An Investigation into the Historical Utility and Present Usage of Ranmasu Uyana, Anuradhapura, Sri Lanka

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***Abstract*—Ranmasu Uyana (The Royal Goldfish Park), located in ancient Anuradhapura, represents a pinnacle of ancient Sri Lankan landscape architecture and hydraulic engineering. Situated between the Tisa Wewa and Isurumuniya Vihara, it served as a premier recreational park for royalty. This research examines the park's historical significance, highlighting its advanced water management systems, rock-cut architecture, and the enigmatic 'Sakwala Chakraya' (Stargate). Using a qualitative approach, drawing on site surveys and historical chronicles, the study explores how ancient engineers harmonized natural landscapes with man-made structures. The research further evaluates the transformation of Ranmasu Uyana into a modern heritage site and the contemporary challenges it faces in preservation.**

***Index Terms*—Anuradhapura Era, Hydraulic Engineering, Landscape Architecture, Ranmasu Uyana, Sakwala Chakraya.**

I. Introduction

Ranmasu Uyana, located between *Tisa Wewa and Isurumuniya Vihara* in the ancient Kingdom of Anuradhapura, is a prime example of Sri Lankan garden art and hydraulic civilization. Spanning approximately 40 acres, this park was renowned as a recreational ground for kings since the early Anuradhapura period (Seneviratna, 1994). Unlike religious monuments, this park was created for secular needs, reflecting the advanced technical and artistic progress of the time (Bandaranayake, 1974). *Ranmasu Uyana* is world-famous for its amazing water management system. A highly advanced method was used to distribute water from *Tisa Wewa* throughout the park. Three main ponds can be seen here. Underground pipe systems were utilized to purify the water in these ponds, which were built using stone slabs, and to control the flow. Evidence suggests that fountains and water pools operating on natural pressure existed here. Ancient craftsmen succeeded in controlling the temperature during the hot season by allowing water to flow under seats located within rock caves.

This is not merely a park, but a showroom of the rock carving art of that era. Pavilions and resting places built using natural rock boulders are found here. The carvings of "elephants frolicking in

water" seen on the pond banks are executed very realistically. A special feature is that when looking at these carvings, it feels as if the elephants are truly playing in the water.

The most controversial and mysterious creation located within *Ranmasu Uyana is the 'Sakwala Chakraya'.* Various opinions exist regarding this linear diagram carved onto a rock boulder in the park. Some refer to this as a world map. Another group interprets it as a "Star Gate" depicting the connection between the universe and the earth. However, the archaeological view is that this may have been a symbol used for meditation or astrological activities. According to folklore, it is said that Prince *Saliya,* the son of King *Dutugemunu*, met *Asokamala* in this park. *"Ranmasu"* means gold-colored fish. It received this name because it was a place where kings leisurely watched fish.

II. Research Problem

Although *Ranmasu Uyana* is referred to merely as a royal park, no final scientific conclusion has yet been reached regarding the true meaning of complex carvings like the *"Sakwala Chakraya"* found there. Furthermore, the technical principles by which water received from Tisa Wewa was circulated within the park without damaging the ecosystem, and the impact on its historical value due to the site being limited to only a tourist attraction at present, are investigated here as the research problem.

III. Research Objectives

- To identify the ancient engineering principles used for water management in *Ranmasu Uyana.*
- To examine the historical importance of architectural elements and creations like the *Sakwala Chakraya* within the park.
- To analyze the changes that have occurred in its usage as an ancient royal park transforms into a modern heritage site.

IV. Research Methodology

Quantitative and qualitative research methodologies were used for this research. Under this, ancient documents and reports written about *Ranmasu Uyana* were referenced, and physical factors were studied by exploring the relevant archaeological sites through map reading and photography.

Figure 1. Aerial photos showing the situation of Thisawewa and Ranmasu Uyana

V. Research Results

The primary result revealed in the exploration of the historical utility of *Ranmasu Uyana* is that it is a complex water management system designed by utilizing the natural topography to the maximum. It was confirmed that levels were adjusted so that water received from Tisa Wewa flows to the park's ponds based solely on gravity, without any mechanical power. Furthermore, it was observed that "Silt traps" were used to remove silt when water entered the park, and the ancient technology of natural filtration, where water is filtered through layers of sand and pebbles, was successfully utilized.

