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Climate Change And The Emergence Of A New Economic Paradigm: From 'Finance Capital' To 'Ecological Capital'

A Synopsis of

Jeremy Rifkin: **The Age of Resilience, Reimagining Existence on a Rewilding Earth**

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Abstract: Jeremy Rifkin is a world- renowned expert and President of the Foundation on Economic Trends in Washington DC. He is deeply concerned about the impact of technological changes on human life and the Environment; how imperative it is to re-organize our economies and lives in the wake of Climate change. He is a global advisor to many Heads of States and governments of the world, the European Union, People's Republic of China and others, on this issue.

In his book "The Age of Resilience", he rejects Newton's Mechanical conception and world-view; he contests Kant's view that "autonomy is humanity's highest calling". He hails and fully supports the laws of Thermodynamics which reveal all matter as active and full of Agency. He explains how the current convergence and synthesis of Physics, Chemistry and biological sciences are leading to "a historic paradigm shift in our understanding of the meaning of life....how we come to perceive our relationship to a vibrant, alive, and evolving Earth" (Rifkin,2023 ed; pp.145) and our future course of action would be "a reassertion of our kinship with the natural world" (pp.254).

Keywords: climate change, Age of Resilience, Nature's Agency, GDP, QLI

I. INTRODUCTION

The book is divided into 4 Parts : **Part 1** is about "Efficiency Vs. Entropy, The Dialectic Of Modernity"; **Part 2** is about "Propertizing The Earth And Pauperizing The Workforce"; **Part 3** examines "How We Got Here: Rethinking Evolution On Earth"; **Part 4** is about the dawn of "The Age Of Resilience: The Passing Of The Industrial Era".

II. DISCUSSION

An Encapsulation:

Part 1: Efficiency Vs. Entropy, The Dialectic Of Modernity

Chapter 1: "Masks, Ventilators, And Toilet Paper, How Adaptivity Trumps Efficiency".

1.Rifkin begins by quoting **Adam Smith**, the first modern economist and Founder of this Discipline who in **The Wealth of Nations** gave the Mantra of **Efficiency** as "the very goal to which 'Homo economicus' strives, and to which society bends" (pp.11). Efficient companies adopt "lean manufacturing" processes,

as well as “lean logistics and supply chains” and discard all redundancies of storing buffer stocks for a rainy day. The Covid-19 pandemic revealed that “America was totally unprepared to meet the need” of protective equipment, masks, ventilators, antibacterial soap and toilet paper even, and stared at empty supermarket shelves, pharmacies. **William Galston**, (formerly deputy assistant to President Bill Clinton) ignited a debate with his Article (March 10, 2020, The Wall Street Journal) that stated **“Efficiency Isn’t the Only Economic Virtue”**. This public repudiation of Efficiency was taken up by **Senator Marco Rubio**, and by Management Dean, **Roger Martin**. Both faulted the off-shoring of manufacturing to developing countries and called out for **“a renewal of the American spirit of resilience”**. The global capitalist system while it increased efficiency and cut labour costs, overlooked environmental protection protocols too. It revealed its “Achilles’ heel” by showing up unreliable supply chains and logistics. According to Rubio, the capitalist system “lacks resiliency” which “can be devastating in a crisis”, (“We Need a More Resilient American Economy”, New York Times, April 20, 2020). Martin explained how the project of making the California Valley as the hub of Almond growing industry and its monopolistic thrust, reduced the fertile region to a drought-stricken one, as it was a water- intensive monoculture and subject to the vagaries of nature like massive bee-dying phenomenon. Efficiency proved to be short-term gain, whereas Resilience, in the face of climate change and unknown future events should have been factored in by the industry (pp.14-16).

2. Rifkin writes “Efficiency is the temporal dynamic of modernity” and reorganizes time and space giving “a measure of immortality”. He states: “with the rise of modern science, ever more sophisticated technologies, and market capitalism, a powerful new trinity came to replace the Father, the Son and the Holy Spirit. **Efficiency, in turn, would come to replace God, long regarded as the universal prime mover, as the new divinity of the Age of Progress**” (pp.20). “Efficiency is a temporal value, resilience is a condition” and whereas Efficiency is about “getting rid of redundancies”, Resilience “is all about redundancy and diversity”. However, in nature and biological systems there is “adaptivity” rather than efficiency; regenerativity rather than productivity and these two attributes are inseparable in all biological organisms and ecosystems. Off late businesses are realising how an obsession with efficiency, escalates risk, and increases vulnerability of the economy and society.

