CALIBRE ACESSO ABERTO
CIÊNCIA, FILOSOFIA E TECNOLOGIA

Gibraltar Strait Bimarian Barrier (GSBB)

Richard B. Cathcart[1]
Charles W. Finkl[2]

[1]GEOGRAPHOS, Burbank, California, USA
[2]CERF, Asheville, North Carolina, USA
rbcathcart@gmail.com

Received: 16 May 2023 / Accepted: 20 Oct 2023 / Published: 29 Dec 2023.

Abstract: On-land construction of most of the inexpensive elements of an impermeable durable "fabric" sea-dam separating the Mediterranean Sea from the North Atlantic Ocean will allow speedy installation and early finished facility first use. Despite the vast science-predicted geographical change, including climate change, within the existing Mediterranean Sea Basin we anticipate subsequent built sea-dam "close enough" near-maintenance of the regional environmental status quo; consider encouragement of in-Basin smaller adaptive macroprojects as well as an efficient and sparely organized International Caretaker Council operational authority to be established before 2050-2100 AD. With sea-locks and siphonic small-scale electric power generators allowing seawater inflows, the GSBB can match Basin evaporation with a compensating controlled seawater inflow from the North Atlantic Ocean, keeping most conditions as they are today. The Suez Canal's single sea-lock will work similarly and in tandem with the GSBB. The engineering challenge is to handle a salty fluid that is > 800 denser than air! Successful performance of the GSBB will come in time if the macroproject's planning, execution and handover are up to standard practice. If it judged a failure, the cost of its removal will not be financially onerous or prolonged in time.

Key words: Macro-engineering, artificially stabilized Mediterranean Sea, marine transgression, flexible sea-dam, future climate change, North Atlantic Ocean, navigational alterations, supportive macroproject components, GSBB.

Resumo: A construção em terra da maioria dos elementos baratos de uma barragem marítima de "tecido" impermeável e durável que separe o Mar Mediterrâneo do Oceano Atlântico Norte permitirá uma instalação rápida e uma utilização antecipada do sistema. Apesar da vasta mudança geográfica prevista pela ciência, incluindo as alterações climáticas, dentro da Bacia do Mar Mediterrâneo existente prevemos que a subsequente construção de barragens marítimas dará conta da quase manutenção do status quo ambiental regional; considere-se o incentivo a macroprojectos adaptativos menores na Bacia, bem como a autoridade operacional eficiente e organizada de um Conselho Interno Internacional, a ser estabelecido antes de 2050-2100 DC. Com eclusas marítimas e geradores de energia eléctrica sifónicos de pequena escala que permitam a entrada de água do mar, o GSBB pode combinar a evaporação da Bacia com uma entrada de água do mar controlada e compensatória do Oceano Atlântico Norte, mantendo a maioria das condições como são hoje. A eclusa marítima única do Canal de Suez funcionará de forma semelhante e em conjunto com a GSBB. O desafio da engenharia é lidar com um fluido salgado que seja > 800 % mais denso que o ar! O desempenho bem sucedido da GSBB chegará a tempo se o planeamento, a execução e a transferência do macroprojecto estiverem de acordo com a prática padrão. Se for considerado um fracasso, o custo da sua remoção não será financeiramente oneroso nem prolongado no tempo.

Palavras-chave: Macroengenharia, Mar Mediterrâneo estabilizado artificialmente, transgressão marinha, barragem marítima flexível, futuras alterações climáticas, Oceano Atlântico Norte, alterações de navegação, componentes de macroprojectos de apoio, GSBB.

Introduction

Ongoing and proposed climate change mitigations focused on Earth's air ought to be accompanied by parallel technically practical mitigation plans dealing with the world-ocean's seawater. Soon, society must adopt a new adaptive mindset that is based on predicted future sea-level rise and everyday management of a post-Ice Age marine transgression. That is, a viable human tactical adaptational vision is required which is perhaps one that is derived from past, present-day, and imagined Macro-engineering concepts. For example, it is essential the Mediterranean Sea Basin be apprehended geographically, both holistically and realistically, not as a mare nostrum of merely probable, separately threatened, coastline correctable protective construction or destruction mini-projects. Certainly, a global meter of sea-level rise will reshape the world's coastline, its

major cities (some already equipped with storm-surge barriers) and seaports (such as ancient and beloved Venice, Italy), and its vast uninhabited beaches, cliffs and wetland stretches as well. The total monetary cost of even haphazardly defending the Earth's coastlines by emplacement of protective dikes and seawalls is significantly less than that of avoiding seawater-inundation induced urban damage [1]. Yet, perhaps an even cheaper physical protection scheme may be available for population centers situated east of the Strait of Gibraltar. Taking the form of a seawater impenetrable "fabric" dam, with sea-locks there (also at the northern entrance to the Suez Canal. [erja[s with as safety backup at its southern entrance), spanning the shipping-route between Spain and Morocco, the proposed engineering structure is referred to as the Gibraltar Strait Bimarian Barrier (GSBB). Although truly unassessed yet, the question remains as to how do Mediterranean Sea Basin populations want their national coastlines [2] to appear during the remainder of the 21st Century?

People, lately advised by medical experts have learned about the normal functions of human physiology based on thousands of years of observation. In contradiction, the Earth has been scientifically studied for only a few hundred years. As remarked by Lynn Margulis (1938-2011) "Can you imagine yourself with the task of overseeing your body's physical processes?" [3]. Indeed, caretaking of such a living creation seems a ludicrous notion. Humans [4] appear to essentially constitute a kinetic state of matter as opposed to the thermodynamic states prevailing in the inanimate. Only during the first decade of the 21st Century have geoscientists used supercomputer models to consider the sphericity aspect of Planet Earth: "A mostly forgotten assumption in climate models is that of a flat Earth atmosphere. Spherical atmospheres intercept 2.5 W-m-2 more sunlight and heat the climate by an additional 1.5 W-m-2 globally" [5]. Critical also is the bioshell fact of Homo sapiens ' existence for past millennia [6].

Since at least the mid-1960s AD and almost daily, normal human environmental concerns have been manipulated by elaborate but unperfected computer-projections for impending worldwide climate catastrophe. Numerous such publicized dire warnings have well served those of a certain pecuniary persuasion; that is, those individuals and groups with certain social connections and celebrity status who permit themselves to be intellectually overwhelmed by airy hyperhypotheses and mathematical gibberish. In fact, the impressive government and academia-housed electronic gadgetry, along with the conversationally impressive laboratory-coated modelers and broad-

cast institutional press-release penners, seems to thoroughly stunt normal human imaginations. This onslaught results from those who partake of this addictive certitude that is based on ignorance (nescience) and its drug-like miasma of mapped globalized future disasters. "Climate Science," massaged and emitted by excessively fictionalized electronic and print social-media pronouncements, remains ersatz "science" stultified and intellectually sullied, shifted to inconsequential status in terms of all impending actionable statements of proposed mega-programs of social coercion and public-taxations. With timely politically strategic and tactical duress boldly implied, not inferred, by socially hostile wannabe intellectual masters in government and academia, three-dimensional thinking is fortunately still accomplished by good people (possibly those surviving ostracized "Climate Deniers"?). This situation is due, probably not so extra-ordinarily, to self-control as well as morality, willfulness, and ethicalness. These researchers are thus uncorrupted by imprudent flat-Earth assumptions offered for broadscale consumption by pre-2019 AD so-called climate scientist modelers and their powerful political and monied financial directors.