Upon examining the architectural features of the park, it appeared that they were not merely monuments but creations well-integrated with the environment. Research evidence clarifies that stable ground was selected according to *"Pussa Bhumi*" technology, and platforms approximately eight feet high were built upon it to construct ponds and pavilions. Furthermore, it was confirmed that the carvings of dragons and elephants found here were used not only for decoration but also as a medium of symbolic communication to provide visual signals regarding the direction of water flow and the power of water.

The physical exploration conducted regarding the *Sakwala Chakraya* revealed several important facts about its geometric precision and symbolic arrangement. It appears that the diagrams and images of aquatic creatures from the center to the outer ring were not carved randomly, but arranged

according to a certain logical order (universal or calendar-based). Moreover, the stone seats located near this rock provide evidence that this was a specific area used in the past for deep study or meditation.

In the investigation regarding current usage, the main trend identified was that the majority of tourists (approximately 70%) are attracted to *Ranmasu Uyana* to view "mysterious" factors like the *Sakwala Chakraya* rather than its historical water technology. However, it was observed that physical degradation is occurring due to this tourist attraction. Research results revealed that fine lines of some rock-associated carvings are gradually fading, specifically due to excessive touching and footprints by tourists.

VI. Water Management Technology of Ranmasu Uyana

The pond system spread throughout *Ranmasu Uyana* displays the advanced water technology of that time. Water coming from *Tisa Wewa* passes through a multi-step filtration system. Small silt traps were used to control the speed of water and remove silt (Bandaranayake, 1974). Rock-cut baths, finished by excavating rock, and rectangular ponds finished using stone slabs are prominent here.

Ranmasu Uyana can be described as a unique place where a thorough understanding of garden art and engineering of the Anuradhapura era can be obtained. The water management here was designed not only for bathing but for a multitude of aesthetic and technical purposes.

Figure 2. Water canal made of bricks

Figure 3. Water collecting

VII. Water Source and Distribution

The main source of water supply to *Ranmasu Uyana is Tisa Wewa*. Utilizing the high-water level of *Tisa Wewa*, water was made to flow into the park via gravitational force (Silva, 1988). Water was distributed to various ponds in the park from the tank through underground terracotta pipes and open stone drain systems.

VIII. Water Purification Method and Natural Cooling

A unique feature here is the water purification process. Water coming from Tisa Wewa does not enter the ponds directly; it first passes through a small filtration system (Silt traps). There, layers of sand and pebbles were used to remove silt and impurities from the water (Bandaranayake, 1974). Also, a technology to naturally cool the water by allowing it to flow through rock walls at the points where water enters the ponds is visible here.

IX. Pond System and Control

The pond system operational within *Ranmasu Uyana* was interconnected and designed according to a sound engineering plan. Specifically, these ponds were established utilizing different levels of the land, and they were arranged very systematically so that water overflowing from high-level ponds flowed down natural slopes to other ponds at lower levels (Seneviratna, 1994). The manner in which ponds finished by excavating natural rock boulders were used to retain water here is distinctive. Furthermore, special technical methods were used within this system to properly control the speed of water flow and the quantity of water. According to archaeological evidence, *Mr. Paranavithana* points out that this water control was done using small-sized sluices or sluice gates prepared with the aid of stone slabs (Paranavithana, 1946).

Figure 4. Bathing pond

Figure 5. The bathing pond is an activated water pumping naturally

Figure 6. Water canal with a sluice gate made of stone

Figure 7. Water drainage system in the pond

X. Water Drainage and Agricultural Integration

The most attractive feature of *Ranmasu Uyana's* water management system is its drainage system. Ancient irrigation engineers paid equal or even greater attention to taking water out of the park as they did to bringing water in.

XI. Systematic Drainage Network

Every pond in the park was designed so that when water overflowed or when dirty water needed to be removed, it flowed out systematically. This water was taken outside the park ramparts via spillway drains and underground pipelines established at the bottom of ponds or in their vicinity. This also helped prevent health problems, such as mosquito breeding, due to water stagnating within the park.

XII. Water Recycling and Fertilizer Water

The unique feature of this system is "Water Recycling". The water remaining in the park's ponds after people bathed and fish were raised was rich in organic matter and silt containing nutrients. According to modern science, this water is rich in plant nutrients like Nitrogen and Phosphorus. Ancient engineers did not waste this valuable water.

