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Sustainability in Ancient Civilizations: What Can We Learn from Pre-Industrial Societies?

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Abstract

The questions raised in this paper are about a sustainable practice in ancient civilizations that has undermined the notion that sustainability has just been an alternative in response to environmental degradation in the industrial era. Documented by case studies of the Inca Empire, Nabatean civilization, and the Edo period Japan, the study identifies how agriculture, water systems, and waste were intelligently handled by pre-industrial communities with the help of locally designed, low-tech solutions and community-based strategies. Societies have been living within the limitations of their setting and used local knowledge, ecological awareness, and values to achieve a balance and strength. The paper looks at available scholarly literature as well to reinforce the usefulness of the concept of traditional ecological intelligence. Although admitting the contextual disparity between historical and modern eras, the study contends that implementation of several past model-based concepts might improve and optimize how sustainability is currently conducted, including a place-centered approach, circles where prisoners are placed, and community plans. Through a critical revisit of the past, the study calls for the vision of a more inclusive and comprehensive concept of sustainability based on integrating modern innovation into the wisdom of the past.

Keywords: Sustainability, Ancient Civilizations, Pre-industrial Societies, Ecological Intelligence, Traditional Knowledge, Low-tech Solutions, Community-based Practices

1. Introduction:

Sustainability has come to be the main point of discussion in the world where the industrialized world is grappling with the far reaching effects of modernization. Climate change, degradation of biodiversity and destruction of natural resources have been among the issues that have resulted in pressing demands to have green-sensitive policies and practices. Answering to this, the technological innovation of solar power, electric vehicles, green infrastructure, and smart cities receives much concern. Even though these tools are essential, the preconceived notion is that sustainability was created recently in order to correct the environmental injustices of the past.

But looking deeper into history, one could conclude that the principles of sustainability, i.e., resource efficiency, harmony with the environment, and resilience, are centuries old in the pre-industrial world. Even in the times before fossil powered epoch, numerous ancient cultures evolved sustainable agriculture, water management, and urban planning that enabled them to be productive given the constraints of their

environment. Fast forward to present and if such systems were not designed out of a scientific knowledge of ecology, they were both studied over generations through trial and error and cultural assimilation.

The following paper will discuss three examples of sustainability in ancient past-the Inca Empire in the Andes mountains, the Nabatean tradition in the arid land of Petra, Edo Japan. The societies had to live under different environmental limitations and applied to them appropriate solutions related to their ecology and culture. Inca farms made terraced farms and complicated notice by themselves in the high-altitude plots. Nabateans knew how to capture rainwater in a desert setting. Edo Japan established a form of proto-circular economy where waste has been minimized whereas forest resources in a densely populated island environment were preserved.

This study does not aim at romanticizing the past or proposing a revisitation of the ancient life. Rather, it is about appreciation of the power of indigenous knowledge, low-tech fix, and community-based methods that tend to be belittled in the current high-tech sustainability endeavors. As a global community attempts to find fair and viable solutions to the environmental issues it faces, reintroduction to these ancient models will lead to more holistic, encompassing, and location-specific approaches to the sustainable living paradigm.

Literature Review / Background:

The idea of sustainability as it is currently known came to the fore with the Brundtland Report in 1987, in which it was summed up as follows: “Sustainability meets the needs of the present without compromising the ability of future generations to meet their own needs.” This definition has been used subsequently to inform the world plans such as the UN Sustainable Development Goals (SDGs). Nevertheless, the recent studies in the fields of anthropology, archeology, and the history of the environment indicate that sustainable lifestyles are not peculiar to the contemporary context.

Eugene N. Anderson, an environmental anthropologist, proposed the concept of ecological intelligence as contained in traditional societies, that is, knowledge systems critically alert to environmental frequencies and has the ability of managing resources over the long-term period (Anderson, 2014). On the same note, Inca archaeology studies conducted by Ann Kendall demonstrate that pre-Colombian Andean culture employed advanced types of agriculture that maintained a balance between productivity and conservation of their ecological fluxes. The terrace cultivation and highland irrigation was not just a technological accomplishment, it was also a sociocultural activity based on the communal work and exchange.