Chapter 2: “Taylorism and the Laws of Thermodynamics”

1. With the publication in 1911 of Frederick Taylor’s The Principles of Scientific Management, the book has “become the bible for embedding efficiency into the very heart of modern civilization”. Standardisation and compartmentalisation of work made the workers indistinguishable from the machine and cost-benefit analysis assessed their efficiency. Thus the **“Gospel of Efficiency”** was established whether at Home or in the school-system. Rifkin points out how “Twentieth-century education has been almost exclusively dedicated to molding students to a Taylorist mindset, readying them to be efficient in the world of industry and commerce”. This has resulted in fragmented chunks of disconnected facts and knowledge, lower- level thinking and rote memorisation for high-stakes tests in the U.S. These apostles of the efficiency Gospel subordinated the aesthetic to the utilitarian. Increasing industrial productivity sidelined preservation of natural scenery and historic sites. The narrative of Efficiency ignored equity, race and gender justice, morality and our human responsibility to the natural world around us.

2. In the section: “Misreading How the World Works: How Revered Minds Led Our Species Astray”, Rifkin gives us disturbing statistics as the outcome of the ‘Age of Progress’; that one-third of the earth’s topsoil is degraded, that it takes 500 years to replenish 1 inch of topsoil: only 60 years are left to feed the human population on Earth. Within 80 years, 50% of other species will become extinct; Oxygen is rapidly becoming scarce, phytoplankton in the oceans are depleting due to rapid warming of the Oceans; floods, hurricanes wildfires and droughts are wreaking havoc due to rise in global warming. Thus, ecosystems are destabilising: only 23% of landmass is untouched by human intervention and 19% of Earth’s area will become a “barely livable hot zone” by 2070. Rifkin is unflinching in his indictment: “the indisputable truth is that much of the blame lies at the feet of the scientific community, the economics profession, and the business community” in promoting a global economy for human prosperity. He analyses how **Descartes**, the French mathematician (“Treatise of Man”) created the narrative of a mathematical attitude that would create an orderly, predictable, and self-perpetuating mechanical existence on Earth, akin to God creating the cosmos. Other species/animals were dubbed as “automata”. **Issac Newton’s** “universe of matter and motion was orderly and calculable and made no room for spontaneity or unpredictability. It

was a world of quantities without qualities”; **“Newton mathematicised the Age of Enlightenment” and “provided the scaffolding for the ensuing Age of Progress”**. Adam Smith, the founding figure of the discipline of Economics in “embracing Newton’s atemporal schema” as a model for economic activity, caused **“generations of economists”** be **“led astray, furthering them from reality”** (pp.29).

3. In the section, “The Laws Of Thermodynamics: The Rules of the Game”, Rifkin writes how the Newtonian equilibrium worldview in which time is reversible, was refuted by the Laws of Thermodynamics. The Nobel Prize winner, Belgian chemist Ilya Prigogine, alluding to the profession of Economics which was wedded to Newton’s concept of equilibrium said; “the idea of an unchanging, permanent substrate for matter has been shattered... **[thermodynamics] leads to a conception of matter as active**, as in a continuous state of becoming” and “matter is no longer passive, as described in the mechanical worldview, but is associated with spontaneous activity. This change is so deep that **I believe we can speak about a new dialogue of man with nature**”. For Einstein too the laws of thermodynamics were the overarching frame that governed the universe. Marketplace dynamics did not reflect Newtonian mechanical concept, reflected economist W.S. Jevons. Nobel Laureate chemist F. Soddy admonished economists of rigid adherence to Newton’s principles, and **that it “would imperil civilization and the natural world”**. For the short-lived economic gains, the bill of Entropy (the side effects of depleting the available energy on Earth and affecting other phenomena) would be felt for eons to come, and **“how do we rethink our notion of what constitutes wealth?”** (pp.37-38).

Chapter 3: “The Real World, Nature’s Capital”

1. **Soil is “nature’s base capital”**, on which life processes depend. From 7 hundred million human beings at the dawn of the Industrial Revolution, we are now 6 billion people estimated to be living off 44% of net primary production by 2050, leaving only 54% for other species on Earth. The “Great Expectations” from the Green Revolution in Agriculture has only depleted top soil irretrievably with the use of genetically modified high yielding variety of seeds, which, though increase yields appreciably require large amounts of petrochemical fertilizers, insecticides and pesticides, used by monoculture practices too, and which need extensive irrigation. India alone has 6 thousand million tons of topsoil being leached annually. Such “scientifically based efficiencies”, are to blame according to The Union of Concerned Scientists in the US. In their Report **“The Hidden Costs of Industrial Agriculture”**, (August,2020), they are categorical that: “this system is not a cost-effective, healthful, or sustainable way to produce the food we need”. Rifkin writes that 29% of all global warming is due to food and agricultural practices. He warns of **3 Global Pandemics** or “syndemics” simultaneously affecting human civilization: **Obesity, Undernutrition and Climate Change**. The FAO of the UN proclaims healthy soils as producing healthy food. But the “fast food” culture, processed foods with longer shelf life are designed around efficiency but contain more saturated fats, sugars, low nutrient content; antibiotic- resistant bacterial infections are on the rise...2.8 million such infections occur annually in the US; the World Bank has warned that such drug- resistant diseases could be the next Pandemic, equal in impact to the Financial Crisis of 2008.

