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The transnational earth: Evolution meets the World Heritage in model development scenarios for a globally inclusive knowledge economy

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The article explores the global promise of the natural reserves of the knowledge capital that permeate the earth's evolutionary and ecological connectivity and may constitute the greatest reserve of the sustainability and common good of the global knowledge economy. It builds the case for valuing knowledge yielded by basic research that inter-relates natural properties and processes across and beyond national jurisdictions as a mapping tool for World Heritage nominations as well as for collaborations that would deliver a unique stimulus for building conservation-premised transnational knowledge economies that fully engage the developing world. This perspective is vetted in the South Pacific Island Region, the Eastern Tropical Pacific, and the Isthmus of Panama, via model approaches crafted to empower the World Heritage instrument to vitalize the economic might of scientific exploration of the planet's biodiversity and to play a central role in unlocking the potential of nature's knowledge-rich evolutionary pathways to redefine the world's economic geography. The roadmap toward unleashing the economic energy of transnational research endeavors as stewards of new conservation frontiers is offered with a business model grounded in the confluence of knowledge and wonder and contributing an investment platform that encourages a globally shared benefit of the knowledge economy.

KEYWORDS

global knowledge economy, UNESCO World Heritage, evolution, natural knowledge capital, transnational science, Pacific, Panama

1 Introduction

Referring to “shifting tides of world-making in the UNESCO World Heritage Convention,” [Brumann \(2014\)](#) documents how the original emphasis on the co-ownership and co-stewardship of World Heritage sites by humanity rather than just the respective nation state transited to an emphasis on the World Heritage List as a shared exercise in world representation. The “shared exercise” further evolves to connote the right of nation states to have their candidates listed while keeping the already listed sites “free from supranational interference” ([Brumann, 2014](#), p. 2188). Looking forward, [Lafrenz Samuels and Platts \(2022\)](#) take an unexpected angle. They introduce the global challenge of climate change not only on the premise of the impacts and risks it poses for World Heritage sites but also as a nations-transcending impetus for restoring some of the principles of collective responsibility upon which the World Heritage program was founded. It is in the domains

of climate mitigation, adaptation, climate communication, and climate action where they map out globally meaningful pathways for World Heritage to advance.

The present article defines and substantiates a complementary perspective. Framed by the context of the emerging global knowledge economy, the article profiles and engages the transnational reserves of the yet-to-be-tapped scientific knowledge that pervade the natural world's evolutionary and ecological connectivity. Further, it focusses on these reserves' extraordinary potential to embolden and take into the future the original World Heritage vision of promoting global conservation and peace through collaboration amongst countries. A brief analysis of the existing trajectory of the World Heritage mission offers an essential preface.

On 16 November 1972, the General Conference of the United Nations Educational, Scientific, and Cultural Organization (UNESCO) adopted the Convention Concerning the Protection of the World Cultural and Natural Heritage (UNESCO, 1972). This international instrument, which has since attained universal recognition while continuing to evolve in its scope of application, bestows "Outstanding Universal Value" on properties that exhibit cultural and/or natural significance "so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity" (UNESCO, 2021, p. 24).

The adoption, by the United Nations General Assembly on 25 September 2015, of the resolution and action plan titled *Transforming our world: The 2030 Agenda for Sustainable Development* (United Nations, 2015) has profoundly influenced the evolution of the World Heritage instrument. "The role of World Heritage properties as a guarantee of sustainable development needs to be strengthened. Their full potential to contribute to sustainable development needs to be harnessed" (UNESCO, 2015, p. 4). However, as Fuhrmann (2022) observes, the adoption of sustainability as a guiding principle of the World Heritage Convention also exposed the Convention to an apparent difficulty posed by the general approach to sustainability, namely, the difficulty of simultaneously pursuing the competing goals of achieving economic growth, fostering social cohesion, and stopping ecological degradation.

At the same time, the strong respect for national sovereignty that permeates the Convention's operational guidelines has been increasingly discussed as a limitation or deficiency. For example, Von der Decken (2015) points out that the inscription of a property on the World Heritage List needs the request and consent of the State Party concerned and, therefore, the World Heritage Convention cannot be applied to sites situated in areas beyond national jurisdiction, like the Polar Regions or the international marine areas. However, a change of the status quo has been negotiated under the 1982 United Nations Convention on the Law of the Sea. The change resulted in a legally binding instrument on the conservation and sustainable use of marine biological diversity of oceans outside national waters that will permit the establishment of a comprehensive network of marine protected areas on the high seas (Fox, 2019). Following the countries' long-sought agreement on its final version, the U.N.'s 193 Member States adopted, on 19 June 2023, this landmark biodiversity agreement that aims at taking stewardship of the ocean (Stokstad, 2023), paving the way

for pioneer World Heritage sites in international waters (UNESCO, 2020). This cause gained tremendous momentum during the UN Convention on Biological Diversity summit (COP16) that took place in Cali, Colombia, from 21 October to 2 November 2024. A consortium of 11 philanthropies including the Bezos Earth Fund, Bloomberg Philanthropies, Blue Action Fund, Blue Nature Alliance, and Schmidt Ocean Institute have pledged \$51.7 million to support the development of Marine Protected Areas across the High Seas (Oceanographic Magazine, 2024). And, I will add, this cause injects a new energy into the World Heritage mission's underpinning premise of global responsibility.

It has been suggested by some scholars that the World Heritage Convention's condition—and ideal—of global responsibility, i.e., of the nations of the world coming together to save each other's sites, has not sustained its original momentum. Noting that nominations of World Heritage sites are increasingly justified by tourism and the associated potential for economic development, Albert et al. (2022) conclude that a focus on economic values without reference to the Convention's wider mandate contradicts its spirit. Meskell (2018) backs with evidence a concern that competition is replacing the vision of collaboration among nations as the interest in getting sites onto the World Heritage List is ever more guided by nation-state politics and motivated by the competitive value of UNESCO's World Heritage "brand." Reviewing Meskell's book in the scientific journal *Nature*, Robinson (2018) cites another issue that ranks high among Meskell's concerns, namely, that the World Heritage recognition often enshrines only one version of history and, thus, recontextualizes some of history's problematic chapters.

Bestowed on natural sites, the World Heritage distinction graces exceptional elements of the earth's architecture and globally significant progenies of evolution whose genesis predates political borders and whose revelation is accurately documented by science. As Ayala (2017a) affirms, "science transcends cultural, political, and religious differences because it has no assertions to make about these subjects...that science is not constrained by [these] differences is one of its great virtues" (p. 833). Thus, as proposed and explored in this article, it is the realm of the natural world—and its global connectivity—that hold 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.

