Create tools that help people take collective action to improve resilience.	Connect hyperlocal knowledge into global models and efforts.

Increase the utility of citizen data for climate issues

This report has demonstrated that currently, citizen generated datasets are underused by decision makers, despite their potential to fill several known evidence gaps in the Global South. Addressing some of the common concerns associated with these datasets including their size, messiness and potentially "patchy" nature could bridge the *distance gap* between official and traditional knowledge, as well as increasing their uptake by decision makers. Addressing quality concerns may not be enough. Traditional gatekeepers of global evidence synthesis need to adapt their processes to incorporate these types of insights and engage decision makers to make best use of the value of these data.

Apply methods from citizen-led experiments in agriculture to other climate issues

Large field experiments with citizen scientists, known as n-trials, are a route to scaling data collection about adaptation approaches that are most viable in a given location. Trials typically involve large numbers of participants[134] and follow random allocation of different treatments in real-world settings, to allow more robust conclusions about the impact of different interventions. This approach is already being used in agriculture experiments with smallholders to test seed varieties, crop management practices and pest control (Case Study 1: Seeds for Needs). These initiatives could be enhanced by building on local, traditional and indigenous agricultural practices. Field experiments could also be applied to test interventions in other key areas of climate adaptation, like biodiversity management or health surveillance.

Enhance the evidentiary value of crowdsourced data in climate adaptation

Citizen generated data can help investigate and monitor compliance with regulations. Existing applications include tracking human rights abuses,[135] monitoring wildlife crimes[136] and measuring the impact of policies to reduce waste by industry.[137] But the authentication of citizen generated data about climate issues or violations of climate legislation is lagging behind.

Questions about the provenance and accuracy of crowdsourced data can limit their uptake by legal experts and policy makers. In court cases, for example, it's important to demonstrate that evidence hasn't been tampered with. The Digital Evidence Vault from researchers at Carnegie Mellon, is a rare example of a process for logging and authenticating crowdsourced digital data that can be used by human rights investigators. Investing in new standards and tools for verification could enhance the evidentiary value of data crowdsourced from the front lines for formal decision making and regulatory processes.

Develop new approaches to handle sparse data for disaster risk and biodiversity management.[138]

Hyperlocal collective intelligence initiatives typically collect relatively small but rich datasets. Investing in the development of new statistical techniques[139] that can cope with sparse, unlabelled datasets is key to unlocking the full value of this type of data. This could be particularly useful for crowdmapping initiatives in disaster response that lack data for hard-to-reach locations. RapiD, is an existing tool used for mapping that applies weakly supervised learning to validate geographic predictions made using a limited number of data points labeled by volunteers on OpenStreetMap. Another key application area is biodiversity management where locally granular but sparse on-the-ground observations could be coupled with remote sensing data to allow better modeling of species' distributions.[140] This approach could shift the dial on monitoring species listed as Data Deficient under the International Union for Conservation of Nature (IUCN) Red List. In the long term, these investments could help governments to better target their interventions for Biodiversity 30x30 and the Loss and Damage Fund.

134
Resilient livelihoods of vulnerable smallholder farmers in the Mayan landscapes and the dry corridor of Guatemala. 2020. FAO. https://www.fao.org/3/ca9109en/ca9109en.pdf.

135
Syrian Archive. (Website). https://syrianarchive.org/. Accessed October 9, 2023.

136
Wildlife Crime Technology Project (Website). https://www.worldwildlife.org/projects/wildlife-crime-technology-project. Accessed February 9, 2023.

137
Civic Laboratory for Environmental Action Research (CLEAR). 2020. Research on the relationship between EPR and shoreline plastics. CLEAR, November 19, 2020. https://civiclaboratory.nl/2020/11/19/research-on-the-relationship-between-epr-and-shoreline-plastics/. Accessed October 9, 2023.

138
McClure, E.C., Sievers, M. et al. 2020. Artificial Intelligence Meets Citizen Science to Supercharge Ecological Monitoring. Patterns, Volume 1, Issue 7, October 9, 2020. https://www.sciencedirect.com/science/article/pii/S2666389920301434#bib52.