2. **We are the “Carbon Age people”, “the Fossil Fuel People”** states Rifkin : leaving behind a huge carbon footprint and **the “Age of Progress” is “a misnomer”**, since we have ruthlessly exploited Fossil Fuels for Industrial wealth creation, created global warming, with the global fashion industry generating 10% of global warming emissions and huge wastage of fabric---all of this has created a massive Entropy Bill of Global Warming and is threatening life on Earth. The author analyses the way out is **“a complete rethinking of economics** and, more important, **the nature of human agency”**; how to rescue “our collective humanity from the **toxic brew of rationality and efficiency**” of the ‘Age of Progress’ and find our way by becoming “more adaptive and empathic way to live that is more befitting of the coming Age of Resilience”. There is an urgent need of **“rethinking our very existence...to change course and learn how to thrive on an unpredictable and rewilding Earth”** (pp.44-51).

Part 2 : Propertizing The Earth And Pauperizing The Workforce

Chapter 4 : “The Great Disruption, The Planetary Enclosure Of Time And Space”

Rifkin traces the history of the advent of Technology:

1. In May 1844, Samuel F.B. Morse launched **the Morse Code**: an electric telegraph machine that could send encoded messages through electric currents to a location 40 miles off and receive a message instantaneously. It was hailed as **a God-like feat**; it annihilated distance and durational time and **marked the beginning of the Electronic Age**.

2. **The Mechanical clock organized “the schedule” for every activity and the Industrial Age and market capitalism embraced the slogan “Time is Money”**. The watch/clock reoriented people from nature’s time, calculated by sunrise, high noon and sunset. Calibrating time became a fetish---punctuality, precision and efficiency went hand in hand. In Art, Linear perspective and the importance of the point of view of the observer, **led the way to a shift in human consciousness, to an autonomous self as “one’s gaze” could “assess, capture, expropriate and privatize” what it saw on the horizon**. Religious iconography had always focussed the eyes upwards toward Heaven, considering the horizon in a fallen world as a temporary stay on Earth. **These advancements led to the “expropriating and enclosing space”**, more so with the advent of the **print technology** which stressed on individual authorship whereas the earlier oral literatures and books stressed on revealed knowledge collected for the community. **Printed maps led to greater discovery of new spaces and colonization of distant territories**. Oral literatures which reflected community involvement and cultural cohesion receded before print and visual mode proliferation. Many dialects were relegated to the background for the sake of “efficiencies in commerce, social life, and governance” (pp.63).

3. **James Watt’s patented the steam engine in 1776**; steamships began operating in the 1830’s: these new modes of communication, of energy, of mobility and logistics “enthroned efficiency as the dominant theme of society by the 1890’s” in Europe and America—“all made possible by exhuming coal from the burial grounds of the Carboniferous era” (pp.64).

4. With the **adoption of Greenwich Mean Time**, (October 1884), and the imposition of a universal time system “time was separated from local temporalities and the rhythms of the earth to serve commerce, logistics, and trade in a newly globalized economy”.

Rifkin thus articulates the **crux of the problem of earth hurtling to utter disruption and the cataclysmic**: “With these new temporal and spatial coordinates, humanity has successfully enclosed, partially privatized, and expropriated the great spheres of the earth and the other agencies that make up the intimate geochemistry, physics, and biology of the planet. **All have been captured, pillaged, and consumed with a hedonistic zeal driven by efficiencies unparalleled in the short existence of our species**” (pp65).

Chapter 5: “The Ultimate Heist, Commodifying The Earth’s Spheres, Gene Pool, and Electromagnetic Spectrum”

