
THE PACIFIC FRONTIER OF TRANSNATIONAL LEGACY INVESTMENTS

MOBILIZING THE ECONOMIC, DIPLOMATIC, AND SPIRITUAL POTENTIAL OF THE SCIENCE AND WONDER OF EVOLUTION, TO THE BENEFIT OF GLOBAL SUSTAINABILITY¹

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1. INTRODUCTION

The economically uncharted yet uniquely unifying territory of the earth's evolutionary and ecological fabric and the priceless knowledge resource woven into this fabric have been the central foci of my professional journey spanning some 40 years. This journey of discovery and reflection and of a transnational dimension has led me to conclude that it is the valuation of

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the natural world through the lens of evolution that entails an immense yet dormant conservation-centered economic energy, ever more momentous as an inexhaustible source of competitive strength in the context of the emerging global knowledge economy and untapped as a business incentive for making world travel a catalyst of Earth-spanning legacies.

Several original, internationally vetted premises now solidify this conclusion. I have posited that blocks of countries that share treasure troves of biodiversity and other natural heritage riches woven together by Earth's evolutionary history and representing the world's premier repositories of the natural knowledge capital could shape the knowledge economy as profoundly as oil-rich countries have influenced the traditional economy (Ayala, 2017).

It is on scales that transcend national jurisdictions where these natural reserves of the knowledge capital are most valuable and opulent, denoting a true perception of future possibilities. It is on those politically blind scales where nature's knowledge-rich evolutionary pathways await to be awakened in their capacity to redefine the world's economic geography, become catalysts of novel international collaborations, spark artistic creativity of a transnational horizon, and act as economic arteries of peace (Ayala, 2024a).

I assert that the transnational scale serves as the "New World" of this century, still largely undiscovered and unexplored. This scale does not interfere with nations' sovereignty and with their Exclusive Economic Zones (EEZs) that grant coastal states sovereign rights for exploration, exploitation, and management of natural resources within 200 nautical miles from their coastlines and that are acquiring unprecedented significance in the face of the growing demand for the mining of subsea minerals and metals, rare earths in particular. This scale holds an immense potential to serve as an antidote to global geopolitical rivalries (Ayala, 2025a).

The transnational scale also frames my assertion that it is the realm of the natural world—and its global connectivity—that holds the key to invigorating and further emboldening UNESCO's original World Heritage vision of uniting nations and promoting global conservation and peace.

It is within the universal dimension of the natural world where the current 'lists' of these icons of humankind's heritage fall short of proactively charting the globe-crisscrossing bonds among them and of pooling their statures and inspirations into catalysts of novel solutions to optimizing human society's interface with the environment, to making globalization conducive to the appreciation of knowledge as public good in both economic and moral sense, and to other priorities in

ensuring that our pathway into the future is sustainable and meets socially desirable ends. And it is the dormant economic energy of this global connectivity that makes this perspective tangible and momentous (Ayala, 2025b).

As I will explain in the segments that follow, Panama has played a crucial role in the formative stages of this most rewarding professional journey. I deem Mexico uniquely positioned to showcase the magnitude of the now rigorously tested opportunity yielded by this journey. And I bring in two Czech cultural treasures of universal value that emblemize UNESCO's World Heritage and UNESCO's Memory of the World programs, respectively, and that uniquely and proactively transcend the cultural and natural realms in offering powerful lessons towards the pursuit of global sustainability.

2. THE POTENT CARDS HELD BY MEXICO

2.1. The inclusion of the Revillagigedo Archipelago in the Eastern Tropical Pacific Marine Corridor

Let's enter the Eastern Tropical Pacific: a marine biogeographic region endowed with great biological and ecological connectivity and exceptional biodiversity along the convergence of major marine currents.

The governments of four countries—Colombia, Costa Rica, Ecuador, and Panama—have collectively charted the Eastern Tropical Pacific Marine Corridor (CMAR). This transborder marine protected area across the sovereign waters of these four countries features four World Heritage properties: Cocos Island National Park (off the Pacific Coast of Costa Rica); Coiba National Park and its Special Zone of Marine Protection (in the Gulf of Chiriquí in Panama's Pacific); Malpelo Fauna and Flora Sanctuary (off the coast of Colombia); and the Galápagos Islands (some 620 miles from the South American continent, under the jurisdiction of Ecuador). It is now reinforced with the Connect to Protect Eastern Tropical Pacific Coalition of philanthropic, government, and non-governmental organizations and their pledges of technical and financial assistance that will accelerate progress towards strengthening CMAR by creating what will be the world's largest transboundary marine biosphere reserve (UNESCO, 2023). Moreover, CMAR involves a research partner of world renown: the Panama-headquartered Smithsonian Tropical Research Institute (STRI)—the very institution that, almost 30 years ago, was my key ally in the Action Plan that I developed for Panama.

This borderless sanctuary is unmatched anywhere in the world in the enormity of the scale at which vanguard, long-term geared scientific research is advancing the frontiers of knowledge about crucial migratory pathways, cradles of endemism, and many other vital insights into the natural world while systematically channeling this knowledge into a proactive protection of an extraordinary oceanic landscape. While public access to Eastern Tropical Pacific research data is available through several portals, a huge gap exists between the appreciation of these data within academia and the potentially incalculable worth of “processing” these data into revelations of wonder that would acquire economic worth that stimulates investments—not donations—in basic science and that would fuel human creativity outside science.

Mexico’s commitment to strengthen CMAR via the inclusion, in 2022, of the Revillagigedo Archipelago—declared a serial World Heritage site in 2016 and dubbed the “Galápagos of Mexico”—has not received the international attention it merits. The Revillagigedo Archipelago (often symbolized by Socorro Island) superbly complements the other four World Heritage icons of CMAR as pillars of a giant evolutionary theater. A research team from the National Autonomous University of Mexico (UNAM) established its potential to serve as a model system to address fundamental issues regarding biotic assembly on islands (García-Navarrete *et al.*, 2023). The four volcanic islands that form the Revillagigedo Archipelago, together with their surrounding marine habitat, emblemize the convergence of two very different and large marine biogeographic regions: the Northeastern Pacific with the highly productive temperate waters of the California Current moving southward, and the Eastern Tropical Pacific. Their location at the intersection of the California Current with warm waters of the Northern Equatorial Current that transports tropical waters from west to east places the Archipelago in a complex transition zone that has engendered a unique set of biological and ecological processes and that offers insights into fundamental evolutionary patterns and processes (Aguirre-Muñoz *et al.*, 2015; IUCN, 2026).