XIII. Agricultural Nourishment

The park was situated at a slightly higher level than the surrounding paddy lands, according to the topography. Using gravitational force, the nutrient-rich water removed from the park was directed straight to the paddy fields associated with the *Isurumuniya Vihara* located at the lower level (Seneviratna, 1994). Because of this, those paddy fields continuously received water mixed with natural fertilizer.

Figure 8, 9. Water Management system

Figure 10, 11 Water transportation system

XIV. Aesthetic Carvings and Water

Ranmasu Uyana is not merely a technical irrigation creation; it is a beautiful environmental system blended with artistic taste. As pointed out by Silva (1988), ancient craftsmen utilized artistic carvings well to remove the rough engineering nature of the water management system here and to add softness and a living nature to it. The greatest art creation found in the park is the figures of 'Elephants Frolicking in Water' carved on the surface of the natural rock boulder. Utilizing the natural shape and surface texture of the rock very subtly, elephants playing in a lake with lotus flowers are depicted here very realistically. This carving, which shows some elephants holding up their trunks while others are submerged in water, is believed to have been created with the aim of providing mental relief to royals visiting the park by allowing them to enjoy the beauty of a forest.

Furthermore, the abundant use of Makara figures and architectural elements within the park's water control system can be seen. Specifically, at places where water enters and exits ponds, water spouts have been designed as if water is spraying from a Makara's mouth. While this was a technical tactic used to break the water pressure and release it, the purpose was also to symbolize the purity and protection of water through the Makara, who is considered the lord of water in Oriental art. Thus, these carvings associated with water flow paths, ponds, and rock boulders clearly demonstrate the inseparable bond that existed between water and art in ancient Sri Lankan architecture.

Figure 12, 13. Elephants are playing water Elephants are playing water

Figure 14, 15. A *wimana* carvings Created hole

Figure 16. Steps with *Sandakada pahana*

XV. Investigation of Sakwala Chakraya

Sakwala Chakraya: Physical Location and Symbolic Analysis

The *'Sakwala Chakraya'*, carved on the side wall of a natural rock boulder located at the northern end of *Ranmasu Uyana,* is a mysterious, well-finished circle with a diameter of about 6 feet. Its interior is filled with various geometric figures, mysterious symbols, and animal figures. As mentioned by Silva (1988), it is a special feature that several stone-carved seats have been prepared in front of the rock so that one can sit and look at this creation or meditate. These seats bear witness that this was not a mere decorative element, but a device or chart used for some function.

The internal arrangement of the *Sakwala Chakraya* consists of several complex geometric layers. Seven rectangles are carved in the center connected to each other, and it is the scholarly opinion that this represents "Mount Meru" or the center of the world according to Buddhist cosmology. It is believed that the strips and circles extending from the center symbolize various planes (Dimensions) of the universe. Furthermore, as *Paranavithana* (1946) points out, the outer ring of the Chakra is decorated with aquatic animal figures such as fish, crabs, turtles, conch shells, and crocodiles, representing the connection to the earth's oceans or water.

XVI. Scholarly Interpretations and Theories on Sakwala Chakraya

Various theories exist among archaeologists and researchers regarding the *Sakwala Chakraya* located in *Ranmasu Uyana.* According to the opinion of the renowned archaeologist Mr. *Senerath Paranavithana,* this is a "World Map" or "Universal Map". He has pointed out that the diagrams here symbolize the Seven Great Oceans, Seven Great Mountain Ranges, and how the world is positioned according to Buddhist cosmology (Paranavithana, 1946). Another group of researchers refers to this as an "Astronomical Tool" (Star map) used by ancient kings to determine auspicious times or observe planets. Additionally, based on the stone seats here, *Marasinghe* (1991) points out that this could have been a 'Mandala' or meditative tool used by yogis or kings to contemplate the universe. However, although a popular opinion has built up at present that this is a "Stargate" or a gateway to go to other planets in the universe, no archaeological evidence for that has been found so far.

