THEREFORE CHOOSE LIFE, AN URGENT CALL TO ACTION

Could ecosystem restoration stabilize the climate and cool the planet in mere decades?[1]

September 2023

A whitepaper/blueprint

by Biodiversity for a Livable Climate and the EcoRestoration Alliance

A blueprint for action to complement our

Appeal to Humanity, UN Secretary General, and World Leaders - Google Docs

Introduction and Overview

Climate and global ecosystem restoration using emerging science and proven practices must occur on all of Earth's land and sea. Human barriers to action must be confronted and overcome to fully restore decimated ecosystems and life on Earth. Humans have destroyed the plant kingdom on land and water. Deforestation with the concomitant loss of evapotranspiration and photosynthesis has destroyed the climate equilibrium. We must be restrained from our wanton destruction and we must restore what we have been destroying. Protection of biodiversity and all life, particularly the plant world, must be assured, with appropriate consequences enforced to stop destruction and allow restoration and regeneration.

We draw hope from countless demonstrations of human interventions that regenerate healthy ecosystems effectively and quickly. If we scale up these demonstrations —massively and quickly—Earth's ecosystem can thrive. We can build climate stability. The urgency of this situation cannot be overstated. If we fail to act now, our prospects are too bleak for words.

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[1] A note on the science behind this bold proposition: The Living Earth Perspective (reviewed below) offers a *plausibly* fast-acting solution to the climate crisis, the biodiversity crisis, and other crises that will follow therefrom. We believe that with more research, this view will prevail.

However, because the planetary deterioration is outpacing normal scientific progress, we are calling for action research that will build on the insights of the Living Earth perspective to simultaneously restore healthy ecosystems that modulate normal climate, *and* advance our understanding of interactions between living systems and climate.

While our **Appeal** calls for action, this paper identifies specific actions that can save the future. As the following table illustrates, our "Living Earth Paradigm" complements and counterbalances the mainstream view with immediately actionable insights.

Issue	Prevailing Paradigm	Living Earth Paradigm
Carbon in the atmosphere	is the main problem	is a long-term problem, but a short-term distraction
How long it will take to restore normal...	greenhouse gas levels? 1000 yrs	global temperatures? 10 years
Water in the atmosphere	has no net effect on climate	drives climate and weather patterns
Water in the soil	is relatively unimportant	is critical for cooling and for life
Plants	draw down carbon	cool the planet, hydrate soils, control weather (and draw down carbon)
Carbon in the soil	is only relevant as a carbon sink	is key to holding water and building life (and holding carbon)
Land temperature is mostly determined by	climate	ground cover: bare dry ground gets hot; vegetated land cools
The main cause of fires, floods, and drought	climate change	destruction of soil and plant life
Deserts are caused by	drought	mismanagement of land, livestock, and water
Drought, fires and famine are caused by	lack of rain	dehydrated impermeable soils, depleted aquifers, loss of rain-regulation
Living things	are affected by climate	control the climate
Humans caused climate change by	burning fossil fuels	defoliating the planet and dehydrating the land
Slowing the flow of water upstream	decreases water downstream	increases water downstream by supporting life and water cycles
The most important thing to do	stop emissions that capture heat	restore healthy ecosystems that maintain livable conditions
The climate problem must be addressed	globally	locally
Solutions have to come from	the power elite	***almost everyone almost everywhere***

Climate Stability on a Living Planet (Section 1)**,** explains how carbon, water, and life build stability in Earth's climate. Evidence demonstrates that ecosystem restoration has the capacity to stabilize climate chaos, if humans stop destroying Nature and allow it to heal. Life's complex interactions have built-in self-stabilizing functions that we, in our ignorance, have destroyed. We must restrain ourselves and help Nature to restore her healthy cycles. Scientific research predicts that healthy ecosystems can restore climate stability in a few decades. Further, research is necessary to observe and define best methods, "optimizing" the benefits of ecosystem restoration, while allowing great liberty in their many local applications. We will evaluate and revise our adaptive methods based on scientific observation and evaluation. Our best first move though, is "Hands-off! Protect existing ecosystems." The risks of inaction on ecosystem protection and restoration are great; immediate global action is needed.

What Needs to Be Done (Section 2) is a roadmap for action. The key problems are defined. They can all be traced in whole or in part to human mismanagement of land and water. Each of these mismanagements can be revised locally and globally to improve our ecosystem restoration. Humanity can *accelerate* ecosystem restoration. With an abundance of possible solutions and a terrifying lack of time, humanity must act to bring stability to the most critical places, focussing on Earth's biggest opportunities, described in the 12 chapters below.

Mobilization - Key Problems and Practical Solutions (Section 3), the greatest threat to humanity is the "business as usual" practices that brought us here. To save the future, **we need to help everyone everywhere respect and reconnect with nature, and work with Earth to protect and restore the only planet we have.**

This document includes 12 Specialized Guides for specific actions in strategic local and regional areas, offering opportunities in local contexts, which can be evaluated for adoption in other places. This respectful, restrained approach will support Nature's healing capacities, bring climate health and a peaceful joy to all who choose to participate.

This is the greatest work of our time, and we have no time to waste. Let's begin.

Section 1: Climate Control on a Living Planet

The Story of Water & Life: The Opportunity

Greenhouse gasses capture heat and thereby the planet warms, but the heat comes from hot and desiccated ground bereft of plant-driven, water-based cooling systems. As water moves and changes states, it interacts with plant life and the atmosphere, acting as a coolant for the planetary air-conditioning system, an essential condition for life on Earth. Once we understand the full force of plants and the water cycle, we can actually confront

the climate crisis with a new set of measures. Plants, healthy soils, and healthy ecosystems stabilize weather and the climate. We can leverage these qualities to fight the climate crisis.

More than half of the planet's living biomass has been destroyed since the beginning of civilization. The abilities of living soils, forests, natural grasslands, coastal ecosystems, and oceans to regulate the climate and maintain livability have been severely reduced bringing a cascade of ecological breakdowns and disasters. We can slow, stop, and reverse this vicious cycle by protecting existing ecosystems and regenerating nature around the world.

