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Why Sponge Planet?
Discussions on Land-Based, Water-Driven Solutions

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The recent *Nature Water* article, "To Solve Climate Change, We Need to Restore Our Sponge Planet," by Kongjian Yu, Erica Gies, and Warren W. Wood[1], makes a compelling case for recalibrating climate strategies to prioritize the water cycle alongside reducing carbon emissions. The authors highlight how human activities—agriculture, urbanization, and industrialization—have degraded 75% of the earth's land, severely disrupting natural water systems. This degradation diminishes the planet's capacity to regulate temperature through water vapor, cloud formation, and the hydrological cycle, further accelerating climate instability.

The Sponge Planet concept advocates for restoring and replicating natural systems—wetlands, floodplains, and forests—that slow water down, recharge aquifers, and mitigate flooding and drought. In contrast to traditional grey infrastructure, which often worsens water scarcity and contributes to sea-level rise, "Slow Water" solutions offer holistic and decentralized alternatives. This model is built on three principles: 1) retain water at its source; 2) slow its flow; and 3) embrace water at its natural sink.

Real-world projects, such as Benjakitti Forest Park in Bangkok, Thailand, and the Meishe River Restoration and Breathing Sea Wall in Haikou, China illustrate the Sponge Planet in action. These initiatives address local flooding, regional river floods, and global sea-level rise while integrating nature into urban development. They reduce flood risks, purify water, enhance biodiversity, and provide public spaces—offering comprehensive and sustainable climate solutions[2][3].

The article underscores the importance of systems thinking: addressing water, climate, and biodiversity in an integrated manner delivers far greater benefits than isolated interventions. By redefining our relationship with water and fostering community-driven, small-scale projects, the Sponge Planet model presents a hopeful and actionable framework for resilience and climate adaptation.

More than just a technical approach, the Sponge Planet model represents a fundamental shift in how we perceive and interact with our environment. It intertwines philosophy, epistemology, methodology, and practical applications to build resilient and regenerative systems that ensure a sustainable future for the planet and its inhabitants.

In the following commentaries, *Landscape Architecture Frontiers* has invited global leaders—thinkers, scientists, planners, and experts—to share their insights on water and climate resilience, with a particular focus on sponge cities and the broader Sponge Planet concept.

1. Sponge Planet in action: Local flood mitigation through water retention at Bangkok's Benjakitti Forest Park, which transformed an impermeable urban brownfield into a porous sponge oasis providing holistic ecosystem services (source: Ref. [2]).
2. Sponge Planet in action: Regional flood management by slowing water flow. The Minhu Wetland in Liupanshui transformed a concrete drain into a dynamic green-blue waterway, restoring natural ecosystems and mitigating flooding and pollution. This innovative approach also serves as a catalyst for development while enhancing property value (source: Ref. [3]).
3. Sponge Planet in action: Adapting to sea-level rise by embracing water. The Haikou Breathing Sea Wall project reimagined the traditional sea wall as a resilient, permeable barrier against climate change. Featuring terraced planters and restored mangrove habitats, it enhances coastal defense and biodiversity while protecting urban areas. This innovative approach also fosters ecological and recreational values (source: Ref. [1]).

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Water is the Pulse of Life and Planet Earth

Anne Whiston SPIRN

Water is the pulse of life and the planet Earth. Water flows from ocean to air, from air to earth, from earth to river and sea, an exchange between heaven and earth powered by the sun. Water, flowing, links air, earth, and living tissue. The branching riverbed cut by water flowing, the branching tree within which sap rises, mirror the branching arteries through which blood courses. Where there is life, there is water.

Across the world's cultures, water is an emblem of creation, cleansing, and renewal. Gardens display and celebrate sight, sound, and sense of water as it spills and flashes through channels, cascades, flumes, and fountains into basins and pools. The dance of light and liquid are a reminder of ancient refuges where water meant life or death. Water flowing—tapped to irrigate crops, to drink, and to carry wastes—orders human settlement.

