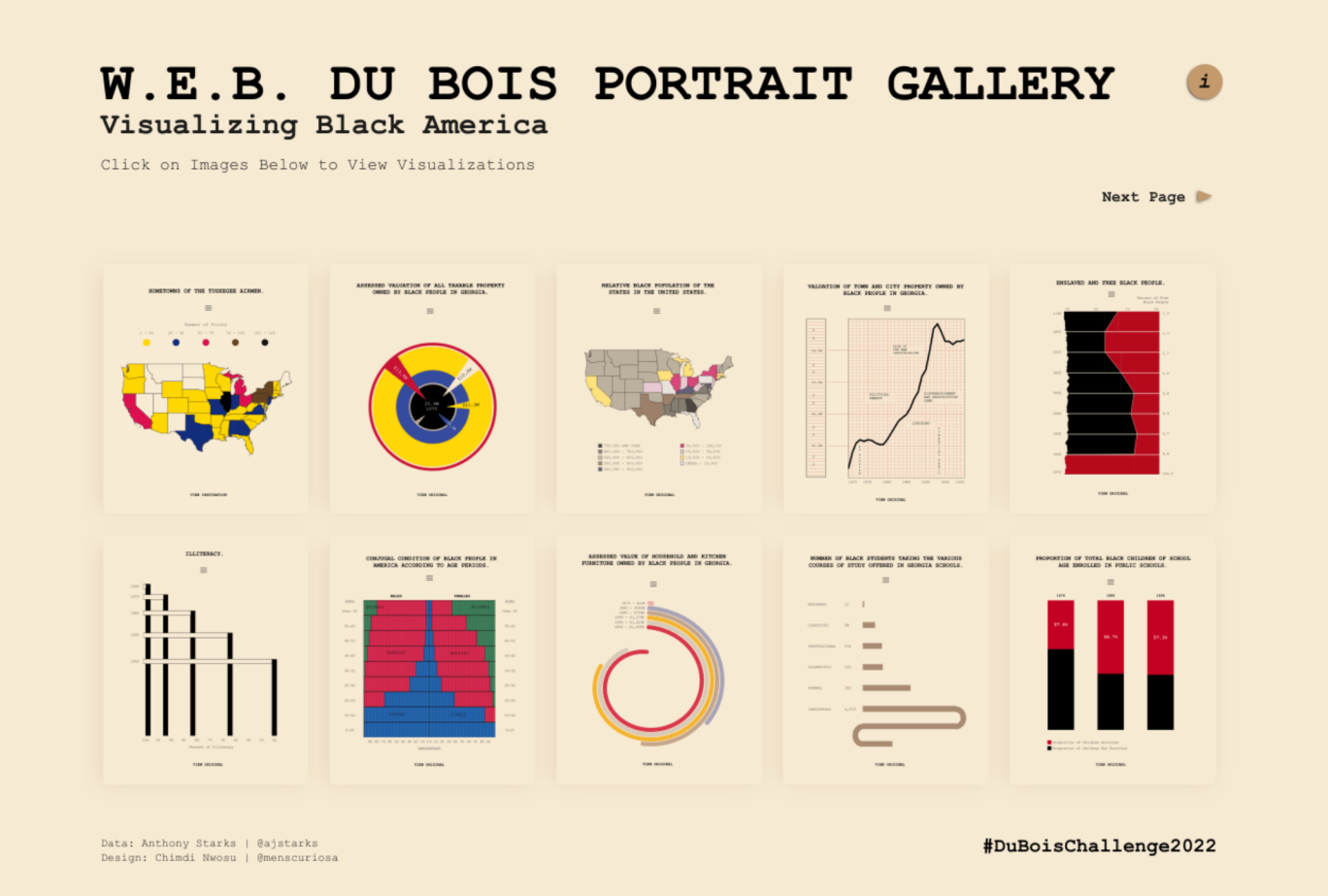
Multicultural Technologies For Climate and Environmental Justice

Naolo Charles

In his 1900 Paris Exposition, W.E.B. Du Bois, an African American sociologist, historian, and civil rights activist presented a series of sociological studies that used innovative graphical representations to depict the social and economic conditions of African Americans in the United States.

Through these visualizations, Du Bois aimed to challenge prevailing racist stereotypes and provide empirical evidence of the systematic oppression faced by African Americans. Du Bois was also an early advocate for the use of photography as a tool for documenting the lived experiences of African Americans. These photographs, taken by noted photographer Thomas E. Askew, served as a powerful counter-narrative to prevailing racist stereotypes, humanizing African Americans and showcasing their dignity and resilience in the face of adversity.