1. The modern notion of private property was advocated by **John Locke** in his “Two Treatises on Civil Government”, 1689. He stated private property to be an unalienable right, fulfilling God’s promise to Adam that he and his progeny would have dominion over his earthly kingdom and all creatures therein and nature’s bounty as well : **“God and his reason commanded him[humankind] to subdue the earth”**. Without man’s labour land...would scarcely be worth anything”, i.e., **Nature was a wasteland** until man transformed it into valuable property (Locke, pp.207). The **lithosphere or topsoil**, is the ‘Critical Zone’, described by the U.S. National Science Foundation as **“is a living, breathing, constantly evolving boundary layer where rocks, soil, water, air, and living organisms interact. These complex interactions regulate the natural habitat and determine the availability of life’s sustaining resources, including our food products and water quality”**. The soil is teeming with life but genetically modified farming practices have made it a threatened natural resource---26% of ice-free zone is occupied by livestock; human diet fixated on meat protein leads to 14% of all greenhouse gas emission by cattle; **95% of earth’s surface “has been modified by humans”**, stated the 2020 Report of World Economic Forum. Deforestation, massive plantations, urbanization, mining activities, road transport systems have all

contributed to soil loss. Such human enterprises have diminished carbon sinks of forests and instead led to an increase in carbon emissions—resulting in Global Warming and Climate Change to the detriment of life on the planet (pp.68).

Nor are the oceans free of **this “heist”** ---rampant fishing, extracting oil and gas at the bottom of the sea has led to **57% of the ocean floor to be divided among Nations**, whereas the Oceans make up 70% of the Earth.

Another shocking subtitle---"The Hydrosphere: Privatizing Water", details how **the WTO declared water as a tradable commodity, as a “commercial good”, as a “service”, an “investment”, making water a business item.** The World Bank championed the “privatization of public water systems”. Such public-private enterprises are callous about the upkeep of this infrastructure and so it leads to “asset stripping”, because the focus is on profit-making: 59%--63% more than government utilities. Global companies started selling bottled water and earned more than \$ 300 billion revenue by 2020. The report indicted these Multinationals water companies as” primarily accountable to their shareholders, not the people they serve”. Yet, the irony is that the 2019 Reports of the WHO and UNICEF stated 2.2 billion people as having no source of safe drinking water, and 4.2 billion not having basic sanitation services.

2. The U.S. Supreme court ruling in favour of the first **genetically engineered life-form** (a microorganism engineered to consume oil spills on the oceans). In 1987, the U.S. Patent and Trademark Office, ruled that “all genetically engineered multicellular living organisms, including animals, are potentially patentable-- - a ruling that signalled the beginning of the biotech century” (pp.77). Monsanto, Bayer, Syngenta are the big names in plant genetics and genetically modified seeds; Dolly the Sheep; genetically modified mouse with human genes for Cancer research purposes; CRISPR—the most versatile tool to become “genetic scissors” for gene manipulation begs the question who is to play God and are scientists and doctors equating morality with efficiency ?---“the gruesome parade of horrors”, as described by Warren Burger, chief justice, U.S. Supreme Court.

3. 1989 saw the launch of the **global positioning System (GPS), by the U.S. Government.** It is the largest surveillance system ever devised; it has “infantilized” human beings who no longer use that part of the brain responsible for spatial sense and navigation and our cognitive abilities are “atrophying”; there is a “loss of personal agency” in our dependency on the GPS which is leading to a new phenomenon called “death by GPS” (pp.84).

4. **Digital natives**, that is millennials and Gen-Z, communicate with each other through emoticons, acronyms and visual medium; **a prolonged immersion in the virtual world** is seriously “**affecting human cognition**”, led to a “precipitous decline in vocabulary and literacy”: reading habits that would lead to reflection and analysis, develop the imagination and perception are of no efficacy and has led to a “decline in critical thinking” (pp.86). Living, working, playing in the virtual world of cyberspace has not only “changed the wiring” of the brain of netizens, “but have **also begun to rob humanity of its own future**” (pp.87).

5. Efficiency or “optimization of all futures in an ever-present now, eliminating time’s arrow altogether” is at the heart of “**algorithm governance**”. U.S. President George W. Bush in his speech in 2002 promulgated “pre-emptive action” in Governance, Foreign Policy and military strategy. Big Data, Analytics and Algorithms “describe, predict, prescribe, and even preempt futures, with the intent of controlling or at least affecting events in markets, social movements, and governance in futures not yet here”. AI is “to unmask the known unknowns and unknown unknowns: that is, to know the future before it knows itself...to be clairvoyant” to mitigate future risk and be hyperefficient. But algorithms can reflect biases of governments/ programmers, create divisive categories---“**humans are considered to be an ‘input’ to the process and they are not seen as real, thinking, feeling, changing beings**”. **This underscores the point that “algorithms value efficiency over correctness or fairness”.** To Rifkin, “preemption represents....an extended lockdown”, negates privacy and individual agency. Taylorism has reached gargantuan proportions: earth’s complex systems, every operative agency “has been expropriated, commodified, and put on life support in the name of efficiency and profits” (pp.90-93).