The scientific fundamentals are described below.[2]

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[2]This story is brilliantly illustrated in a video by Jimi Sol, co-authored by several members of our team. Here are the sources cited in that video. How Plants Cool the Planet - YouTube - https://www.youtube.com/watch?v=B-oJyInmTTo

Most of the water plants that plants take up comes out through the leaves:
https://cid-inc.com/blog/transpiration-evapotranspiration-and-leaf-area-index/

For every molecule of CO2 sequestered, several hundred molecules of water are evaporated:
https://www.nature.com/scitable/knowledge/library/water-uptake-and-transport-in-vascular-plants-103016037/

Temperatures have been measured to be cooler in forests:
https://www.google.co.nz/books/edition/A_Trillion_Trees/Cz00EAAAQBAJ?hl=en

Plants house condensation-nucleating bacteria:
https://www.nature.com/articles/ngeo1037

When water condenses at cloud level, it releases the heat it absorbed during evaporation:
https://www.usgs.gov/special-topics/water-science-school/science/condensation-and-water-cycle

Up to half of this heat released during condensation radiates back into space:
https://journals.ametsoc.org/view/journals/bams/78/2/1520-0477_1997_078_0197_eagmeb_2_0_co_2.xml?tab_body=pdf

Clouds create a net cooling effect:
https://earthobservatory.nasa.gov/features/GlobalClouds/cloudiness2.php

Healthy ecosystems absorb water into the soil which replenishes groundwater:
https://www.nrdc.org/bio/lara-bryant/organic-matter-can-improve-your-soils-water-holding-capacity

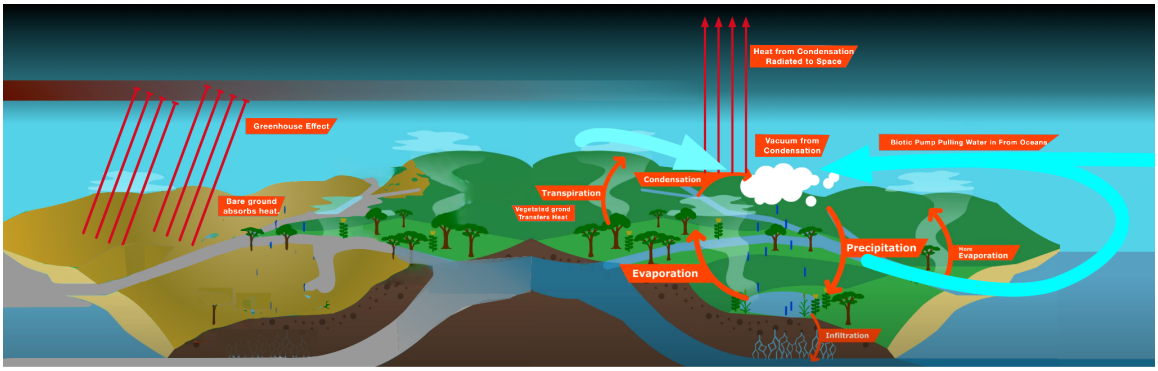
Plants sequester carbon and put it underground:
https://amazingcarbon.com/PDF/JONES-LiquidCarbonPathway%28July08%29.pdf

Sequestered carbon can stay underground for hundreds of years:
https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/terra-preta

The ocean food web is based on plants:
https://www.noaa.gov/education/resource-collections/marine-life/aquatic-food-webs

Marine ecosystems seed clouds:
https://www.publish.csiro.au/EN/pdf/EN07080

Marine ecosystems sequester carbon in the form of shells:
https://royalsocietypublishing.org/doi/10.1098/rspb.2017.0891



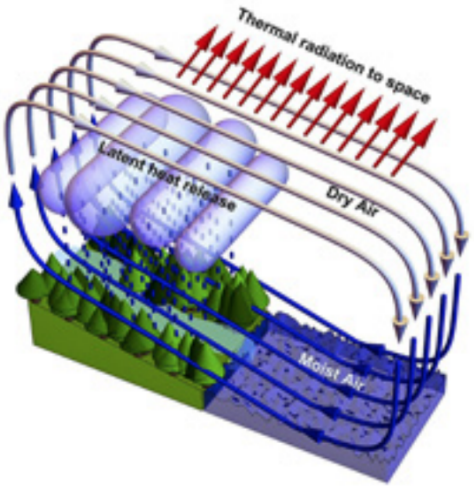
Living systems keep us cool. Bare ground gets hot in the sun, but healthy ecosystems turn carbon, water and energy into biomass and energy-rich water vapor carries energy away from the earth's surface. When the vapor condenses into droplets, energy radiates out to space, clouds form and shade the surface, volume changes from condensation bring oceanic moisture across continents from distant oceans, rain hydrates the soil and nurtures life. Artwork based on [How Plants Cool the Planet - YouTube]

"The water cycle" is often depicted as a simple process: clouds bring rain, rain evaporates into water vapor, water vapor condenses into rain. This description applies to within-watershed "Small Water Cycles." Larger scale water cycles circulate water from sea to land via the Biotic Pump. Overall planetary water processes are much more complex. They are created and influenced by living things, which are crucial to the regulation of temperature and weather.[3] As we understand the forces in the Small Water Cycle, the Biotic Pump and the living things that create these cycles, we will manage them better, respecting the natural forces that shape weather, temperature, and climate.