139
For example, weakly supervised and semi-supervised machine learning. See e.g. Practical Machine Learning for Developing Countries: learning under limited/low resource scenarios. PML4DC Workshop at ICLR 2023. https://pml4dc.github.io/iclr2023/.

140
Teng, M., Elmustafa, A., et al. 2023. Bird distribution modelling using remote sensing and citizen science data. CCAI Workshop at ICLR 2023. https://s3.us-east-1.amazonaws.com/climate-change-ai/papers/iclr2023/57/paper.pdf.

Case Study 9

Citizen science with smallholder snow pea farmers from Indigenous communities in Guatemala

GAPS ADDRESSED

Data Gap

Doing Gap

Distance Gap

Diversity Gap

What problem were they solving?

Although Guatemala has not historically suffered from water stress, climate change has disrupted rainfall patterns, and 45 percent of the country is now vulnerable to drought.[141] This poses a particular threat to the country's smallholder farmers who rely on rain-fed agriculture for their livelihoods. In the volcanic region of Santa María de Jesús in the Southern part of the country, many of the farmers specialize in cultivating snow peas — a key export crop for over 35,000 indigenous farmers in the Guatemalan highlands. To access export markets, they need a certification that depends on limiting the use of chemical fertilizers. This means that farmers have to rely on smart water management to obtain good yields, something that cannot be determined on a regional basis. Micro-variations in the location of their plots (e.g. on slopes or valleys) determine how much rainfall and water are available. Farmers would like to estimate the effect of rainfall on crop yield for each plot, so as to be able to intervene effectively during droughts. This estimation requires the collection of plot-by-plot data on soil conditions, rainfall, and crop yield.

Some farmers in Santa María de Jesús are adapting to water shortages with DIY (Do it yourself) storage solutions like plastic water tanks to capture rainfall. While experimentation is yielding small scale solutions, farmer associations rarely interact, making it difficult to pool this expertise and learn what works. Smallholders are also largely disconnected from the valuable expertise of agronomists, who could guide the discovery of more effective adaptation strategies if they had better insight into the environmental variations experienced by the farmers. This dynamic creates a *distance gap* between the lived experience of agricultural communities and scientific knowledge on climate adaptation.

What did they do?

The UNDP Accelerator Lab in Guatemala, in partnership with civil society organization Tikonel[142] and UNDP's Volcano Chains Project,[143] developed a citizen science initiative involving 20 farmers from the Santa María de Jesús region recruited through both local associations of smallholders. Aged 18 to 75, farmers also included Indigenous women. With the Lab's facilitation, they designed a process for data collection simple enough to be sustainable, but standardized enough to ensure data can be aggregated over time and compared between different farm plots. They used low-cost sensors (DIY hygrometers) and KoboToolbox, an open source platform, to capture data, and WhatsApp to communicate with each other.

After experimenting with different types of sensors, farmers agreed that the most strategically important variables to monitor were rainfall and soil moisture. Farmers aggregate this data and share their readouts through a digital platform developed through this prototype.[144] The platform can be accessed by both farmers, agronomists and decision makers from the Ministry of Agriculture and the Ministry of Natural Resources and Environment. This will also help experts provide the farmers with more personalized guidance, increasing scientific knowledge about farming snow peas in the highlands.

What was the benefit of using collective intelligence for this issue?

Collective intelligence provided a way for farmers' organizations to co-create the information platform and steer design towards data that is needed most to help them make decisions about irrigation and disease management solutions. Using a citizen science approach enabled the initiative to open up a conversation with agronomists and experts from outside the region, helping to shrink the *distance gap* between credentialed experts and farmer scientists.

Bringing together different smallholders from the region surfaced useful insights into local agricultural practices including using chlorine for contaminated water sources. The collaborative citizen science method also facilitated peer exchange whereby farmers teach one another in their local languages. The co-creation sessions, leading to the choice of the data to collect and the protocols to collect them, also created the conditions for women who do not know how to read and write to share their input. This sharing of expertise fast tracks the adoption of climate adaptation strategies as smallholders learn what works from others whose plots face similar environmental conditions.