The inclusion of the Revillagigedo Archipelago in CMAR merits to be appreciated as the springboard for the valuation of this giant evolutionary theater from new angles that will shape business, philanthropic, and political leadership along transnational bridges of knowledge.

2.2. *The union of Science and Humanities in the distinguished academic and political career of Dr. Rosaura Ruiz Gutiérrez and in the mission of the Secretariat she heads in the Government of Mexico*

Dr. Ruiz has pioneered, in Mexico and internationally, the studies of evolutionary theories from the scientific, historical, and philosophical perspectives. The alignment of her distinguished career with the transformative opportunity detailed in this article has been emboldened by a unique impetus: her recognition with the 2025 Hana and Francisco José Ayala Medal, awarded by the prestigious Comillas Pontifical University in Madrid on October 3, 2025, in the presence of Quirino Ordaz Coppel, Ambassador of Mexico to Spain; León de la Torre Kreis, director of the Casa de América that hosted a "prelude" to the Medal on October 2; and of other special invitees (Ayala, 2025c; Ruiz Gutiérrez, 2025). I am deeply grateful to Comillas Pontifical University for honoring my late husband Francisco José and me by associating our names with its Center (*Cátedra*) of Science, Technology, and Religion and with the Medal that recognizes "*extraordinary accomplishments in bridging disciplines and nations to bolster the intellectual, spiritual, and humanitarian contribution of science in the spirit of the work of Francisco José Ayala.*" The caliber of this recognition is underscored by the three inaugural 2024 Ayala Medals that were bestowed upon two prominent Spanish scholars, the anthropologist and philosopher Camilo José Cela Conde and the philosopher Diego Bermejo Pérez, and that honored for his illustrious accomplishments Dr. Robert Hauser, then Chief Executive Officer of the preeminent American Philosophical Society founded by Benjamin Franklin in 1743. This institution counts more than 100 Nobel laureates among its members and excels as an unparalleled venue to bring sciences, arts, and humanities in service to humanity.

In adherence to its definition, the Ayala Medal is in a unique position to combine the prestige it bestows with the mandate to inspire new bridges to the future. It is from this perspective that I will now detail the foreseen transnational valuation of the economic, diplomatic, and spiritual potential inherent in the scientific and wonder aspects of evolution, starting from its broadest context.

3. THE GLOBAL CONTEXT: THE ASCEND AND LATENT POTENTIAL OF THE KNOWLEDGE ECONOMY

The onset of the 21st century is marked by a rapid transition of the global economy toward a *knowledge economy* that places a core emphasis on the use of information resources—technologies, skills, and processes, such as cloud computing.

But is there a raw material, a *mineral* that can fuel this new economy, just as oil powered the industrial economy?

There is. I have argued that a vast reserve of this raw material is embedded in landscapes and seascapes teeming with rainforests, coral reefs, and other spectacularly biodiverse habitats and harboring geologic history rich in fossil records. These extraordinary natural environments are vast treasuries of potential scientific knowledge, the *knowledge mineral*, the raw material for the knowledge economy.

A comparison between the geography of the knowledge mineral and the geography of oil reveals a striking difference. Whether we look at the global, regional, or national distribution of oil reserves, the overall amount of oil is no more than the sum of these reserves. Connecting two or more reserves does not increase the volume and quality of the oil contained in these reserves.

In contrast, the knowledge-mineral resource can be fully assessed, harnessed, and valued only in the context of evolutionary, ecological, and other relationships that are blind to political borders and that complement and enhance the knowledge content and worth of the individual natural heritage assets they conjoin. These relationships sculpt the global repository of the knowledge mineral as an infinite, multilayered network of *knowledge veins* without borders. Moreover, this multilayered natural knowledge capital increases in volume and value the more it is explored, extracted, and used while simultaneously acquiring an additional value as an infinite web of wonder.

3.1. A precedent

The invitation of the Panamanian Government of then President Ernesto Pérez Balladares presented me with an extraordinary opportunity to validate this new economic paradigm at a national scale. I am proud to mention the result of this effort that set an international precedent: the *Tourism-Conser-*

vation-Research (TCR) Action Plan for national development and international prestige of the Republic of Panama that I developed between 1998 and 2000 (Ayala, 1999; Ayala, 2000a).

Panama is a geological wonderland packed with marine fossils that chronicle the bonding of a vast archipelago into the present-day isthmus that divides oceans and unites continents and along which countless plant and animal species have migrated and intermingled between the Americas, endowing it with breathtaking botanical and faunal diversity.

I viewed the location, in Panama, of the renowned Smithsonian Tropical Research Institute (STRI) as another unmatched asset, also entirely omitted in Panama's economic-development plans. I invited the involvement of STRI's executives and experts in the design of this national project's key outcome: a pioneer network of 23 heritage routes based on themes that span Panama on various spatial scales, interpret and integrate scientific discoveries from new angles and across disciplines, and simultaneously strengthen the economic, conservation, and research values of the heritage riches they interlink.

For example, *The Route of the Three Oceans* exalts the discovery that, on the Pacific side, Panama adjoins two distinctive oceanographic zones. These two zones, in terms of their ecology, represent two different *oceans* and, thus, paired with the Atlantic, endow the country with three oceans. Comparative genetic studies that would be carried out simultaneously in the three oceans of Panama would be of extraordinary significance for deciphering species evolution and adaptation. Apart from its obvious scientific and conservation importance, the three-oceans theme offered an effective tool for positioning Panama as a distinctive world travel destination.

The novel ideas and interpretive potential of this heritage theme matrix attracted the involvement of some 15 hotels and hotel projects in Panama that jointly contributed close to five million dollars to science, education, and conservation (Ayala, 2000b).

