Water, Ritual, and Prosperity at the Classical Capital of Bagan, Myanmar (11th to 14th Centuries CE): Preliminary Exploration of the Tuyin-Thetso “Water Mountain” and the Nat Yekan Sacred Water Tank

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The IRAW@Bagan project is aimed at developing an integrated socio-ecological history for residential patterning, agricultural practices, and water management at the Medieval Burmese (Bama) capital of Bagan, Myanmar (11th to 14th century CE). As part of this long-term research program investigations have been initiated on the Tuyin-Thetso mountain range, located 10 km southeast of Bagan’s walled and moated epicenter. This upland area figures prominently in the chronicles of early Bagan, and numerous 13th century religious monuments were erected there. Recent explorations on Tuyin-Thetso have drawn attention to an additional feature of historical significance, a rock-cut tank located along the western edge of the Thetso-Taung ridge. Referred to by local villagers as Nat Yekan (Spirit Lake), this reservoir appears to have been integral not only to the initial collection and subsequent redistribution of water via a series of interconnected canals and reservoirs spread across the Bagan plain, but also, through its associated iconographic imagery, it may have been intended to purify this water, symbolically enhancing its fertility. This presentation will provide a preliminary assessment of Nat Yekan’s potential economic, political, religious, and ideological significance during Bagan’s classical era.

Bagan (aka Pagan), like most of the historic Buddhist capitals of Myanmar, was located in the central “dry zone” (Aung-Thwin 1987:88, 1990:1; Aung-Thwin and Aung-Thwin 2012:38; Hudson 2008:553; Stadner 2013:12; Strachan 1989:8) – the country’s Myanmar’s “most arid” region (Cooler 1997:19-20) – on the eastern bank of the strategic and economically important Ayeyarwady River (Higham 2001:134; Hudson 2004:221, 265). Recent archaeological assessments support a mid-9th century CE date for the establishment of the Bagan community.
(Hudson 2004:220, 265-266; Moore et al. 2016:285; Nyunt Nyunt Shwe 2011:26), with the 11th to 14th centuries being the period when Bagan was the capital of a polity that controlled much of what is now the country of Myanmar (Daw Thin Kyi 1966:187; Galloway 2006:35; Higham 2001:134; Hudson 2004:183, 266, 2008:553, 555; Kan Hla 1977:17; Moore et al. 2016:285; Stadner 2011:214-215, 2013:14, 18). Bagan’s florescence was followed by an era of socio-political “collapse” and reorganization, after which time it saw continued usage as a provincial capital and pilgrimage center (Hudson 2004:234-245, 266, Table 15, 2008:555; Hudson et al. 2001:53; Stadner 2011:215-216, 2013:14, 18). Bagan was subject to a monsoonal rainfall regime, and like other early tropical state formations, it must have been challenged by periods of droughts and/or floods, some minor and short-lived, others major and multi-decadal. Indeed, contemporary communities in the region are frequently challenged by droughts, and severe famines have also been historically documented (Scott 1976:1). The low annual rainfall that characterized Myanmar’s dry-zone today (500-1000 mm) has led some to presume that ancient Bagan was likely not particularly well suited for irrigation or wet-rice cultivation (Aung-Thwin 1990:8; Cooler 1997:22-23; c.f., Hudson 2004:45, 194). That said, during its florescence the city likely received more rainfall than at present (Hudson 2004:45; Lieberman 2003:101-112; Stadner 2013:12). More precisely, Bagan’s era of growth and decline coincides with, and was undoubtedly influenced by, two significant climate changes: The Medieval Climate Anomaly (MCA; 900-1300 CE), marked by warmer conditions with increased rainfall, longer monsoon seasons, shorter dry season droughts, and rains more evenly distributed throughout the year – which were ideal conditions for agriculture – and the subsequent Little Ice Age (LIA; 1300-1570 CE), a cooling period that brought negative changes in both rainfall (i.e., droughts) and temperature, and hence deteriorating agricultural conditions (Buckley et al. 2010, 2014; Cook et al. 2010; Lieberman 2003:103, 2009:330, 792, 2011:939; Lieberman and Buckley 2012:1052; Wohlfarth et al. 2016; Wündsch et al. 2014; Yamoah et al. 2017).