What does this experience tell us about collective intelligence for climate action?

The emphasis on codesign and working with accessible, locally appropriate technologies like rain gauges and DIY sensors helped this initiative engage a wider range of people and perspectives into the initiative. This included women, older and younger farmers, and Indigenous Peoples, typically underrepresented in agricultural digital innovation initiatives.

This collective intelligence climate prototype exemplifies and articulates a trade-off inherent to collaborations across different forms of expertise. Farmers, who are in charge of data collection, are constrained to keeping it simple and manageable: they need to use sturdy sensors, which must be affordable and cheap enough not to be subject to theft. On the other side of the collaboration, agronomists need higher-quality and more granular data collected longitudinally which are more burdensome to collect. It is hoped that if the farmer scientists adhere to the standardized protocol and maintain data collection over time, the data quality will keep improving and drive higher acceptance by agro-experts in the long term.

COLLECTIVE INTELLIGENCE USE CASES
Real-time monitoring of the environment, Distributed problem solving

IPCC CATEGORY
Adaptation, Improved cropland management

COUNTRIES
Guatemala

COLLECTIVE INTELLIGENCE METHODS
Peer learning, citizen science

PEOPLE
Smallholder farmers, agri-experts, Tikonel (NGO), UN Volunteers, Ministry of the Environment and Natural Resources, Ministry of Agriculture, Cattle Raising, and Fishing, Volcano Chain project.

DATA
Sensor data (humidity and rain)

TECHNOLOGY
KoboToolbox, ShinyApps, WhatsApp

141 https://www.fao.org/3/ca9109en/ca9109en.pdf.

142 The Tikonel Association. (Website). https://tikonel.org/asociacion/. Accessed on January 15, 2024.

143 The full name of the project is "Promoting Sustainable and Resilient Territories in the Landscapes of the Central Volcanic Chain in Guatemala" (Proyecto Volcanes: "Promoviendo territorios sostenibles y resilientes en paisajes de la cadena volcánica central en Guatemala". The project is implemented by the Ministry of Environment and Natural Resources with assistance from UNDP. https://www.undp.org/es/guatemala/proyectos/promoviendo-territorios-sostenibles-y-resilientes-en-paisajes-de-la-cadena-volcanica-central-en-guatemala.

144 Citizen Science: Producers in Santa María de Jesús, Sacatepéquez (Website). https://javierbrolo.shinyapps.io/CienciaCiudadana/. Accessed January 15, 2024.

Invest in collective intelligence for climate decisions and action

Decisions around climate policy are necessarily fraught, and this report demonstrates that public deliberation on climate action with tangible economic and social commitments by decision makers is still rare. To date, much emphasis has been placed on developing "miracle" technologies that will solve climate change.[145] This report calls for attention to the harder problems — how to bring people together to identify the pathways for sustainable and equitable transitions, while overcoming a lack of political willpower.

Technology and tools to support collective intelligence processes from deliberation to data collection are proliferating but few of these tools are developed with low-resource contexts in mind. Many tools also fail to follow basic principles of human-centered design, making them difficult to use and understand by non-specialists. The biggest gaps in this space include tools that support large-scale deliberation and collective decision-making, tools for monitoring impact and tools that bridge the gap between data collection and action. Funding should encourage the creation of open source and accessible tools with plans for their long-term maintenance.[146]

Some collective intelligence initiatives try to increase their impact on decision-making by contributing directly to decisions perceived by the authorities as high priority, for example because they are mandated by an international agreement or a national law. This is the case of initiatives of the UNDP Accelerator Labs in, respectively, South Africa (see Case Study 10) and Bolivia (see Case Study 8).