It was an honor to win the interest of the world-renown architect Frank O. Gehry and to enrich the heritage route matrix and the Action Plan's entire achievement with a state-of-the-art trilogy of Gehry-designed models of interpretive facilities that bridged Panama's Caribbean and Pacific heritage contexts and which I envisioned acting collectively as engines of nationwide conservation and poverty-mitigation initiatives.

The coverage by *Science* (Ayers, 1999), *Scientific American* (Nemecek, 1999), *Hotels* (Miller, 1999), *Civilization*—the magazine of the Library of Congress

(Hogrefe, 1999/2000), and other prestigious media cemented the originality and caliber of the TCR Action Plan pioneered fusion of science and wonder into a sustainable development blueprint for a nation.

The Plan was formalized by the Presidential Decree of November 30, 1998. Its legacy remains alive: more than two decades later, my invited meeting with then President Laurentino Cortizo (Redacción Excelencias News Panamá, 2020) resulted in the re-adoption of my TCR strategy by his government via a new Presidential Decree of September 28, 2020.

4. PANGEA WORLD

However, my achievement in Panama also convinced me that using a scale defined by a nation's borders only scratches the surface of this opportunity.

I founded Pangea World with the mission to harness the wonder of Earth's evolutionary and ecological fabric to rewrite the geography, diplomacy, and conservation potential of the knowledge economy and set new standards of sustainability at world scale. An international event I organized in the West coast center of the U.S. National Academies of Sciences, Engineering, and Medicine in February 2014 (UC Irvine, 2014) merits to be highlighted among the formal presentations and discussions I have held to vet the aspiration behind this mission and to launch its pursuit. Within that process I also revisited Panama, disclosing that nation's tremendous potential—embedded in its quality as an unparalleled crossroads of the natural world's connectivity—to champion canals of "transnational-knowledge neutrality" in a most symbolic synergy with the neutrality paradigm of the Panama Canal (Ayala, 2021).

I have been keenly aware that the viability of Pangea World's mission is conditioned on its capacity to prove that it does not represent an idealistic platform detached from the funding and logistical challenges of basic science. Therefore, I have dedicated almost two decades of my scholarly writing and research work in different parts of the world to conceptualizing and refining a business model in which quality, competitiveness, and prestige grow along with the geographical footprint of the underwritten research.

Writing in the *Proceedings of the National Academy of Sciences of the United States of America*, Avise (2008) endorsed this model's capacity to yield "a global archipelago of interconnected 'wonder sites' where the

scientific study and preservation of nature are the explicit and formal motivation for linking sustainable economics with science" (p. 11567).

I have named this model Transnational Resort. The model has been shaped by my disclosure that, across the world, the existing valuation of resort sites as prime real estate wastes the potential of these places to serve as windows into science-revealed, wonder-packed connections among variously distant ecosystems, geological formations, and other pillars of the earth's architecture. I have realized that unleashing this potential could be immensely powerful. Panoramic views explored as interpretive channels and complemented with ever-changing exhibits that could effectively incorporate an even broader perspective offered by satellite images would mediate an experience—live—profoundly different from experiences gained in a "capsule" of a natural history museum in New York, London, or other contextually anonymous place. The provision of such deeply authentic, uniquely exclusive, and vastly expansive insights into the borderless wonder of the natural world would leave intact the scientific value and intellectual property of the discoveries, thus offering a financial mechanism that systematically encourages the open-ended, geographically unrestrained scientific exploration.

This is the essence of the business strategy that is at the heart of the Transnational Resort model. This model is not intended to deliver another breed or chain of hotels. Rather, I have crafted it for maximum capacity to excel as "transformative investment in the global knowledge economy" and "gateway to borderless legacies for the environment and humanity." While the Transnational Resort model incorporates a hospitality component, it is geared to welcoming and empowering guests keen to make a difference in the world. The business soundness and social benefit that this model offers in terms of unique opportunities for "legacy investments" of formidable magnitude and high profile have already been vetted in peer reviewed economic journals including the *Journal of the Knowledge Economy* (Ayala, 2020) and *Frontiers in Environmental Economics* (Ayala, 2024b). Moreover, as established in these publications, the transnational resorts are master planned to lay out the welcome mat for painters, composers, and other artists, thus serving as nurturing grounds for artistic creativity that extols and celebrates the borderless complexity of this planet's vital support systems and for excelling as wombs of science diplomacy.

It is in their carefully orchestrated confluence that the business model of Transnational Resort, and the economic model that appraises the earth's

evolutionary and ecological fabric for its mega reserves of the *knowledge mineral*, reveal their full potential.

4.1. *Examples of the international credentials of the “symphony” of the economic and business models of Pangea World*

I was honored to receive, and accept, an invitation from the United Nations, from then Assistant Secretary General Sylvia Fuhrman, to hold an event in New York in September 2010, scheduled to coincide with the 65th Session of the U.N. General Assembly and inviting me to present my professional journey to the attending heads of state and other dignitaries.^{3 4}

According to a U.N. press release of September 17, 2010 (United Nations Department of Public Information, 2010), the new economic model of Pangea World “*represents an unprecedented opportunity to fortify a knowledge bank with incalculable value to strengthen and sustain the emerging global knowledge economy, one that could elevate the conservation of the planet’s most exquisite and vulnerable places into an economic imperative.*”

Addressing that U.N. event as then Foreign Secretary of the U.S. National Academy of Sciences, Dr. Michael Clegg stated: “*The genius of the Pangea concept is that it presents an approach to sustainability that is firmly grounded in a business model that will provide an enduring source of revenue.*”

The mutually reinforcing fluidity of the two models’ interlay, which is the very essence of the professional mission I have named Pangea World, has been enriched with an association of great symbolism: the association with Villa Tugendhat, Mies van der Rohe’s architectural masterpiece located in the Czech city of Brno and declared World Heritage in 2001, as a revolutionary articulation of innovative spatial and aesthetic concepts into space without limits that fundamentally changed the relationship that people had to their spatial surroundings, and even infinite space (ICOMOS, 2001).