One may wonder how may non-geoscientists really escape omniscient bureaucratic gazes that mold behavioral influence of these error-prone authorities'diktats? We suggest that possibly quite soon individuals will gain capabilities, with the help of just-dawning artificial intelligence RD (also known as "artificial responsibility"), for modeling personal daily weather forecasts. Additionally, it will be possible to model interesting future local, regional, and global climate regimes from the purview of situation-adjustable family entertainment. Such computer-assisted group fun could be enjoyed during familiar hot dry or humid summertime evenings to avoid sweltering "Hothouse Earth" and cold wintertime days but possibly not a hyper-chilly "New Ice Age Earth"! For instance, developed technology already allows monitoring and prediction of weather events by using TEMPEST, an AI-assisted personal meteorological event-reporting system nowadays sold by WeatherFlow. Such personal facilitation enables macro-imagination to bud. Thanks to the ramifying and amplifying World Wide Web virtual resources, the day will come when people will no longer need national weather service data inputs nor politicized modeled climate warning prognostications from various long-established international organizations. Because technology is improving, climate change alarm-doubters may achieve absolute liberty from the condemnable and unimaginative wannabe thought ghetto-fencers who seem strongly desirous of human civilization's inglorious just-over-the-horizon species doom! Indeed, this is a Bu-

siness as Usual-1 Scenario proposed as the final limitation on Homo sapiens. This scenario features the economic twilight of all humankind, dubbed the "crepuscular planet [Earth]" [7].

As a geopolitical issue, global and regional climate change entails vastly more ambiguity than is perceivable in the popular news media-constrained public discourse about geophysical futurity [8]. Only lately, for example, was the standard datum for the instrumental measurement of the world's oceanic sea level, the "mean sea-level (MSL)" substituted by an improved measurement. Frustratingly, MSL is still referred to and although flawed from its earliest conception, there never was a worldwide fixed international definition. Such an oversight can become financially costly if two or more different sets of national coordinates are employed by separately organized and funded planning and building teams on a mutually beneficial joint megaproject! The introduction of an internationally valid elevation/depth reference system [9] based on the known irregularities of Earth's gravity-field has become useful because the strength and direction of the planet's gravitational force is determined mainly by seawater distribution in a single world-ocean basin. For curious astronomers, the Universe is fully assembled for commerce-oriented professional macro-engineers. The Earth's open bioshell [10] is a place where applied force and planned function can be amalgamated by innovative technological design and modern-day AI-guided additive manufacture [11]. As octogenarians, we notice a depressing alteration in public perception of life, including the Universe and everything within it. As developed so far, Geoscience has instilled an almost disinterested, or sometimes overly passionate, uninformed public outlook that ranges from perception of the life-sustaining world-ocean as "the sea around us" to today's mechanistic "blue machine" driven by the saddening climate change leitmotif of contemporary existential geopolitics. Corrective Macro-engineering plans unavoidably fail when they are underpinned by a failure in the context of human imagination. Innovation, commonly defined as the ability to produce an object (or an idea) that is both original and adequate to a geographically-demarcated place, is a core component of Homo sapiens' ability to promote and cope with various aspects of inevitable Earth-bioshell change [12]. Expert imaginers use their instructive macro-imaginative capacities to impressive community-wide perceived effect as they "... to try to figure out how the world works, or at least, how some aspect of the world works" [13]. Unfortunately, there are numerous real-world regional planning failures that were initiated by groupthink lock-in of a once diverse RD team which be-

came totally focused on promotion of a specific desired Earth-bioshell development, functioning as an interest group only [14].

As the world turns toward infrastructure gigantism

Human action within the Universe-imposed gravitational constraints of the Earth-bioshell, while still assumed by the world-public to be vigorous, is now systematically slowing [15]. William Lee Steffen (1947-2023) [16] first illustrated in a generalized diagram the ongoing deceleration of human-centered provoking facets of global bioshell change, including global climate change, yet he mostly ignored his own chart-line's important implications [17]. In other words, Steffen did not recognize potential eucatastrophe, the favorable future trend for Homo sapiens instead of an impending disaster. Instead, this concept expressed in more comprehendible terms would be called "salvation" when viewed as the preservation from ruin, deliverance from difficulty and imponderable danger! The canonical Section 27 statement from the 1987 Brundtland Commission report Our Common Future: Report of the World Commission on Environment and Development boldly asserts "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs". In a spirit of charity, we assume Steffen's continuous explanatory omission was deliberate, meant to induce hubristic macro-engineers to be truly humble about the limits of what they know, what they can know, and about the gap between what they plan and what they ultimately deliver to this planet's reality. The difference comes not from their own incapacity to deliver on the ballyhooed megaproject plans, but from inevitable unknowns or absent facts that cannot be efficaciously daisy-chained to form a reliable objective single factor. These factors are what often render such grandiose plans an inspiration for protesting comedy skits. (A Californian, the engineer William Henry Smyth (1855-1940) coined "technocracy" in AD 1919 while a UK sustainability authority neologized "avivocracy" as its first antonym almost a century later [18].) We care to believe that, perhaps, W.L. Steffen intentionally sought to forestall the usual dreary European dreams of cheap future electricity-powered decadence?

Bernard Gottschalk (1935-2021) mathematically speculated by an unusual newspaper-published graph that indicated a 0.10 C thermal spike of global air temperature co-incident with the Second World War [19]. Europe above ground level was somehow affected despite the massive shading aviation contrails [20] and daily large ground-impact explosive shockwaves that distorted the ionosphere above

[21]. The import of these collective findings is highlighted by the fact that predicted global climate change becomes financially too risky whenever the advancement of human-generated technologies is forgotten or underplayed by modelers! As of mid-2023 AD, most corporate and governmental climate change researchers worldwide do not support Green-style economic growth [22]. In fact, their preferred stance is civilizational "degrowth" or depopulation, a geopolitical position that is greatly out-of-step with the world-public's vociferously expressed desires for a common need for positivity, hope, and suitable rewards for appropriate behaviors [23]. Indeed, the model named International Futures suggests a human bioshell-confined living species that is anticipated to exhibit, or at least realistically characterized, as high-poverty and fast population increase, but with moderate energy demands and aerial carbon dioxide gas emissions [24]. As an understatement, let us indicate that we are somewhat bewildered by these contrasting announcements! Nevertheless, and despite these repressive purviews, we pursue our own course of macroproject proposals based on the facts at hand. That is, the known laws of the Universe help distinguish the impossible from the merely probable [25].