Develop accessible, creative tools and methods for collective decision-making

So far, institutions have failed to take advantage of collective intelligence to bring together large groups of citizens to debate the climate policy issues that matter. Even the three most established collective intelligence methods for decision making: citizen assemblies, participatory budgeting and Deliberative Polling®, have only a limited set of tools at their disposal. And, as highlighted in Section 6 of this report, there are few examples of these approaches being used to decide on climate issues in the Global South. New tools and processes should prioritize bringing different perspectives into decision making, such as Indigenous communities and other underrepresented groups to scale deliberation beyond the "the usual suspects."[147] Importantly, these tools should focus on accessibility and interpretability, something that current collective intelligence initiatives struggle with. Creative approaches like storytelling are known to reduce complexity around climate issues and are often more compatible with local practices. In the future, we may see increased use of digital tools to bring narratives to life or emerging technologies like generative AI being used to facilitate consensus policies based on suggestions submitted by groups with opposing views.[148]

Involve more diverse groups of people in oversight of government climate commitments

Current mechanisms of reporting on climate action and impact by governments lack transparency, making it difficult to hold them accountable. Novel tools and methods that involve people in oversight of climate commitments or make it easier for institutions to openly report on progress themselves could help. In North Macedonia, groups of citizen scientists known as "cool heroes" are working with the UNDP Accelerator Lab to map both urban heat islands and the fresher "oases," including parks and other green spaces, where the inhabitants of the capital, Skopje, go to escape the heat. Their data collection has surfaced that some green spaces, although contemplated by local urban plans, have been erased by urban development; this discovery is helping to support advocacy efforts. The Tracka platform in Nigeria, is another example where a social accountability tool involves citizens in monitoring spending and the delivery of basic services by local government. To date, it has tracked actions taken in almost 600 local government areas across 26 of Nigeria's 36 states. A key R&D opportunity is to develop new approaches that close the loop between citizen oversight and government implementation of climate-related policies. But real progress will only come if institutions and corporations commit to using these types of mechanisms to build trust with the public.

Create tools that help people take collective action to improve resilience

Most existing collective intelligence tools focus on facilitating data collection at the individual level rather than supporting people to take coordinated action based on the data. Future tools should try to close the loop to help communities take action themselves, particularly in the face of climate-related extreme weather events. The COVID-19 pandemic demonstrated communities' remarkable resilience and ability to organize through digital forums to share resources and provide assistance to one another in real time. Apps like Geofarmer that support peer exchange between smallholders are currently the closest example of this in the climate context, but the majority of collective intelligence solutions are still designed for individuals and don't offer much collaborative or cooperative functionality. AtmaGo is one tool that allows communities to share information and coordinate actions. In Indonesia it's being used by local residents to organize mitigation activities like mangrove planting and beach cleanups. Investing in tools that consolidate and enhance distributed action through collaboration, even outside of acute crises, could help the public withstand and recover from climate related shocks more quickly. Careful design can help place the data generated by collective intelligence initiatives directly at the disposal of the people best qualified to use it. A particularly clear example of this design strategy is in citizen science projects concerning farming, like Seeds for Needs (Case Study 1) or the initiatives by the UNDP Guatemala Accelerator Lab (Case Study 9).

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Jacobson, M. Z., 2023. We don't need 'miracle' technologies to fix the climate. We have the tools now. The Guardian, February 7, 2023. https://www.theguardian.com/commentisfree/2023/feb/07/climate-crisis-miracle-technology-wind-water-solar. Accessed October 9, 2023.

146
Previous research has shown the importance of the public digital commons and open source tools such as OpenStreetMap and Ushahidi for democratizing innovation and shifting power towards more locally-led, diverse and inclusive collective intelligence initiatives: Nesta. 2022. Designing the Collective Intelligence Commons. Nesta, October 18, 2022. https://www.nesta.org.uk/report/designing-the-collective-intelligence-commons/. Accessed October 9, 2023.

147
A common criticism of participatory budgeting initiatives is that most contributions come from individuals from higher-income groups rather than underrepresented communities. See for example: Page, M., Lim, C. 2019. Beyond the "usual suspects"? Reimagining democracy with participatory budgeting in Chicago, Sociological Forum, Volume 34, Issue4, December 2019. https://onlinelibrary.wiley.com/doi/abs/10.1111/socf.12550.