A signing act held at Villa Tugendhat on June 15, 2017, formalized a highly symbolic bond between Pangea World’s mission to harness the *free-flowing*

³ <https://www.pangeaworld.com/journey/pangea-world-at-united-nations-international-school/>

⁴ Letter of invitation from Mrs. Fuhrman, U.N. Assistant Secretary General, to Hana Ayala, dated June 18, 2010. <https://www.pangeaworld.com/wp-content/uploads/2022/04/UN-Invitation-to-H.-Ayala.pdf>

natural reservoirs of knowledge to benefit humanity and the spirit of the Villa, where Mies' celebrated architecture and design revolutionized the human relationship with the environment via masterful execution of *free-flowing* space. In the words of Dr. Federico Mayor Zaragoza that were read at that conference:

It is deeply meaningful to me, as UNESCO's former Director General, that Villa Tugendhat, an icon of UNESCO's World Heritage mission, will become an icon of Pangea World's global mission that values knowledge as the economic safeguard of the earth's heritage (Ayala, 2025d).⁵

It is its special focus on the vast island-dotted Pacific as an exceptional reservoir of the borderless raw material of knowledge that makes this honorific alliance central to the initiative that I will hereinafter refer to as the Project.

5. THE PROJECT: EXPANDING THE MEANING AND PROMISE OF THE PACIFIC CENTURY

My guidance of the Project would unfold in close consultation and coordination with Dr. Rosaura Ruiz and her Secretariat of Science, Humanities, Technology, and Innovation of the Government of Mexico, and with the UNESCO Office in Mexico. I deem most relevant and valuable the involvement of the Embassy of the Czech Republic in Mexico. I also envision the Project-centered interaction that could be formalized with the National Secretary of Panama's National Secretariat of Science, Technology, and Innovation (SENACYT), given the pivotal role that Panama and SENACYT have played in the evolution of my Pangea World mission. Moreover, I intend to mediate a strategic alliance with the Panama-headquartered Smithsonian Tropical Research Institute (STRI) at an appropriate stage of the Project's development.

The Project's identity as a bridge across the transnational New World entails a special link with Spain. The address that I delivered in the Casa de América in Madrid on October 2, 2025, on the subject of the Ayala Medal's international relevance, concluded with the following words:

⁵ <https://www.pangeaworld.com/journey/new-world-symphony-for-the-21st-century/>

May this Medal engender a profound symbolic opportunity for Spain—a country credited with the most transcendental amplification of geographical limits in the history of humanity—to expand our planet’s horizons again by exploring and navigating policies that value the locally-elusive riches of the transnational New World as the ultimate public good (Ayala, 2025a).

The Comillas Pontifical University, which excels in nurturing science and promoting exchange of scientific knowledge while striving to encompass the full reality of humankind and the world we live in endows this symbolic opportunity with an execution path that the Project will highlight. Another priority task will be the strengthening of the existing relationship with the Embassy of the Czech Republic in Madrid, with the goal of consolidating the perspective of universal significance that the Project will draw from the Czech cultural legacies of universal value and importance.

The Project’s proposal encompasses two phases, to be initiated consecutively but with built-in mutually reinforcing links and affinities starting from the very onset of the Project.

5.1. Phase 1: Coalescing and valuing scientific discoveries within dynamic “spheres of wonder” that transcend science

I have deemed it desirable to replace the term “heritage routes” with “spheres of wonder,” to eliminate any assumption that these are trails to be traveled. The term uses the word “spheres” figuratively, not in the literal geometric sense, and with emphasis on their dynamic quality: they can grow, influence each other, and interconnect.

This dynamic approach echoes—and takes to a transnational level—a key consideration that navigated the design of the heritage matrix of the TCR Action Plan for Panama: the consideration to bestow multiple layers of appreciation on the profiled heritage riches, as illustrated by the multilayered valuation of the natural wealth of the Darién, the easternmost province of Panama that harbors the Darién National Park, a UNESCO World Heritage Site. The Darién contributes some of the oldest testimonies to the *Saga of the Isthmus*, a “chronological route” that journeys back in time as it integrates the most important geological and paleontological records across Panama into a thrilling, rigorously researched account of the making of the Central American isthmus and its completion with the rise of the Isthmus

of Panama. At the same time, the Darién is a prominent component of the *Route of the Sanctuaries of Life* that encompasses and illuminates five major cradles of endemic life across Panama, thus endowing this collective pool of irreplaceable heritage with much greater power than any of its component parts could command to fuel national pride and to draw the international attention it deserves.

With a special emphasis on the inclusion of the Revillagigedo Archipelago in the World Heritage portfolio of CMAR, the design of the *spheres of wonder* will derive from the interrelation and interpretation of various locations where research has already begun lifting the curtain on the bounty of knowledge and wonder that pervades the Eastern Tropical Pacific and its interface with Northeastern Pacific and that collectively stage an extraordinary spectrum of testimonies to evolution in action in contexts as different as are the Galápagos Islands and Revillagigedo (that surfaced above sea level millions of years ago) and Panama's Coiba Island (that separated from the mainland by rising sea levels only some 12,000 years ago).

What a giant opportunity awaits to be awakened and seized by processing the evolutionary and ecological trajectories revealed by science within the transnational World Heritage theater into *spheres of wonder* that are scientifically accurate, intellectually audacious, awe inspiring, and bold new research ambitions igniting!

Mexico holds a formidable intellectual power in UNAM. I see in this institution a potential long-term ally whose expertise could facilitate the conceptualization of a pilot set of *spheres of wonder*. The participation of the UNESCO Office in Mexico would superbly complement UNAM's. I will be personally involved, in consultations with Pangea's Distinguished Science Adviser Dr. John Avise.

Avise's pioneer work in phylogeography ignited one of the major scientific revolutions in the late 20th century. He is a skillful interpreter and narrator of world class science, as underscored by *Evolutionary Pathways in Nature*, a book he conceived as a "*biological expedition into the remarkable world of nature, as viewed through the evolutionary prism of molecular phylogeny*" that permits "*a deeper appreciation of the many intellectual and aesthetic treasures of the biological world*" (Avise, 2006). Avise's comparison of "*the best-orchestrated of scientific treatises*" to "*symphonic masterpieces, with a wide sphere of influence*" (Avise, 2001) provides another testimony to the lyricism of his portrayals of science for the non-academic world.