North Europe earth-fill sea-dams, the NEED

The American geographer Jerome E. Dobson bestowed the dual-media designation "Aquaterra." This collective toponym identified landscapes that were cyclically inundated (flooded or drowned) by seawater and then again exposed to the ambient air. This repeated increase (rise) and decrease (fall) of sea level during multiple ice age cycles in the Late Pleistocene (130,000 -11,700 YBP, years before the present-day) took place after the first Earth-bioshell appearance of biologically modern Homo sapiens until "today" [26]. Aquaterra's dry-landscape area was approximately the size of South America, it was all coastal (shallows + "beaches"), flat (wind-wave suppressed gradient), and mostly located within the planet's Equatorial Zone. In other words, the human species has much long-term experience with naturally transforming coasts and strand dwelling survival macro-problems! The people of the Netherlands, since circa 1818 AD, have rightly boasted that "God created the world, but the Dutch created the Netherlands" [27]. In other words, Netherlanders, like others who elsewhere settled near vertically variable, tidal, and storm surge effected zones, studied perceptible climatic change. These sometimes-drastic regime changes compelled the projection of affordable region-specific actionable adaptation and mitigation plans [29]. The successful performance of durable megaprojects, however,

always depends on what happens during planning, execution, and handover to operational staffers. Macroprojects are, off course, fully or partially imagined before they are materialized and utilized while many conceptualizations only ever exist as residual (un)recorded memories in the human mind! And yet, their prospective realization can have palpable effects on civilization's demeanor for decades. This situation obtains because this tentative state bestows a momentary investment in hardware, time, and manpower for examining and acquiring the precise knowledge (at the macroproject proposal stage of development) determines cost-effectiveness. Jesus' habit of bountiful excess whenever it came to meeting peoples expressed needs and literally anoints him as an historically notable macro-engineering specialist.

Complementing concepts of the "blue machine" are fashionable "blue humanities" narratives [30]. These discoveries focus on present-day world-ocean explanations that are partially founded on accumulating accurate geophysical and geopolitical facts concerning seafloor terrain, from shorelines to the deep trench depths as discovered by mobile humans during prior millennia [31]. Ever since anthropoids became Homo sapiens, humans have been beset by constant biological and psychological adaptational bioshell stresses, the so-called polycrises, which is a collective term for synchronous and interwoven species survival macro-problems [32]. Unfortunately, the widespread and indiscriminate use of "polycrises" as a pejorative buzzword inserts a thought-limiting fence that blocks debates regarding macro-engineering's most exuberant innovational concepts that offer alternatives to the status quo. Climate change, caused by recognized and still to be determined factors, is a macro-problem of primary concern to humans viz. sublimation of the Polar Zone icecaps, marked shrinkage of mountain range glaciers almost everywhere presents humanity with ecological shifts of huge landscape scope [33] as well as unfamiliar coastline submergence. For all European nations, including western Russia, North Africa, and the Middle East, faltering of the North Atlantic Ocean Overturning Circulation translates to a worrisome and, possibly geopolitically bothersome, climate change that may result in an encompassing polycrisis of unprecedented geographical consequence [34].

In all probability, Earth's future climate, composed of many weather regime climate regions, will be unprecedented in the recorded history of humankind. Although highly mobile and physiologically-socially adaptable, the people of Earth's bioshell tend to avoid insalubrious places that might be 120 C and receive 25 cm/year of

precipitation [35]. Instead, many geoscientists mull chemical engineering concepts that might lead to industrialization of the Earth's air-shell, significantly reducing its gaseous carbon dioxide concentrations. On the other hand, potential future increases in atmospheric carbon dioxide content will stimulate biomass accumulation of annual plants whereas an artificial return to lower Pleistocene Ice Age carbon dioxide concentrations will reduce biomass approaching 90% [36]. Annuals include vital food crops for humans and ranched domesticated grazing beasts. Governments, commercial and even philanthropic organizations are increasingly directing available monies toward the development of techniques to change the gaseous and sometimes, too, the particulates (dust, nanoplastics [37]) content of the atmosphere. For our purposes here, and following its discoverer, Peter M. Saunders [38], the world-ocean's air-seawater interface is composed of a one-meter-thick assemblage of different seawater layers varying vertically and horizontally in temperature and salinity. Ignoring pollution from sewage outfalls [39], shipping mishaps and operations etc., humans have influenced the sheer bulk and flows of this topmost layer of the world-ocean through freshwater impoundments on landscape [40]! Hydropower facilities help to illuminate the world's huge expanse of cities [41]. However, new electricity production may be installed aboard floating PV power-stations, perhaps even spanning the entire length of the Earth's Equator like some gargantuan hula-hoop [42] which might also power sun-spectrum lamps strung above the tree canopy of the Tropic Zone rainforests (say, of the Amazon River and Congo River basins) to foster a massive uptake of aerial carbon dioxide by green plants 12 hours daily [43].

European ideas for sea-dams stem from intentions to recover some of the previously lost "Aquaterra" or to prevent future loss of extant landscapes to ongoing sea-level rise. One of these of recent elaborations, the Northern European Enclosure Dam (NEED) [44], Figure 1, supposedly was devised to showcase the macro-size of infrastructure that would be required for one region if global sea-level rise continued unabated. NEED is comprised by three earth-fill embankments. The first being a 161 km-long dam between Brittany, France, and Cornwall (England) followed by a 331 km-long barrier spanning the ocean gap between Norway and the Shetland Islands (Scotland) and finally completed by a constructed interruption of 145 km filling the north of Scotland to the Shetland Islands. Presumably NEED shields about 6,000 km of northwest European coastline and possibly reduce the influx of climate refugees. Totaling 637 km, with a stabilized volume of 36 cubic km (approximately one hundred times the AD 1932-completed Afsluitdijk barrier linking the provinces of

Figure 1: *NEED, its three dams and the resulting controlled freshwater lake (Google image).*