Yet water is not only sustenance and solace. It is power. A force that carves boundaries and erases them, water is enmeshed with politics and needs. Along rivers, across deserts, its absence or abundance stirs conflict, turning neighbors into rivals. The Nile, the Mekong, and the Colorado—lifelines for cities and farms—are arenas where thirst drives nations to the brink of war. Water, bearer of life and discord, is an architect of human fate.

As climate shifts, the call to restore water's natural rhythms grows more urgent. The vision of a "Sponge Planet," offered by Kongjian Yu and others, holds that by yielding to water—letting it seep and settle—we may find balance. To restore wetlands, to refill aquifers, to allow rain to linger upon the land is to repair the earth's water cycle. This gentle slowing will soften the blow of floods, ease the bite of droughts, and temper the rising heat.

This vision is not only restoration; it is remembrance. A return to water's ancient path—where land is not severed from rain—reminds us that water is not merely resource, but rhythm. It governs not only survival, but the delicate harmony of climate, organisms, and human flourishing.

The Bucket and the Sponge

Hans Joachim SCHELLNHUBER

Anthropogenic climate change has accelerated during the last few years. We must limit this unintended geophysical experiment as soon as possible (mitigation) and try to best manage the unavoidable impacts thereof (adaptation). Water and its hypercomplex dynamics on the earth is key to both challenges.

Meeting those challenges requires revolutionizing our take on geometry and materiality. Conventional hydroengineering thinks in terms of buckets of appropriate size, which serve as basins, tanks, reservoirs, canals, etc. for preventing or enabling the flow of water. The simpler the geometry, the better. By way of contrast, nature's deal with water is much more complex—just think of percolation across a sediment or the retention power of a sponge. The latter can be stylized as a fractal with structure at all scales (see, e.g., the paper by Joshua Broden et al. on the famous Menger Sponge[1]), maximizing the interaction of a liquid and its environment.
As has been demonstrated by Kongjian Yu and colleagues, the sponge approach to climate mitigation and adaptation is a crucial innovation inspired by ecosystems.

The latter employ combinations of organic and mineral materials for creating sponges of various functionalities, while contemporary "bucket" designers mainly rely on concrete and steel. The concurrent emissions of greenhouse gases exacerbate global warming and its impacts on the water cycle, thus triggering a vicious cycle. How about switching to climate-neutral (e.g., clay) or even climate-positive (e.g., wood, bamboo, hemp) materials for building artificial sponges? I have proposed to construct entire cities from timber[2] for the massive extraction of atmospheric CO_2, but why not extending this approach to nature-based hydroengineering?

What we need the most for co-managing climate and water is fantasy, which, according to Albert Einstein, is an unlimited resource.

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Harnessing Natural Systems for Water Management and Climate Resilience

Glen T. DAIGGER

Many are aware of the opportunities to significantly expand natural system infrastructure to adapt water management systems to climate change. The opportunity is significant as more traditional physical infrastructure has been pursued to a greater extent in recent decades, leaving greater options to increase adaptation by expanding natural systems. What is less well understood is that significantly expanding natural systems will also mitigate climate change impacts. Natural systems provide water storage capacity that mitigates flooding during intense rains and provides water supply during droughts. Natural systems also provide increasing water conveyance capacity during intense rains to remove water more rapidly to reduce flooding. They can also modify local and regional rainfall patterns when the extent of the natural system is sufficient, retaining water in the watershed to serve as water supply (drought-proofing) and reducing the frequency and intensity of storms (reduced flooding). These latter benefits are coupled with the recreational, heat island mitigation (cooling), and aesthetic benefits of expanded natural systems. This combination of benefits, coupled with the opportunity present because of the traditional under-investment in natural water management systems, highlights the opportunity presented by greater emphasis on implementing and expanding natural water management systems.