Tree-planting based on large quantitative targets can backfire:
https://link.springer.com/article/10.1007/s10661-018-7131-3

[3] Human domination of the global water cycle absent from depictions and perceptions.
https://doi.org/10.1038/s41561-019-0374-y

BIOTIC PUMP PRINCIPLE – FLOW AND EXCHANGE OF THE AIR MOISTURE BETWEEN CONTINENTS AND OCEANS



Scheme 10: In the wet regime, a healthy natural forest is obviously associated with an abundant water cycle. When forest degrades, so does the water cycle. Less forest, less river flow

https://www.mpsr.sk/en/download.php?fID=263

When water changes from ice to water or from water to vapor, energy is absorbed. Through evapotranspiration, plants convert vast amounts of liquid water into energy-rich water vapor. When the vapor rises and condenses, rain forms, releasing 2260 joules per gram of water as radiation.[4] At high altitudes, as much as half of this energy radiates into space, cooling the planet.[5]

This process is further facilitated by plants: along with water vapor, they emit biological aerosols and condensation nuclei that facilitate the condensation of vapor into water droplets and rain. Thus, plants cool locally by packing energy into water vapor and dispatching it upwards; they cool globally by releasing some of that energy into space and by forming clouds that shade the earth, reflect sunlight back into space, and send cool precipitation back to earth.

Condensation has other important climate consequences. As condensation occurs, a thousand liters of vapor become one liter of rain. This "implosion" or vacuum creates low pressure zones that pull in air from near and far. Over large forests, these processes are so strong that they drive a powerful "Biotic Pump"[6][7] that draws humid air from oceans, moving moisture and rain deep inland, and creating airborne rivers that flow across, and even between, continents.

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[4] 6.1: Energy, Heat and Work - Chemistry LibreTexts In contrast, the melting of ice absorbs only 335 joules; evapotranspiration over the surface of the planet is significant!

[5] Hermann Harde Radiation and Heat Transfer in the Atmosphere: A Comprehensive Approach on a Molecular Basis

[6] Biotic pump - Wikipedia

[7] Winds and rain: the role of the biotic pump - MedCrave online

Powered by evapotranspiration, the biotic pump thus hydrates terrestrial ecosystems, averting droughts by extending rainy seasons and reducing severe rainfall events. Simultaneously, living biomass increases, drawing down more carbon, and further increases evapotranspiration and cooling, both locally and globally. This is the great cooling pump of the planet.[8]

Nurtured by water, healthy, hydrated ecosystems both maintain the biotic pump and have numerous other beneficial effects. When rain falls on healthy soils, societies of microorganisms and fungi thrive. Soils become more alive, absorbent, resilient, and more resistant to erosion and drought. Healthy soils and mycorrhizal networks form a "soil carbon sponge" that absorbs water, and then releases it slowly, nourishing and hydrating the biome, while percolating water into aquifers, where it can be retained for a long time. Heatwaves, droughts, flash floods, run-offs, and erosion are diminished.

The story of life-facilitated climate regulation is not confined to land. In healthy oceans, phytoplankton, crustacea, and many marine organisms capture carbon dioxide from the atmosphere. By metabolizing and biomineralizing CO_2 from ocean acidification into calcium carbonate, and into their carapaces and shells, marine organisms reduce ocean acidification. When these organisms die, their calcium shells fall to the ocean floor, and form huge limestone deposits storing the CO_2. This metabolic activity counteracts ocean acidification and reduces greenhouse gasses.

Thus, over 3.5 billion years, life on earth has created conditions conducive to life on earth. However, over the past few centuries, human activities have brought this system to the point of collapse.

Science, Action and the Urgency of Now

Although science has advanced quickly, the climate is degrading even more rapidly. We can't afford to wait for disambiguation and the "best analysis and model." Delay will put us past the tipping point for irreversible, catastrophic destruction of life on Earth.[9]

For scientific as well as societal reasons, climate models are incomplete. The complex interactions of life, water, matter and energy are difficult to model. Some variables have been omitted or underweighted. Disciplinary specialization has unrealistically narrowed our focus, inhibiting interdisciplinary conversations,[10] and obscuring the holistic, interactive reality of our living planet.

Fortunately, risk-minimizing, restorative options are available now. They are overwhelmingly beneficial, increasing sustainability, prosperity, and resilience against the ravages of climate change.

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[8] https://bio4climate.org/2022/03/15/our-underrated-climate-ally-the-small-water-cycle/ ; http://www.waterparadigm.org/download/Water_for_the_Recovery_of_the_Climate_A_New_Water_Paradigm.pdf

[9] Exceeding 1.5°C global warming could trigger multiple climate tipping points | Science

[10] Reference Gaya Roshan's letter to the UN.

As we adopt new practices, we must evaluate our efficacy, improve our analysis and understanding and revise practices in light of new knowledge. Outcome evaluation and measurement must be integral to the process, giving evidence-based direction to the improvements of restoration practices. Holistic scientific, engineering and implementation practices will change to restore and protect ecosystems and the climate. The evaluation of change with improved communication can build a cohesive culture of regeneration, restoration and climate stability.

Section 2: What Needs to Be Done

Overview

Our fevered planet is already 1.2°C hotter than it was 200 years ago,[11] increasing the frequency and severity of extreme weather events. Powerful storms, with sea surges and destructive winds, tornadoes, long-lasting droughts, massive floods, and forest fires have increased on a scale never before experienced. Emissions reductions will help by reducing the greenhouse effect, slowing ocean acidification and warming. The present heat accumulation from existing greenhouse gasses has become the most acute climate symptom. We must reduce emissions to zero and also cool the resulting heat accumulation. Regeneration of the biosphere can cool while it also sequesters carbon.

Over the last 200 years, human misuse of land with resulting degradation has moved into the atmosphere nearly as much CO_2 from land use changes as fossil fuel use has. Ecosystem restoration will put much of that carbon back into living beings and soil organic matter, while providing bioremediation for chemical pollution. Ecosystem restoration is the most effective, well-proven, and benevolent method for carbon capture, temperature reduction, weather regulation, and reduction of the atmospheric greenhouse gas concentrations. Ecosystem restoration can produce significant regional cooling and climate mitigating effects in only a few years. Significant planetary cooling effects can be achieved in a few decades if implemented widely and immediately before we are past the rapidly approaching tipping points.