Figure 17. The Stargate

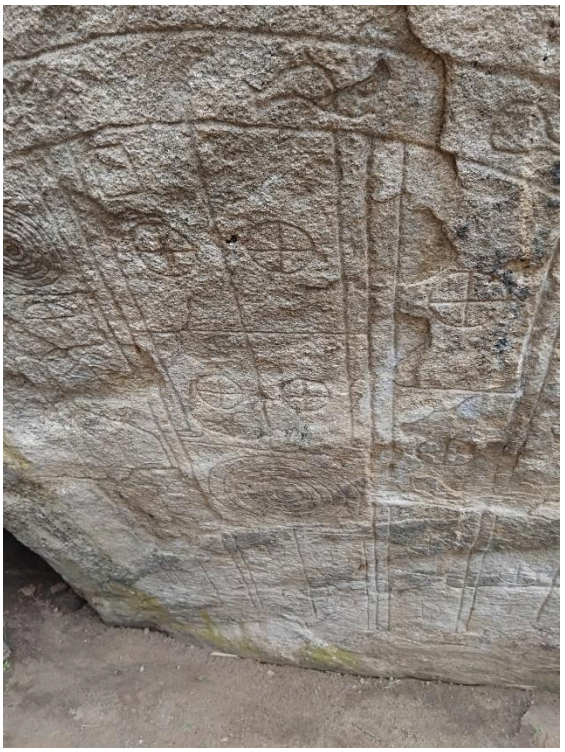

Figure 18. The Stargate

XVII. Historical Utility and Technical Excellence

Ranmasu Uyana is considered a unique example of Secular Architecture existing in the Anuradhapura era. Going beyond religious purposes, this park, created for the leisure and mental well-being of royalty, is wonderfully blended with the environment. As mentioned in ancient texts like *"Manju Sri Vastuvidya Sastra",* it is a specialty that this was constructed without damaging natural rock boulders, paying close attention to the stability of the ground *(Pussa Bhumi)* (Marasinghe, 1991). The technical excellence here is well reflected in its water system. As noted by *Bandaranayake* (1974), the existence of a water filtration system prepared using natural materials like sand and charcoal is ample testimony to the advanced engineering knowledge of the ancient Sri Lankan.

XVIII. Current Usage, Challenges, and Conservation

At present, *Ranmasu Uyana* operates as an archaeological reserve as well as a major attraction for local and foreign tourists. Specifically, due to "mysterious" theories built around the *Sakwala Chakraya,* a large number of people come to view this under the concept of "Mystery Tourism". In addition, it is used as a live laboratory for the studies of archaeology and engineering students. However, a risk of damage to these monuments has emerged due to human activities such as tourists climbing on rocks and touching carvings. There are also environmental issues, such as the blockage

of water drainage systems. As pointed out by scholars like Mr. *Senerath Paranavithana and Seneviratna* (1994), preserving this unique heritage for future generations is the responsibility of the authorities as well as the public.

XIX. Conclusion

Several facts were confirmed in the investigation conducted by this research regarding the historical utility and current usage of *Ranmasu Uyana* in Anuradhapura. *Ranmasu Uyana* is not merely a park created for the leisure of royalty, but a place where the unmatched engineering knowledge, environmental management, and universal philosophy possessed by the ancient Sri Lankans were well blended.

Firstly, considering the park's water management system, the manner in which water was circulated using natural slopes and gravitational force, with a massive water system like *Tisa Wewa,* clearly elucidates the advanced hydraulic technology of that time. Especially, the process of water purification using sand, pebbles, and charcoal (Natural filtration) shows that we possessed a sustainable technology that could provide an example even to modern environmental engineering.

Secondly, mystical carvings like the *Sakwala Chakraya* reveal that ancient creators engaged in a spiritual and scientific exploration that went beyond mere physical comforts. As pointed out by scholars like *Senerath Paranavithana,* regarding this as a universal map or astronomical tool is more logical, and it may have been something that even surpassed the global knowledge existing at that time.

Looking at current usage, *Ranmasu Uyana* has transformed from a historical heritage site to a popular tourist destination. Although tourist attractions have increased due to modern interpretations like "Stargate", it appears that the public awareness regarding their true archaeological value and engineering excellence is insufficient. This research further emphasizes the necessity of implementing a formal conservation program to prevent the degradation of these monuments in the face of human impact and environmental threats.

Finally, this research concludes that *Ranmasu Uyana* is a living testimony that proclaims the grandeur of Sri Lankan civilization to the world, and it is a national responsibility to protect it for future generations as an educational and research center beyond a mere collection of ruins, while safeguarding its architectural, technical, and philosophical value.

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