Atlanta University, Georgia. Thomas E. Askew, ca. 1899.

When W.E.B Dubois used data visualization to confront systemic racism, he employed technology for communal purposes. In my work as a social entrepreneur and founder of the Black Environmental Initiative (BEI) and the Canadian Coalition for Environmental and Climate Justice (CCECJ), I see a similarly urgent need to employ technologies for the benefit of Black and equity-deserving communities around the world. One of the key priority initiatives in CCECJ is the development of a map to uncover and display patterns of location of polluting industry, climate change vulnerabilities and chronic health issues vs the location of indigenous, immigrant and racialized communities in Canada.

In this essay I build on our work in environmental justice to argue that a just climate transition requires not only technologies, but also innovative "human systems" or "cultural technologies" that can pave the way for new cultural norms to be established alongside reformed economic and social systems.

Colonial gravity and the monoculture model

What does culture have to do with environmentalism and technology? While the term "technology" is usually used for technical inventions and innovations in science and engineering, cultural technologies refer to a broad range of human-made systems that shape and mediate human interactions and mental models. Others have argued that both technological innovation and cultural shifts are necessary for a sustainable transition. The concept of cultural technologies highlights the interconnectedness of these two aspects of social change.

Cultural technologies can establish new norms on how humans frame their relationships to the world and to one another. One of the most marking examples of the power of cultural technologies and their ability to change human thinking–hence the world–is the creation of the white and black races in the 17th century. Before the 17th century, it was not commonplace for people to identify with the color of their skins. Bacon's Rebellion of 1676 in colonial Virginia, which involved both African slaves and white indentured servants, is a key moment in history that illustrates the gradual development of racial categories as a political weapon of division. Plantation owners used to rely both on enslaved Africans held in bondage and poor indentured white servants from Britain as well as free indentured blacks. However, Bacon's Rebellion was the first time that the higher classes saw poor black and white people joining forces to fight the colonial power. According to historians, that marked a turning point, prompting plantation owners to largely cease enslaving white indentured servants to instead rely solely on the supply of African slaves. The slaves codes formally designated servants of European descent as "whites" and accorded them preferential rights while categorically stripping those of African descent, referred to as "Blacks", of all freedoms.

This example shows how the technical innovation of the monocultural agricultural practise created a need for forced labour that eventually led to the creation of the cultural technology of race. The

normalization of the concept of skin-based race was promoted by higher-classes to divide the lower-classes based on their most visible differences and prevent multi-cultural collaboration against colonial rule. By the 1700s, it was no longer possible for Virginians of African descent to gain freedom through indentured servitude. This is one of the moments that solidified skin-based race hierarchies, leading us to a world where the people may often be less concerned about the continuous harm of capitalism on the planet and more animated by skin-based racial divide narratives, a testament to the effectiveness of the old colonial tactic of divide and conquer.

The monoculture model, usually used to describe agricultural or ecological systems where only one type of crop, plant, or species is cultivated over a large area, can also be used to describe societies imperialistic ideals that elevate Western culture as the universal reference point. Mono-cultural technologies are designed in ways that promote the dominance of one culture over the others. Multi-cultural technologies do the opposite by promoting balanced power dynamics. A perfect example of multi-cultural technologies is the system of ethnic alliances that used to form part of the social fabric in many west-African cultures. As a cultural technology, ethnic alliances were a human-made system of power and cultural norms that was designed to create communal bonds and mutual dependencies to encourage cooperation. On the other hand, patents for instance are an expression of the mono-cultural practise of owning intellectual property while the "Commons" movement is a good example of a multi-cultural technology that does the opposite. In this article, we argue that in order to win the fight against climate change and pollution society may need more innovation in the space of multi-cultural technologies than in the area of engineering innovation. This is true mostly because the existing cultural norms were designed to maintain the current capitalist system of land and people exploitation in place. For instance, we cannot really understand recent social shifts, such as the move from widespread support to the Black Lives Matter movement to the apparent anti-DEI social movements, if we overlook this crucial historical context explaining the persistence of colonial alongside capitalist patterns in society.

These patterns emerged from a global history of European colonization, which over the last five centuries has left its mark on societies worldwide. Colonization creates a form of social determinism that we call, in this article, "colonial gravity": just like gravity in physics, which ensures that everything that goes up always comes down, colonial gravity describes cultural patterns that tend towards colonial norms. This colonial gravity shapes cultural norms and patterns of behaviours both in colonized minority communities and in the "majority" group.