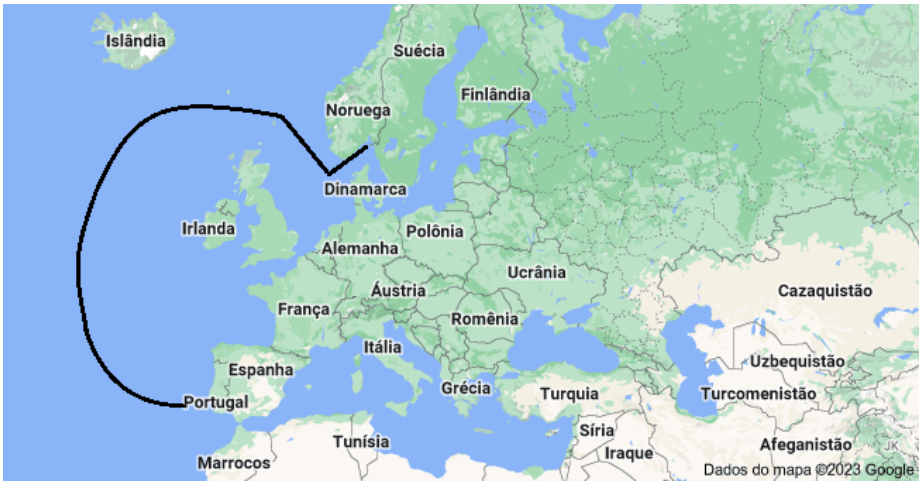

Figure 2: *The debated ridiculous focus map of a European student contestation (U. Leiden image).*

Noord-Holland and Fryslan, and converting saltwater of the Zuider Zee to a freshwater reservoir named Ijsselmeer) NEED would constitute a western European multilateral scheme that could potentially become a freshwater lake [44]. In effect, NEED is an enlargement of

an idea offered by Swedish oceanographer Stig H. Fonselius (1921-2003) a half-century earlier to isolate the Baltic Sea, making it a potable water reservoir serving all northern Europe [45]. However, during AD 2023, a public debate was organized by Universiteit Leiden, held 20 April 2023, on the topic "Should we build a European mega-dam?" Artistic license was prevalent since the debate focused on a misleading chart, without bathymetry, of an enclosure dam quite remarkably different from the more accurate straight-line NEED! Figure 2.

The planimetric chart offered to pro/con debaters by the contest's officiators appears to be an inverted interrogation point (?), without the dot beneath the curl and lobe. It is a cartographical travesty, invalid oceanographically, as well as a deliberate exhibition by the debate sponsor, the Kring of Coastal Engineers, that mocks the Macro-engineering idea of NEED. What might be Portugal's motive for associating itself with such a bathymetric blunder? Could NEED halt harm to western Europe's seashores from another Storegga tsunami like the one that terminated availability of once-inhabited "Doggerland" [46]? (Dutch planners seem to anticipate such a destructive sea-wave process-event by their determined investigation of mega-scale offshore sand extraction in one place of 20 billion cubic meters that results in a final rectangular trench in the seabed that is 224 km-long by 15 km wide of minimal depth 6 m that will affect the southern North Sea tidal range by several centimeters [47].) Oddly, on 17 August 2023, Sweden's government authorized, without controversy whatsoever, the expenditure of four million Krona (USD 364,000), administered by Dr. Celine Heuze, to examine the proposition: "Would the Northern European Enclosure Dam really protect Sweden from sea level rise?" The investigative group's Final Report is due for release during December 2024 AD. One may well wonder about the non-simultaneous same-year coincidence of these public macro-project representations. Fenno-Scandinavia is being elevated by post-Ice Age glacial unloading while the Netherlands, along with southern England, is known to be subsiding. Perhaps anticipating the fabulous financial costs of NEED, the Netherlands wishes to off-load further public NEED RD to other Europeans, the "we" (European Union) of the debate's title? Our query is answered by Hugo Kim Nota's Master of Science thesis, defended on 24 February 2022, that concluded: "For the Netherlands, it can be seen that it will have to bear a significant amount of the NEED costs due to its high exposure risk. . . " [48]. Unlike NEED, which can be implemented piecemeal, the grotesquely charted version debated must be rejected in toto as a worthless macro-engineering notion.

Its purpose is to negatively nudge public opinion so that it will not to be built. Besides, the UN Environmental Programme, voiced its concern about the under-recognized stress on the Earth-bioshell's biodiversity of marine sand mining, amounting to six billion tonnes per annum at the present time (AD 2023).

South Europe fabric sea-dam, the GSBB

What is the motivation for thinking from a macro-engineering point of view? For us, such a procedure could reveal how much Homo sapiens might gain infrastructurally if people really wanted to progress past the level of major bioshell project technologies that are extant. Oftentimes, macroprojects are offered to funders with several alternatives as Plan A, Plan B, et cetera. No one ever alludes to a Plan Z (at the end of the alphabet) because such a presentation would likely be assumed as crackpottery! "Balmy" in the English-language is an adjective used to describe a prevailing weather regime that is pleasant, warm, and calm but the same word can also be utilized to describe someone, or the technically realizable idea of some physical thing, that is presenter-condemned as being foolish or irrational to undertake. Viewable on YouTube are a plethora of unserious videos about macroprojects, most of which feature the phrase "insane plan" in their titles, viz. "Atlantropa: The Insane Plan to Drain the Mediterranean" first offered by MEGAPROJECTS during January 2023. Possibly there exists a reverence for the Mediterranean Sea Basin that does not exist for the North Sea? Or, maybe, it is reverse commercial and geopolitical sales psychology? Whatever is the case, there is a pronounced renewal of public interest in macroprojects worldwide. And, the Strait of Gibraltar is one place of especial interest to many persons. Figure 3.

A sill is a seafloor barrier of relatively shallow depth restricting seawater movement between basins and such is the geomorphic status, for millions of years, of the Strait of Gibraltar. Since the mid-1960s, the professional ideology of macro-engineering has delegated those trained and skillful persons to be tasked with special responsibilities to undertake macroprojects that harness topographic features of the Earth-bioshell. These enormous technologies are designed for implementation to present beneficial and enlightening new geophysical situations to all wise people. Nevertheless, some macroproject plans were sometimes fiascos resulting from unreasonable mechanistic thought. That is, they were not germane to solving the macro-problem at hand and were possibly even utterly inchoate! For example, professional Italian architect Cristiana Penna's 2024 book,

Figure 3: *International Space Station astronaut taken oblique photograph ISS069-E-3412, acquired on 14 April 2023, showing the 13 km-wide Strait of Gibraltar situated between the Iberian Peninsula (Spain) and northern Morocco in Africa, a unique seawater connection between the North Atlantic Ocean and the Mediterranean Sea which naturally throttles seawater exchanges between both saltwater bodies (NASA image).*