Chapter 6: “The Catch-22 of Capitalism, Increased Efficiency, Fewer Workers, And More Consumer Debt”

In Chapter 6, Rifkin details how **“the Gospel of Efficiency is conversely leading to the implosion of the Capitalist system”** and is **“the last act”** of the Age of Progress (pp.93).

1. In the mid-twenties American industry, having adopted Taylor’s principles of scientific management, reached a high point of efficiency and profit boom by producing more goods at cheaper costs, laying off any extra hands and paying minimum wages to its work-force. As a result, incomes shrank and there occurred a “consumption deficit” in the words of Henry Ford. The period saw the rise and huge success of the Advertising Industry, junking the “Christian value of frugality”; and promoting visions of the good life by increasing possession of the latest goods available in the market, and thus living **“the American Dream”**, an idea particularly appealing to new migrants to the U.S. The “gospel of consumption” promoted avidly on Radio and Television had as its handmaid, Installment buying schemes, Credit Card facilities (1958: Bank Americard) led to the “culture of narcissism” as coined by the social critic C. Lasch. In 1943, Norbert Weiner, a mathematician from MIT, described **Cybernetics, a transdisciplinary study and system of “Control and Communication in the Animal and the Machine”**, where machines could think, learn, and adjust their behaviour via feedback. This ushered in the age of computerization and artificial intelligence. **Robotics, computerization and AI**, while substantially increasing efficiencies, caused millions of workers, skilled, unskilled, professional knowledge holders to lose jobs **“begging and devastating workforces” across countries** and created a crisis of consumption. Loans and debt mounted and in 2008, the real estate bubble burst causing bankruptcy: Lehman Brothers, AIG, Wall Street players, banks and money lending institutions staggered under this colossal **“economic collapse”, known as the “Great Recession”**. Total household debt in America in 2008 was \$12.7 trillion while GDP was \$14.7 trillion: “clearly, the capitalist system was broken”, is the trite comment by Rifkin (pp.99-106). Furthermore, Rifkin’s detailed analysis and the subtitles of Chapter 6, viz; ‘The Suburban Camelot’, ‘The End Of Work’, ‘Mortgaging The Future’---all describe how these have led to ‘The Endgame’, where the workers are “efficient appendages to the machines they attend” (pp.106). Lean production of Japanese industry culture, the digital surveillance culture, ‘Gamification: Making Servitude Fun’—all these work scenarios bear out Weiner’s “prescient prophecy” : **“the automatic machine... is the precise economic equivalent of slave labor**. Any labor which competes with slave labor must accept the economic conditions of slave labor” (pp.101). **About 8.5% of global workforce would be replaced by Robots by 2030**, according to an Oxford economic study by Cone and Lambert.

2. Our planet is struggling, writes Rifkin, to **“readjust to the damage our species has inflicted during the fossil fuel- driven Industrial Age”**. We are beginning to understand how **“misguided we’ve been in ever believing that our own species’ agency was sufficient to master the powerful planetary forces that govern life on Earth”**. Yet there is **“a last card to play”** before extinction. Hope lies in the new discoveries in the sciences--- of Physics, Chemistry and Biology, --- which reconceive the evolutionary processes that have shaped life. These new discoveries will gain momentum and help us to rethink life and “what it means to be a human being on an animated Earth comprised of a manifold of interactive agencies”. Rifkin is sanguine of the **dawn of a new “Age of Resilience” embracing a “stewardship ethic of tending to the natural world”**. From a “work ethic” focussed solely on production and profits and consumption, soon there will be **“resilient employment”**, which will engage in **“eco-stewardship that is too complex for even the most intelligent technology”** (pp.112-3).

How this “Resilient Revolution” will unfold, how this “new epoch will change our very notion of agency” is taken up in detail by Rifkin in part 3 and 4 of his book.

Part 3 : How We Got There, Rethinking Evolution On Earth

Chapter 7: “The Ecological Self, We Are Each A Dissipative Pattern”.

1.This chapter is about our beliefs as to who we are as a species. It presents the Christian idea of Original Sin, living in uncertainty of gaining Salvation or eternal Damnation; Darwin rejected this concept but also explained human life as a random selection of traits—physical and mental; Freud stated life to be centred on the fulfilment of the libido and sexual desires; the Enlightenment philosopher **Immanuel Kant stated that autonomy was humanity’s highest calling** and Rationality, unencumbered by Emotions, was the path to embrace.