Colonial gravity also ensures that anything that happens in a colonial structure always ends up benefiting or creating preferential treatment and opportunities to the actors most aligned to colonial rule while creating challenges and hardship for those who are not. Colonial gravity also shapes unique ecosystems based on skin-color and social classes through processes of environmental racism. Infrastructure projects that displace marginalized communities don't just destroy lands and physical environments; they also erode cultural heritage and communities' histories.

Clearly, mental models traditionally linked to European values, such as empiricism, individualism, and reductionism, have shaped and continue to influence our approach to technology. This article contends that we must shift away from viewing these philosophies as universally applicable and instead embrace insights from diverse cultures to develop new cultural technologies that align technology with visions of a just transition. Rather than seeking technological solutions alone to address environmental challenges, we should prioritize the cultivation of cultural infrastructures that safeguard humanity from extinction.

Just like agricultural monocultures inhibit biodiversity, a monocultural model of technology

prevents diverse "innovation ecosystems" from thriving. In an era of global crises, the dominance of one culture over others threatens long-term global stability. Rejecting Eurocentric monoculture becomes imperative for fostering inclusivity and resilience in society. We should be careful and intentional about the types of cultural technologies that we develop to support our technical innovations as their impacts can actually change the world.

Resisting colonial gravity through multicultural technologies

How can we resist the monoculture model and the pull of colonial gravity? In our work, we use the term "multi -cultural technology" to describe instances where communal values or interests drive technological use to promote community safety and self-actualization. Multi-cultural technologies lead to the realization of collective interests and human diversity while mono-cultural technologies continue to emphasize the domination of one culture, one way of knowing and being, over the others. In response to the exploitation and erosion of their communities, many groups have embarked on a journey to develop innovative use of technologies aimed at safeguarding communal interests and protecting their communities.

In Flint, Michigan, residents have used environmental data and mapping techniques to raise awareness of lead contamination in the city's water supply. More recently, the Chicago Center for Health and Environment (CACHET) developed the EnviroReport App, a mobile application for reporting environmental incidents within local communities in Chicago, Illinois. This reporting capability could lead to timelier resolutions of individual and community concerns. In the Canadian Arctic, Inuit communities are leveraging traditional knowledge, satellite imagery, and geographic information systems (GIS) to monitor and adapt to environmental changes. By combining indigenous wisdom with modern technology, these communities track shifts in wildlife populations, monitor changes in the landscape, and develop strategies for sustainable resource management in the face of climate change. Projects like OpenStreetMap and Global Forest Watch provide valuable mapping resources for communities to address environmental challenges.

In my own work with the Black Environmental Initiative, a Canadian-based environmental justice group, we focus on engaging and protecting Black communities by leveraging afro-centric environmental education. As part of our efforts within the Black Environmental Initiative and building on lessons learnt from our I-Can Breathe project, we are attempting to develop an Environmental Justice Squad initiative. These squads will consist of community members trained to use environmental monitoring devices to assess pollutant exposure. They will build lasting community relationships and offer monitoring services to residents, aiding in evaluating indoor and outdoor air quality, identifying pollutant sources, and recommending community-led behavioral changes or policy reforms. This work is always implemented alongside a cultural revival strategy that re-centers the valuing of afro-centric cultural concepts in education.

While these projects use digital techniques to maximize community benefits, they also allow for the inclusion of different ways of knowing and different cultural lenses owned by the communities. As I will argue in the section that follows, though, there are key conditions that facilitate socially just and culturally adapted uses of technologies specifically in the context of environmental data.

Using data for environmental justice

In my work on environmental justice advocacy and life cycle assessment research, my collaborators and I have identified several key conditions to facilitate ethical and just use of environmental data. Transparency about where data comes from and how calculations are made, alongside ways

to make the insights intelligible and comparable, are essential for making environmental data actionable. These actions must be community-led and able to be implemented in an affordable way for environmental justice to thrive. In this section I will briefly outline some of the ways these conditions operate in practice.

The first condition for using environmental data toward multicultural ends is to enable transparency. It's crucial to recognize the limitations of greenhouse gas emissions data and not rely solely on mathematical models to assess environmental harm. True environmental impact monitoring requires hyper-local data that isn't always captured by aggregated databases or government-owned sampling stations. In my work with the Black Environmental Initiative, for example, when we assist community members with evaluating air pollution using monitoring devices, it is not always straightforward to understand the data they collect. Despite focusing on a single type of pollution, the hyper-local data collected with monitoring devices may not be easy for community members to interpret.