Atlantropa 2.0: The Euro-African Continent, published in English by Letteraventure in Italy, recounts the sad lifetime story of notoriously idee fixe German architect-engineer Herman Sorgel (1885-1952), the primary butt for many of those silly "insane" macroproject histories outlined in sensational, brief YouTube videos. His monstrous Atlantropa concrete dam designed for emplacement within the Strait of Gibraltar was, by itself, unsafe, costly, and inappropriate. For example, modern concrete (but not ancient Roman concrete) once immersed in seawater deteriorates quickly and might have aged rapidly because of inadequacy of design, construction, or operation. Because the tsunamigenic tectonic plate boundary between Africa and the Iberian Peninsula is located beneath the Alboran Sea [49], Sorgel's design blueprint was undoubtedly structurally insufficient for the imposed tasks he optimistically imagined for it. The word "macro-engineering" evidently had its first print appearance in the British weekly science news roundup magazine New Scientist, on 12 March 1964 at page 685. There, anonymous columnist "Geminus", in his article "It Seems to Me", elegantly alleged: "The real cause of our attachment to macro-engineering is at once more subtle and more profound". Yes, because the fantastic is fascinating! Many of macro-engineering's productivity macro-problems are caused more by internal rather than external disruptors. Macroprojects can vary from

the molecular to the planetary and beyond, out to the farthest places of this Universe. Especially in formal schools there is much talk about investing in macroproject RD, but de facto most researchers invest in refining old ideas. This kind of situation obtains because the Earth-bioshell's reality remains theoretical. Curiosity-prompted RD is thus considered marginal, if not useless, because it is not immediately productive. Making a region of the bioshell world-ocean, namely the Mediterranean Sea Basin, into a managed compartment of Spaceship Earth" [50] is a kind of boldness that was rarely seen until technically detailed discussions of terraforming Mars commenced. Indeed, a night-lit NEED would be visible to humans equipped with small telescopes dwelling, temporarily or constantly, on Mars [51]. It is a well-known fact that sea level is affected by river dams on land [52]. Additionally, groundwater mining on land, echoing Archimedes old-time assertion, has shifted the trajectory of Earth's polar drift [53]. Contemplating the Earth's atmosphere 20 C warmer than today [54], as it seems to us, fosters among macro-engineers a tendency to launch more vigorous worldly speculations that possibly adopt some professional techniques used by future-minded persons [55].

Some supercomputer climate models suggest that widespread wind- and solar-power installations, if imagined as "farms" covering the Sahara and Sahel landscapes of northern Africa, would increase air temperature, rainfall, and vegetation. Following that projection, digital modelers assume that such well-spaced facilities affixed to >9 million square kilometers of desert and drylands would possibly generate 82 TW, about 4.4 times human civilization's AD 2023 energy production [56]. But it should be noted that at a conservative 2% compounded annual growth rate, 18.5 TW cannot be doubled in less than 134 years! Thus, beneficial power-plant "farms" built in drylands might conceivably substitute for hydro-power. That is, it might be unnecessary to construct the trans-Gibraltar Strait Herman Sorgel-style concrete dam twin powerhouses because output would exceed actual human bioshell needs for electrical energy before 2100 AD. (Reportedly, by circa 2027 AD, the first phase construction will be completed by Xlinks Morocco-UK Power Project to transmit 10.5 GW via two 1.8 GW HVDC subsea cables 3,800 km, from a 1,500 square kilometer solar and wind farm in Morocco (Guelmim-Qued Noun region) to Alverdiscott, North Devon, England.) As macro-engineers, we see this exuberant innovational landscape development as a potential extension of the geography of biological rewilding opportunities occurring concurrently with civilization's "Great Deceleration" [15]. Increases of precipitation are projected for western

China and central Asia, hosting China's riskiest climate change stimulator called the Belt and Road Initiative [57]. Furthermore, Europe may become the main market for green hydrogen fuel manufactured and exported from northern Africa, especially Morocco and Egypt, before AD 2050.

Recent mathematical problem treatments have decisively shown that a hydrogen gas-methane blend can be transferred through former pure natural gas pipelines via land and submarine routes [58]. While electrical cables can be buoyant (for example, US Patent 3795759 issued to William A. Rhyne in March 1974), present trans-Mediterranean Sea underwater pipelines can perhaps be shut-down or abandoned with a change-over to green hydrogen or re-purposed to prevent the development of dead zones within a closed-off world-ocean division. Hypoxia alleviation, a means to technically raise the dissolved oxygen concentration in a large volume of seawater by bubbling air from undersea pipelines, appears mandatory to us, the contemplators of a pendulous draped fabric GSBB. We propose a cure that uses in-place non-operational submarine natural gas pipelines to aerate an isolated Mediterranean Sea. Such a macroproject was previously suggested for the Baltic Sea [59] and it now appears that the currently non-functional 1,234 km-long Nord Stream-2 natural gas submarine tube offers an interesting re-dedicated use prospect for Macro-engineers. As the Mediterranean Sea waters warm, more marine species of life will migrate downward to reach cooler seawater [60].

The Gibraltar Strait Bimarian Barrier would be composed of an impermeable fabric, a complete physical interruption that precludes migration of Mediterranean Sea marine life or its seawater into the North Atlantic Ocean but the GSBB will have some fixable, even preventable, biofouling [61]. (Alien, or invasive, marine life species are spread throughout the Mediterranean Sea by recreational vessels, commercial and naval traffic, refugee rafts, and the lack of a truly effective brine-barrier in the lakes of the central part of the Suez Canal shipping route.) Bigger dead zones must result when the seawater column is warmed and acidification of seawater results from increased uptake of aerial carbon dioxide by absorption. A macro-project, involving the onerous annual discharge from tankers of millions of metric tons of slaked lime constantly, to achieve a yearly total alkalinization of the Mediterranean Sea has been computationally studied and found to be efficacious [62]. Artificial marine upwelling to lift nutrients from near the sea-bottom to overhead marine life (mostly living in the euphotic zone) has been proposed to sequester aerial

carbon dioxide in seawater. We do not examine that technology's possibilities here. Construction materials and labor for the GSBB might be brought to Morocco's Tangier Med Port for storage and housing because it offers the greatest container capacity near the Strait of Gibraltar, but outside of the Basin proper. Tangier Med Port, unfortunately, is open to storm surges and tsunamis as proved by the storm surge of AD 1913 and the tsunami of AD 1755 that devastated Lisbon, Portugal as well as damaging major earthquakes such as that of AD 2023. Entirely artificial harbor constructions first appear in the Basin's archaeological record during the Iron Age, 1200-600 BC; more such maritime refuges for commercial shipping during storms may be built in the future because we are now equipped with massive earthmoving machines.