Given its dry-zone location, and the vagaries of its monsoonal climate (Lieberman 2011; Lieberman and Buckley 2012), one might expect that the city would have developed sophisticated infrastructure to facilitate both the storage and redistribution of water (Hudson 2004:44). Such a complex water management system is, however, not readily apparent in the center’s peri-urban (mixed urban-rural) zone (Cooler 1997:22), at least when compared to its regional contemporaries – such as the Khmer capital of Angkor (Kumma 2009) and the Sinhalese capitals of Anuradhapura and Polonnaruwa (Gekkiyangwe and Pushpakumara 2013; Gilliland et al. 2013) – where exceptionally large reservoirs and extensive canal systems are found. Indeed, it has been suggested that – other than the Ayeyarwady River – access to water was likely an endemic issue at Bagan (Cooler 1997; Luce 1969:7). Does this mean that Bagan’s citizens survived without the benefit of water management infrastructure? Not necessarily. Bagan’s inscriptions and retrospective chronicles inform us that its kings augmented the city’s water supply through the construction of wells, dams, canals, and brick or stone-lined holding tanks (Aung-Thwin 1985:63; Kan Hla 1977:22; Luce 1969:76, 84, 256; Pe Muang Tin and Luce 1923:65, 131; Scarborough 2003:62-63; Stargardt 1968:360-361). It is possible that these water management features may have simply silted up over time (Hudson 2004:2, 266). The dearth of such features may also reflect the fact that Bagan’s water management system had a subtler character than those of its contemporaries (Moore et al. 2016:283; Win Kyiing 2016, 2018). Considered in unison, these observations imply that more detailed surface reconnaissance and remote sensing strategies are required to fully appreciate how the Bagan metropolis dealt with seasonal rainfall.
In May 2017, the IRAW@Bagan project initiated a more extensive analysis of Bagan’s water management system through visitations to known water management components, and by searching for additional features (e.g., ponds, wells, canals) using both remote sensing and surface reconnaissance. These activities included examination of Nat Yekan tank (aka Spirit Lake), located atop Mount Tuyin. Situated 10 km southeast of the Bagan epicenter, Mount Tuyin rises roughly 140 m above the Bagan plain (278 m asl) and runs approximately 14 km NW-SE (Figure 1). A relatively narrow premonitory (ca. 1 km E-W at its base), Mount Tuyin figures prominently in the chronicles of early Bagan, as it was one of five places around the city that a royal white elephant carrying a Buddhist tooth-relic kneeled, prompting King Anawrahta (1044-1077 CE) to build a stupa there (Hudson 2004:27; Pe Muang Tin and Luce 1923:91, 109, 119, 147, 158; Stadtner 2011:222, 230, 2013:43). For the purposes of the IRAW@Bagan research program, Mount Tuyin constitutes the only significant upland area on the Bagan plain (Figures 2 and 3), and as such it is believed that it would have played a significant role in water management strategies at the city, especially because these would have been based on collecting and redistributing runoff from the monsoon showers (Win Kyaing 2016, 2018). Key here is the potential connection between the flow of runoff downslope, from the western side of the Mount Tuyin summit, towards the Mya Kan Reservoir (aka Emerald Lake or Kyanzittha Reservoir; Aung-Thwin 1990:28; Luce 1969:56; Moore et al. 2016:294-295). According to an inscribed pillar that once sat on it bank, this reservoir may have been built in the late 11th century by King Kyanzittha (1084-1113 CE), although Luce (1969:76, 345-346) notes that the retrospective chronicles erroneously attribute it to a later ruler, King Kyazwa (1235-1249 CE; see also Cooler 1997:29; Hudson 2004:28). For our purposes, it is noteworthy that the chronicles imply that the king: “dammed the water falling from the foot of Mt. Tuyin [Tuyin] and made a great lake. He filled it with the five kinds of lotus and caused all manner of birds, duck, sheldrake, crane, waterfowl, and ruddy goose to take their joy and pastime therein. Near the lake he laid out many tā of cultivated fields; it is said he ate [produced] three crops a year. Hard by the lake he built a pleasant royal lodge, and took delight in study seven times a day” (Luce 1969:345; Pe Muang Tin and Luce 1923:156; emphasis ours).