A Holographic View Beyond 4D: How Water's Natural Rhythm Can Shape the Future

Jun FU

Galileo Galilei Lincei, regarded as the father of modern science, believed that the universe is composed in the language of mathematics. Albert Einstein once said that "it is the theory that determines what we can observe." If one transcends the traditional 4-dimensional view and looks at the earth anew, that is, deeply and holistically from a 5-dimensional perspective of group-theoretic analysis[1], theoretically the natural harmony of all meandering rivers may add up to a sinuosity of π. Indeed, computer simulations based on fractal geometry have yielded close results.[2] Excessive human interventions to rechannel the flows of rivers, for near-sighted convenience in lack of consilient knowledge, run the risk of deviations from the natural rhythm, causing disturbances and disruptions to the natural environmental processes, including climate, tectonics, and riparian habitat and fluvial deposits from deep seafloor to planetary surfaces. The evidence is compelling, especially in the recent decades of massive industrialization and rapid urbanization.

Viewed both deeply and broadly, water is energy within a certain range of molecular vibrations or frequencies[3], and river is power in interaction with its environs—its bedrock and banks and the atmosphere above, which can be simulated approximately as semi-circles in spirals with topological features of Riemannian manifolds and homogeneous geodesics. Thus, if channeled incorrectly, it can become a powerful destructive rather than a nurturing force for the ecosystems and ultimately human civilizations. Humans have since long seriously underestimated the sheer cutting power of flowing river—even graywacke or granite is not hard enough to keep a river in its track over geologically significant periods.[4]

What is the remedy? The vision of "Sponge Cities/Planet" offered by Kongjian Yu and his associates, may hold a key to Nature-based Solutions: that is, by yielding to the natural rhythm of the water flow and letting it seep and settle rather than rush, we may maintain a better balance between man and nature (incidentally, the concept of harmony between man and nature is integral to the Chinese traditional Taoist philosophy), and become more resilient and sustainable even as urban communities amalgamate. Logically consistent with the research finding that high-sinuosity ($S > 2$) is good for conservation of biodiversity[5], this gentle slowing in tune with nature may soften the pounding of floods, ease the bite of droughts, and temper the rising temperature in the nonlinear complex ecosystems of human life.

Indeed, what they offer is not only a vision but a call for action, as the climate continues to shift, posing an existential threat to humanity.

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Design, Society, and Water

Peter CHILDS

Design can be regarded as the transformation of an existing state to a preferred condition. Many societies have deemed stewardship of the earth as important and associated domains and disciplinary practices aspire to deliver benign outcomes.

Water is both a substance and a metaphor. We are used to the many physical properties of water, its diverse phases, and cycles between these. Society has long recognized the importance of water and its symbolism as an essential for life. We even talk of being in a state of flow, where ideas emerge as a result of effective communication between our subconscious and conscious mind.

Centuries of studies have resulted in significant understanding of mechanics and thermodynamics. Warm air can support significantly more water than cold air. As a result of a warming climate, we can expect more extreme precipitation events.

Such considerations, blending philosophies of design, stewardship, and disciplinary practice along with our understanding of global scale thermodynamics have resulted in bolder approaches to the conception of societal design. One such exemplar is the notion of Sponge Cities where water management is considered at city or regional level with significant accommodation of water, associated with extreme atmospheric or oceanic events, planned at relevant scales.

Nature-Based Solutions: The Next Frontier in Climate-Resilient Water Infrastructure

David SEDLAK

The need to adapt to rising seas, larger storms and more frequent droughts offer an opportunity to create water infrastructure that provides multiple benefits. For example, a new type of subsurface flow wetland on San Francisco Bay in California protects engineered levees from storm surges while simultaneously improving water quality and providing recreational opportunities. This pilot project has generated great enthusiasm throughout the region, but the path forward for popular, nature-based pilot projects is challenging due to difficulties with the financing and permitting of non-traditional projects. Resistance to this approach is common from water management institutions designed to address twentieth century problems with standardized engineering designs. The first generation of nature-based climate adaptation projects may be more expensive and riskier than grey infrastructure alternatives because they do not benefit from the design experience and operational efficiencies that develop over decades. Nonetheless, Nature-based Solutions can be worth the extra cost and effort because they provide multiple benefits and receive greater support from the community. Research on such systems coupled with demonstration projects and innovative methods for making system performance more reliable is essential to ensuring that engineers, planners, and architects have the opportunity to consider their use in response to climate change.