The Project will give utmost attention to shaping transformative insights into the wonder of evolution. Insights that are transformative in their potential to foster the appreciation of evolutionary perspectives outside the sciences, by showcasing how scientific understanding of natural processes may enrich esthetic and moral perceptions and illuminate the significance of life while affirming that these matters are and ought to remain outside science's scope.

Great inspiration will be drawn from the novel bridges between science, religion, and art that anchor the monumental legacy of Francisco José Ayala (National Science and Technology Medals Foundation, 2001; Templeton Prize, 2010). It was Ayala's life-long effort to eliminate contradictions between *science* and *religion* on the premise that they concern different matters, that they are like two windows looking at the same world but showing different aspects of that world; yet each is essential to human understanding (Ayala, 2007, 2014). The movement of planets, the composition of matter and the atmosphere, and the origin and adaptations of organisms are among the foci of science; the meaning and purpose of the world and of human life are components of the view afforded through the window of religion. Of utmost relevance to the Project is Ayala's finding that it is in the context of the human interface with natural wonders where the horizons seen through these two windows uniquely converge. "*Science may inspire religious beliefs and religious behavior, as we respond with awe to the immensity of the universe, the glorious diversity and wondrous adaptations of organisms [...] Religion often is, for scientists and others, a motivating force and source of inspiration for investigating the marvelous world and solving the puzzles with which it confronts us*" (Ayala, 2016).

I posit that the grand stage of *spheres of wonder* could become highly influential in challenging and neutralizing faith-motivated objections to teaching and research in evolution that are undermining the power of science to drive human welfare and human progress in many parts of the world. It will deliver an ever more engaging platform on which to demonstrate that embracing science need not lessen or compromise faith and, in the other direction, that awe-inspiring scientific content can positively influence a person's receptivity to religious belief, thus nurturing the Project's capacity to make a formidable, globally impactful contribution.

Engaging wonder to bridge science and art is another dimension of the Project that will draw inspiration from the visionary approaches championed

by Francisco Ayala. The novel form in which Ayala applied his exploration and appreciation of artistic creativity to evolution underscores his talent as “master interpreter” of evolution. Pablo Picasso’ legendary *Guernica*, praised as the most powerful anti-war painting in history, the painting *Juan de Pareja* by another great Spanish master Diego Velázquez, and the *Dagger of Aurangzeb*, a weapon shaped by an unknown Muslim craftsman into a treasure of Indian decorative arts, are among the art masterpieces that Francisco Ayala used in his comparative celebration of human creativity and the creativity of evolution that, although lacking intentionality and foresight, generates novelties (Ayala, 1970, 1994, 2004).

It is conceivable that a random combination of pigments or stones could result in an ordered whole such as a work of art or a building, But the probability that [...] the entire cathedral of Santiago resulted from a random association of marble, bricks, and other materials is very small. In the same way, the combination of genetic units that carries the hereditary information responsible for the formation of the vertebrate eye could have never been produced by a random process like mutation, not even if we allow for the three billion years plus during which life has existed on the earth. The complicated anatomy of the eye like the exact functioning of the kidney are the result of a nonrandom process—natural selection (Ayala, 2015).

The Project will use the science-mediated insights into evolutionary creativity that has so prominently molded the wonder of the Pacific’s and the earth’s natural heritage to inspire new works of art of transnational dimension, be it paintings, musical compositions, or other artistic progenies of human creativity. The potential benefits to science and to humanity are incalculable, as evidenced by a powerful precedent: the bond that intertwines the timeless legacies of the great German explorer, scientist, and humanist Alexander von Humboldt and the renowned American landscape painter Frederic Edwin Church. South America—the Andes, in particular—shaped in a fundamental way Humboldt’s visionary scientific concept of a climate-based delineation of life zones across the globe. But it was not until their masterful interpretation by Church’s artwork that mankind fully recognized the grandeur of Humboldt’s research-based revelations of the natural world’s connections and unity (Winthrop, 1859).

Valued and interpreted in their wonder content within the *spheres of wonder*, the themed transnational clusters of scientific discoveries along the Pacific’s borderless paths of evolution will offer a vast new frontier for the confluence and harmony of science-based and faith-based appreciation and

guardianship of nature. They will also represent an infinite reservoir of inspiration for artistic creativity that would extoll and celebrate the borderless complexities of earth's life-support systems.

This will carry powerful implications, far beyond the Pacific, that I will highlight with reference to a bold document of the United Nations titled *Transforming our World: The 2030 Agenda for Sustainable Development* (United Nations, 2015). Of utmost relevance is the growing call to integrate three vital yet missing dimensions into *The 2030 Agenda*: (1) the crucial value of evolutionary processes and the consequences of their impairment (De Meester *et al.*, 2024); (2) the great potential of the dialogue between science and religion (Tatay, 2022); and (3) the great promise of the art-science collaborations to tackle global environmental challenges (Paterson *et al.*, 2020).

By addressing this call from an original and transnational perspective, the Project seeks to chart the course in a highly inspirational fashion that integrates and mutually reinforces all three dimensions.

5.2. Phase 2: Opening a new frontier for "legacy investments" that redefine the sophistication and purpose of world travel

It is within this Phase 2 that the full meaning, and solutions, will be provided for the statement that I articulate earlier in this document, in the section 2.1.: "While public access to Eastern Tropical Pacific research data is available through several portals, a huge gap exists between the appreciation of these data within academia and the potentially incalculable worth of 'processing' these data into revelations of wonder that would acquire economic worth that stimulates investments—not donations—in basic science and that would fuel human creativity outside science."

The analysis of CMAR's latent potential that I offer in *Frontiers in Environmental Economics* (Ayala, 2025b) discloses and addresses another current omission of formidable dimensions. Each one of that marine region's World Heritage sites is a crown jewel of its home country's tourism promotion. However, it is at the level of the extraordinary natural connectivity and dynamics of the region's singular heritage cache where an entirely new measure of excellence and spectrum of benefit related to world travel could be attained. This level represents a unique nurturing environment for a proactive network of transnational resorts, master planned to serve as an exceptional portal that would permit to interpret and appreciate "contextually" the marvels disclosed along the region's evolutionary and ecological trajec-

tories and, thus, offer a privileged anchorage for *business investments* in vanguard science with mighty legacy rewards.