148
Bakker, M. A., Chadwick, M.J. et al. 2022. Fine-tuning language models to find agreement among humans with diverse preferences. arXiv:2211.15006 [cs.LG], November 28, 2022. https://arxiv.org/abs/2211.15006.

GAPS ADDRESSED

Data Gap

Diversity Gap

Decision-making Gap

Case Study 10

Engaging coal-mining communities in the Just Energy Transition in South Africa

What problem were they solving?

Phasing out South Africa's aging coal-fired power stations is expensive, risky, and a highly contested topic. Coal supplies the majority of the country's electricity and provides jobs for more than 90,000 people. The "Just Energy Transition" (JET) is a national program, supported by the Presidential Climate Commission (PCC) to transition the country towards sustainable, clean energy sources, while also addressing potential impact on coal-dependent communities. Although JET will be implemented nationally, there are complex trade-offs at the sub-national level. There have been significant challenges engaging people living and working in coal-mining regions in JET, meaning that the views of coal mining communities may be missing from policy discussions. There are also very limited studies or data on how people living in coal-mining regions, particularly those directly and indirectly reliant on the coal industry for work, understand energy transitions.

What did they do?

The UNDP Accelerator Lab in South Africa used citizen social science and micro-surveys to understand coal mining communities' awareness of and views on the Just Transition and potential impacts of different policy options on their lives. The approach was prototyped in Zamdela, a neighborhood close to the Lethabo Power Plant and Seriti New Vaal coal mine. iSpani, a youth founded and led organization, recruited a network of local community researchers called Youth Agents. These young people collected data using a mobile micro-survey which was uploaded onto a decentralized data platform, managed by iSpani. Survey respondents included mine workers and others with links to the coal value chain. The Youth Agents gathered 208 survey responses on awareness and attitudes related to the JET. In particular, they focused on gathering novel data about perceived impacts of mine closures, attitudes towards future employment and overall awareness of the Just Transition process. The Youth Agents were also involved in the interpretation of the collected data, via citizen social science, drawing on their unique insight into their communities.

UNDP South Africa plans to apply this approach in other mining communities with the aim of collecting more than 5,000 responses in two months. The final survey results will be shared with the Presidential Climate Commission and other key stakeholders in a series of dialogues and policy roundtables for the implementation of JET, to inform their next round of planning.

What was the benefit of using collective intelligence for this issue?

Taking a collective intelligence approach helped uncover the perspectives and priorities of the communities who will be economically impacted by energy transitions. In some cases, the data are conflicting: 82 percent of those surveyed worry about climate change, but over 70 percent do not see coal as a problem for South Africa. Meanwhile, over 40 percent said they would stay in the area and look for another job if the coal mine closed, despite the limited livelihood alternatives in coal-mining areas. While still a small sample, these insights — virtually absent beforehand — will help decision makers across sectors make more informed decisions taking into account the trade-offs in terms of the potential social and economic impacts of mine closures while transitioning to new energy sources.

Working with embedded community researchers helped to reduce some of the institutional distrust that previously acted as a barrier to engaging coal-miners in dialogue. Employing youth as micro-data entrepreneurs also ensured other barriers such as access and language were overcome. The citizen social science approach provided rich qualitative data alongside the quantitative survey responses. For example, the youth agents highlighted the importance of emphasizing potential health and economic co-benefits of the transition. They reported that respondents were particularly positive about JET when talking about developing new professional skills and reducing the respiratory illnesses caused by coal-mining. These are potential leverage points that could help decision makers communicate more effectively about the JET process and shape policies that directly respond to these priorities.

What does this experience tell us about collective intelligence for climate action?