Discussion

We discard as completely infeasible, as well as useless, the spurious idea of filling the Gibraltar Strait with a dike-like rock-fill originally proposed in 1997 AD [63]. Similar structural control dams, also composed of mounded rocks as presented in 2015 AD [64] and 2022 AD [65], equally fail to result in cheaper blockade solutions. On the contrary, our hung fabric GSBB has been fully explicated. That is, its ultimate function on-land parts fabrication means of marine installation, its minimal siphonic hydropower plant output, and its final use by Mediterranean Sea Basin societies were previously described in an AD 2019 book chapter [66]. Our inspiration for the GSBB came from the flexible kinetic constraints used by highway and railway builders for the prevention and control of geological disasters on sloping and terraced landscapes, e.g., landslides. These roadway and town protections absorb the kinetic energy of falling material impacts, some have been tested >10,000 kJ by significant inelastic deformation. Basin members of an International Caretaker Council, in a sense an absorber of ongoing Basin geopolitical conflicts, would be responsible for maintaining the present-day level of the Mediterranean Sea. Artistically, but only when ship or boat-viewed from the North Atlantic Ocean side of the GSBB, the GSBB amounts to a watery version of Architecture's public garden and zoo "Ha-Ha" optical illusions designed to keep people apart from secured areas. There is no requirement for a grander-scale geopolitical organization because the stoppage of seawater flow that is outgoing from the Mediterranean Sea seems almost inconsequential considering the vastness of climate change, weather regimes occurring during the 21st Century [67-69] and because, too, only one major infrastructure refurbishment will be required. That is the addition of a sea-lock, or two for

safety, at the Suez Canal that is/are capable of safely restraining a one-meter seawater difference near Port Said [70] or Port Suez. A Mediterranean Sea kept one-meter lower in elevation than the rest of the world-ocean would cause the excluded seawater to rise 0.0005 meters from that single cause. Undoubtedly, a sea-lock situated in the Basin at Suez would help to mitigate any tsunami striking Egypt's coast at the Suez Canal's northern entrance [71]. The ICC might be established with a Memorandum of General Agreement on the Current Geographical Situation. Spain and Morocco would need to constantly confer, serving as the GSBB's guardians for all other Basin ecosystem-states. There can be, then, little question of "Neo-colonialism" in international relationships within the Mediterranean Sea Basin.

Conclusions

We concur with Langdon Winner's astute assertion that all technical artifacts have political overtones [72]. The estimated volume of 1.27 cubic kilometers of piled rocks and dredged sand comprising barrier components for one sea-dam are too costly to consider as suitable for a world-ocean compartmentalization "wall" sited in the Strait of Gibraltar, even though this site is the best place to throttle inter-basin seawater flows. Of course, when the GSBB is operational there will be variations in sea level and continued crustal deformation of the Mediterranean Sea Basin. For instance, Venice, Italy, will still require its MoSE, which first successfully tested its lift-gates by simultaneous elevation on 3 October 2020, to ward off Adriatic Sea storm surges. Additionally, continued status quo sea levels offer saving little recalibration for the underwater ANTARES, ARCA and ORCA neutrino telescopes or the massive improvements necessary to maintain the functioning of coastal airports [73]. The polysemy of the word "model", as in supercomputer model of climate change, is the first obstacle to proper assessment of the GSBB's worthiness. Therefore, public dialogues should concern the risks of GSBB construction, operation, or even destruction. Cogent public discussions may theoretically display a macro-engineering approach that is fruitful and encouraged by relevant supervisory organizations that offer widely respected value concepts of the present-day world. Disparate societies that comprise human civilization are subject to unexpected exogenous inputs. Because these factors are so complex, it would be counter-productive to add any component of social engineering to the realization and operation of the GSBB. Would it not be foolish to cause the demise of a real-world 21st Century "Atlantis"? Paradoxically, some Earth-bioshell climate manipulators

who grandiosely dub themselves parasol-purveying "geo-engineers," offer to block incoming sunshine with transparent refractive surfaces composed of manufactured ultra-thin polymeric films and bunched nanotubes deployed in outer space between the Earth and Sun [74]. The boldness of this concept arouses curiosity as well as ordered contemplative faculties, resulting in a kinder and gentler re-assessment of the worth of NEED by recalling the early-18th Century satire penned by the wit Jonathan Swift, Thoughts for a Project for Draining the Irish Channel [75]. So, perhaps the NEED episode of public exposition was really a work of art? Re-reading Figure 2, possibly the organizers of the NEED debate intended to portray a human ear [76], meant to mimic the Vitruvian ideal of the human body! Like the Dutch, we, and others like us would enjoy being heard, our ideals and ideas at least rationally considered.

References

[1] Hinkel, J.; Vafeidis A.T.; Perrette, M.; Nicholls, R.J. Coastal flood damage and adaptation cost under 21st century sea-level rise. PNAS 2014 111, 3292-3297.

[2] Sengputa, D.; Choi, Y.R.; Tian, B.; Brown, S.; Meadows, M.; Hackney, C.R.; Bannerjee, A.; Li, Y.; Chen, R.; Zhou, Y. Mapping 21st Century Global Coastal Land Reclamation. Earth's Future 2023 11, e2022EF002927.

[3] Margulis, L.; Living by Gaia. 2016 In Talking on the Water: Conversations about Nature and Creativity, edited by Johnathan White, 76. San Francisco: Sierra Club Books.

[4] Went, F.W. The Size of Man. American Scientist 1968 56, 400-413.

[5] Prather, M.J.; Hsu, J.C. A round Earth for climate models. PNAS 2019 116, 19330-19335.

[6] Beckage, B.; Lacasse, K.; Winter, J.M.; Gross, L.J.; Feffer-man, N.; Hoffman, F.M.; Metcalf, S.S.; Franck, T.; Carr, E.; Zia, A.; Kinzig. A. The Earth has humans, so why don't our climate models? Climatic Change 2020 163, 181-188.

[7] Valero, A.; Agudelo, A.; Valero A. The crepuscular planet: A model for the exhausted atmosphere and hydrosphere. Energy 2011 36, 3745-3753.

[8] Hulme, M. (2023) Climate Change Isn't Everything: Liberating Climate Politics from Alarmism. Cambridge UK: Polity Press. Pages 70-71.

[9] Sanchez, L.; Agren, J.; Huang, J.; Wang, Y.M.; Makinen, J.; Pail, R.; Barzaghi, R.; Vergos, G.S.' Ahlgren, K.; Liu, Q. Strategy for the realization of the International Height Reference System (IHRS). Journal of Geodesy 2021 95, 33.

[10] Finkl, C.W.; Cathcart, R.B.; Serpa, N.S.C.; Isvoranu, D.; Badescu, V.; Dourado, F. Effects of an asteroid impact-generated South Atlantic Ocean Tsunami upon Guanabara Bay, State of Rio de Janeiro, Brazil. CALIBRE: Revista Brasiliense de Egenharia e Fisica Aplicada 2023 8, 16.

[11] Shoemaker, T.A.; Beaino, C.; Centella, D.M.; Zhao, W.; Tanissa, C.; Lawrene, J.; Hashash, Y.M.A. Generative AI: The New Geotechnical Assistant? ASCE Journal of Geotechnical and Geoenvironmental Engineering. 2023 149, 02823004-1.

[12] Smil, V. (2023) Invention and Innovation: A Brief History of Hype and Failure. Cambridge, MA: MIT Press. 219 pages.

[13] Kind, A.; The Skill of Imagination. 2023 In Routledge Handbook of Philosophy of Skill and Expertise, edited by Ellen Fridland and Carlotta Pavese, 335-346. London: Routledge. 542 pages.

[14] Jamieson, D. Ethics, and intentional climate change. Climatic Change 1996 33, 323-336.