The collaboration that extended the Eastern Tropical Pacific Marine Corridor towards the Northeastern Pacific on the wings of the inclusion of the Revillagigedo Archipelago has immensely emboldened the business incentive that the Transnational Resort portfolio would hold to accelerate the region's transformation into a powerhouse of science-mapped natural knowledge capital that promises to enlighten and inspire without depreciating in its value to advance human welfare and human progress—locally, regionally, and globally.

Individually and collectively, the transnational resorts of the envisioned Pacific portfolio will have the unique opportunity to nurture and be nurtured by the *spheres of wonder*, thus serving as cradles of artistic inspiration and creativity that will advocate and share with the world the universal value of discoveries that unmask borders-blind, free-flowing linkages and relationships. The consistently transnational scales of their master plans will prime them for stewardship of unmatched legacies in championing science diplomacy, promoting harmony of science and faith, and instigating transnational bridges of peace.

The Transnational Resort model offers an unparalleled opportunity to enrich with new dimensions the philosophy of a free-flowing space that Mies van der Rohe's iconic Villa Tugendhat transformed into heritage of universal value.

What a powerful alliance waits to be established with the world renown of Mexican architects! I envision the Project's engagement of Mexican architectural talent for what will become the flagship refinement of the Transnational Resort master plan in its architectural and design components. This step ought to be preceded by a careful selection of an optimum site on Mexico's Pacific coast. While the Revillagigedo Archipelago is geographically isolated—about 800 kilometers (500 miles) west of the city of Manzanillo and 400 kilometers (250 miles) south of Cabo San Lucas—it relates to Mexico's Pacific coast through ecological connectivity, which is an important consideration given the core emphasis that the Transnational Resort master plan places on contextual access.

This flagship architectural blueprint will hold a great potential to inspire counterparts across CMAR countries and to further distinguish Mexican architects as masterminds of these counterparts.

The formalized link of my Pangea World mission with the World Heritage spirit of Villa Tugendhat allows me to bring into the Project—and to align with the CMAR quintet of World Heritage natural sites, inclusive of Revillagigedo—the World Heritage cultural site of Villa Tugendhat, and to do so in a most symbolic fashion that promises to invigorate and further embolden UNESCO’s original World Heritage vision of uniting nations and promoting global peace and that will foment the prestige of the investments in the Project.

May a prominent Mexican national become the trailblazing investor.

5.3. Epilogue: A New World Symphony for the 21st century

The 2017 conference and signing act anchored the association of Pangea World with Villa Tugendhat in another highly symbolic context—that of the uniquely meaningful discovery of the New World by the preeminent Czech composer Antonín Dvořák. A sequel—a special event held in California on October 28, 2018, marking the 100th anniversary of the birth of Czechoslovakia, and co-organized by the Pacific Symphony, Consulate General of the Czech Republic in Los Angeles, and Pangea World⁶—further illuminated the poetic theme of *New World Symphony for the 21st century* that bonded both events. This theme harnesses another Czech cultural treasure of universal value, disclosing its unique synergy with the Villa Tugendhat legacy and channeling this synergy into the spiritual imperative of the Pangea World journey and its Transnational Resort instrument, as explained below.

In 1892, Dvořák landed in America, with a noble mission of historic proportion, for it engendered an artistic discovery and transformation of America. As Dvořák stated in an interview for the *New York Herald* published on May 21, 1893, “*I did not come to America to interpret Beethoven or Wagner for the public [...] I came to discover what young Americans had in them and to help them express it*” (quoted in Abbott & Seroff, 2009).

Dvořák’s *Symphony No. 9 From the New World* has become the icon of this discovery. This exceptional piece of classical music is visionary in its celebration of the spirit of Afro-American songs and Native American tones. At the same time, its magical lyricism fuses the awakening of the American voice

⁶ <https://www.pangeaworld.com/journey/bridges-of-awakenings-from-czech-lands-to-america-and-beyond/>

with the joy and inspiration that Dvořák drew from America's nature, thus bridging the Symphony's New World identity with the Czech tradition of integrating landscape into music (Clive, 2016). Dvořák brought into the New World this Old-World tradition in a most respectful and mutually enriching fashion that added a transcontinental layer of appreciation to America's natural assets. This augmented the value to America of Dvořák's discovery of America while immortalizing his *Symphony from the New World* as a gift not only to America but to the entire world (Ayala, 2025a).

The *Symphony from the New World* is a prominent component of the "Archives of Antonín Dvořák," inscribed (in May 2023) in the UNESCO Memory of the World Register that safeguards the most important documentary heritage of humanity. The register is a compendium of "the documented, collective memory of the peoples of the world...[that] charts the evolution of thought, discovery, and achievement of human society...[and] is the legacy of the past to the world community of the present and the future" (Edmondson, 2002).

The "Memory of the World" dimension of Dvořák's Symphony No. 9 is already uniquely aligned with the future. This poem of discovery became one with a 20th century triumph of science and human ingenuity when, in 1969, a recording of the *Symphony from the New World* accompanied U.S. Astronaut Neil Armstrong as he took man's first steps on the moon, expanding the frontiers of the New World beyond our world.

I have conceived Pangea World's transnational mission in the spirit of this symphonic masterpiece and on the premise that it is the earth devoid of national borders that represents, right here on earth, the New World where some of humankind's greatest opportunities await. This premise frames the central principle that will govern the science investments from transnational resorts: while the knowledge derived from natural resources of a particular country ought to be shared with and benefit that country, the knowledge mobilized via comparisons and correlations at a transnational level ought to be treated as an asset of universal value and destined to benefit all of humanity. The artists hosted by transnational resorts will have the singular opportunity to lend their creativity and cultural perspectives to the noble task of further enriching and augmenting the global relevance, exposure, and inspiration of borders-transcending scientific discoveries. Performed on a stage set in a theater of wonder without walls, this science-art duet will also invite and stimulate new depths and rewards of spiritual insights and reflections.

