




Construction ahead

bi-monthly interface with the construction industry in ethiopia

Architecture:
art or science?

10  2007
Butterfly
Publishing
www.constructionahead.com

Lalihela and Lihanos • The Royal Netherlands Embassy building • Intellectual property

LALIBELA AND LIBANOS,

THE KING AND THE HYDRO-ENGINEER OF 13TH CENTURY ETHIOPIA

Prof. Mark Jarzombek

*Director, History, Theory and Criticism Section, Department of Architecture
Massachusetts Institute of Technology*

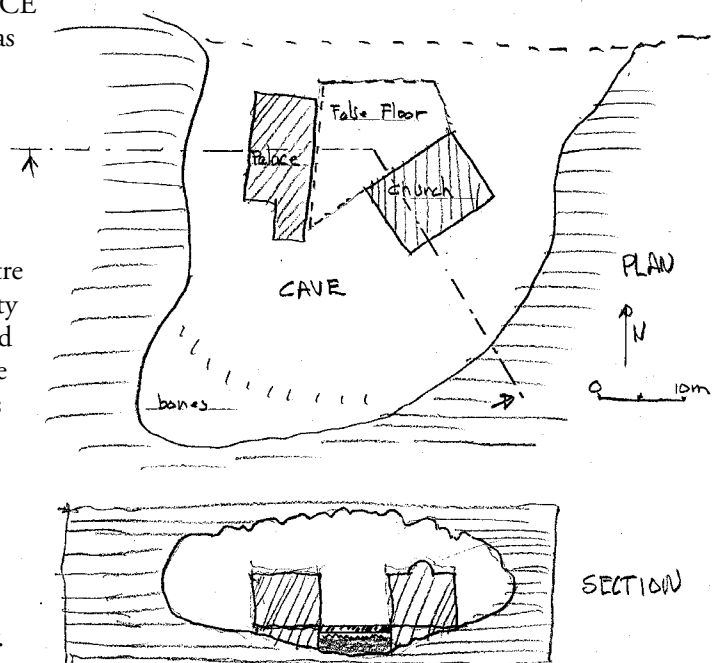


The complex of rock-cut churches in the city of Lalibela, Ethiopia is celebrated as one of the great religious sites of the world.¹ In a few years, a lofty UNESCO-funded space-frame roof will protect some of the churches from the ravages of heat and time. The attention that this site has received in recent decades has intensified scholarly debate about the churches: How were they built? What religious iconography underlies their design? What was their liturgical function? Were they modelled on the Holy Land? Were all twelve built by King Lalibela who ruled in the early thirteenth century, as tradition claims?² While such issues are central to our understanding of the churches, this paper considers a neglected, if no less important, aspect of this religious site, namely water. I will argue that Lalibela was just as much a hydro-engineering marvel as it was a religious site. In fact, its hydro-engineering not only guaranteed the city's economic foundation, but was also an intrinsic part of its religious message. Needless to say, unlike Petra and Hellenistic-era sites which have long been appreciated for their hydro-engineering, Lalibela is given little recognition in this regard, and this despite the fact that the most astonishing aspect of the pools associated with the churches is that they are located at the top of a high plateau one thousand meters over the valley floor.

To get a broader historical picture of Lalibela, one has to start with the demise of the Axumite civilization in the 8th century CE. Axum, in the north of Ethiopia, rose to prominence in the 4th century BCE as a metal producing center, and as an important regional geo-political power with connections stretching eastward to Yemen across the Red Sea, and westward to Nubia. The foundry, so essential to its wealth, was prominently located just behind the palace in a rise at the centre of a gentle bowl in which the city was spread. Still today, bronze and iron slag from the foundry litters the valley floor. But kilns in those days had devastating consequences for the environment. Requiring vast amounts of lumber, it was only a matter of time before the surrounding forests disappeared to expose the vast, quickly eroding and treeless landscape that we see there today.

With its metal production diminished and its economy weakened, Axum became vulnerable to civil strife and foreign invaders. By the 11th century, power shifted to the Zagwe Dynasty, which had its center in the mountain villages of the Ethiopian Highlands to the south of Axum. Though the Zagwe were no longer metal makers but metal importers, they were not necessarily impoverished; nonetheless there was a significant political and economic decline and, with it, a new and simpler power structure under the headship of a priest-king. The Axumites had already converted to Christianity in the 5th century and were, much like the Armenians, examples of early Christian states. But it was Yemrehanna Kristos, who ruled at the end of the 12th century, who was, so it seems, the first Zagwe king to define the parameters of the new state, ruling Ethiopia according to Apostolic canons.³ The religious economy that developed during this time was composed of king, priests, and farmers, and was thus far different in tone from cosmopolitan Axum.