But this concept of the autonomous self has been challenged by **Anthropologists such as Levy-Bruhl : that in primitive social orders the “I” did not exist---it was only “We”**. These societies lived in “ ‘a mist of unity’ in which other animals were not distinguished as ‘the other’ but rather as animated beings in different guises. Even mountains, waterfalls, and forests were thought of as alive and full of agency”. This seamless intertwining of the world of body and spirit was cast aside in the period of the rise of “great hydraulic agricultural societies”, and of “marauding empires”. Rifkin writes how “**the expropriation, enclosure, and propertization of what our earlier ancestors regarded as an animated Earth has been the central theme of what we call civilization**” (pp.118-9). While in Western theology, the all-knowing God granted Adam and his progeny dominion over Earth, Eastern religions and philosophical systems have an inclusive approach and consider the Human is not the master, but, only a part of the species on it.

2.It is an eye-opener that the **scientists who ushered in the digital age : Weiner, Ludwig von Bertalanffy revised their views about human life** : “Our tissues change as we live...we are but whirlpools in a river of ever-flowing water. We are not stuff that abides, but patterns that perpetuate themselves”. Nicholas Georgescu-Roegen’s reshaped economic theories by infusing it with a Thermodynamics perspective; **A.N. Whitehead** challenged Newtonian science of “durationless” instants: “there is no Nature at an instant”; in **Fritjof Capra’s** words “**Quantum theory forces us to see the universe not as a collection of physical objects, but rather as a complicated web of relations between the various parts of a unified whole**”. This leads to “Rethinking Existence: From Objects and Structures to Processes and Patterns”, writes Rifkin (pp.121-23). With the introduction of **a new field of study, Ecology**, by the German naturalist, Ernst **Haeckel** in 1866, **biologists turned their attention to the relations and interactions of various living organisms...** how our bodies are only 43% cells while 57% of it is made up of microorganisms that dwell in us--- viruses, bacteria, fungi, archaea, protists and minerals such as calcium, phosphorus, sodium, potassium, magnesium, hydrogen, oxygen, carbon ---how “the innards of every human being and all of our fellow creatures are simply extensions of the biomes, ecosystems, and spheres that make possible a planet thronged with life...the very idea of an Earth filled with fixed structures is a misnomer” (pp.130-31). The Human Microbiome Project of the U.S. Government, its leading medical research arm, defined **the human body as a ‘biome’ or “a large naturally occurring community of flora and fauna occupying a major habitat” as an ecosystem or “a biological community of interacting organisms and their physical environment**”. Thus, we are a sum total of the many agencies of Nature, intricately woven together.

Chapter 8: “A New Origin Story”, discusses how biological clocks and electromagnetic fields are forces of the planet, synchronizing the processes that shape our life. But global warming has brought on unpredictable weather events and is putting the biological clocks of every species at risk. Beside the circadian master clock embedded in the brain, other species have internal clocks synchronized to lunar/tidal and circannual and ultradian cycles to which the cells of the body respond and create healthy metabolic activity, digestion, sleep and reproductive functions. When these go awry and dysfunctional due to a rapidly changing climate causing freak weather systems, a “profound calamity is unfolding across the living kingdom from which there may be no escape if we fail to act in time” (pp.137). Living in dense concrete jungles of our urban existence we never see starlit skies and the nine galaxies visible to the naked eye in a dark sky. Today ‘dark sky parks’ are much sought-after tourist destinations. Alienated from sunlight, moon and starlight, wind currents, rainfall, and geomagnetic rhythms, **Nature’s theatre of such interrelations is a “togetherness of things”,** where “each happening is a factor in the nature of every other happening” writes Whitehead in “Nature and Life” (Rifkin pp.143). But **today scientists in the fields of Chemistry, Physics and Biology are bringing these fields in a synthesis. This is “a historic**

paradigm shift in our understanding of the meaning of life and, in particular, how we come to perceive our relationship to a vibrant, alive, and evolving Earth” (pp.145). Experiments by biologist Dany Adams at Tufts, have revealed how when a frog embryo is developing and before it gets a face---an “electric face” is reflected on the surface of the embryo. Such studies reveal the awesome facets of Nature and the universe.

Chapter 9: “Beyond The Scientific Method: Complex Adaptive Social/Ecological Systems Modeling” takes us on the evolving journey of Science, from Bacon’s pronouncement that “the world is made for man, not man for the world”---- to a perception of the natural world not as a mere ‘resource’ but “as a ‘life force’ of which our species is only one of a legion of species whose own journey on Earth is of commensurate value to our own”

1. This objective, detached, inductive and linear approach of Sir Francis Bacon, (the patron-saint/father of modern scientific method, and who steered the Royal Society for science set up in London,1660), was led with the belief that “human beings have “the power to conquer and subdue” nature and “to shake her to her foundations” in order to “establish and extend the power of dominion of the human race over the universe” (pp.155;151).