During my master's degree, I conducted research on using life cycle assessment results to communicate products' environmental impacts to consumers. We found that the use of a binary system could be a good solution for more transparent environmental indicators. For instance, instead of calculating a factory emission of various chemicals by using databases and adding them up to form a unique score, we can use Boolean indicators to create a unique score that conveyed the factory's environmental practices in an easy-to-understand way.

In my own research and beyond, we have found that successful translation and communication strategies are essential for transforming technical data into easily understandable information. Intelligibility is thus essential for mobilizing environmental data toward climate justice. One way to make complex data intelligible is to translate it into a simpler form. For example, the concept of "ecological footprint" measures human impact in terms of land and resources needed for current consumption levels. Similarly, "carbon footprints" quantify greenhouse gas emissions, often translated into equivalent units like trees needed to absorb emitted carbon or miles driven by a car to produce the same CO2 amount. Water scarcity can be illustrated through virtual water, expressed in terms of bathtubs or swimming pools filled with water. Simplifying energy consumption and renewable energy potential also involves tangible comparisons, such as solar panels powering households.

Despite the benefits of translating complex data into comparables, it's important to recognize the limitations. Such translation work should not be treated as dogmatic truth but rather as an expression of trends and patterns. And it's important to ensure the transparency of the metrics we use. For instance, the concept of the carbon footprint was created by the oil industry in order to move blame away from industry to individuals. Therefore, it is important not to use it in ways that would shift away responsibility to consumers.

Another limitation of simplifying data into intelligible forms is it paints a simplistic picture of environmental impacts, which in reality are multidimensional and often interconnected. The use of a "unique score" simplifies information but also includes the amalgamation of several pollutants that are not behaving similarly in the environment. For example, we transform methane and nitrous dioxide into carbon dioxide in order to obtain one number that we call carbon equivalent. But in communities, the methane coming from dumps or polluting facilities does not actually present the same threat to communities as the carbon dioxide and not over the same time frame. Using a single data point to communicate environmental impacts reduces the accuracy. The challenge lies in balancing simplicity with accuracy to ensure communities receive meaningful information.

These different environmental threats often have distinct impacts locally and globally. For example, there may be two industrial facilities located in a low-income community which have a similar greenhouse gas emissions performance on paper. However, one company might emit more carbon dioxide (CO2) while the other one emits more methane. While the facility that emits more CO2 will have larger impacts on global warming trends, the facility that emits more methane could in fact have more of a direct impact on communities health since Methane (CH4) is a more potent but shorter-lived GHG compared to CO2, with a higher heat-trapping potential over a 20-year timeframe. We know that black communities in urban environments deal with heat island issues. Therefore, although methane emissions can be amalgamated in CO2 calculations, in this example, it might make more sense for the EJ advocates to focus on tracking methane emissions.

This is an example of how a traditional environmentalist looking at this data could favor different policy or advocacy priorities than an environmental justice advocate who would probably favour reducing the immediate threats of CH4 on their community. Although traditional environmentalism and environmental justice both care about reducing environmental harms, they might make very different decisions in specific contexts. This is why transparency on what happens behind the veil of mathematical calculations is so important.

Finally, comparability of environmental data is also essential for communities to make informed decisions about environmental protection. However, achieving data comparability across jurisdictions is challenging due to disparities in emission factors, calculation methodologies, and reporting protocols. To address these challenges, communities must lead the production of their environmental data monitoring systems. This requires investments in community capacities to assess pollutant exposures effectively. It is imperative for municipalities worldwide to establish Environmental Justice Squads, led by trained community members– my work with the BE Initiatve aspires to building squads like this.

Fortunately, similar initiatives are already underway across the globe. Community-based organizations worldwide, such as the West Oakland Environmental Indicators Project, the Inironbound Community Corporation, the Louisiana Bucket Brigade, and the East Yard Communities for Environmental Justice, exemplify grassroots efforts to address environmental injustices. These organizations train community members to conduct environmental monitoring, advocate for policy changes, and promote environmental justice in marginalized communities.

Promising directions for self-actualizing community projects

There are many new initiatives on the horizon which show promise in helping resist colonial gravity and support multicultural technologies for environmental justice. Two areas in particular– community-led energy projects and using artificial intelligence (AI) for environmental justice–are the most exciting to me. To conclude this essay I will outline a few promising directions for future work on digital technology and environmental justice.