The Need for a Sponge Region

Peter HEAD

There is a growing scientific understanding of the relationship between the changing atmosphere as the planet warms and the interactions regionally and locally with oceans, lakes, wetlands, soils, and vegetation. There is strong evidence that vegetation influence the atmospheric water cycle.

Forests create a moisture pump through the processes of evaporation (both transpiration and interception) and condensation. By pumping enormous amounts of atmospheric moisture drawn from the ocean, through what has been termed a "biotic pump," a forest regulates rainfall to be spatially uniform over the entire catchment; water is then returned to the ocean as river runoff.

Inland rainfall depends on a large near-contiguous forest, but deforestation, especially near the coast, risks switching the continent from wet to dry—with catastrophic implications. With 40% of the world's population living within 100 km of the coast, this is a historic and growing problem which requires focus on the urban rural system.

With less water evaporation near the coast, summer storms move further inland. Intense rains put these areas at risk from increased flooding, soil erosion, and fast water torrents cascading down into coastal cities.

A key Ecological Civilization solution is restoring coastal wetlands and massive lowland revegetation through agroforestry and reforestation including greening semi urban, urban, and old industrial areas, to slow and normalize this water cycle through a complete regional sponge system.

Can a Restored Sponge Planet Help Mitigate Climate Change?

Timothy RAVASI

There is no doubt that human-enhanced climate change and other anthropogenic disturbances such as urbanization and coastal development are progressively jeopardizing the health of our planet. The well-being, prosperity, and security of over a billion coastal people are already at risk due to the degradation of seascapes and coastal environments. To date, most of the scientific and socio-political efforts to mitigate climate change are focused on the reduction or capture of anthropogenic CO_2 with little attention to other mitigation strategies like alternative energy and most importantly, restoring natural water cycles.

In this insightful perspective article recently published in *Nature Water*, Kongjian Yu and colleagues argue that restoring natural water cycles using a holistic approach embedded in the concept of a Sponge Planet represents the next natural step toward mitigating climate change. It is true that around the world there are already very successful examples of Sponge Cities showing that in principle, this approach can help mitigate climate change at least at the local scale. But what about at the global scale? One of the main criticisms of the Sponge Planet concept is its scalability. In this paper, the authors assert that the cumulative and even synergistic effect of assembling numerous local initiatives (Sponge Cities) across our planet can scale up the mitigation power of a Sponge Planet to the global scale.

With their elegant reasoning, they convinced me, and the answer to my initial question is "yes." If planned correctly and supported by local governments and economies, a Sponge Planet can help mitigate climate change also at the global level.