Massive ecological restoration of the planet's already-degraded lands and waters would undoubtedly help stabilize the climate, limit warming to 1.5°C while diminishing extreme weather events. The first positive effects would be visible within years! Plans like the Bonn Challenge, 1 Trillion Trees and 30 by 30 if really implemented, would, together with large-scale transition of global food production to regenerative practices, have a much more pronounced positive effect than current models indicate. Both local and global restoration would together stabilize the climate.[12] Circumstantial, historical evidence shows rapid declines of global temperature have resulted from forest grow-back on 56 million hectares of idled agricultural land that quickly reforested.[13]

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[11] *Summary for Policymakers — Global Warming of 1.5 ºC.* IPCC. https://www.ipcc.ch/sr15/chapter/spm/

[12] Cooling the Climate Mess with Walter Jehne (the more important part starting from 47m33sec. Rob de Laet: Cooling Climate Chaos version blueprint

[13] ‘’We investigate whether the decline in global atmospheric CO2 concentration by 7–10 ppm in the late 1500s and early 1600s which globally lowered surface air temperatures by 0.15◦C, were generated by

Indeed, several converging analyses[14] suggest that in this way we can stop the heating of the planet within decades using the cumulative effects of evapotranspiration, high atmosphere condensation, and thermal radiation to outer space. Together, these cause local and global cooling using evaporation, while simultaneous photosynthesis sequesters carbon.

Our strategy, as a complement to emissions-reductions, builds strength and resilience using the formidable power of biological ecosystem restoration. The co-benefits are enormous, improving the living conditions of billions of people, increasing their income and diminishing the driving forces behind climate migrations. In fact, land regeneration can trigger a much needed new economic boom, driving investments towards a more prosperous and equitable world. By including full accountability in economic assessments, the profitability of maintaining healthy ecosystems will become abundantly clear.

In the words of the UN Secretary General António Guterres:

"We have a choice. Collective action or collective suicide. It is in our hands."[15]

We agree on the need for global action to counter this existential threat, but with a different mindset and plan in hand. Our blueprint adds practicality, actionability, equity, security, and multiple benefits to all. Ecosystem restoration practitioners can build resilient life and hope for climate stability. We point the way towards a new (and ancient) realignment and reconnections between all beings on our living planet.

Section 3: Mobilization - Key Problems and Practical Solutions

The Scope of our Plan

Many proven techniques, including traditional knowledge, can unleash and accelerate nature's intrinsic capacity for healing, regeneration, and climate regulation: regenerative agriculture, permaculture, agroforestry, rewilding, and interventions for protecting, conserving and reviving oceans, and coastal ecosystems.

While tackling surface warming directly, and moderating extreme weather, our plan offers many co-benefits:

- it supports the future of water and food security by massively restoring topsoil, vegetation, and disrupted water cycles;

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natural forcing or were a result of the large-scale depopulation of the Americas after European arrival, subsequent land use change and secondary succession." Quote from Earth system impacts of the European arrival and Great Dying in the Americas after 1492 - ScienceDirect

[14] Prof Bunyard calculation for cooling the planet:
Solar Energy and Rainforest Cooling plus Winds - Calculations See also the video under footnote 11 by Walter Jehne.

[15] Collective Suicide or Collective Action? It's in Our Hands, Says UN Chief - Impakter

- it can sequester enough CO_2 to offset current global emissions;
- it supports conservation and restoration of biodiversity;
- it supports the livelihoods of two billion rural people in the Global South;
- it improves quality of life for billions;
- it supports conditions that would slow mass migrations; and
- when implemented at sufficient speed and scale, it will help prevent the collapse of societies around the world, and help them work with nature.

Ecosystem restoration is not only our best technique for drawing carbon out of the atmosphere, sequestering it in biomass, and cooling the planet, it is also a fast-acting solution to the "metacrisis" of climate chaos, mass migrations, and biodiversity loss.

Our plan has some limitations, too:

- it does not stop the energy crisis;
- it does not ensure equitable access to global resources or restraint from exploitation;
- it does not solve overpopulation (but reproduction rates go down as women are educated and offered good options); and
- it does not articulate an ethical and socio-economic framework for multi-generational stewardship (but it makes the need for such a framework clear)

High Level Goals to pursue immediately:

- Preserve all existing forest ecosystems. Stop deforestation now. [16]
- Declare ecocide a crime against humanity. Protect the Rights of Nature.[17]
- Reform the global food system to regenerate soils, and reduce dependence on fossil fuels and pesticides.[18]
- Sequester atmospheric carbon in living and newly-growing biomass. [19]
- Empower Indigenous and rural stewards by recognizing their time-tested methodologies, reward the preservation and restoration of biodiverse ecosystems, and transition to sustainable food production with permaculture and agroforestry-type systems.[20]
- Finance regeneration of degraded ecosystems by reforming financial systems and social metrics to include price, costs and benefits of degradation and restoration of ecosystems. [21]

[16] UN Global Biodiversity Framework Targets 1, 2, 3, 4, 9, 10, 11, 14, 15, 19
[17] UN GBF 1, 4, 18
[18] UN GBF 4, 5, 7, 9, 10, 14, 16, 18, 21
[19] UNGBF 1, 2, 3, 4, 8, 10, 11, 14, 15, 19, 21
[20] United Nations Global Biodiversity Framework 1,2,3,4, 19, 21, 22
[21] UN GBF 1, 2, 3, 4, 10, 14, 15, 18, 19, 20, 21, 22