In other studies, there is the skill set of the Nabateans in mastering water technology in the arid regions. As Flores (2015) remarks, Nabatean engineers used the rock-cut channels and underground cisterns that collected the season rainfall and efficiently distributed the water, without the available modern pumps and filtration system. What made their survival possible was intensive knowledge about how the earth works in terms of geology, weather patterns and the actions of the water element, which is now getting renewed attention as critical to climate-adaptation researchers.
Edo period in Japan is emerging as one of the few instances of mass scale pre-industrial sustainability. Kawaguchi (2007) and Mikami (2016) report how urban waste was arranged and reutilized, how tightly

controlled forests were produced, and that recycling was being utilized in some form of a circular economy many centuries before. The ideology of the environment did not motivate these behaviors but rather was necessitated and instilled by cultural beliefs which are inclined to a balance, mildness and longevity.

Notably, researchers warn against making false generalizations relating to the pre-industrial societies which were presumed to be sustainable. Denevan (1992) tells us that other ancient civilizations rooted in environmental mismanagement may have led to the collapse of others like the Easter Island one. Thus, even though several communities were resistant, their concepts should be assessed conceptually and applied wisely to the contemporary intricacies.

However, the historical sustainability gives an alternative concept to the prevailing idea that progress must occur on a technological basis. It highlights the possibility of low cost, community based and environmentally inter-relational solutions most of which are still right and needed, in particular, in those areas of the globe where there are infrastructural or economic limitations.

Case studies of the Ancient Civilizations and their Sustainable Practice:

4.1 Andes Civilization: the harmony of the Andes:

Andean mountains were inhabited by the kingdom of Inca (c. 14001533 CE) with their rugged terrains and fluctuation in climate and scarcity of arable land making these challenges solve by creating innovative solutions. The most remarkable sustainability project implemented by the Incas was the widespread practice of andenes, which were agricultural terraces constructed by the Incas, out of stone walls of mountains. These terraces were able to ward off soil erosion, accumulate water and generate a microclimate that was able to support varied crops such as potatoes, quinoa and maize.

These terraces were built and had highly advanced irrigation lines which channeled melt water of glaciers and springs through canals. Incas had crop rotation and diversity of seeds in altitudinal gradients due to which it was more resistant to pests and variations in climate. In refilling the nutrients in soil, organic fertilizers (e.g. guano) were adopted.

The Inca road system was an infrastructurally good example of environmentally sensitive engineering. More than 24,000 miles of highway were built using the local stone to not raise out of the ground, or cause ecological destruction. Llamas were used as pack animals thus wheeled transport was less and fossil fuels were minimally utilized. The whole logistical system did not require heavy-energy investments.

These drawings demonstrate the capacity of design to stay congruent with the natural systems in order to deliver robust agricultural products. Incorporating terrain farming, gravity irrigation, and diversity of grown crops may be of interest to the modern mountainous or marginal areas, particularly in that of climate adaptation and food security.

4.2 Water Wisdom in the Desert: Nabatean Civilization:

The Nabateans, whose society thrived between the 4 th century BCE to the 2 nd century CE, constructed their society within the harsh desert topographies of modern day Jordan and North Arabia. The sustainable design and the rock-cut construction became a marvel in Petra, the capital city of theirs. The main point of their prosperity was a high level of hydrological infrastructure that was able to capture and preserve little water resources.

The precipitation of the area is continent and periodic, but Nabateans designed an extenuative system of channeling, reservoirs, water channeling systems, and underground storage containers to capture runoff of the mountains. They channeled water through rock, channeled water into catch calculate to storage tanks and underground containment in a strategy to discourage evaporation. Many cisterns could store enough water that could last a population of Petra many months.

They even had climate sensitivity in their city designs, and architecture. Buildings were oriented to get the most shade, breeze and stability of heat (thermal mass) with no external energy required to act on them (passive cooling measures). Such advances helped the Nabateans to sustain the agriculture, the commerce, and urban living in one of the desert driest regions on Earth.

The models of water management currently used by them give earthlings paradigms to adopt low energy, decentralized patterns of water management in arid and semi-arid landscapes. With the growing problem of water shortage in the world, more and more ancient experience such as Nabatean hydrology come into play.