[15] Nielsen, R.W. Anthropogenic data question the concept of the Anthropocene as a new geological epoch. Episodes, Journal of International Geoscience 2021 45, 257-264.

[16] Oldfield, F. In memory of Will Steffen, 1947-2023. The Anthropocene Review. 2023 10, 474-478.

[17] Steffen, W.; Sanderson, A.; Tyson, P.D.; Jager, J.; Matson, P.J.; Moore III, B.; Oldfield, F.; Richardson, K.; Schellnhuber, H.J.; Turner II, B.L., Wasson, R.J. 2005 Global Change, and the Earth System: A Planet Under Pressure. New York: Springer-Verlag. 348 pages.

[18] Hudson, M. Ending technocracy with a neologism? Avivocracy as a conceptual tool. Technology in Society. 2018 55, 136-139.

[19] Gottschalk, B. Global surface temperature trends and the effect of World War II: a parametric analysis (long version). Posted 19 March 2017 at arXiv: 1703.06511v1.

[20] Ryan, A.C.; MacKenzie, A.R.; Watkins, S.; Timmis, R. World War II contrails: a case study of aviation-induced cloudiness. International Journal of Climatology 2011 32, 1745-1753.

[21] Scott, C.J.; Major, P. The ionospheric response over the UK to major bombing raids during World War II. Annales Geophysicae 2018 36, 1243-1254.

[22] King, LC.; Savin, I.; Drews, S. Shade of green growth skepticism among climate policy researchers. 2023 Nature Sustainability. https://doi.org/10.1038/s41893-023-01198-2.

[23] Morris, S.; Carlos, C.; Kistruck, G.M.; Lount Jr., R.B.; Thomas, T.E. The impact of growth mindset training on entrepreneurial action among necessity entrepreneurs: Evidence from a randomized control trial. 2023 Strategic Entrepreneurship Journal 1-23. DOI: 10.1002/sej.1472.

[24] Burgess, M.G.; Langendorf, R.E.; Mayer, J.D.; Dancer, A.; Hughes, B.B.; Tilman, D. Multidecadal dynamics project slow 21st-century economic growth and income convergence. Communications Earth Environment 2023, 4, 220.

[25] Berryman, S. How Archimedes Proposed to Move the Earth. 2020 Isis 111, 562-567.

[26] Dobson, J.E. Aquaterra incognita: Lost land beneath the sea. 2014 Geographical Review 104, 123-138.

[27] Mostert, E. Water and national identity in the Netherlands; the history of an idea. 2020 Water History 12, 311-329.

[28] Bijker, W.E. The Oosterschelde Storm Surge Barrier: A Test Case for Dutch Water Technology, Management, and Politics. 2002 Technology and Culture 43, 569-584.

[29] Park, T.; Hashimoto, H.; Wang, W.; Thrasher, B.; Michaelis, A.R.; Lee, T.; Brosnan, I.G.; Nemani, R.R. What Does Global Land Climate Look Like at 20 C Warming? 2023 Earth's Future 11, e2022EF003330.

[30] Muka, S. 2023 Oceans under Glass: Tank Craft and the Sciences of the Sea. Chicago: University of Chicago Press. 240 pages.

[31] Trethewey, L. 2023 The Deepest Map: The High-Stakes Race to Chart the World's Oceans.

[32] Morin, E.; Kern, B. 1999 Homeland Earth: A Manifesto for the New Millenium: Advances in Systems Theory, Complexity, and the Human Sciences. Cresskill NJ: Hampton Press. Page 74.

[33] Bosson, J.B.; Huss, M.; Cauvy-Fraunie, S.; Clement, J.C.; Costes, G.; Fischer, M.; Poulenard, J.; Arthaud, E. Future emergence of new ecosystems caused by glacial retreat. 2023 Nature 620, 562-569.

[34] Marriner, N.; Kaniewski, D.; Pourkerman, M.; Vacchi, M.; Melini, D.; Seeliger, M.; Morhange, C.; Spada, G. Forecasted weakening of Atlantic overturning circulation could amplify future relative

sea-level rise in the Mediterranean: A Review of climate and tide-gauge data links. Earth-Science Reviews 2023 242, 104456.

[35] Tol, R.S.J. The climate niche of Homo Sapiens. Posted 22 May 2023 at arXiv: 2306.00002v1.

[36] Temme, A.A.; Liu, J.C.; Cornwell, W.K.; Aerts, R.; Cornelissen, J.H.C. Hungry and thirsty: Effects of CO2 and limited water availability on plant performance. Flora 2019 254, 188-193.

[37] Allen, S.; Allen, D.; Moss, K.; Le Roux, G.; Pheonix, V.R. Examination of the ocean as a source for atmospheric microplastics. 2020 PLoS ONE 15, e0232746.

[38] Saunders, P.M. The Temperature at the Ocean-Air Interface. Journal of the Atmospheric Sciences 1967 269-273.

[39] Tuholske, C.; Halpern, B.S.; Blasco, G.; Villansenor, J.C.; Frazier, M.; Cayfor, K. Mapping global inputs and impacts of human sewage in coastal ecosystems. 2021 PLoS ONE 16, e0258898.

[40] Hawley, W.R.; Hay, C.C.; Mitrovica, J.X.; Kopp, R.E. A Spatially Variable Time Series of Sea Level Change Due to Artificial Water Impoundment. 2020 Earth's Future 8, e2020EF001497.

[41] Zhang, Y., Li, X.; Wang, S.; Yao, Y.; Li, Q.; Tu, W.; Zhao, H.; Zhao, H.; Feng, K.; Sun, L.; Hubacek, K. A global North-South division line for portraying urban development. 2021 iScience 1-17.

[42] Silalahi, D.F.; Blakers, A. Global Atlas of Marine Floating Solar PV Potential. 2023 Solar 3, 416-433.

[43] Gao, Y.; Liang, S.; Wang, D.; Li, Y.; He, B.; Jia, A. Exploration of a novel geoengineering solution: lighting up tropical forests at night. 2022 Earth System Dynamics 13, 219-230.

[44] Groeskamp, S.; Jkellsson, J. The Northern European Enclosure Dam for if Climate Change Mitigation Fails. 2020 Bulletin of the American Meteorology Society 101, E1174-1189.

[45] Fonselius, S.H. Stagnant Sea. 1970 Environment 12, 2-11, 40-48.

[46] Walker, J.; Gaffney, V.; Fitch, S.; Muru, M.; Fraser, A.; Bates, M.; Bates, R. A great wave: the Storegga tsunami and the end of Doggerland? 2020 Antiquity 94, 1409-1425.

[47] de Boer, W.P.; Roos, P.C.; Hulscher, S.J.M.H.; Stolk, A. Impact of mega-scale sand extraction on tidal dynamics in semi-enclosed basins: An idealized model study with application to the Southern North Sea. 2011 Coastal Engineering 58, 678-689.