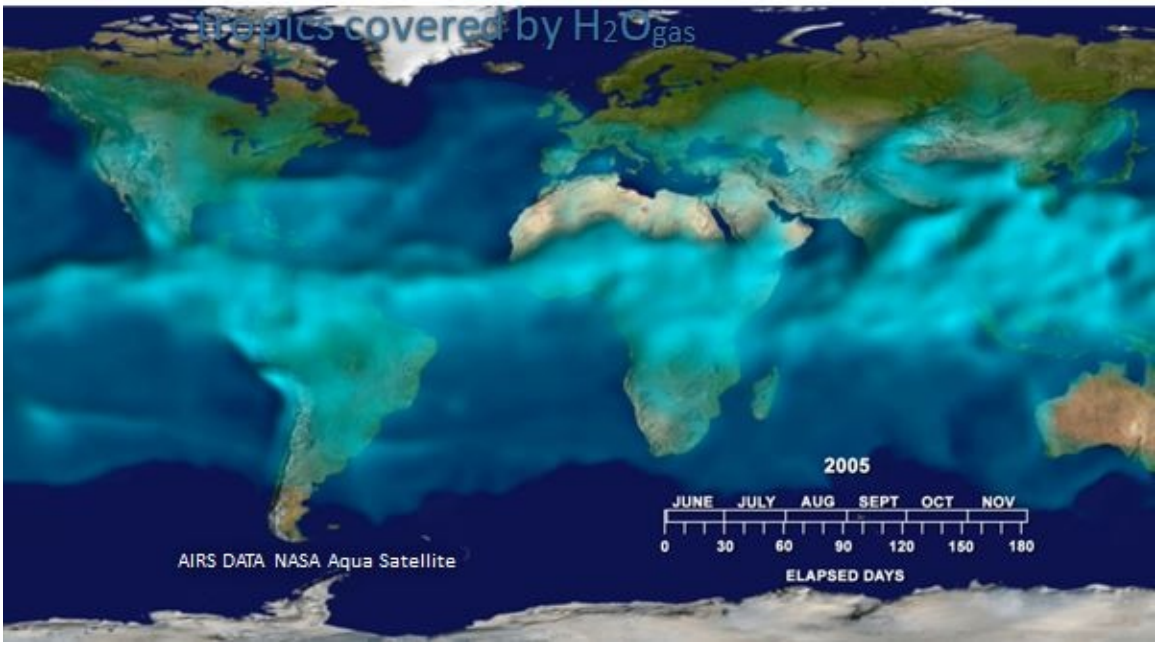
- Promote evapotranspiration, cooling, and regeneration by covering bare ground with native plants, regreening cities, and de-paving impermeable surfaces.[22]
- Slow the flow of fresh water in order to hydrate the land and restore healthy soil, wetland, and river biomes.[23]
- Clean up and restore healthy life in oceans, lakes, and rivers.[24]
- Reverse desertification and aridification using proven regenerative techniques.[25]
- Reinforce the biotic pump to pull more ocean moisture into the continental systems by restoring large forests, coastal biomes, estuaries and other ecologies starting in strategic places.[26]
- Replace pesticide-dependent and synthetic fertilizer-dependent mono-cultural forestry and agriculture by cultivating synergistic suites of co-adapted species.[27]
- Support the hundreds of millions of smallholder farmers, foresters, and fisher-people who are already engaged in sustainable, nature-based, and holistic practices.[28]

Prioritizing Strategic Interventions

It's a big planet; time is short, and some problems are acute. Here is a prioritized list of specific strategic interventions, selected to emphasize synergies and interactions that restore global hydrology and stop further global warming through worldwide grassroots collaborations.[29]

Protect and restore the Amazon rainforest to its former strength and size. The Amazonian Biotic Pump affects climate across the entire globe. It must be restored and protected. This should also decrease the frequency and power of hurricanes crossing the Atlantic.[30]

[22] UN GBF 1, 2, 3, 4, 11, 12, 14, 15, 18, 19, 21
[23] UN GBF 1, 2, 3, 4, 6. 7. 9. 10, 11, 14, 15, 18, 19, 21
[24] UN GBF 1, 2, 3, 4, 7, 8, 9, 10, 11, 14, 19, 21
[25] UN GBF 1, 2, 3, 4, 7, 9, 10, 11, 14, 15, 18, 19, 21
[26] UN GBF 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 18, 19, 21, 22
[27] UN GBF 1, 2, 3, 4, 5, 6, 9, 10, 11, 14, 15, 18, 19, 21
[28] UN GBF 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23
[29] IUCN Red List of Ecosystems - resource
[30] Forests versus hurricanes - CIFOR Forests News



Protect and restore vegetation cover and coastal forests in the Horn of Africa. Eastern Ethiopia, Somalia, and Northern Kenya are all experiencing extreme floods and droughts and moving toward desertification.[31] We can alleviate or reverse this degradation by connecting moisture streams from the Arabian seas with the West African monsoon.

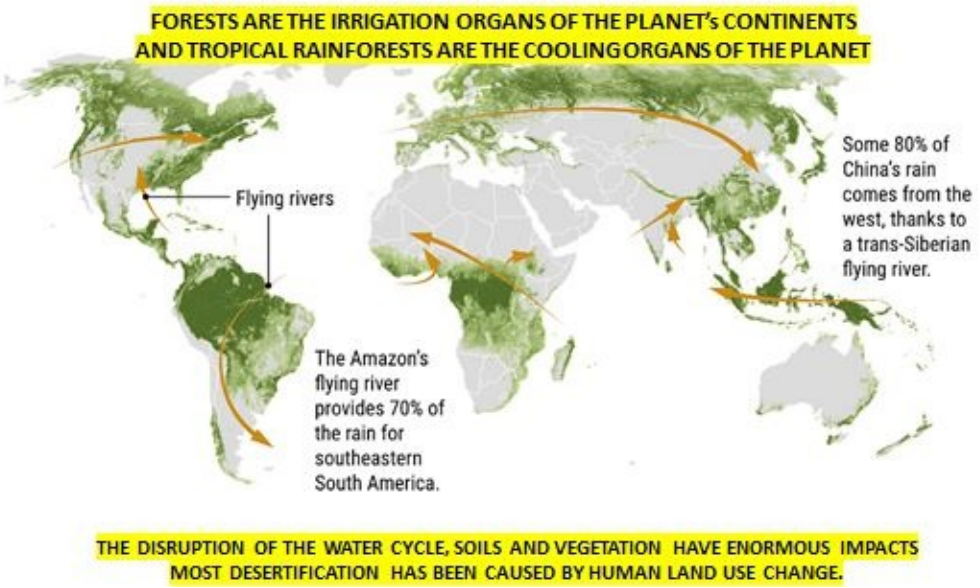
Protect and restore vegetation cover and coastal forests on the Pacific side of the United States and Canada to rehydrate these lands, and protect food production.