A trail-blazing World Heritage endeavor based on the *blue carbon* positioning of the global portfolio of the 50 marine sites from 37 countries that are currently on the World Heritage List deserves praise as an existing cross-national initiative that integrates the economic dimension into the conservation imperative for natural heritage of universal value. The term "blue

carbon” refers to organic carbon that is sequestered and stored by ocean and coastal ecosystems that include seagrass meadows, tidal marches, and mangroves. Douvère (2021) discloses that the 50 UNESCO marine World Heritage sites “make up just 1% of the world’s oceans but host 21% of the world’s blue carbon ecosystems and 15% of the world’s stored blue carbon” (p. 601). Douvère’s article, published in the journal *Science*, singles out the growing blue carbon credit market for the promise this market holds to address, at least in part, the urgent priority to fund the protection and restoration of these highly productive, climate-change mitigating coastal ecosystems. Jessen and Hill (2024) corroborate this position, pointing out that the accelerating interest of businesses in blue carbon offsets has unveiled a new and potentially significant mechanism for financing coastal restoration and other projects. But they also offer words of caution. “Envisioning and operationalizing a future of blue carbon governance requires a multi-faceted approach centered on up-to-date research, transparent monitoring and reporting, inter-sector and multi-jurisdictional relationships, and community integration for equitable outcomes” (Jessen and Hill, 2024, p. 84).

The path that I have endeavored to chart brings new dimensions into the economic consideration and empowerment of global conservation. It is nurtured by research I undertook in three geographical contexts—the South Pacific Island Region, the Eastern Tropical Pacific, and the Isthmus of Panama, respectively. In this article, I submit that it is the valuation of the natural world through the lens of evolution that entails an immense yet dormant conservation-centered economic energy, ever more meaningful 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. I propose that evolution offers a great unifying and vibrant platform for fostering UNESCO’s original World Heritage mission; for ensuring the benefit of this mission to all of humanity; for combining multiple World Heritage natural sites into catalysts of an environmentally enlightened economic development throughout the world; and for judging the universal value of future candidates for the World Heritage recognition.

I will start with reflections on the dynamics of the subject of evolution.

2 The unbounded yet unifying power of evolution

Dobzhansky (1973), considered among the 20th century’s most distinguished geneticists and evolutionary biologists, famously titled one of his influential articles “Nothing in biology makes sense except in the light of evolution.” Ayala (1999), one of Dobzhansky’s main disciples, took this position even further in his assertion that “only under the prism of evolution it is possible to understand what we humans are, from where we came, and the possibilities that the future brings us” (p. 15).

The importance of Darwin’s discovery revealed in the publication of *On the Origin of Species* (Darwin, 1859) ignited a new era in the intellectual history of mankind. According to Ayala (1994), the ultimate significance of Darwin’s achievement is the completion of the “Copernican revolution” initiated in the 16th

century through the discoveries of Copernicus, Kepler, Galileo, and Newton and bringing about a radically changed conception of the universe as matter in motion governed by natural laws. Darwin did not just gather ample evidence for the occurrence of evolution; he extended the Copernican revolution to the world of living things by accounting scientifically for the complexity, adaptations, and diversity of organisms as the result of natural processes, notably natural selection. Together, these two intellectual revolutions ushered in the beginning of science in the modern sense of the word; they may jointly be seen as one Scientific Revolution (Ayala, 2007, 2016).

The understanding of evolutionary processes has undergone its own revolution since Darwin. Gregor Mendel’s discovery (in Darwin’s lifetime but not widely known until the 20th century) of the theory of biological heredity filled the “missing link” in Darwin’s own theory of evolution by natural selection, bringing to light genes as the discrete units of heredity and recognizing mutation as the ultimate source of hereditary variability. The subsequent fusion of Mendelian genetics and Darwin’s principle of natural selection yielded the “synthetic theory of evolution”; the dramatic discoveries of molecular genetics then led to yet another synthesis, encompassing an understanding of evolutionary processes at the molecular level. Entirely new disciplines have been born and endowed evolutionary biology with primary importance in conservation science, as exemplified by landscape genetics that is disclosing the importance of preserving habitats critical for the functioning of normal evolutionary processes within species and, thus, for conserving the potential for future evolutionary change (Shaffer, 2017).

United by the theme *In the Light of Evolution* (ILE) and spanning 10 years (2007–2016), a series of state-of-the-art colloquia sponsored by the U.S. National Academy of Sciences adopted and met the formidable objective of exploring evolutionary perspectives on biological topics that are both scientifically intriguing and of special relevance to contemporary societal challenges (Avisé and Ayala, 2017). The ILE series has fueled my own appreciation of evolution as a grand catalyst for the advancement of scientific knowledge in a manner that radiates inspiration, enriches human life, and stimulates collaboration across disciplines, sectors, and political borders to the benefit of the environment and humanity. It has energized my aspiration to reveal—and ignite in fulfillment—the immense potential of the evolutionary approach to map out a transformative course for the global knowledge economy that draws strength from and strengthens basic research and conservation of the planet’s natural riches and that is nurtured by and nurtures the World Heritage paradigm and its icons.

A brief comparison with Vermeij’s (2006) acclaimed, groundbreaking work based on natural economies and human economies (see also Vermeij and Leigh, 2011) is helpful for defining the angle and the philosophy that have guided the research underpinning the present article and the perspectives informed by that research. These two publications are emblematic of Vermeij’s disclosure that competition, cooperation, adaptation, and feedback govern both evolution and the human economy. Vermeij asserts that the similarity between ecosystem-based natural economies and human economies lies in that both are adaptive systems in which cooperation and competition among individuals for locally limiting

resources affect the fates of individuals and groups. He points out that the evolution of modern *Homo sapiens* is unprecedented in the entire history of life given the global monopoly of the biosphere that has been acquired by a single species, aided by predominance of cultural over genetic adaptation. And he draws lessons from the history of natural economies in his call for fundamental changes in the criteria by which human economic success of individuals and societies are measured.