Initially having served as a quarry for sandstone slabs (Win Kyaing 2018:283; see also Nyan Hlaing Lynn 2017), Nat Yekan is a rock-cut reservoir located on a 1 km long promontory known as Thetsoe-Taung (Ni Tut 2013:166; see also Moore et al. 2016:295 Nyan Hlaing Lynn 2017; Win Kyaing 2018:283), roughly 700 m south of the Tuyin-Taung Pagoda, which itself is positioned at the very northern end of Mount Tuyin (figure 4). Inscriptions confirm the presence of religious institutions in the Thetsoe-Taung area in the 12th and 13th centuries, and a number of small pagodas (as many as 10), as well as three rock-cut reservoirs – including Nat Yekan – are known to exist on its summit (Moore et al, 2016:294-295). With respect to its construction date, some villagers believe that Nat Yekan is an early 11th century precursor to the larger Mya Kan Reservoir (Ni Tut 2013:161; Nyan Hlaing Lynn 2017). Alternatively, the imprecisely dated Paw Daw Mu Phaya inscription refers to the donation of a sandstone lake on Thetsoe-Taung in 1082 CE (Michael Aung-Thwin, personal communication, October 10, 2018). A somewhat later date derives from an inscription from Thetsoe-Taung itself, in which we are told that a sandstone lake was constructed in 1211 or 1212 CE (Michael Aung-Thwin, personal communication, October 10, 2018; cf. Ni Tut 2013:162). Before accepting either of these as the date of inception for Nat
Yekan, it is important to remember that their associated inscriptions could be referring to the construction of one of the two smaller rock-cut tanks also located on the mountain.

Having been brought to scholarly attention only recently, Nat Yekan tank has yet to receive any detailed investigation, although two “popular” publications have focused on this important water management feature (Nit Tut 2013; Nyan Hlaing Lynn 2017; but see also Moore et al. 2016:295; Win Kyaing 2018:283). Or own investigations indicate that Nat Yekan tank is hewn directly from the sandstone substrate, although on the east side an 11-m long, 5 m high sandstone slab retaining wall was used to close off the reservoir (Figure 12). A smaller (2.7-m long) section of retaining wall was also used to close of the eastern corner of the north wall. The square tank is 16 m x 16 m in size, 7.3 m deep, and if filled it would have held as much as 1869 m$^3$ of water. Today, the tank only holds water on a seasonal basis (Figures 5 and 6).

As in the past, the main flow of water enters Nat Yekan tank from the south, via a rock-cut and stone-walled channel that originates in the area adjacent to a smaller rock-cut water tank associated with Monument #2225. A round hole, ca 20 cm in diameter, is carved into the very center of Nat Yekan. This depression likely held a pillar that served as a water depth measuring device, as is seen in some nearby village and pagoda water tanks today (Figures 10 and 11). Such pillars are often topped with carved lotus buds, a symbol that is connected to purity, fertility, and prosperity in the Buddhist belief system (Ward 1952). More specifically, the lotus symbolizes “creation out of water” (Ward 1952:138).