Protect and restore all Boreal Forests in Alaska, Canada, Russia, and Scandinavia. This band of ancestral forest encircles the northern hemisphere and is losing its ability to maintain stable global weather patterns.[32] [33]

[31] https://www.researchgate.net/figure/Drought-impacts-in-Africa-from-1950-to2021-EM-DAT-https-publicemdatbe_fig2_359209369
https://www.icpac.net/documents/506/Final_FSNWG_Drought_Special_Report.pdf

[32] For more on protecting northern forests, see *Rescuing the Planet: Protecting Half the Land to Heal the Earth*, by Tony Hiss.

[33] see also 5 Flying rivers and watersheds of the sky based on the biotic pump...



After 5 Flying rivers and watersheds of the sky based on the biotic pump...

Protect and restore the vegetation of the great Asian islands of Sumatra, Kalimantan, Sulawesi, Mindanao, Papua, and smaller islands as well to increase and balance the moisture streams feeding the Indian subcontinent.

Close up look of the biotic pump flows over Indonesia and India

Protect and restore forests and vegetation on the Indian Subcontinent. A strategic reforestation of areas in India can help rehydrate the subcontinent, smooth (decrease variability), increase the length of the wet monsoon, and increase snowfall on the

Himalayas and Hindu Kush to offset glacier melt that is threatening the water supply of at least 1.6 billion people.[34]

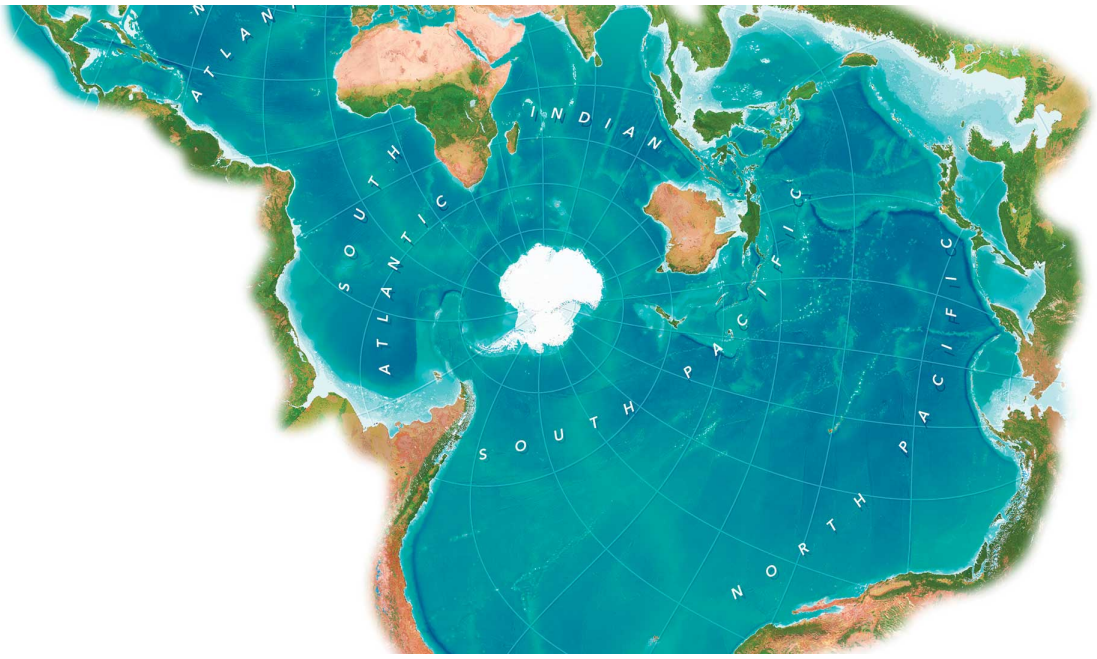
Protect and reforest the western coastal forests of Europe, and the whole Mediterranean. By reforesting and rehydrating drought-plagued Portugal and Spain, we can reinforce the moisture stream east to the Eurasian land masses, and engage the Biotic Pump to conduct moisture across Europe to Russia and northern China.

Protect and reforest the East coast of Australia to rehydrate the land and recharge the biotic pump there.

Clean up the oceans to protect the sea surface microlayer which generates aerosols that form clouds, and regulate energy transfer and evaporation to the atmosphere.[35]

[34] The world has a third pole – and it's melting quickly | Glaciers | The Guardian

[35] Climate disruption caused by a decline in marine biodiversity and pollution by Howard Dryden, Diane Duncan :: SSRN ; Sea surface microlayer - Wikipedia