2. We owe today’s positive guidelines for saving ourselves from the apocalyptic, to a Canadian ecologist, **C.S. Holling** who perceived ecological systems to have **Resilience, Adaptability and Transformability**. He explained “Resilience” as persistence and flexibility in the face of the unexpected; an “adaptive management” and if not maintainable then onto a “transformation to a new self-organizing system”. Rifkin writes that **Holling “laid the foundation for a radical new scientific method that would fuse ecology and society and come to challenge the guiding principles of conventional economic theory and practice”**. Holling’s resilience theory has influenced various branches of study, be it the Arts or the Sciences. It stands out as **a lighthouse** in troubled waters, changing the course of human understanding and defining principles---from “efficiency” of control to a model of “adaptivity as the temporal means to reestablish its relationship with the earth from one of expropriation to reharmonization. It is the dividing line that takes us from the Age of Progress to the Age of Resilience”. Rifkin is emphatic in his view that if the discipline of **Economics** is to survive it “will need to metamorphose into a wholly new way of thinking of its relationship to the natural world” (pp.155). Further, he writes that the conventional capitalist model of **Economics, in the Age of Industrial Progress, is “deeply at odds with the way an animated Earth operates”** (pp.161). But there is hope that ‘Homo Sapiens’ has always adapted to climate changes in the past and will adapt and transform into a truly enlightened society, leading with responsibility.

Part 4 : “The Age Of Resilience, The Passing Of The Industrial Era”

Chapter 10 : “The Resilient Revolution Infrastructure”, informs us that **every infrastructure revolution consists of 3 components** essential in maintaining our collective social existence. These are ---**new forms of communication, new sources of energy and power, and new modes of transportation and logistics**.

1. In the **First Industrial Revolution, in the 19th Century**, it was the steam-engine and prolific coal-mining, national railways, that empowered the rise of capitalist economies, urban dwellings and national markets under state control. In the **Second Industrial Revolution, in the 20th Century**, cheap oil, the telephone, radio, TV., the internal combustion engine established vast road systems, air transport, inland waterways vast suburban housing and infrastructure saw the rise of Globalization and global governance institutions.

2. Today, we are in the era of the **Third Infrastructure Revolution** with the Internet of Things (IoT)—an era of big data, analytics and algorithms--- a digital platform for communication and sharing of Information, knowledge and entertainment; a digitized continental electricity internet for sharing renewable energy, powered by wind and solar energy and a digitized mobility and logistics internet. This allows humanity to communicate, power and move the day-to-day economic and social life made easier with Smartphones in each hand.

While the two earlier industrial revolutions were centralized in the hands of governments or global business corporations, **the 3rd industrial revolution is distributed, creating a democratic environment as it gives power to the people rather than to controlling centres of power**. These digital networks are

about open access, many a times free access, for ex. Wikipedia; there is free sharing of music and art, travel, wildlife explorations and many goods and services, free online college courses by reputed universities and imparting of knowledge by teachers, and life-style gurus etc. Yet these do not count in computing the GDP, but do compute the quality of life led. Rifkin writes how **“in the digitally connected economy, GDP is quickly losing its hold as a marker of economic performance**. It was never a good metric. GDP is a crude tool” and cannot differentiate cleaning of toxic waste dumps from, manufacturing more weapons of war, Co2 exposure and lung disease, climate disasters or rebuilding climate- resistant buildings. **Many global institutions like the U.N; OECD, the E.U. have turned to QLI or quality-of-life indicators to measure economic well-being**. The smart digital infrastructure of the 3rd Industrial Revolution to bypass restrictive control of governmental and global corporations, and militarized geopolitics, and instead to set up local networks which share green energy and particularized local service networks and conveniences. **Rifkin explains this “fundamental transformation in the way we conceive of economic life: from ownership to access; seller-buyer markets to provider-user networks... finance capital to natural capital; productivity to regenerativity....vertically integrated ...to laterally integrated economies of scale; GDP to QLI; globalization to glocalization”**. The oncoming Age of Resilience, is about **“efficiency giving way to adaptivity, and detachment and commodification of nature giving way to deep reparticipation with an animated Earth”**. Earlier he quoted Mahatma Gandhi’s famous dictum that there is enough on Earth to fulfil man’s needs, but not his greed (pp.180; 165).

3. Rifkin being an advisor to E.U Governments as well as to China, notes how they are progressing ahead with his conceptualization and deployment of climate-related 3rd Industrial Revolution infrastructure transformation in the ongoing Third Industrial Revolution. He **gives details of his proposal to U.S. Congressmen to make “America Resilient”, 2020-2040 plan** for Infrastructure Transformation. Of this 237-page document, some highlights are---retrofitting buildings to withstand sudden climate-related disasters, a water-internet made of IoT sensors to monitor water quality and flows; IoT sensors in ecological corridors for protecting wildlife; sensors in the soil to protect and rejuvenate the “Critical Zone” of topsoil which nourishes life on Earth.