Towards a Planetary Sponge Ecology Through Water and Forest Urbanisms

Bruno De MEULDER, Kelly SHANNON

Restoring integrity to the Blue Marble is being pursued on multiple fronts. The urgent wakeup call requires both enormous commitment from civil society and political will. The notion of a Sponge Planet resonates with other landscape architects' visions, including Giles Clément's Planetary Garden and Richard Weller's Global Landscape Connectivity Projects. The necessity to radically redefine humankind's relation with nature and ways of occupying the world is also advanced by philosopher Bruno Latour (critical zones), evolutionary biologist E. O. Wilson (half earth) and botanist Francis Hallé (restoration of primary forests). In fact, Hallé's advocation for forests and Wilson's plea to set aside space exclusively for non-human species or Clément's garden(s) are all the flip side of water ecologies and part-and-parcel of sponges. They have the capacity to be (above and underground) water sponges, contributing in many ways to natural water cycles, generating biodiverse ecologies, and offering humans a renewed relationship with nature. Water is a necessary condition for ecology. Adaptable and heterarchical mosaics of water, soil, and vegetation must indeed be choreographed by the careful understanding of both historical ecology—an evident indicator of ecological suitability—and potential systemic connections of the contemporary territory uncovered by a careful reading of territorial logics. The tangible concept of security patterns, as defined by Kongjian Yu, can innovatively guide future development. As natural regulators, water and forests define the frame for humankind to more responsibly occupy the world. They, together with settlements and agriculture—the two other major forms of humankind's occupation that are continuously changing the face of the earth—need radical overhaul to overcome ecological and social injustices.

Sponge Planet: Restoring Water Cycles to Cool and Revive Our Cities

Daniel DULTZIN, Fabiola SOSA

As our living systems face an accelerated environmental crisis, we are witnessing a lack of progress in reducing carbon emissions and changing production and consumption patterns, as proposed by the United Nations. However, we now have concrete, viable, and effective solutions to tackle this crisis. These solutions involve restoring the natural water cycle through interventions that slow water flows, retain, filter, reuse it, ad infinitum, and recharge our aquifers. Following the Sponge Cities theory and practice developed by Kongjian Yu, this approach was adopted as a national policy by the Chinese government in 2018, after a successful trial period of 3 years in 30 cities of varied sizes, climates, and geographies. A new approach such as the Sponge Planet can cool it in a few years, effectively dealing with floods, drought, and pollution. Based on scientific knowledge, this new ecological urbanism will create a decentralized sanitation infrastructure for water, food, and energy self-sufficient neighborhoods free of motor vehicles and crime. This approach's intensive technical and scientific work will provide well-remunerated jobs, alleviate poverty, and curb migration. The multilateral financial architecture that places water as the highest priority, followed by wetlands and biodiversity, is an urgent, critical decision to avoid irreversible tipping points.

The Car in the Sponge City

Arthur KAY

Joni Mitchell sang, "they paved paradise and put up a parking lot." In a line she has captured 70 years of urban planning—much of it centered around the car. It was kick started with the 1956 Federal-Aid Highway Act in the USA, 66,000 kilometers at cost running into the hundreds of billions of dollars. And, there is no sign of slowing down. In the years since, the Global Roads Inventory Project estimates we have paved 21 million kilometers of road. In the USA alone there are over one billion parking spaces.

In our forthcoming book, *Roadkill: Unveiling the True Cost of our Toxic Relationship with Cars*[1], Henrietta L. Moore and I show how cars, and the infrastructure they need to operate (roads and parking lots), dominate our cities. They create vast, impermeable landscapes of asphalt and concrete. They prevent rainwater and flood water from soaking into the ground. They keep water on the surface, and make it move fast. Stormwater rushes across these surfaces, overwhelming drainage systems and triggering floods. There is a spatial element as well, roads, highways, and parking lots dominate our public space in cities. Space that could be repurposed for Sponge Planet infrastructure. Car-centric cities have fragmented ecosystems, intensified flooding, depleted groundwater, dried cities out, and heated them up. This leaves our cities increasingly vulnerable to both droughts and flooding. The World Bank estimates that floods cost over one hundred billion dollars each year. Floods negatively impact millions of people. At the same time, water scarcity already affects over two billion people worldwide.

Kongjian Yu's pioneering work rethinks the city as a sponge, and he is challenging us to go even further in thinking about a Sponge Planet. His diagnosis of the problem is sophisticated, and his solution inspired. Moving from Sponge City to Sponge Planet shows the scale needed and Yu's compelling vision. The benefits of Sponge Planet go far beyond water management. By restoring nature to cities they cool overheated cities, improve air quality, and provide habitats for birds, insects, and other animals. Yu makes spaces, like Sanya Dong'an Wetland Park, where a public park doubles as reservoirs.