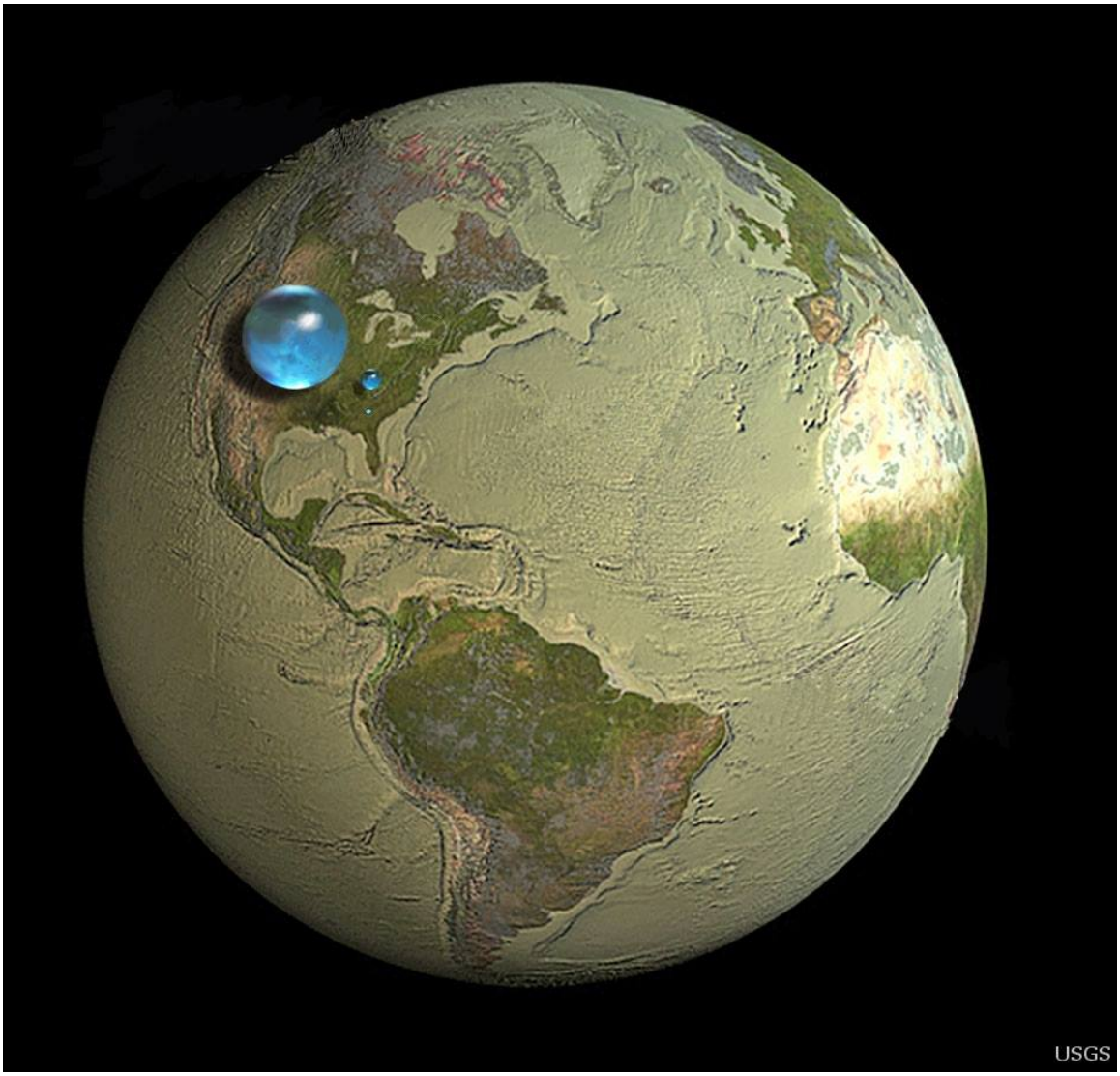
[36] An ocean-centric view of the planet. After [Steal this Spilhaus project for ArcGIS Pro please (esri.com)]

Explore the potential use of phytoplankton blooms to sequester carbon and fight ocean acidification, restoring coastal ecosystems and trans-continental nutrient flows.[37]

Protect and restore whale populations to enhance the ocean water vertical circulation (destratification) and nutrient cycles.

Create and expand marine no-take zones, and reduce and reform industrial fishing practices to allow ocean ecosystems and food resources to recover.

[36] Science to save the ocean (esri.com)
[37] https://phys.org/news/2023-06-oceans-absorb-emissions-driven-huge.html



The large drop shows the salt water which is 97% of the water on Earth. The smaller drop is freshwater. Nearly 70% of freshwater is trapped in glaciers, 30% is in the ground, and only 0.3% is found in all of the lakes, rivers, and streams around the world. A mere 0.001% of the total water is in the atmosphere at any moment, corresponding to about 12900 km3 (3100 cubic miles); this tiny quantity plays a crucial role managing the planetary energy flux[38].

Section 3: Mobilization - Key Problems and Practical Solutions

How to engage humanity to act on the highest priority issues.

[38] https://www.usgs.gov/special-topics/water-science-school/science/how-much-water-there-earth#:~:text=About%203%2C100%20mi3%20(12%2C900,atmosphere%20at%20any%20one%20time.

Regeneration demonstrably works, and we know how to do it. The biggest challenges are educational and social: building a movement and driving engagement and implementation.

The following parallel global actions, enacted worldwide immediately, are required:

CHANGE THE NARRATIVE ON CLIMATE CHANGE

By emphasizing the biotic control of climate, our narrative empowers humans and nature. It complements the mainstream narrative on greenhouse gasses, adding the power of biology, plants, and the combination of evapotranspiration and photosynthesis. Widely adopted and implemented, our story will make it possible to cool the planet, stabilize the climate, and support lives of purpose, respect, and abundance. And because local benefits follow within months, our story inspires and will improve lives immediately.

USE MODERN TOOLS TO INTEGRATE, UNIFY AND EXPAND THE EXISTING MOVEMENT FOR ECOSYSTEM RESTORATION

Millions of regenerative projects by hundreds of millions of indigenous and non-indigenous peoples are already underway around the world, improving practitioners' lives and slowing planetary deterioration. Because the methodologies adopted are diverse, localized, and go by a variety of names, it is easy to overlook the synergies among these people, projects, and methodologies.

Digital tools can build cross-boundary communication and collaboration. Visualizations, videos, demonstrations, and emerging Artificial Intelligence technologies can help integrate, unify, and promote adoption in an expanding the field.

We look forward to the emergence of an accessible, inclusive, inter-operable, digital collaboration platform with tools for knowledge sharing, impact measurement, and empowerment of local and Indigenous communities worldwide.

FINANCE THE REGENERATION OF THE BIOSPHERE

We must create tools for investing in regeneration. We must finance half a billion rural families in the Global South to regenerate their lands and transition to sustainable agroforestry, while restoring small water cycles, protecting biodiversity and local ecosystems.

Indigenous peoples must have ownership of their lands as stewards and guardians, able to protect and restore the local ecosystems. Their successful, sustainable management of

these areas must be financially rewarded based on global standards of sustainability and biodiversity. Their exemplary stewardship can be specified and described, and taught globally. Indigenous peoples have dignity and responsibility to the future that has been forgotten in the present oppositionality to regulation and self-regulation. Historical, extractive, colonial behaviors have badly damaged life on Earth. People and organizations must self-regulate and respect all life, while protecting the future from harm.