Other features of the tank also speak to its broader function, beyond that of simply water collection (Figures 7-13). The tank contains three flights of carved stairs, one on the west wall (running from south to north), one in the northwest corner (running roughly southwest to northeast), and one in the northeast corner of the tank (running east to west). Each of these stairways descends into the tank to a different level. A fourth set of steps was carved into the east wall – below the stone-slab retaining wall – but these are likely symbolic, as they are far too small for actual use. The multiple stairways leading down into the Nat Yekan tank are reminiscent of the intricate stairway systems associated with the stepwells (baoli) of Medieval India. These stepwells were long used to provide potable water and to contend with drought conditions, in addition to offering space for leisure, social gatherings, and ritual practices (Bhattacharya 2015:36; Shubhangi and Shireesh 2015). Significantly, Indian stepwells “were often carved profusely with elaborate detail” (Bhattacharya 2015:36), and they were frequently associated with temples (Shubhangi and Shireesh 2015:29). Studies of the Indian stepwells indicate that they vary considerably in terms of their “size and form types, scales, access and use and the potentiality they have” (Shubhangi and Shireesh 2015:32).

A number of iconographic images are also carved into Nat Yekan’s walls (Ni Tut 2013; Nyan Hlaing Lynn 2017; Win Kyaing 2018:283). These include: 1) a water labyrinth, the tail of a crocodile or a lizard, a Naga-serpent, two hamsa birds (possibly the Ruddy Shelduck, a goose that migrates from the Himalayas, through India, and into Myanmar; Stadtner 2011:134), a large fish, and a possible third goose, all facing south, and all found in association the stair carved into the east wall; 2) a Naga-Buddha or Buddha-Muchalinda image situated in a niche – representing the story of the Naga King using his hood and tail to protect the meditating Buddha from a rain storm (Fisher 1993:23, 175; Leidy 2008:170; Luce 1969:171; Moore 2007:244; Stadner 2013:34; Ward 1952:144) – and a crocodile or Makara (water monster), both found in the northwest
corner of the tank; and, 3) an egret, two tortoises, and two small fish facing each other, all carved into the tank’s southern wall. Water imagery is clearly evident in all of these depictions, and many are also tied to notions of purity, fertility, prosperity, and power within the Buddhist belief system (e.g., Beer 2003:5, 69, 72, 77, 97; Fisher 1993:23; Ward 1952:144-146). Considered in unison, this iconography suggests that, although it undoubtedly served as a source of potable water for both monks and construction crews (Moore et al. 2016:295), broader symbolic meaning is also inherent in the Nat Yekan tank. The question remains, to what purpose was such symbolism aimed?

One final feature of Nat Yekan provides a clue to the tank’s broader significance. In the northwest corner of the tank the natural sandstone has been purposely cut down by roughly 1-1.5 m, in a clearly symmetrically manner (Figure 13). Intriguingly, the very center of this lower portion of the tank’s rock-cut wall – which is roughly 8 m in length – articulates precisely with the top of the carved niche containing the Naga-Buddha image. Also noteworthy is the fact that the northwest stair begins its descent into the tank at exactly the same elevation. In other words, the lower portion of the tank’s rock-cut wall, the northwest stairway, and the Naga-Buddha image were unquestionably all used at the same time. Above this lower section of cut-sandstone wall is a 3-4 m high, artificial embankment containing myriad boulder-sized sandstone blocks (>25.6 cm in length), some of which appear to be purposely aligned in a terrace-like manner. This feature appears to have been used to close off the tank at the same level as the higher rock-cut and stacked sandstone slab walls enclosing the rest of the tank. The evidence suggests that this embankment was added sometime later in Net Yekan’s existence, but precisely when remains a mystery. To the north of this artificial retaining wall the hillside gradually descends towards a seasonal waterfall, and ultimately the area of the Mya Kan reservoir.

We suggest that the northwest portion of Nat Yekan tank initially served as a rock-cut spillway that directed overflow water across the top of the Naga-Buddha image and out the tank, where it was channeled downslope, into the catchment zone of the Mya Kan Reservoir. We also posit that if such a spillway originally existed, its buried surface may contain additional iconography that was also aimed at sanctifying the water as it flowed out of the tank. In other words, we propose that Nat Yekan was not simply a collection node within Bagan’s broader water management system. Rather, we believe that Nat Yekan’s iconographic elements served a similar purpose as the imagery found in association with the intricately carved river beds along the Stung Kbal Spean River in the Kulen Hills, northeast of the Khmer city of Angkor. Here, water was made to flow over and around a series of Shaivite symbols (Boulbet 1979; Chevance, 2005; Feneley et al. 2016:282-284; Hendrickson 2011:451; Jacques and Dumont 1999; Tan 2014:3), many of which – such as carved linga – are clearly tied to notions of fertility (Tawa 2001:134). These symbolically charged water management nodes, and the extensive water storage and redistribution system of which they were part, celebrated the Angkor king’s role as guarantor of prosperity for the kingdom (Tawa 2001:141).