Powered by the Transnational Resort model, Pangea World stands for a mission of economic discovery and economic empowerment of large realms of natural riches welded by relationships of great conservation importance and research worth, harboring a major potential to serve as incubators of dynamic knowledge economies that foster better management and conservation of global natural capital, and receptive to further growth in value through association with cultural legacies of international significance.

The confluence of the inspirations that I have drawn from the “World Heritage” wisdom of Villa Tugendhat and from the “Memory of the World” immortality of the *Symphony from the New World* resonates in a powerful way with the Project’s aspiration—and this resonance will be channeled into the Project’s preeminence.

Crafted under the auspices of Pangea World’s mission, the Project offers to translate Mexico’s move to strengthen the Eastern Tropical Pacific Marine Corridor via the incorporation of the Revillagigedo National Park of the World Heritage stature into a catalyst of something much larger: a truly historic opportunity to facilitate the world’s journey towards a sustainable future. A carefully orchestrated pursuit of the Project’s Phase 1 and Phase 2 will activate an unprecedented investment model in transnational basic science that also embodies radical re-thinking—in terms of hard-nosed economics—of the relationship between evolution, creativity, and the future of humanity.

References

- Abbott, L., & Seroff, D. (2009). *Out of Sight: The Rise of African American Popular Music, 1889-1895*. Jackson, Mississippi: University Press of Mississippi (pp. 273-274).
- Aguirre-Muñoz, A., Méndez-Sánchez, F., Ortiz-Alcaraz, A., Del Mazo-Maza, A., Fueyo-Mac Donald, L., Rhodes-Espinoza, A., Bellot-Rojas, M., Bermúdez-Almada, B., Navarro-Sánchez, M. J., Gallina-Tessaro, M. P., & García-Martínez, S. A. (Eds.). (2015). *Nomination Format for Natural Property “Archipiélago de Revillagigedo” for Inscription on the World Heritage List*, presented to the UNESCO World Heritage Center. Secretaría de Medio Ambiente y Recursos Naturales, Comisión Nacional de Áreas Naturales Protegidas and Grupo de Ecología y Conservación de Islas, A.C. Ensenada, Baja California, México. 145 pp. + 5 Annexes.
- Avise, J. C. (2001). *Captivating Life: A Naturalist in the Age of Genetics*. Washington, D.C.: Smithsonian Institution Press.

- Avise, J. C. (2006). *Evolutionary Pathways in Nature: A Phylogenetic Approach*. New York: Cambridge University Press.
- Avise, J. C. (2008). Three ambitious (and rather unorthodox) assignments for the field of biodiversity genetics. *Proceedings of the National Academy of Sciences of the United States of America*, 105(Suppl. 1), 11564-11570. www.pnas.org/cgi/doi/10.1073/pnas.0801924105
- Ayala, F. J. (1970). Teleological explanations in evolutionary biology. *Philosophy of Science*, 37, 1-15.
- Ayala, F. J. (1994). Darwin's revolution. In J. H. Campbell & J. W. Schopf (Eds.), *Creative Evolution?* (Chapter 1, pp. 1-17). Boston and London: Jones and Bartlett.
- Ayala, F. J. (2004). Design without designer: Darwin's greatest discovery. In W. A. Dembski, & M. Ruse (Eds.), *Debating Design: From Darwin to DNA* (pp. 55-80). New York: Cambridge University Press.
- Ayala, F. J. (2007). *Darwin's Gift to Science and Religion*. Washington, DC: Joseph Henry Press.
- Ayala, F. J. (2014). Evolution and religion. In J. B. Losos et al. (Eds.), *The Princeton Guide to Evolution* (pp. 817-824). Princeton & Oxford: Princeton University Press.
- Ayala, F. J. (2015). *¿De Dónde Vengo? ¿Quién Soy? ¿A Dónde Voy?* Madrid: Alianza Editorial.
- Ayala, F. J. (2016). *Evolution, Explanation, Ethics, and Aesthetics: Towards a Philosophy of Biology*. Amsterdam: Academic Press and Boston: Elsevier (p. 297).
- Ayala, H. (1999). A bridge to the millennium: The ideal and the promise of a heritage-driven economy. In M. S. Ratchford (Ed.), *TCR Strategic Alliance: Tourism-Conservation-Research* (pp. 13-20). Washington, DC: American Association for the Advancement of Science.
- Ayala, H. (2000a). Panama's TCR action plan: Building alliances for a heritage-driven economy. *Cornell Hospitality Quarterly*, 41(1), 108-119. <https://doi.org/10.1177/001088040004100128>
- Ayala, H. (2000b). Surprising partners: Hotel firms and scientists working together to enhance tourism. *Cornell Hospitality Quarterly*, 41(3), 42-57. <https://doi.org/10.1177/001088040004100316>
- Ayala, H. (2017). The economic might of earth's evolution: The epic promise of knowledge. *SAGE Open* (April-June), 1-14. <https://doi.org/10.1177/2158244017701975>
- Ayala, H. (2020). Transnational resort: A transformative investment in the global knowledge economy. *Journal of the Knowledge Economy*, 11, 1573-1595. <https://doi.org/10.1007/s13132-019-00621-4>