The approach elaborated in the present article is not based on comparing evolution and the human economy in terms of processes that govern them. Rather, this article unmasks the dormant economic value of the basic research of nature that is carried out in the light of evolution and is framed by the progressing metamorphosis of the world economy into a knowledge-based economy. It treats the earth's evolutionary and ecological fabric as a borderless treasury of potential scientific knowledge—the natural knowledge capital, dubbed *knowledge mineral*—that merits recognition and appreciation as arguably the greatest untapped reserve of the sustainability, conservation legacy, and globally shared benefit of the knowledge economy (Ayala, 2017b). It demonstrates that the highly consequential scientific discoveries that await in insights into transnational threats of this fabric will also harbor another layer of economic energy for a sustainable future that could be released by these discoveries' appraisal as unparalleled sources of wonder. It draws attention to a locally elusive, globally exuberant precursor of sustainable wealth whose natural footprint transcends and interconnects nations and has the capacity to outperform oil wealth in endurance and lasting benefit to humanity. This perspective merits further elaboration, departing from a geologic time scale.

2.1 Evolutionary veins of the knowledge mineral: an economic perspective

The natural history of petroleum goes millions of years back in time to ancient oceans and seas whose environmental conditions stimulated an immense richness of microscopic life and ensured its burial under layers of sediments that kept pressing the organic material ever deeper into the earth's hot zone where it transformed into oil. Plate tectonics—the process of “the inexorable movement and fracturing of the surface crust of the earth, as it rides on the hot, flowing mantle below” (Coates, 1997, p. 3)—played prominently in sculpting the geography of petroleum hotspots. Referencing authoritative geological research, Broad (2010) highlights two of the petroleum-relevant cradles of the earth's evolution during the Cretaceous period (145–66 million years ago). One was the Tethys Sea: a bygone ocean and a sprawling factory for “biogenic proliferation” that encircled the equator, whose remnants include the Aral, Black, Caspian, and Mediterranean Seas, and whose fertile southern shores formed what are now the oil-rich nations of the Middle East. The other spotlighted cradle originated when Africa and South America began pulling apart, forming the narrow beginnings of the South Atlantic. An abundance of nutrients carried by rivers into this nascent ocean along its western shore spurred a “biological frenzy” that gave birth to the present-day oil fields located in deep water off the coast of Brazil.

The Tethys Sea—the bygone ocean that, in the Cretaceous, swelled to an islands-dotted seaway between the northern and southern continents and figured prominently in the evolution of petroleum hotspots—birthed a great epicenter of biological diversity (see, for example, Hou and Li, 2018; Chattopadhyay et al., 2024). Many of the modern families of marine plants and animals originated and differentiated in that area during that time. But why are today's peaks of diversity where they are? To understand this, we must trace the historical and modern paths that led to the patterns of diversity that we see across global seascapes and landscapes today, and which no single location can reveal.

There is growing evidence about the merit of bridging and jointly analyzing data mined from cradles of natural wonders that are scattered across the world but are united by ecological or evolutionary affinities in order to mobilize bounties of new, invaluable knowledge. A powerful affirmation of this paradigm can be obtained by examining, through the lens of evolution, remote island archipelagos that originated via hotspot volcanism and are scattered across the world's oceans. As Shaw and Gillespie (2016) demonstrate, these oceanic archipelagos represent highly intriguing evolutionary studios in which every species has origins elsewhere, and community composition is constrained by the filter of dispersal ability. Collectively, they offer unparalleled insights into the mechanisms of speciation and into the origin and evolution of community structure.

In December 2018, the Five Deeps Expedition and its submersible executed the first dive of its now completed mission to explore the deepest trench in every one of the world's oceans—a brainchild of American explorer Victor Vescovo. Describing this mission in the journal *Science*, Stokstad (2018) notes that, besides unmasking these mysterious ocean trenches' geological history, the dives are certain to discover new species. And he quotes Stuart Piertney of the University of Aberdeen: “Great insights could come when we can start comparing these ultra deep sites” (Stokstad, 2018, p. 1342).

These examples frame a crucial comparison that can be drawn between the geography of oil and the geography of the knowledge mineral, a comparison that reveals a striking difference. Let's start with oil. The only gain attainable via interrelating the oil reserves or forging alliances among nations that encompass oil reserves is the ability to affect the price of oil by coordinating supply cuts and supply increases. As to the overall amount of oil, it is no more than the sum of these reserves. And, as Treadgold (2019) underscores, the same process of peaking, plateauing, and declining happens to every oilfield and mine over time.

In contrast, the knowledge-mineral resource, the “raw material” of the knowledge economy, actually increases in volume and value the more it is explored, extracted, and used. It can be fully appraised and engaged only in the context of evolutionary, ecological, and other relationships that complement and augment the knowledge 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-mineral veins* that are blind to political borders.

There is a vital consideration necessary to unlock the full potential of this global repository. Scientific exploration of the connectivity and dynamics of the natural world ought to have

the freedom to yield discoveries that can only be made through comparisons and syntheses at the level above national jurisdiction, and to freely venture from *above* to *beyond* national jurisdiction. As revealed by Mendenhall and Helm (2024), the very United Nations treaty intended to protect and sustainably use Biodiversity Beyond National Jurisdiction will not be effective at achieving its goals without strong scientific support, given that current scientific knowledge is insufficient for conducting informative Environmental Impact Assessments of marine ecosystems usage in Areas Beyond National Jurisdiction. The knowledge harvests of the much-needed basic research projects that would rise above and beyond national jurisdiction, would be conducted in the public interest, and would be available to all as a foundation for further and unlimited basic research would represent a “public good” in the purest and truly global sense, meriting designation as of “universal value.” A central issue is to prove that these assertions do not represent an idealistic platform detached from the funding and logistical challenges of basic science—challenges that are of particular magnitude in research endeavors that bridge geographies.

2.2 A business model inspired by World Heritage ethics

The business-cum-legacy model of the *transnational resort* (Ayala, 2020, 2024a) addresses the immense potential of scientific exploration that would have the logistical and financial support to pursue *free flowing* insights into the earth’s natural fabric—be it along borderless paths of spatial connectivity or within themes that integrate unbounded sets of comparisons and correlations—and that would have the freedom to dedicate the intellectual property of the mobilized scientific knowledge to benefit all of humanity. This model is informed by the disclosure of a major overlap between the global map of existing and future developments of sought-after resort settings, particularly in the luxury segment, and the locations of this planet’s most biodiverse habitats and prominent crossroads of nature’s evolutionary and ecological connectivity. It posits an assessment of the unrealized potential of this ever-expanding global archipelago of hospitality on a valuation of the natural world as a giant evolutionary theater. Staged in this theater is the dynamic story of the planet’s landscapes and seascapes in their intricate complexity, vital yet vulnerable unity, and in their impact by the changing configuration of the continents and oceans resulting from the action of plate tectonics and other forces that have shaped Earth’s geologic history. This is the context of the transnational resort model’s goal to inspire a new generation of resorts to recognize that the currently untapped potential of many resort sites to serve as windows into wonder-rich labyrinths of connections among variously distant elements of global ecosystem networks and evolutionary pathways is of an even greater value for the sites’ business and legacy capitalization than the natural assets of the sites themselves.