This experience suggests that collective intelligence can allow for meaningful engagement in complex, contested and politicized topics such as energy transitions. Trusted intermediaries are key. In this case, the iSpani youth agents were able to overcome digital literacy and data access barriers – they supported members of the coal mining community who would have struggled to take part in the survey. They also managed to engage groups that are underrepresented in conversations about the mining industry by approaching respondents in informal community settings – 68 percent of the respondents were women and 30 percent were under 30 years old. Delivering the surveys in community settings like clinics, churches and schools allowed the youth agents to have wider-ranging discussions about the energy transition with survey respondents. This had the added benefit of increasing awareness and understanding about JET among coal mining communities.

COLLECTIVE INTELLIGENCE USE CASE
Distributed problem solving

IPCC CATEGORY
Adaptation: Energy Systems (resilient power systems, energy reliability)

COUNTRIES
South Africa

LEVEL OF MATURITY
Prototype/pilot

COLLECTIVE INTELLIGENCE METHODS
Citizen social science, microsurvey

PEOPLE
Young people, mining communities in Zamdela, iSpani (NGO)

DATA
Citizen-generated data, crowdsourced opinions on JET and its impact on livelihoods, ethnographic data

TECHNOLOGY
Mobile phones, digital platform

Design multi-functional and scalable collective intelligence tools

Our first attempt to map the collective intelligence landscape for sustainable development revealed a fragmented field, with many small initiatives struggling to make a mark on the global knowledge commons.[149] On the other hand, this report suggests that small-scale, hyperlocal activity often results in the most appropriate solutions, especially when it comes to climate adaptation. The final three R&D opportunities focus on striking the right balance between unique and locally-tailored adaptation options and elevating this local expertise to make contributions to global knowledge.

There is some evidence that this is possible. For example, global platforms focused on sharing data and best practice aggregate inputs from unique hyperlocal campaigns. The transfer of established, well-practiced collective intelligence methods between applications can also help. But more experimentation is needed to understand which climate issues require standardization versus localization and who stands to benefit from either approach.

Invest in crisis intelligence tools that track multiple hazards

Collective crisis intelligence tools that support anticipatory disaster risk reduction and management are on the rise.[150] But most early warning systems still focus on tracking one type of hazard, which is out of step with the reality of climate-related disasters that frequently occur together, have cascading effects and are concentrated in certain regions. Existing tools also typically only send alerts to emergency responders or officials rather than communicating directly with crisis-affected communities, and empowering them to take action themselves. CogniCity OSS is an open source software that was originally developed to map floods in Jakarta. With the help of a chatbot, the tool crowdsources on-the-ground reports that are visualized on a map and shared with local residents, government agencies and first responders to guide their response during disasters. Since it was first developed, CogniCity has been expanded to map additional hazards including volcanoes, earthquakes, typhoons, fires and severe weather. It has now been rolled out nationally for disaster response in Indonesia and is also being trialed in other countries, including Panama, where the UNDP Accelerator Lab is using it to help flood-affected communities in Juan Diaz develop better emergency response plans. The Panama Lab is now working to evolve their response system to deal with multiple hazards: this could vastly improve the resilience of crisis-affected communities.

149
Peach, K., Berditchevskaia, A., Mulgan, G., Lucarelli, G., Ebelshaeuser, M. 2021. Collective Intelligence for Sustainable Development: Getting Smarter Together. Nesta and UNDP, May 13, 2021. https://smartertogether.earth/.

150
Berditchevskaia, A., Peach, K., et al. 2021. Collective crisis intelligence for frontline humanitarian response. Nesta, September 15, 2021. https://www.nesta.org.uk/report/collective-crisis-intelligence-frontline-humanitarian-response/.

Develop data standards for qualitative and citizen-generated data

Too often, collective intelligence initiatives reinvent the wheel rather than consolidating existing datasets, or leveraging tools that have been developed by similar projects or tapping into existing communities of practice. This is a major oversight, especially when it comes to filling climate data gaps. One exception is the GLOBE Observer programme which has adapted its data collection protocols for tracking several environmental variables including land cover, tree cover and mosquito habitats since its launch in 2016. New collective intelligence initiatives should consider transferability and alignment with accepted standards for data collection from the outset to increase their chances of longevity. Funders should help with this by clearly articulating data collection and documentation standards for the larger scale initiatives they support.