We should not be shy about the fact that restoring a Sponge Planet also means grappling with our dependence on cars. Will we continue paving paradise for cars? Could the future of our cities and our planet be as simple as fewer cars and more sponges?

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The Need for Green Urban Sponge Solutions for the Great Metropolitan Region of São Paulo, Brazil

Humberto R. da ROCHA, Sin Chan CHOU, Marcos BUCKERIDGE, Carlos A. NOBRE

Extreme events such as flooding, heat waves, and storms severely impact cities, harming people and the economy, which may lead to disruptions of essential services, such as water security, infrastructure, mobility, and thermal regulation. São Paulo is the most populated city in Latin America. Only about 13% of the urban area of the city has vegetation coverage, which results in an urban heat island effect with temperatures up to 10°C higher than the rural surroundings. Nature-based Solutions, such as urban tree coverage near build-up areas, can mitigate these effects.

Projections of the expansion of the Metropolitan Region of São Paulo show an urban area growth of about 38.7% around the 2030s, which causes an increase in the risks due to greater exposure, higher probability of extreme events, and worse social vulnerability. Among the sustainable solutions is the improvement of green infrastructure, which can facilitate water infiltration and retention while improving the local microclimate. These approaches are essential to ensuring a modern and resilient urban society.

The Great Metropolitan Region of São Paulo is the largest in Latin America. This region urgently needs to implement a large-scale green urban sponge solution, which includes expanding urban tree coverage and preserving the surrounding native vegetation.

Redesigning the Entire City to Adapt to the Climate Change

Makoto YOKOHARI

When Frederick Law Olmsted was asked to come over to Boston to solve floods caused by storm water in mid 1850s, what he proposed were to straighten meandering river and locate series of fens downstream to capture storm water and gradually release it to the ocean, which became to be a great success named the Back Bay Fens. These measures to manage storm water are standards in water engineering even today, and thus numerous followers can be found throughout the world. However, such classic measures are beautiful but now becoming incompetent due to extremely intensified rainfalls triggered by the global climate change.
To meet such a challenge some new trials can be identified in the world. Copenhagen, Denmark has been installing series of innovative raingardens since a major flood hit the city in 2011. A comprehensive water management system has been developed for the entire National Capital Region, including Tokyo, Japan. Not only installing individual parks and open space but redesigning the entire urban fabric to adapt to the climate change is indispensable for the sustainable future of cities in the world.

Innovative Adaptation to Changing Climate

Shang-Ping XIE

2023 and 2024 are the hottest years in a row. A warmer atmosphere holds more moisture, exacerbating heavy rainfall in both intensity and occurrence. On 5 ~ 6 February, 2024 in Los Angeles, an atmospheric river in an extratropical cyclone rained 179 mm over two days, equivalent to 50% of the long-term annual rainfall. On 20 July, 2021 in Zhengzhou, an atmospheric river associated with a tropical cyclone rained 200 mm in just an hour, causing property damages estimated at 19 billion US dollars. By slowing down flood water and collecting it in various reservoirs (e.g., ponds, lakes, aquafers), the Sponge City concept described in the perspective article by Kongjian Yu et al. represents an innovative adaptation solution to intensifying extreme rainfalls. Collected water has additional benefits of reducing the heat island effect and softening heatwaves.

Snowpacks on mountains of the American West are natural reservoirs that store precipitation in the wet winter season and supply rivers with melt water during the warm dry season. These snowpacks are under threat of rising temperatures. Shrinking snowpacks expand the hydrological dry season, elevating fire risks. Water transfer projects in California and elsewhere—grey infrastructure in Yu et al.'s term—were traditionally employed to resolve mismatches in distributions of precipitation and population. Innovative alternatives are called for to solve water problems in a warming climate.