The established position, as authoritatively articulated by Arrow (1962), is that appreciating and capitalizing on knowledge as a precursor of future knowledge does not align with the operation of private enterprise system and its emphasis on property rights.

The transnational resort will be well-positioned and economically motivated to defy the free-enterprise economics of basic research. By becoming the principal business partner in science-oriented valuation and consolidation of transnational repositories of the knowledge mineral, it will gain an unconstrained ability to build interpretation-assisted experiential bridges between the land and marine ecosystems surrounding a resort and those “borrowed” from elsewhere along science-disclosed connections. It ought to be emphasized that the extraction and appreciation of the knowledge resource in the context of tourism, which is primarily an exercise in interpretation, does not involve the ownership of knowledge as intellectual property and, thus, engenders a strong business incentive for the resort to encourage unrestricted use of the discoveries it underwrites as input into new research endeavors. This invites a proactive design of transnational-resort portfolios based on science themes of formidable research ambitions and geographical scope that will be unmatched in their capacity to offer a viable solution to what Crane (1971) mentions as a key problem facing scientists who conduct basic research, namely, how to organize programs to collect data at a variety of widely scattered geographical sites. And this also offers a path toward raising the awareness of, and helping address, a concern raised by Prathapan et al. (2018). The article’s authors—and more than 170 co-signatories—draw attention to the Nagoya Protocol that came into effect in 2014, further codifying the objective of the 1992 Convention on Biological Diversity (CBD) to ensure fair and equitable sharing of the benefits from the utilization of genetic resources but not differentiating not-for-profit research—such as biodiversity inventories and taxonomic studies—from commercial research leading to proprietary rights. “As scientists aspiring to describe Earth’s biological diversity in the face of formidable odds, we ask that the parties to the CBD do more to raise the legal curtain that has fallen between biodiversity scientists and the biodiversity they strive to discover, document, and conserve” (Prathapan et al., 2018, p. 1406).

A key premise of UNESCO’s World Heritage Convention is that whilst a World Heritage site remains the property of the country on whose territory it is situated and subject to national legislation, the State Parties to this Convention recognize that such site’s heritage constitutes a world heritage whose protection is the duty of the international community as a whole. This compatibility of a national sovereignty with supranational rank that is enjoyed by natural and cultural legacies deemed by UNESCO to be of universal value has provided inspiration for the transnational resort’s core principle of honoring the nations’ sovereignty over their natural heritage riches on each specific site that is studied along the multi-country trajectory of the scientific exploration underwritten by the resort. At the same time, this principle is embedded in the resort’s advocacy of and adherence to the idea that the transnational pool of the knowledge capital yielded via a cross-fertilization of research insights obtained all along the research project’s multi-country path remain permanently accessible and available to all.

It is precisely on the above-national scales that the reserve of the natural knowledge capital denotes a true perception of future possibilities. It is on those scales that this reserve’s exploration will permit “the best-orchestrated of scientific treatises” that compare to “symphonic masterpieces, with a wide sphere of influence” (Avisé, 2001). It is on those politically blind scales that this

reserve's inner structure of life-affirming linkages, rich in wonder, enhances the values of local, national, and regional pools of the natural knowledge capital, thus fundamentally differentiating this “raw material” of knowledge from oil and mineral ores. This interconnectedness of the natural world's knowledge wealth represents a virtually uncharted territory for UNESCO World Heritage recognition that would benefit humanity also by serving as a unique stimulus for building conservation-based transnational knowledge economies. A systematic and pro-active employment of the transnational resort model is integral to this position's implementation strategy. The following segment, “A World Heritage perspective of a new economic geography,” defines and vets this perspective via three original approaches, each employed in a distinct geographical context while reinforcing the collective capacity of all three to chart the course for global action.

3 A World Heritage perspective of a new economic geography

3.1 South Pacific Island Region

Earlier studies that were undertaken in Fiji with the focus on comparing the natural legacies of multiple locations offer a valuable starting point. For example, a 1974 pilot project—co-sponsored by UNESCO, the United Nations Fund for Population Activities (UNFPA), and the government of Fiji and confined just to the islands of eastern Fiji—disclosed that the traditional categories of high-volcanic and low-lying islands fall short of capturing the great ecological diversity within these categories (UNESCO/UNFPA, 1983). A follow-up study revealed that Fiji alone offers a stunning display of different stages of evolution in the South Pacific islands (Bayliss-Smith et al., 1988). These pioneer studies merited recognition as pilot samplings of Fiji's dormant assets for the incoming knowledge economy: assets whose value could skyrocket amidst the wealth of knowledge represented in the natural evolution of the tropical Pacific—a wealth neglected by existing regional development models and untapped in its potential to spur and underwrite multisite heritage bridges of World Heritage distinction (Ayala, 1995).

The UNESCO Office for the Pacific States invited further exploration of this perspective in the context of *Vaka Moana—Ocean Roads of the Pacific* program, UNESCO Pacific States' contribution to the United Nations sponsored World Decade for Cultural Development 1988–97 (Hooper, 2000).

The reinforcement of traditional links and awareness of the common maritime heritage of Pacific peoples was among the program's core aims. It also figured as the core theme of the address delivered by Hau'ofa (2000) at the 1997 UNESCO conference and deserves a special mention for its crucial relevance to the subject of the present article.

Hau'ofa (2000, pp. 32 and 33) called for “the development of a substantial regional identity that is anchored in our common inheritance of a very considerable portion of Earth's largest body of water, the Pacific Ocean” and that “is necessary for the quality of our survival in the so-called Pacific Century when important

developments in the global economy will be concentrated in huge regions that encircle us.”

Yet, the Pacific Century's global economy, which increasingly transmutes into a knowledge-based economy, will make the economic growth in the Pacific surrounding regions—and beyond—more dependent than ever before on the natural assets of the richly islanded Pacific. A vast majority of discoveries in biology and other sciences are accomplished through disclosures of hidden linkages between processes or substances that were previously viewed as entirely distinct. Thus, the multi-layered web of evolutionary, ecological, and other connections of immense research importance that pervades the Pacific Island Region represents the island nations' collective potential to host trailblazing discoveries. Their collective wealth of natural knowledge capital is guaranteed a long-term appreciation in value, given how fundamental this capital is for unleashing the full potential of the knowledge economy and for ensuring its globally shared benefit.