Connect hyperlocal knowledge into global models and efforts

The balance between tailoring to hyperlocal contexts and developing scalable methods is the central tension at the heart of interventions designed to adapt to the changing climate. A few collective intelligence initiatives have managed to successfully navigate this tension. Plant-for-the-Planet uses common data standards and formats worldwide to enable global aggregation of reforestation data but also tailors the design of re-planting and monitoring programmes to respond to local needs. Another example is the Data in Climate Resilient Agriculture (DiCRA) platform developed by UNDP India to identify the best regional strategies for food security.[151] The platform has been developed as a digital public good,[152] meaning that it can be tailored for use in different locations. Collective intelligence initiatives in the Global South could also help generate and label highly localized training data e.g. about weather, biodiversity or hazards, to improve the accuracy and relevance of large-scale climate models, typically developed in the Global North.[153] In this vein, a pilot project by the UNDP Togo Accelerator Lab collects hyperlocal weather data from farmers so as to provide personalized recommendations to farmers; the Lab has invested in making sure that its data follow accepted standards for agro-meteorological data, to be interoperable with the government's own dataset. So far, the Lacuna Fund has pioneered this space, launching dedicated funding calls for creating localized data and AI models for forestry and agricultural climate applications. If other funders follow suit they can help shift markets towards developing open and responsible digital technology that is relevant to the Global South.

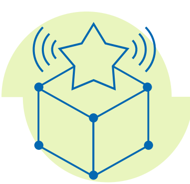
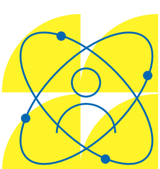
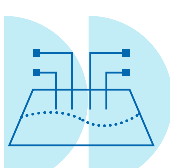
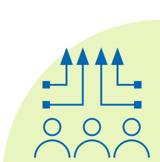
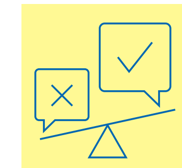
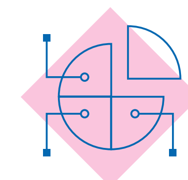
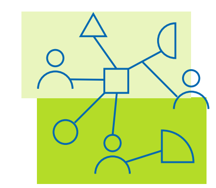
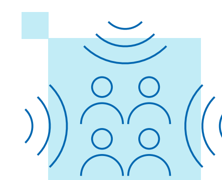
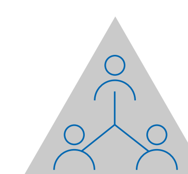
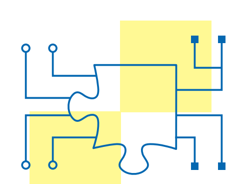
151
Pawelke, A. Glücker, A., Albanna, B., Boy, J. 2021. Lessons Learned from Applying the Data Powered Positive Deviance Method to Identify Grassroots Solutions Using Digital Data. UNDP, October 4, 2021. https://www.undp.org/acceleratorlabs/publications/lessons-learned-applying-data-powered-positive-deviance-method-identify-grassroots-solutions-using-digital-data.

152
A digital public good is an umbrella term that includes open source digital infrastructure, open code, open data and open content: Digital Public Goods. (Website). https://digitalpublicgoods.net/digital-public-goods/. Accessed October 9, 2023.

153
Distribution shift is a common challenge for algorithms developed in the Global North that are applied in other contexts. See for example, Nguyen, T., Brandstetter, J., Kapoor, A., et al. 2023. ClimaX: A foundation model for weather and climate. Climate Change AI #35, 2023. https://www.climatechange.ai/papers/iclr2023/35.

Glossary: collective intelligence methods

This guide provides a description of key collective intelligence methods referred to throughout this report.