The vital relationship between water management and ritual practice – and the broader implications this relationship has for the development of state ideologies, the characteristics of political organizations, and the nature of societal inequalities – has been demonstrated throughout the world’s monsoonal regions (e.g., Boomgaard 2007:15; Lansing 1991; Scarborough and Lucero 2010; Scarborough 2003:84, 88). Across Southeast Asia, iconographic
imagery has long been employed to reaffirm the ideological connection between water and ritual (Boomgaard 2007:6). As has been underscored by Barbara Andaya (2016:243): “For Southeast Asian societies generally, ritual water was highly valued because of its life-giving, healing, and transformative properties. Together with the appropriate ceremonial, the very act of pouring water over a tangible emblem of fertility (like an upright linga) could ensure the community’s well-being.” Similarly, Bob Hudson (2004:2009) underscores that: “Buddhist cosmology and practice are bound up with the ritual pouring of water, reflecting the story of how Buddha, at the moment of his enlightenment, was able to call on the water he had poured in previous lives to witness his good deeds to come back and wash away the forces of evil.” We surmise that at Bagan, similar ideological principals underpinned the basic construction and symbolic embellishment of the Nat Yekan “sacred water tank.” If this can be demonstrated through archaeological investigations, it would also imply that Mount Tuyin is an example of what Vernon Scarborough (1998) has referred to as a “water mountain,” a specialized ritual and economic node that enhanced basic lifeways, socio-political integration, and agricultural production through the collection, sanctification, and redistribution of water, often under the auspices and patronage of societal elites (Scarborough 2003:84).

In May 2018 we will continue our hydrological analysis of Mount Tuyin and the Mya Kan Reservoir. At that time, we will also excavate part of the embankment in the northwest corner of Nat Yekan tank to determine if there was originally a spillway located there, and if so, whether additional iconography was associated with it. Finally, collateral excavations will assess whether a similar water tank exists on the opposite side of the Thetose-Taung ridge. If these propositions hold true, the sacred aspects of Bagan’s “water mountain” will become even more compelling, and our understanding of the secular aspects of the city’s broader water management system will be similarly enhanced.

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Figure 1. Google earth image showing the location of Bagan’s walled epicenter, the Tuyin-Thetso mountain range, the Nat Yekan sacred water tank, and the Mya Kan reservoir.

Figures 2 and 3. Left: The Tuyin-Thetso range as seen from the Bagan plain; Right: the Tuyin-Taung Pagoda at the northern end of the range.
Figure 4. Drone photo of the Nat Yekan sacred water tank in May 2017 (note the carved stair in the foreground).

Figures 5 and 6. Left: Dr. Pyiet Phyo Kyaw (Co-applicant, University of Yangon) at the Nat Yekan sacred water tank in October 2015 (note the water labyrinth image and carved stair in the background); Right: the IRAW@Bagan research team in the dry tank in May 2017 (note the carved stair and Naga-Buddha/Mucalinda-Naga image in the background, beneath the proposed spillway).
Figures 7. Left: Imagery/modifications on the western side of the sacred tank.


Figures 10 and 11. Left: Water level measuring device from the Minnanthu Village water tank (Bagan era); Right: the hole for a possible water level measuring device in the center of Nat Yekan tank.
Figure 12. Modifications to the Eastern side and Northeast corner of Nat Yekan.

Figure 13. Imagery/modifications in the Northwest corner of Nat Yekan (bottom); base level of the proposed spillway and the overlying retaining wall/dam (top).
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