This reasoning framed a series of practical recommendations and policy suggestions. It informed an implementation strategy that defined why and how Vaka Moana's goal of nurturing the Pacific peoples' shared cultural heritage in concert with advancing a conservation-minded economic development should be equally applied to their collective pool of natural heritage wealth, which is already primed for an environmentally forward regional economy by the evolutionary, ecological, and other connections of outstanding conservation and research importance that pervade it on many spatial levels (Ayala, 2000a). These connections would superbly translate into an “infrastructure” of heritage themes that would consolidate a regional repository of natural knowledge capital of global significance and, thus, solidify the competitive advantage that the region could command in the increasingly knowledge-oriented global economy.

This perspective carries profound implications for the world's economic geography. It gives tangible content to the assertion that blocks of countries that share treasure troves of biodiversity and other natural heritage riches woven together by Earth's evolutionary history “could achieve influence and wealth comparable in magnitude—and incomparably superior in endurance—to those that oil-rich countries have traditionally enjoyed” (Ayala, 2017b).

The University of the South Pacific (USP), an international teaching and research body owned by and spread across 12 Pacific Island countries (Cook Islands, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, and Vanuatu), holds a singular strategic position to act as a catalyst of this perspective's fulfillment. USP is right in the middle of the region's intricately interwoven natural bounty of immense scientific value. In its regional reach and identity, USP holds an invaluable “passport” to embark on research projects along borderless natural pathways, unearthing the knowledge capital that no single country can access within its territory.

Basic research conducted to prompt even more basic research is the essential tool for accessing this capital. This invites a comparison with the shifting place and profile of research in universities throughout the world. Studies by Dabić (2021) and Marozau et al. (2021) affirm the globally observable trajectory of universities' evolution from their traditional focus on research and gathering of knowledge toward their ever-deeper integration

into innovation systems and, consequently, subordination of universities' research missions to the expectation of their facilitation of economic and social development. USP, branching across swaths of natural wonders of incalculable scientific value, is in a distinct position to perpetuate and build upon the tradition of research carried out for the sake of knowledge, for it is the basic research that holds the key to unlocking the island nations' potential to build a vanguard, regionally scaled knowledge economy. Confluent with and supportive of this potential's pursuit would be to use knowledge mobilized by research conducted at the level of multi-country pools of natural capital to map out a proactive, themed conservation system that would also provide a most fertile ground for nominations of serial transnational World Heritage sites.

The USP-based nations are also members of the portfolio of the island nations represented by the UNESCO Office for the Pacific States. Within that portfolio, they are joined by Federated States of Micronesia, Palau, Papua New Guinea, and by the French Pacific Ocean archipelago of New Caledonia as an Associate Member of UNESCO. Exceptional scientific value figures prominently in the definition of the universal value of four natural sites that are currently inscribed on the World Heritage List from the Pacific Island realm represented by UNESCO Pacific. Specifically, these sites include East Rennell (Solomon Islands), Phoenix Islands Protected Area (Kiribati), Rock Islands Southern Lagoon (Palau), and Lagoons of New Caledonia.

However, the Pacific Island nations' collective pool of megadiverse evolutionary and ecological heritage of vital connectivity merits much grander and much more comprehensive World Heritage ambition. As a foundation for policy recommendations, it lends itself to orchestrating the quest for the World Heritage recognition of the most unique layers of that multi-country natural knowledge bank with a regional master plan for a knowledge economy that would seamlessly relate USP's basic research to USP's lead role in fostering economic development and societal welfare. That would also yield a formidable incentive and capacity to harness the transnational resort business model and its stewardship of open-ended scientific exploration that balances benefits to the host nations and to humanity. Novel opportunities for interdisciplinary research and action would lie in activating the region's enviable position to tie investments in tourism and hotel infrastructure to the highly synergistic investments in knowledge infrastructure, such as by granting resort islands the privilege—and business premium—of assuming patronage of sets of islands designated as research islands and linked to the resorts via interpretive bridges of no physical imprint yet of formidable capacity to transport wonder into the resort-anchored experience. Both the hospitality sector and the science sector would progress in the process: new logistical and funding mechanisms would be created for research while new planning and management concepts would be introduced in the industry, opening a new frontier for disciplines bridging university curricula. The economically empowered regional conservation effort would be the ultimate beneficiary of this investment model.

The Pacific Island nations collectively possess an extraordinary, uncharted opportunity to ground sustainable-development

strategies in quests for World Heritage recognition of chains of natural properties along evolutionary pathways of universal value. An exquisite cluster of interrelated World Heritage sites already exists in the Eastern Tropical Pacific and is now fortified with a transboundary marine biosphere vision similar in spirit to the one advocated for a different part of the Pacific some 25 years ago: "In the South Pacific, I recommend delimiting areas that contain multiple heritage cores interrelated by heritage themes of national and regional significance for UNESCO's recognition as biosphere reserves. All of the region's future World Heritage Sites should be among those cores. Such a multi-layered approach to biosphere reserve development across the region would be conducive to mobilizing the region's human capacity to foster sustainable development through cooperation, while paying tribute to the region's ecological and cultural complexity" (Ayala, 2000a, p. 200). Yet, the potential of the Eastern Tropical Pacific's iconic cluster to drive a conservation-savvy economic empowerment of a majestic natural laboratory of knowledge-packed connectivity is yet to be fulfilled.

3.2 Eastern Tropical Pacific

The Eastern Tropical Pacific is a marine biogeographic region endowed with great biological and ecological connectivity and exceptional biodiversity along the convergence of major marine currents from the west coast of Mexico to the southern tip of Peru.

In 2004, the governments of four countries within this region—Costa Rica, Panama, Colombia, and Ecuador—signed the San José Declaration that formally established the Marine Conservation Corridor of the Eastern Tropical Pacific. Conceived as a trans-border marine conservation network, this corridor 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).