- Ayala, H. (2021). *For the Benefit of the World: Pairing the Panama Canal with Knowledge Canals of Transcendent Value for the Nation and for Humanity*. Irvine, California: Pangea World. <https://www.pangeaworld.com/wp-content/uploads/2025/08/For-the-Benefit-of-the-World-H.-Ayala-3-2021-v3.pdf>
- Ayala, H. (2024a). Harnessing evolution's gift of borderless wonder to open new economic frontiers for global sustainability: A vision, a roadmap, and a pledge inspired by Francisco J. Ayala's passion for science and art. *Razón y Fe*, 288, 189-216. <https://doi.org/10.14422/ryf.vol288.i1464.y2024.010>
- Ayala, H. (2024b). The transnational frontier of resort master plans: A gateway to borderless legacies for the environment and humanity. *Frontiers in Environmental Economics*, 3, 1229094. <https://doi.org/10.3389/fevc.2024.1229094>
- Ayala, H. (2025a). La relevancia internacional del Premio Ayala (International relevance of the Ayala Award). *Razón y Fe*, 289 (julio - diciembre), 391-396. <https://doi.org/10.14422/ryf.vol289.i1467.y2025.008>
- Ayala, H. (2025b). The transnational Earth: Evolution meets the World Heritage in model development scenarios for a globally inclusive knowledge economy. *Frontiers in Environmental Economics*, 4(1447583). <https://doi.org/10.3389/fevc.2025.1447583>
- Ayala, H. (2025c). Homenaje a la Dra. Rosaura Ruiz Gutiérrez, académica, política, humanista, galardonada con la Medalla Ayala 2025. *Razón y Fe*, 289 (July-December), 413-418. <https://doi.org/10.14422/ryf.vol289.i1467.y2025.010>
- Ayala, H. (2025d). A transnational symphony of science and art for the globalized world: An economic perspective inspired by T. G. Masaryk's transnational humanitarianism. Masaryk University, Brno, Czech Republic. <https://doi.org/10.5817/CZ.MUNI.AYALA1-2025>
- Ayers, T. (1999). Panama applies science to tourism and conservation efforts. *Science*, 284(5419), 1546-1547.
- Clive, M. (2016, 31 October). *Dvořák: Symphony No. 9 in E minor, Op. 95, "From The New World."* <https://utahsymphony.org/explore/2016/10/dvorak-symphony-no-9-in-e-minor-op-95-from-the-new-world/>
- De Meester, L., Vázquez-Domínguez, E., Kassen, R., Forest, F., Bellon, M. R., Koskella, B., Scherson, R. A., Colli, L., Hendry, A. P., Crandall, K. A., Faith, D. P., Starger, C. J., Geeta, R., Araki, H., Dulloo, E. M., Souffreau, C., Schroer, S., & Johnson, M. T. J. (2024). A link between evolution and society fostering the UN sustainable development goals. *Evolutionary Applications*, 17(6), e13728. <https://doi.org/10.1111/eva.13728>
- Edmondson, R. (2002). *Memory of the World: General Guidelines to Safeguard Documentary Heritage*. Paris: UNESCO. <http://unesdoc.unesco.org/images/0012/001256/125637e.pdf>

- García-Navarrete, P. G., Escalante, T., Espinosa, D., & Morrone, J. J. (2023). Evolutionary biogeography of the Revillagigedo Archipelago, Mexico. *Journal of Natural History*, 57. <https://doi.org/10.1080/00222933.2023.2203337>
- Hogrefe, J. (1999, December/2000, January). Panama on its own. *Civilization*, pp. 50-55.
- ICOMOS (2001). *Advisory Body Evaluation*. <https://whc.unesco.org/en/list/1052/documents/>
- IUCN. (2016). World Heritage Nomination - IUCN Technical Evaluation. Archipiélago de Revillagigedo (México) R — ID 1510. In *IUCN World Heritage Evaluation* (pp. 83-93). <https://whc.unesco.org/archive/2016/whc16-40com-inf8B2-en.pdf>
- Miller, G. (1999). Panama in transition. *Hotels*, 33(3), 44.
- National Science and Technology Medals Foundation (2001). *Francisco J. Ayala National Medal of Science*. <https://nationalmedals.org/laureate/francisco-j-ayala/>
- Nemecek, S. (1999). A plan for Panama. *Scientific American*, 281, 26.
- Paterson, S. K., Le Tissier, M., Whyte, H., Robinson, L. B., Thielking, K., Ingram, M., & McCord, J. (2020). Examining the potential of art-science collaborations in the Anthropocene: A case study of Catching a Wave. *Frontiers in Marine Science*, 7. <https://doi.org/10.3389/fmars.2020.00340>
- Redacción Excelencias News Panamá. (2020, 15 de febrero). Panamá se enfoca en el Turismo del patrimonio natural y cultural. <https://www.excelenciaspanama.com/turismo/panama-se-enfoca-en-el-turismo-del-patrimonio-natural-y-cultural>
- Ruiz Gutiérrez, R. (2025). Discurso de la Dra. Rosaura Gutiérrez en la ceremonia de entrega de la Medalla Ayala 2025. *Razón y Fe*, 289 (July-December), 419-423. <https://doi.org/10.14422/ryf.vol289.i1467.y2025.011>
- Tatay, J. (2022). Images, metaphors, and models in the quest for sustainability: The overlapping geography of scientific and religious insights. In M. Fuller, D. Evers, & A. Runehov (Eds.), *Issues in Science and Theology: Creative Pluralism?* Issues in Science and Religion: Publications of the European Society for the Study of Science and Theology 6 (pp. 199-208). https://doi.org/10.1007/978-3-031-06277-3_18
- Templeton Prize (2010). *Francisco J. Ayala*. <https://www.templetonprize.org/laureate/francisco-j-ayala/>
- UC Irvine. (2014). "Pangea World unveils transnational model for science research and conservation." University of California, Irvine, Press Release, February 11. <http://news.uci.edu/press-releases/pangea-world-unveils-transnational-model-for-science-research-and-conservation/>
- UNESCO. (2023). Transboundary Marine Biosphere Reserve of the Tropical Eastern Pacific of Colombia, Costa Rica, Ecuador, and Panama. <https://www.>

- unesco.org/en/articles/transboundary-marine-biosphere-reserve-tropical-eastern-pacific-colombia-costa-rica-ecuador-and
- United Nations Department of Public Information. (2010). Study on sustainable wealth creation from natural resources to be launched at United Nations International School, 19 September. Press Release (September 17). <https://www.un.org/press/en/2010/note6277.doc.htm>
 - United Nations. (2015). *Transforming our World: The 2030 Agenda for Sustainable Development*. Resolution 70/1 adopted by the U.N. General Assembly on September 25, 2015.
 - Winthrop, T. (1859). *A Companion to the Heart of the Andes*. New York: D. Appleton & Company.