Chapter 11: “The Ascendance Of Bioregional Governance”. This chapter brings to the fore, climate related disasters and that **local governance has to do with the well-being of ecoregions, rather than geographical boundaries**, for example the states that make up the Great Lakes ecoregion which is now prone to annual flooding, hurricane fury in the Gulf of Mexico ecoregion and such like horrifying disasters “on a rewilding Earth”. This is resulting in a shifting of affiliations, of political identity, and allegiance to environmental well-being of the ecoregion inhabited by the local people: **“our species is beginning to find its way back to the natural world”, declares Rifkin (pp.189)**. A growing rift in the populations against a centrally controlled system is beginning to be felt: “the secession fever is spreading all around the world” with a call for **“bioregional governance”**, to be witnessed also, in the growth of small and medium-sized high-tech SME’s, rather than global corporations : a reverse migration to rural community life is to be seen. The scientific community too has given a “call to rewild half the earth”. If a 6th extinction is to be prevented here on Earth, then half of the planet’s surface should be left as natural reserves to preserve the existing biodiversity (pp.194).

Chapter 12: “Representative Democracy Makes Way For Distributed Peerocracy”. Political alienation is on the rise with surveys across countries where the popular cry is that ‘my voice is not being heard’. The current government structures are failing to deliver as per expectations of the citizenry; social divides, economic disparities, a sense of marginalization among communities, a lack of trust---these are challenges before Democracy. Hence **“local governments are beginning to enlist their citizenry in participating in “peer assemblies” working alongside”** the government to arrive at more wholesome solutions and management of their biosphere (pp.204). **A Digital generation prizes freedom of access and inclusivity, and are the guiding operatives of peerocracy. Rifkin elaborates how this “new notion of freedom” will be the “the defining dynamic of a future governed by bioregions”, which aims at “connectedness that stretches beyond our species to include our fellow creatures and all of the other agencies of the planet”**. Such an embedded schema will transform economic activity and social life too, as we head towards an era of Resilience. 2019 witnessed street protests in U.K. and France centred around issues of climate change and environment protection---this led to “citizen assemblies” being set up. A nurturing and

healing attitude, an empathy for our fellow creatures co-habiting with us, is the starting point in efforts to save our planet from doom.

III. Conclusion: Rifkin ends his book with hope and positivity that the Human DNA is made of resilient qualities and would make humanity develop a Holistic perspective, leading the planet and all its life forms to Regenerativity.

Chapter 13: “The Rise Of Biophilia Consciousness”

1. Human history has been a succession of different types of affiliations: “animist consciousness” of the hunter-gatherer era; “religious consciousness” during the rise of agricultural civilizations; and “ideological consciousness”. of the Industrial era. Today the Internet has connected up people across the globe in “empathic attachments”. **Psychological studies, and researchers in Philosophy, aver: “the basic wiring of our neurocircuitry keeps the empathic spirit alive”**. Rifkin is sanguine that **this human trait** which has endured through bright as well as dark phases of civilization **“is now taking humanity into the next stage of our empathic evolution”**. He perceives that the younger generations are breaking free of religious and ideological chains and “stepping into a new more inclusive biological family. Biophilia consciousness is just now emerging and is likely to be the defining narrative of the Age of Resilience as our species begins to empathize with our fellow creatures” (pp.233).

2. **‘Biophilia’ is a term coined by the humanist psychologist, Erich Fromm, to describe the feeling of being attached to all phenomena that are alive.** E.O. Wilson, American biologist and naturalist in his book “Biophilia”, stated that **biophilia is embedded in our DNA**; and is described as a primal sense that we are of the family of life and that our well-being depends on the collective well-being of all that is alive: **“an innate tendency to focus on life and life-like processes”** (Rifkin, pp.239). Educational reforms are now also advocating a development of “biophilic consciousness” by spending time in and with the natural outdoors, taking the young learners from the ‘socializing’ to ‘naturalizing’ the child. **From ‘mastering’ Nature to reorientation with Nature, “of being one with the life force of the earth”, “to experience universal intimacy”**. Rifkin ends his book by stating this is not something born of the superstitious; rather it is **“a deep empathic, mindful, and cognitive understanding of our abiding attachment to life. It is a long journey of epic proportions that is bringing our species back home once again, grounded and hopefully renewed and ready for the great struggle before us of reanimating the breath of life. The earth beckons”** (pp.254).

REFERENCE:

[1] 1. Rifkin, Jeremy: **The Age Of Resilience, Reimagining Existence on a Rewilding Earth**; Great Britain, Swift Press, Paperback Edition, 2023.
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