CHALLENGES	DESIGN TACTICS	WHAT IS IT GOOD FOR?	EXAMPLE
Challenge prize 	A competition that offers a financial reward to a person or team who can solve a problem.	Attracting new innovators who might challenge the status quo, or redirecting the efforts of incumbents - encouraging them to think about the problem in a new way.	An offer of seed funding and mentoring is made to innovators who can develop new technologies to help people with health conditions stay independent for longer.
Citizen science 	A process where scientists and volunteers work together to collect or analyze scientific data or observations.	Creating or analyzing high quality data faster, or at larger scale, or with more granularity.	People use a pre-built testing kit to collect local data on water quality which informs research on ecological health.
Crowdmapping 	A type of crowdsourcing that generates information associated with and linked to a specific geographical location.	Creating new, more detailed data about a place more quickly. Can enrich and/or verify 'big data' e.g. from satellites. Also allows people to share information with each other.	People provide detailed information on human rights violations that they have seen or experienced and the location where it took place.
Crowdsourcing 	An umbrella term for a variety of approaches that source data, information, opinions or ideas from large crowds of people - often by open calls for contribution.	Gathering diverse inputs from a wider range of people.	Residents report opinions on the progress of government initiatives via a platform.
Deliberation 	A method of weighing up different options through dialogue.	Weighing up trade-offs on difficult or contentious issues and helping to arrive at more consensus-driven recommendations.	A representative sample of the population is brought together online to discuss and rank policy options to achieve net zero by 2050.
Microtasking 	An umbrella term for when a larger activity is split into small, simple, repeatable tasks that can be distributed among volunteers.	Allows quicker progress on a given challenge and lowers the threshold for contributing, meaning that more people can be engaged.	Individual volunteers in different locations planting trees to achieve regional and global reforestation targets.
Participatory modeling 	People work together to create a realistic model (often digital) of an issue by identifying relevant data inputs, relationships and impacts of different actions.	Helps a group to create a shared understanding of an issue and to explore different options for action.	Local decision makers, water companies and farmers work together to create a model of water use and management in their region.
Participatory sensing 	People using cheap sensors to collectively monitor the environment around them.	Helps to deepen community members' understanding of the issue.	A local community installs devices that help measure noise pollution in their neighborhood.
Peer-to-peer exchange 	People sharing their knowledge or skills with one another.	Fast-tracks learning by sharing most relevant advice and increases likelihood of information being taken up because it comes from people 'like me'.	People share questions over SMS, and then receive back suggestions from others in their community.
Serious (digital) games 	Using game-like elements to make engagement in a project more fun and motivate audiences to explore or contribute to complex topics or research.	Increasing participants' contributions, motivation and retention - enabling the collection of more data, faster.	Students receive points and awards for identifying malaria in blood samples on an online app.

Methodology

This study was carried out from December 2022 to March 2023.

We identified over 100 case studies for our core analysis (PART A page 28, The value of collective intelligence for climate adaptation and page 50, The value of collective intelligence for climate mitigation) of current collective intelligence initiatives for climate action. This analysis was limited to case studies from the Global South that had been active in the period since 2015. This included some case studies that started in the Global North and had expanded to other countries. Focusing on the Global South allowed us to identify the collective intelligence applications that are most relevant and practically feasible for the communities on the frontlines of the climate crisis. The primary analysis was carried out by two Nesta researchers who coded case studies independently and verified each others' work.

To identify emerging and future opportunities (PART A page 66, Towards closing the decision-making gap and page 102, The Frontier: R&D opportunities for Climate Action), we broadened our analysis to include examples from the Global North and initiatives where collective intelligence is applied to issues beyond climate. Case studies were drawn from existing repositories, as well as a rapid review of the academic and gray literature. The five case studies from UNDP Accelerator Labs featured as standalone boxes were analyzed through semi-structured interviews carried out by a Nesta researcher during August 2023.

We contextualized our findings to broader sectoral trends through a rapid literature review drawing on official reports published by international institutions and development actors (e.g. IPCC, UNEP, WRI), other gray literature and peer-reviewed publications. We tested an early version of our findings with seven experts through two semi-structured interviews and a facilitated online workshop, held in April 2023.

Co-building the Accelerator Labs as a joint venture with:

UNDP Core Partners

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