A Water Intelligence in Times of a Climate Crisis

Kazi Khaleed ASHRAF

I live and work in the densest city on the planet—Dhaka. It seems that Dhaka has a choice between two destinies: one is experienced as the real but really needs to be rejected, and another is tantalizingly real yet far from being experienced. I am a proponent of the second one, in which water is critical. Water is also central to the global climate disaster.

Dhaka's issues are symptomatic of many cities of the world in the throes of climate and environmental disasters. The current crisis of Dhaka is the product of the three failures: lack of vision from national policy-makers, poor planning by planners, and incompetent management by city managers. This is the scenario of the first destiny, or what appears to be real. What prescribed planning models and development trends seriously lack is an understanding of the hydro-ecological landscape of Dhaka, and the need for innovative responses to the dynamics of water.

Conventional planning considers the city from a high and dry vantage point—I call it "dry planning." The city is civilized if it is dry, even if it creates inequity in the allocation of resources and urban services, and a class distinction between those who are dry and those who are wet. What is wet is seen as primitive and backward. The outcome is that water as the basis of a rich environmentally attuned life has evaporated, the river has become a dirty drain, the wetland has become a swamp, and the monsoon has become just a miserable season.

Planning around land and water (and not land versus water) seems to be a natural recourse in such a landscape. It requires new design intelligence. An audacious vision for such cities has to begin from the edge of the precious landscape of waterways, wetlands, and agricultural terrain, ushering a conception of a city that integrates urbanism, agriculture, infrastructure, and flooding, offering a new climate-conscious model for a city.

Climate Change, Smallholder Farmers, and Food Security for the Poor

Kenneth STRZEPEK

It is widely accepted that smallholders, less than 2 hm^2 in size, are central to food systems, accounting for 84% of all farms. Increasing their producing is key to reducing poverty and supporting food security.

Smallholder farmers produce around a third of the world's food and are responsible for about 80% of the food produced in Asia and sub-Saharan Africa, and any climate change adaptation and mitigation measures in agriculture to reduce Green House gases must include smallholders.

Currently, the smallholder farmers who produce 30% ~ 40% of our global food supply are largely dependent on available rainfall for agricultural production, making them particularly vulnerable to climate change-induced water shortages and are often in the regions of the world most at risk from climate change, both gradual and through extreme events, such as droughts, floods, and heatwaves.

This means that any actions related to climate change will focus to reduce their risk from, and increase their resilience to, climate change, i.e. adaptation, rather than mitigation to reduce greenhouse gases, but they are often not empowered to do so, since they often do not have the economic, institutional, educational or other support to take action.

The Importance of Being Able to Visualize What We Seek

Franco MONTALTO

In the Northeast US, the increasing frequency of extreme weather events, notably floods, drought, and heat waves have begun to shape climate adaptation and mitigation strategies, which increasingly feature multifunctional Nature-based Solutions (NbS)[1]. NbS are of regional interest because of their intrinsic multifunctionality, a defining characteristic that enables them to address multiple problems in the same place, often at the same time, working with, and not against, natural systems and processes. However, like other adaptation measures throughout the world, implementation of NbS in the Northeast US remains piecemeal, incremental, and inadequate[2]~[4]. While scientific research—as well as basic common sense—clearly demonstrates the potential benefits of NbS, and locally impactful NbS examples abound, innovative strategies for upscaling the rate, area, and scope of NbS projects are today a great need. We will not significantly upscale NbS by working exclusively in the easy spots, the wide-open spaces, the uncontested land, or the unpopulated coasts. To make changes that can measurably counteract the climate challenges we face, we need to conceptualize, design, and ultimately build landscapes that look very different from the legacy landscapes in which we dwell. It may not be easy to visualize what it would look like to have multifunctional NbS systems growing out of all the nooks and crannies of our human-dominated landscapes. However, I would argue that it is equally difficult to visualize what our region will look like in 50 or 100 years if—without undertaking this existential visioning exercise—extreme weather events continue to get more frequent, spatially prevalent, and severe.

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