A major contributor to the unparalleled potential of the Eastern Tropical Pacific to become the cradle and showcase of a pilot transnational knowledge economy is the ever-stronger alignment of the prestige and singularity of the region's World Heritage quartet with a research partner of world renown—the Panama-headquartered Smithsonian Tropical Research Institute (STRI), the world's premier research authority on tropical biodiversity, its understanding both retrospective and prospective, and its pivotal contribution to human welfare. Two synergistic factors have spurred this growing alignment. One is the location and research ambition of STRI's newest marine station on STRI-owned Coibita Island that is part of the World Heritage listed Coiba National Park. The other factor is the milestone outcome of a team effort that has been led by STRI's marine biologist Héctor M. Guzmán and which yielded the scientific basis for a major expansion of the limits of Panama's Cordillera de Coiba marine protected area. With this expansion, sealed via an executive decree of 8 June 2021, Panama adds more than 50,000 square kilometers to the Coiba

protected area—a move that affords protection to deep oceanic habitats made up of several biodiversity-rich seamounts while bringing to above 30 percent the total amount of the country's marine surface under protection (Smithsonian Tropical Research Institute, 2021). Moreover, the expanded Cordillera de Coiba now borders the vast marine expanses of Colombia's Malpelo Fauna and Flora Sanctuary and the adjacent Yuruparí-Malpelo area delimited for conservation and development of sustainable fishing activities, with major implications for promoting biological and geological connectivity within this binational marine protected area.

The 2021 United Nations Climate Change Conference (COP 26) fortified the future of the Eastern Tropical Pacific with two additional deeds. One was the announcement by Ecuador's President Guillermo Lasso of the expansion of the Galápagos marine reserve that will be inclusive of the Cocos Ridge, which extends toward Costa Rica (Valencia, 2021). The other, most consequential deed was the launch by the leaders of Colombia, Costa Rica, Ecuador, and Panama of a new marine protected area to be called the Eastern Tropical Pacific Marine Corridor (CMAR), which 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 strengthen CMAR by creating a transboundary biosphere reserve (Blue Nature Alliance, 2022). As announced by UNESCO, Colombia, Costa Rica, Ecuador, and Panama had already started a regional process toward the establishment of what would be the world's largest transboundary marine biosphere encompassing UNESCO Biosphere Reserves and World Heritage Sites (UNESCO, 2023). The creation of the permanent secretariat that endows and fortifies CMAR with governance structure, as revealed by the governments of the four countries on 31 October 2024, during the COP 16 summit (Bezos Earth Fund, 2024), will undoubtedly accelerate this process. The foresight behind this undertaking is well complemented by the fact that all four countries have already signed the High Seas Treaty, with Panama being the first among them to ratify this landmark international instrument (High Seas Alliance, 2024).

In the Eastern Tropical Pacific, international tourism has already discovered the region's breath-taking sceneries and unique wildlife. Each 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 that an entirely new level of tourism product and benefit could be attained. It is precisely at that level that a proactive, science-vetted, master-planned transnational resort network would pioneer investment opportunities. The result would leave a minimal physical imprint, while generating a collective business incentive 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. Such a master would deliver a universally applicable investment platform geared to elevate conservation and Earth-centered basic science from donations-dependent causes to economic forces that are blind to political borders. It would be uniquely expandable along the evolutionary and ecological affinities that interlink the natural

reserves of knowledge and wonder of the Eastern Tropical Pacific, the South Pacific, and other parts of the Pacific and are further illuminated by the latest wave of unprecedented scientific expeditions and discoveries that are transforming the Pacific-wide evolutionary theater into a mega research laboratory of global promise.

During the *Tara* Pacific Expedition—which ran continuously from 2016 to 2018 and accomplished an 18,000 km longitudinal transect of the Pacific Ocean—the coral ecosystems from 32 archipelagos were sampled following the same protocol, disclosing a vast, drastically underestimated richness of reef microorganisms (Planes and Allemand, 2023; Galand et al., 2023). These unprecedented insights now allow researchers to gain a better understanding of the structure, evolutionary trajectories, and other key dimensions of coral reef diversity that are of critical importance for guiding conservation efforts across the Pacific and beyond (Voolstra et al., 2023). At the same time, a pioneer study is charting archaeological and ethnographic perspectives on the ritual value of coral—a “stone from the sea”—across this immense ocean region (Molle et al., 2023). It discloses another most momentous research opportunity that well complements the natural-science angle in strengthening the natural-cum-cultural identity and value of the Pacific's past and present coral legacy and in fully revealing the unmatched World Heritage potential of the ultra-diverse while ultra-connected island and marine realm of the Pacific.

The Pacific superbly anchors and nurtures the notion of rigorously researched linkages, packed with knowledge and wonder and highly susceptible to combining or branching into new heritage pathways as they absorb new discoveries and, thus, keep augmenting the value of national, regional, and global pools of heritage riches. But it was the heritage bounty of Panama that not only profoundly shaped this notion but also affirmed it as a transnational imperative. Panama provided an exceptional receptor for the design, involving STRI experts, of science-mapped themed valuation of its heritage wealth as a dynamic foundation for national development, and for the demonstration of environmental, social, and economic benefits of this unprecedented undertaking (Ayala, 2000b). The science-illuminated paths of affinities and relationships that defined the heritage themes were found to overlay with areas of greatest social needs all across Panama and, thus, equipped with “staging areas” for high-profile, high-impact investments—particularly in legacy-minded tourism and hotel projects—acquired the capacity to uniquely propel the flow of benefits throughout the country. Importantly, this pilot endeavor has retained its potential to outgrow Panama in another precedent-setting fashion. The significance and worth of the Panamanian territory as an unparalleled crossroads of natural pathways that transcend the borders and exclusive economic zones of multiple countries and even wind across high seas beyond national jurisdictions are yet to be appreciated as mighty sources of competitive strength and leadership position in the global marketplace (Ayala, 2021). And this potential is of direct relevance to the subject of the present article. As reasoned in this article, the emerging global knowledge economy presents an unprecedented opportunity for further evolution of the World Heritage instrument in a fashion that would make it much more proactive and consequential in shepherding humankind's

journey toward sustainability. Panama, whose natural heritage is a masterpiece of geological and evolutionary “engineering” of global influence, is in an unrivaled position to lead the way.

3.3 The case for an iconic union of the World Heritage and the world economy on the Isthmus of Panama

The Gulf of Panama, whose natural wealth of great scientific importance is an integral part of the natural treasure trove of the Eastern Tropical Pacific Seascape, also occupies a distinct niche in the human history of the Pacific. Twenty-one years after Christopher Columbus encountered the *New World*, Vasco Núñez de Balboa became, in 1513, the first European to sight the Pacific, then named South Sea, and—upon crossing the Darién segment of the Panamanian Isthmus—to enter the Pacific waters in a bay in the Gulf of Panama (Conde-Salazar Infesta, 2009). The Pacific Ocean discovery spurred the development of trans-Isthmian paths that facilitated Spanish expansion in Central and South America and through which gold, silver, and other riches from Spain’s New World territories were transported across the Isthmus on their way to Europe. The Historic District of Panama together with the Panama Viejo Pre-Columbian and Historic Archeological Site and, on the Caribbean side of Panama, the Portobelo-San Lorenzo Fortifications now boast UNESCO World Heritage recognition as outstanding vestiges of the infrastructures of the Spanish colonial era.