[48] Nota, H.K. 2022 Northern European Enclosure Dam: Financial Feasibility of Large-Scale Adaptation Strategies for Future SLR in Northern Europe: NEED vs DIKE REINFORCEMENT. TUDelft: Delft University of Technology. TUDelft: Delft. Page iii. [An electronic version of this Thesis is available at http://repository.tudelft.nl/.

[49] Pena, L.G.; Ranero, C.R.; Gracia, E.; Booth-Rea, G.; Azanon, J.M.; Tinivella, U.; Yelles-Chaouche, A. Evidence for a developing plate boundary in the western Mediterranean. 2022 Nature Communications 13, 4786.

[50] Deese, R.S. The artifact of nature: 'Spaceship Earth' and the dawn of global environmentalism. 2009 Endeavour 33, 70-75.

[51] Beech, B.; Seckbach, J.; Gordon, R. (Eds.) 2022 Terraforming Mars. New York: Scrivener Publishing. 566 pages.

[52] Hawley, W.B.; Carling, C.H.; Mitrociva, J.X.; Kopp, R.E. A Spatially Variable Time Series of Sea Level Change Due to Artificial Water Impoundment. 2020 Earth's Future 8, e2020EF001497.

[53] Seo, K-W.; Ryu, D.; Eom, J.; Jeon, T.; Kim, J-S.; Youm, K.; Chen, J.; Wilson, C.R. Drift of the Earth's Pole Confirms Groundwater Depletion as a Significant Contributor to Global Sea Level Rise 1993-2010. 2023 Geophysical Research Letters 50, e2023GL103509.

[54] Park, T.; Hashimoto, H.; Wang, W.; Thrasher, B.; Michaelis, A.R.; Lee, T.; Brosnan, I.G.; Nemani, R.R. What Does Global Land Climate Look Like at 20 C Warming? 2023 Earth's Future 11, e2022EF003330.

[55] Merrie, A.; Keys, P.; Metian, M.; Osterblom, H. Radical ocean futures-scenario development using science fiction prototyping. 2018 Futures 95, 22-32.

[56] Li, Z.; Zhang, Q.; Milier, P.A.; Zhang, Q.; Bernteil, E.; Smith, B. Impacts of large-scale Sahara solar farms on global climate and vegetation cover. 2021 Geophysical Research Letters 48, e2020GL090789.

[57] Ascensao, F.; Fahrig, L.; Clevenger, A.P.; Corlett, R.T.; Jaeger, J.A.G.; Laurance, W.F.; Pereira, H.M. Environmental challenges for the Belt and Road Initiative. 2018 Nature Sustainability 1, 206.

[58] Baker, L.S., Kazi, S.R.; Zlotnik, A. Transitions From Monotonicity to Chaos in Gas Mixture Dynamics in Pipeline Networks. 2023 PRX Energy 2, 033008.

[59] Conley, D.J.; Bonsdorff, E.' Carstensen, J.; Destouni, G.; Gustafsson, B.G.; Rabalais, N.N.; Voss, M.; Zillen, L. Tackling Hypoxia in the Baltic Sea: Is Engineering a Solution? 2009 Environmental Science Technology43, 3407-3411.

[60] Chaikin, S.; Dubiner, S.; Belmaker, J. Cold-water species deepen to escape warm water temperature. 2022 Global Ecology and Biogeography 31, 75-88.

[61] Azzurro, E.; D'Amen, M. Climate change paves the way for a new inter-ocean fish interchange. 2022 Frontiers in Ecology and the Environment 20, 558-563.

[62] Butenschon, M.; Lovato, T.; Masina, S.; Caserini, S.; Grosso, M. Alkalinization Scenarios in the Mediterranean Sea for Efficient Removal of Atmospheric CO2, and the Mitigation of Ocean Acidification. 2021 Frontiers in Climate 3, Article 614537.

[63] Johnson, R.G. Climate Control Requires a Dam at the Strait of Gibraltar. 1997 EOS, Transactions, American Geophysical Union 78, 277.

[64] Gower, J. A sea surface height control dam at the Strait of Gibraltar. 2015 Natural Hazards 78, 2109-2120.

[65] Sedira, A.A.A.; Rakha, A.E. Unconventional Solution to Control of the Sea Level Rise in the Mediterranean (Proposed Idea) 2022 International Journal of Scientific Engineering Research 13, 695-697.

[66] Cathcart, R.B. 2018 Gibraltar Strait Barrier: Macro-Engineering to Regulate Future Sea-Level Rise. Chapter 4, pages 173-202. In Petrova, V.M (Ed.) Advances in Engineering Research, Volume 26. New York: Nova Publishing.

[67] Chan, W-L.; Motoi, T. Effects of stopping the Mediterranean Outflow on the southern polar region. 2003 Polar Meteorology and Glaciology 17, 25-35.

[68] Behr, L.; Luther, N.; Josey, S.A.; Luterbacher, J.; Wagner, S.; Exoplaki, E. On the Representation of Mediterranean Overflow Waters in Global Climate Models. 2022 Journal of Physical Oceanography 52, 1397-1413.

[69] Marriner, N.; Kaniewski, D.; Pourkerman, M.; Vacchi, M.; Melini, D.; Seeliger, M.; Morhange, C.; Spada, G. Forecasted weakening of Atlantic overturning circulation could amplify future relative sea-level rise in the Mediterranean: A review of climate and tide-gauge data links. 2023 Earth-Science Reviews 242, 104456.

[70] El-Geziry, T.M.; El-Wakeel, Y.M. Criteria of sea level, return periods, and design risk factor in Port Said Harbor (Egypt). 2023 Arabian Journal of Geosciences 16, 473.

[71] Finkl, C.W., Pelinovsky, E.; Cathcart, R.B. A Review of Potential Tsunami Impacts to the Suez Canal. 2012 Journal of Coastal Research 28, 745-759.

[72] Winner, L. Do Artifacts Have Politics? 1980 Daedalus 109, 121-136.

[73] De Vivo, C.; Ellena, M.; Capozzi, V.; Budilion, G; Mercogliano, P. Risk assessment framework for Mediterranean airports: a focus on extreme temperatures and precipitations and sea level rise. 2022 Natural Hazards 111, 547-566.

[74] Borgue, O.; Hein, A.M. Transparent occulters: A nearly zero-radiation pressure sunshade to support climate change mitigation. 2023 Acta Astronautica 203, 308-318.

[75] Groom, N. Draining the Irish Sea: The Colonial Politics of Water. Chapter 2, pages 21-3. Allen, N.; Groom, N.; Smith, J. 2017, In Coastal Works: Cultures of the Atlantic Edge. London: Oxford University Press.

[76] Switek, G.B. Project Mars: the natura of macroanthropos. 2006 The Journal of Architecture 17, 485-495.