Community-led energy projects

Community energy projects empower communities to control their energy production, consumption, and decision-making processes. In Canada, projects like the Smart Energy Communities Accelerator Pilot Program support sustainable energy projects and climate action plans, collaborating with local governments, First Nations, and community stakeholders. These projects provide tools and processes to build knowledge and structures for communities to effectively develop their own energy and emissions plans. They also provide resources for coaching and peer support to promote collaboration, knowledge sharing, and build collective energy literacy.

Similar community-led energy projects are happening around the world. In Germany, the community power movement promotes citizen-led renewable energy projects, leading to community-owned wind farms, solar parks, and biomass facilities. Denmark and Belgium also emphasize community-owned wind energy projects and cooperatives. In the United States, community solar gardens expand solar power access, while the Solar Electric Light Fund (SELF) uses the power of the sun to fight poverty and climate change.

Initiatives like ÉnergieRich provide communities with knowledge, tools, and resources for transitioning to sustainable energy systems. Led by Dena Montague, ÉnergieRich seeks to produce economically viable and socio-culturally adapted technologies produced by local populations, with a focus on underserved communities. Their pilot project in Burkina Faso introduced local small scale manufacturing of solar powered technologies and they plan to begin operations in the United States. The founder, Dena Montague, advocates for decentralizing innovation for climate justice, similar to what Sanjana Paul and Camille Minns argue in another essay in this series. Montague argues that the people living with the effects of climate change are uniquely equipped to address the problems they face and thus provide the most innovative and transformative ideas for addressing climate change.

While community energy projects like this offer self-actualization opportunities, they require pre-existing social infrastructure, including environmental literacy, land access, favorable policies, long-term residents, and community trust, which are often lacking in low-income communities. More work is needed to ensure that community energy projects are sustainable long-term.

Artificial intelligence for environmental justice

Another promising area of development is AI, which offers innovative solutions for environmental monitoring, public health, and community resilience. Organizations like Global Forest Watch and SkyTruth leverage AI and satellite imagery to monitor deforestation, illegal logging, and land use changes. By analyzing high-resolution satellite data,

Dr. Paulin Coulibaly, McMaster University

these platforms identify deforestation hotspots, track habitat loss, and support advocacy campaigns to protect biodiversity and indigenous rights.

In Canada, McMaster University professor Dr. Coulibaly Paulin's work exemplifies the application of AI for environmental justice, particularly in the context of water resource management and climate change adaptation in vulnerable communities. Dr. Paulin's work focuses on leveraging AI technologies to address environmental challenges, promote social equity, and enhance resilience in water-stressed regions.

I had the opportunity to interview Dr. Paulin as part of a documentary project. I noticed that, just like W.E.B du Bois, Dr. Paulin's practise is rooted in the need to contribute to his community's safety and self-actualization. Dr. Paulin's research integrates AI-driven hydrological models, remote sensing data, and weather forecasts to develop flood forecasting and early warning systems for flood-prone areas. These systems enable authorities, emergency responders, and local communities to anticipate flood events, mitigate risks, and implement evacuation plans in advance, reducing the impact of floods on vulnerable populations and promoting disaster resilience.

While AI can be used to foster environmental justice, just like all the new media technologies, it can also be used to create social division. The internet and social media, for example, held the promise of the democratization of information control and production. However, because of colonial gravity, it actually led to monocultural eco-chambers where racist messaging propagates with more efficiency than multicultural values. Today, since communication technologies have the capacity to influence the attitudes and emotions of the masses, it becomes imperative for EJ advocates to truly think through the use of these technologies to advance environmental justice. Coupling AI capabilities with environmental monitoring systems is one way that communities can at least establish the evidence of their environmental issues–a truth that can often be challenged by those who deny racism.

Conclusion

It is crucial to acknowledge that no technology to address environmental harm will ever fulfill its full potential without the concurrent development of connected cultural technologies. These cultural innovations must foster decentralized innovation, away from the Eurocentric models that have shaped our political and cultural affairs. Eurocentric models have led to economic systems that view land, nature, and people as mere economic resources, disregarding their spiritual and moral value as revered by Indigenous and African cultures.

In essence, global environmental and climate efforts must urgently focus on intentionally developing cultural technologies that shift us away from Eurocentric paradigms. Only then can we prioritize the well-being of low-income and racialized communities, as well as the broader public interest in ensuring a safe planet for all.