The Permanent Delegation of Panama to UNESCO (2017) proposed integrating and consolidating these World Heritage sites within the *Colonial Transisthmian Route of Panamá*, thus creating a serial cultural property bonded by the legacies of the trans-Isthmian paths of Camino Real (Royal Road) and Camino de Cruces (Cruces Road). In its response, the World Heritage Committee (2019) encouraged Panama to resubmit the Colonial Transisthmian Route’s nomination with comprehensive conservation and management plans. The roadmap that is being pursued by the Panamanian government toward the resubmission goal is divided into two phases and reinforced with a new narrative that stresses the importance of the involved sites not individually but in clusters and collectively to fully expose their exceptional universal values (En Segundos Editorial Staff, 2023). According to Panama’s former minister of culture, the inclusion of the Colonial Transisthmian Route of Panama in UNESCO’s World Heritage List will contribute to the “continuous re-valorization” of the country’s culture and identity as *Bridge of the World* and will spur an integral and tourist development of the Route and its surrounds (EFE, 2023).

In a decision adopted at its 46th Session held in New Delhi in July 2024, the World Heritage Committee (2024) referred the resubmitted nomination of the Colonial Transisthmian Route of Panama back to the State Party in order to allow it to legally protect the whole heritage route as one entity, to complete and implement a tourism and interpretation strategy for the nominated serial property as a whole, and to address the Committee’s other recommendations.

The recent approval, by Panama’s National Assembly, of a new law that declares The Colonial Transisthmian Route as Panamanian Cultural Heritage strengthens the Route’s World Heritage candidacy with new guarantees of protection, conservation, and valuation (Ministry of Culture of Panama, 2024). However, the World Heritage Committee’s request to further consolidate the singularity of what has been positioned and valued as a serial cultural property invites a much bolder appreciation of Panama’s singular position to open new frontiers for the World Heritage stewardship of human welfare and human progress. It merits attention as a most timely opportunity to chart an iconic path into the future along which World Heritage and world economy are positioned to converge in a globally inspiring, conservation empowering union. The Panama Canal and its Watershed—and their joint role in world commerce—figure prominently in this argument that the present article bases on the following rationale.

As noted in the existing text of the nomination, the Charges River—the fluvial route of the Camino de Cruces—has been mostly dammed to create Gatún Lake and the Panama Canal, which makes the Cruces Road the precursor and predecessor of the Canal. However, comparisons ought also to reveal crucial differences. One, unlike the trans-Isthmian routes’ core function to consolidate Spanish dominion of the New World, the Canal, as an international waterway, is defined by guarantees of permanent neutrality and permanent access to it by vessels of all nations on the basis of entire equality (United States Congress, 1977; Organization of American States, 1977). Two, while the environmental settings of the trans-Isthmian colonial routes and of the Canal overlap, the Canal is distinct in that its very function and future are dependent on the health of its natural companion—the tropical rainforest—as the guardian of its fresh water supply. Three, the Portobelo – San Lorenzo fortifications, valued in their World Heritage recognition as skillful adaptations of Spanish military architecture to tropical climate and landscape features, were pillars of the defense of the trans-Isthmian paths. The defense of the Canal-Watershed route relies on a different arsenal of “weapons” that are advancing the frontiers of science with formidable social dividends. STRI’s leadership of this new-generation defense employs tools ranging from canopy research cranes that have revolutionized research at the heretofore inaccessible tropical forest canopy to the Agua Salud Project, aimed at quantifying the ecosystem services provided by tropical forests, and to the ForestGEO (Forest Global Earth Observatory) network of forest research plots throughout the Watershed and across the world that uses the same collection protocols to gain unprecedented, globally comparable insights into the forest diversity and dynamics. This new breed of fortifications does not just deliver defense; it mobilizes a new source of wealth—knowledge.

A new scenario comes to light: that of an inter-oceanic pool of irreplaceable cultural heritage cushioned by an equally irreplaceable inter-oceanic pool of natural heritage that emblemizes the ever-tighter correlation between environmental protection and the world economy and is harnessed, as a vanguard research laboratory, to enhance the future of humanity. This scenario broadens the content and justification of the Colonial Transisthmian Route of Panamá’s nomination for the World Heritage inscription from

a serial Cultural property to a mixed Cultural-Natural serial property that denotes an inherently international vision of future possibilities. The proposed revised nomination also uniquely aligns with the prospect of the Eastern Tropical Pacific's transformation into a transnational "laboratory" of sustainability since it serves to position the region's wonder-packed evolutionary pathways as pilot *transnational canals of knowledge neutrality* in a symbolic resonance with the neutrality paradigm of the Panama Canal.

The rationale behind intertwining the Colonial and the Canal Watershed routes within a nomination of a Cultural-Natural serial property is also readily expandable to a transnational scale. The World Heritage ranking Portobelo and San Lorenzo military compounds belonged to a larger defensive system that included other World Heritage listed prime examples of Spanish-American military architecture of the 17th and 18th centuries, most notably the massive colonial fortifications in Santiago (Cuba), in Cartagena (Colombia), and in Veracruz (Mexico). The present context of Fort San Lorenzo is the San Lorenzo National Park that spreads across more than 13,600 hectares at the northwestern entrance to the Panama Canal and contains a treasure trove of natural, historical, and cultural legacies. This national park, together with Chagres National Park, Soberania National Park, and other parts of the Canal Watershed, are important components of the Mesoamerican Biological Corridor—a multi-country system of *defense* of biological diversity and landscape connectivity that encompasses a network of protected areas and connecting corridors from southern Mexico to eastern Panama aimed at fostering sustainable social and economic development. It is within this new-generation system of defense of a transnational dimension that Fort Sherman—a U.S. military base that was a crucial link in the Caribbean Defense Command, which reverted to Panama in 1999, and whose large expanse of land covered by tropical rainforest is now a core component of the San Lorenzo National Park—stands out as a singular anchor for a most consequential legacy investment. This investment's appreciation and prestige would be defined by an economically savvy ambition to harness and augment the singularity of the Central American Isthmus as a knowledge- and wonder-packed natural lifeline between the two continents of the hemisphere—a lifeline that could also proactively consolidate the Mesoamerican Biological Corridor's existing and future World Heritage sites as a World Heritage path into a sustainable future. Such a borders-spanning path of universal value would offer a vast uncharted territory for complementary legacy investments in a regionally scaled tourism-conservation-research masterplan that would solidify the region's competitive advantage and foster the confidence and reciprocal benefit of the region's interplay with the global knowledge economy.