We urge the immediate adoption and implementation of the UN Global Biodiversity Framework, particularly at the level of local communities and individuals:

- global plans designed to protect healthy ecosystems, and to rebuild destroyed ecosystems as these actions will stabilize the climate;

- long term investment strategies to support the benefits that accrue from regeneration of biodiverse, climate-enhancing landscapes, delivering food and water security, global social stability by creating abundance throughout the world, and interrupting climate migrations;

- coherent incentives, quality-of-life metrics, and monetary and international policies designed to maximize long-term global well-being and sustainability.

REGENERATE AT LEAST ONE BILLION HECTARES OF DEGRADED LAND BY 2030 TO AVOID CLIMATE DISASTER

Restoration of strategically important locations must be prioritized. Life-friendly microclimates and water cycles return wherever ecosystem restoration occurs.

Many non-binding pledges like the UN Global Biodiversity Framework (GBF) are now in place[39] but we need to see the direct relationship between climate change and the degradation of ecosystems and act accordingly to build restoration and regeneration.

Change must happen from the top down, and from the bottom up. It must happen on a global scale. Enthusiastic mass actions must demand and effectuate urgently needed changes. We each must contribute to the change we want to see in the world.

39

https://www.un.org/sustainabledevelopment/blog/2022/12/press-release-nations-adopt-four-goals-23-targets-for-2030-in-landmark-un-biodiversity-agreement/ COP15 Global Biodiversity Framework 30x30 plan, and by the just-signed UN agreement on protecting marine biodiversity in international waters.

SPECIALIZED GUIDES FOR PLANETARY REGENERATION

We are writing a series of succinct specialized "guidebooks" to speed adoption and mobilization of ecosystem restoration and regenerative land use practices. The scope of this document is not to describe all the biomes in detail, there are far better sources for that.[40] The specific topics are designed for various locations and scales. In addition to providing guidance to policymakers, we aim to help people everywhere to act independently.

As global systems fail, more and more people will realize that their lives, and those of their loved ones and descendants, are at risk. Engagement in ecosystem restoration will bring meaning, healing change, and improved quality of life to all.

A very useful detailed guide for ecosystem restoration can be found in this spreadsheet by Regen Network Regen Network Taxonomy copy made for Blueprint

Guidebooks (in progress):

BLUEPRINT WRITING GUIDELINES + CHAPTER STRUCTURE:

Chapter 1: Reviving the Soils and Covering Bare Land

Chapter 1: Reviving the Soils and Covering Bare Land.docx

Proposed authors: Philip Bogdonoff, Ed Huling, John Roulac, Jim Laurie, Walter Jehne, Michael Pilarski, **Ousmane Pane**

Chapter 2: Regenerating the great forests and grasslands

Chapter 2: Regenerating the great forests and grasslands.docx

Proposed authors: Rob de Laet, Peter Bunyard, Rodger Savory, Anastassia Makarieva, Jim Laurie, **Alan Savory, David Ellison**

Chapter 3: Rehydrating the Lands by Restoring the Water Cycles

CHAPTER 3: REHYDRATE THE LANDS BY RESTORING THE WATER CYC…
Chapter 3: Rehydrate the Lands by Restoring the Water Cycles.docx

[40] Habitats Classification Scheme (Version 3.1)

Proposed authors: Zuzka Mulkerin, Michal Kravčík, Jan Pokorny, Judy Schwartz, Alpha Lo, Anastassia Makarieva, Peter Bunyard, Jon Schull, Erica Geis, **Duane Norris**

Chapter 4: The Global Atmospheric Hydrology and the Earth's Energy Balance

Chapter 4: The Global Atmospheric Hydrology and the Earth's Energy Balance.docx

Proposed authors: Sue Butler, Rob de Laet (coordinator), Jennifer Francis, Peter Bunyard, Anastassia Makarieva, Jan Pokorny

Chapter 5: Restoration along the Watersheds

Chapter 5: Restoration along the Watersheds.docx

Proposed authors: Ananda Fitzsimmons, Elizabeth Herald, Alpha Lo, Zuzka Mulkeri, Erica Geis,

Chapter 6: Restoring the Oceans,

Chapter 6: Restoring the Oceans.docx

Proposed authors: Jon Schull, Russ George. Howard Dryden, Colin Grant, Bru Pearce, Rob de Laet, Brian von Herzen, **Anamaria Frankic**

Chapter 7: Restoring the Coastal Ecosystems above and below the waterline.

Chapter 7: Restoring the Coastal Ecosystems above and below the waterline.docx

Proposed authors: Anamarija Frankic, Tom Goreau, Jim Laurie, **Brian von Herzen**

Chapter 8: Substantially Sequestering Atmospheric Carbon

Chapter 8: Substantially Sequestering Atmospheric Carbon.docx

Proposed authors: Stefan Schwarzer, **Brian Herzen, Russ George**

Chapter 9: Take Ample Measures to Slow or Reverse Sea Level Rise

Chapter 9: Take Ample Measures to Slow Sea Level Rise.docx

Proposed authors: Rob de Laet, Bru Pearce, **Michal Kravcik, Jim Laurie, Walter Jehne,**

Chapter 10: Take Ample Measures to Redesign Cities and Economic Infrastructure

Chapter 10: Take Ample Measures to Redesign Cities and Economic Infrastructure.…

Proposed authors: Joan Tiffany, Gabe Cira, Erica Geis, Michal Kravcik, Maya Dutta, **Christopher Haines,** Philip Bogdonoff, **Marco Schmidt**

[see https://www.google.com/search?q=ecorestoration+in+cities]

Chapter 11: Reforming Global Food Production

Chapter 11: Reforming Global Food Production.docx

Proposed authors: Philip Bogdonoff, Peter Bruce-Iri, Alpha Lo, **Michael Pilarski, Ousmane Pame, Gabe Brown, Joel Salatin, Russ George, Daniel Nirenberg,**

Possible Appendix: Nature-based Solutions in Progress

List of Nature-based Solutions in progress

Proposed Author: Alpha Lo