4.3 Circular Economies of Edo Japan:

The period is known as the Edo period (16031868) when Japan enjoyed a long period of peace, cities formed in Japan, and the nation isolated itself on purpose. Having little land and natural riches the Tokugawa shogunate developed the society, based on conservation, on reusing, and on community accountability.

The system of sanitation in city centers and nutrient cycles was highly developed. The urban human waste was gathered and sold to the farmers as a fertilizer, thus ensuring soil fertility and keeping the nutrient cycle complete. Recycling trade was conducted through guilds, which reused and fixed paper, textile, ceramic and metal. The wastes were small.

Forests have been dealt as national national strategic assets. Due to overharvesting during previous centuries, a national reforestation program was implemented in the country which formed a strict control of logging and necessitated new tree planting programs. This system has stood the test of time in the supply of timber in construction, fuel and industry all the way through to the modern age.

These ecological policies were backed by such cultural norms. Daily life was simplified, economical, and environmentally respectful in its makings, making uses of art, religion and education. Long life and sturdiness were glorified as opposed to consumerism.

The Edo ideals can be located in the modern trend of a zero-waste, urban composting, and product circularity. The Edo experience demonstrates the existence of healthy ecosystems that are capable of supporting large populations when such is enhanced by right policies, well-functioning institutions and a cultural ethos into which concerns about ecological balances were nurtured.

Lessons to the Contemporary Sustainability

The discussed cultures offer some eternal values that can be applied in the modern understanding of sustainability:

Adaptation of Sustainable Solutions: The solutions in question need to be tailored to local and societal settings. The terraces of the mountains of the Incas, the desert cisterns of the Nabateans and the urban recycling of Edo Japan solved three different ecological problems. Contemporary planners are not supposed to apply universal solutions, but are rather supposed to focus on place-based design.

Oneness with Nature: The cultures integrated themselves with nature such as soil formation, water flows, nutrient regeneration instead of trying to fight the elements. It is a way of reducing the harmful activities to the environment and strengthening resilience.

Resource Circularity: Healthy Edo Japan reflects the potential that resource circularity has in decreasing the use of resources and emitting waste. Today, it is essential to embrace the idea of closed-loop systems when developing cities in a sustainable manner.

Community and Culture: The element of sustainability could not be isolated to the social framework, culture, and societal responsibility. Efficiency in environmental management hinges on community participation as well as inculcating environmental ethics into mainstream life.
Cost-Effective/ Low-Tech Solutions: These civilizations were not relying on very high technology, but they utilised their observations, their craft and their local materials. This implies that sustainable development does not have to involve capital-intensive and energy-intensive development all the time; a concern that is particularly significant to the developing regions where infrastructure is not well stress tested.

Limitations and Difficulties:

Ancient models are inspiring, but are also hard to apply to the present-day contexts. The pre-industrial societies were not complex and tended to work on a smaller scale. The appropriate innovation and change has to be made to adapt terraced agriculture or water harvest to megacities or interdependent global supply chains.

We also find in ancient times, that in some instances sustainability was based on hierarchic power structure which restricted equality or involvement. Although not every ancient society was sustainable, some of them perished because of environment mismanagement or outside factors.

Therefore, the past experiences have to be judged critically and adjusted to become embedded in the dimensions of modern science, technology, and social fairness.

Conclusion:

The three examples are Inca, Nabatean and Edo Japanese civilizations that demonstrate that sustainable living can be the result of being very familiar with the place where one lives, cultural adaptation, and resourcefulness instead of using an abundance of technology. Their agriculturist, water and circle-economics experiences can be given a read into the problems of sustainability in the present times.

In a time paired with environmental crisis and rapid urbanization, the reconsideration of these sorts of pre-industrial practices gives us a chance to not only expand on the concept of sustainability in regards to innovation and growth, but one that can be grounded in the principles of sustainability. The integration of ancient knowledge and contemporary technologies allows policymakers and communities to balance their resilience, equity, and relationship with their natural environments and the ecological design to ensure a sustainable future based on respect of nature and culture.

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