Panama seeks international partnerships—corporate or philanthropic investors who will bet on its future via investments in clean energy, electric mobility, rainforest conservation, and other opportunities that intertwine financial returns and environmental rewards, as revealed in a *Forbes* magazine's interview of Panama's new Minister of the Environment Juan Carlos Navarro (Silverstein, 2024). The present article recommends that the investor focus be emboldened by its priority orientation on those who, by investing in Panama, will bet on the planet's future. Panama possesses an unparalleled potential to prosper and dazzle the world as a gateway to economic discovery and economic empowerment of borders-transcending realms of natural riches welded by relationships of

great conservation importance and research worth and harboring a major potential to serve as incubators of dynamic knowledge economies that foster better management and conservation of global natural capital. This assertion is underscored by another formidable legacy investment opportunity anchored by three privately owned islands in the naturally opulent Gulf of Panama that cushions the very Pacific entry to the Panama Canal. A master plan has already been drawn to value and engage this three-island portfolio as the staging area for a transnational resort of a trail-blazing mission to excel as a steward of the neutrality-governed knowledge canals of transnational dimension, stature, and legacy (Ayala, 2020). Complementary to the Mesoamerican focus and desired benefit of the Fort Sherman legacy-investment anchor, this pilot project extols the privileged position of Panama as a gateway into ocean-linked biological networks of the Pacific. It acquired a notable validation at its conceptual-design stage, during an international conference co-organized by Pangea World and the University of California, Irvine, and hosted by the Beckman Center of the U.S. National Academies of Sciences, Engineering, and Medicine: [The] "strategy of interlinking and valuing multiple pools of knowledge-rich natural capital with a legacy investment in the Panama islands can provide a new economic geography for the future benefit of our people, said Winston Thompson, Fiji's ambassador to the United States" (University of California, Irvine, 2014).

Panama can play prominently in endowing the transnational resort model with the capacity to elevate the wonder of the natural world's connectivity to a centerpiece of both the ideal and the pursuit of global sustainability. This model's implementation consistently on transnational scales primes it for stewardship of unmatched legacies in championing science diplomacy, for promoting the confluence of science-based and faith-based appreciation and guardianship of nature, and for instigating transnational bridges of peace (Ayala, 2024b). It opens a new frontier for realizing the immense promise of the globe spanning and ever-expanding World Heritage portfolio to foster conservation-centered transnational knowledge economies equipped with an investment platform that translates Earth's evolutionary and ecological connectivity into shared global benefits.

4 Concluding perspectives

The scenarios staged and analyzed by this article in the South Pacific, Eastern Tropical Pacific, and the Isthmus of Panama testify to benefits that evade the existing approaches to harnessing and capitalizing on the power of the World Heritage assets to enrich all humanity. The principal reserve of these dormant benefits exists in the untapped force of the World Heritage not merely to adopt but also to shepherd the ideal and imperative of sustainable development.

Pro-active, cross-disciplinary and borders-blind approaches to identifying sites of universal value and of relationships that further bolster this value could revolutionize the rigor and substance of the "World" qualifier bestowed on the natural and cultural legacies whose benefits are to perpetuate from present through future generations of all humanity. There is much merit in Keough's (2011, p. 613) suggestion that "Member states

should no longer be allowed to submit their own nominations for inclusion directly to the Committee. Several independent groups, comprised of anthropologists, archaeologists, ecologists, and others, should research and recommend worthy sites to the World Heritage Committee.”

A bonanza of opportunities to fortify the “World” qualifier exists in the natural world—and keeps growing with the growing recognition of the need to assemble a strong composite view of that world, including by accelerating convergence among disciplines that traditionally operated at different spatial and temporal scales, such as biogeography and ecology (Jenkins and Ricklefs, 2011) and by employing new spatial phylogenetic methods as a foundation for biodiversity-conservation decisions that, by considering all levels in the tree of life, permit science to identify and protect landscapes that allow for future dynamics (Allen and Mishler, 2022).

The transnational resort model’s business incentive to underwrite scientific exploration of the borderless natural world on the condition that the achieved discoveries will benefit the world could play a pivotal role in facilitating research-based delimitation of series of candidate sites of mutually reinforcing World Heritage merit across both land and marine contexts. In turn, this emphasis on pan-Earth, relationships- and affinities- highlighting science would pave the way for endowing the World Heritage with an unprecedented transformative influence on the global knowledge economy paradigm and trend.

Roberts (2009) analyses the very qualifier of “global” in the context of the knowledge economy, questioning its validity. The analysis draws attention to the fact that while advanced economies derive a high proportion of their economic wealth from the creation, exploitation, and distribution of knowledge and information, most developing countries may well be on the periphery of any emerging global knowledge economy.

Global is the very essence of the earth’s evolutionary and ecological fabric. Given the growing evidence that highly consequential scientific discoveries await in insights into webs of correlations, relationships, and dynamics of the natural world—insights powered by comparative studies whose value is directly correlated with the daringness of their spatial and chronological scales—the global perspective ought to be the point of departure toward the awakening of nature’s knowledge capital. Political borders and the “developed” or “developing” label bestowed on a country are entirely irrelevant to the awakening of what may well be the greatest reserve of the strength, sustainability, and equitable course of the global knowledge economy. In the process, unprecedented opportunities will be created for configuring expansion-prone boundaries of future serial transnational World

Heritage Sites whose stature and universal value will, in turn, bolster the confluence of knowledge and wonder along the transnational paths of scientific exploration.

Paved with wonder and tasked with generating and propagating common good, these veritable “bridges of awakenings” will connote high-profile legacy-investment opportunities in flagship transnational marriages of hospitality and science whose prestige and business value will be directly correlated with the geographical swell of the underwritten research, far beyond tourist itineraries.

This, in a nutshell, is the vision and ambition that the present article aspires to justify as it maps out a journey toward harnessing the earth’s raw material of knowledge to shape the world of tomorrow. The special emphasis it places on aligning this journey with the World Heritage philosophy and promise is intended to ensure that the story of the knowledge mineral will unfold, in perpetuity, as a globally inspiring story and economic paradigm of building “noble wealth” that advances the common welfare of mankind while nurturing its shared heritage.

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