Yemrehanna Kristos's capital was centred in a now remote part of the Ethiopian highlands, some 200 kilometres south of Axum.⁴ Today all that is left of this capital is his palace and a church, which is still being used by the local population and the occasional pilgrim. The church is located at the mouth of a natural cave with spectacular views eastward into the surrounding valleys. The palace is placed along side it, at an angle, some 16 meters to the west. The site was chosen apparently



Plan and Section of the church-palace complex of Yemrehanna Krestos



View northwest from Lalibela's ridge top



View from the church-palace complex of Yemrehanna Krestos



Church of Yemrehanna Krestos, trap door giving access to underground lake in front

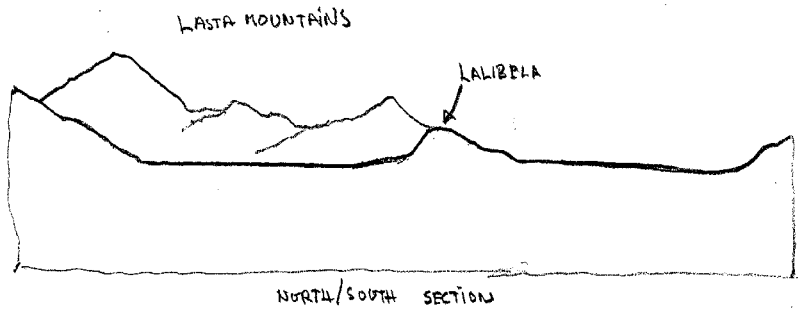
because the cave, despite its elevation at 2600 m over sea level, had a remarkable feature - a natural lake. All that needed to be done was to shore up the edges of the lake with foundations to support the two buildings and to seal off the space between the buildings with a floor. The floor, which still exists, was made of heavy and durable olive wood beams, with access to the water below provided by a trap door just in front of the church.

The church, of course, was the central institution of the new state and, in fact, still today has some 120 priests associated with it, despite its remoteness. It was also the all-important interchange between religion and water that served as the economic base of the society. The king controlled the water supply, however, not only by physical means, but also by enhancing its symbolic value. This was not just any water, but "holy water," attracting a vast array of pilgrims to the city; needless to say, these pilgrims played an important part in the economy of the city. Today, one can see the bones of about five thousand such pilgrims, coming according to legend from far off places, piled up at the back of the cave.

Yemrehanna Kristos's city failed, however, and its urban fabric, apart from the church complex, has long since disappeared. Perhaps there was not enough water apart from the one single source for a flourishing city. At any rate, Yemrehanna's younger brother, Lalibela (1181-1221), when he inherited the throne, moved the capital - which became named after him - even further to the south on the sloped, elevated site separated on all sides from the valley floor by steeply ascending paths.

In the design of the city, originally known as Roha, Lalibela used the same basic strategy as his brother, but at a grander scale. There was not one church, but at least twelve, all richly endowed and housing a substantial priestly class, living off the gifts of food and money from the peasants and pilgrims. Still today, Lalibela is Ethiopia's leading pilgrimage site, welcoming between 20,000 to 50,000 believers during important holidays, and supporting, at last count, about 350 priests and 250 deacons who are training to be priests, along with hundreds of monks and students. During Lalibela's day, the number was certainly higher.

Just as important as the question of institution-building was that of water conservation. Unlike Axum, which lay in a protected valley and where streams were diverted to create an



Schematic north-south section through Lalibela

artificial lake – the remnant of which is now nicknamed “The Bath of the Queen of Sheba” - the highlands were rugged and the valleys open to invaders. There was, for example, plenty of water in the valley rivers that flowed hundreds of meters below the hill-top site of Lalibela. But a site by the river would not have been easy to defend, and this reason is often given as an explanation for the choice of the present site atop the plateau. There was, however, another reason Lalibela picked this spot. Here, remarkably, at the very top, there was water.

Though there are no hydro-geological studies of the site, it is close to indisputable that the water comes from an artesian aquifer, the source of which – as is common for aquifers – is miles away, in this case in the 3000 meter-plus high Lasta Mountain Range to the north. The tallest mountain of the range is Mt. Abune Joseph some twenty kilometres away, but one 3000 meter peak is only three kilometres away. Lalibela, at an elevation of about 2000 meters is, in essence, in the foothills of these mountains. These springs were certainly known by local villagers long before the village there was transformed into a capital. But there is a big difference between water leaching out of the rocks and the water distribution system that is in place now.

The design of this distribution system was the work of an expert, who, so it seems, was brought in especially for this purpose. Not

much is known about this man apart from his name, Abba Libanos. He held considerable stature, and there is even a church named after him. Inside the church one can still see a painting, probably a 19th century copy of a lost original, which shows Libanos holding a cane against the top of a mountain. The cane, with a cross on top, though made of wood, has a metal tip in the shape of a small spade. From the spot where it touches the earth, there springs a river. It is unique in the representations of holy men in Lalibela

Who Libanos was is open to conjecture. He could have been a native Ethiopian, and it is most certain that there existed a tradition of water engineering dating back centuries. But it is unknown how far that tradition had developed, and it was certainly, given the evidence currently available, not put to use at Yemrehanna Kristos. Did Abba Libanos travel to other cities to perfect his craft? Did other water specialists come to Lalibela as part of his team? It is also possible, that Libanos was not Ethiopian but came from the Levant and, if so, must certainly have known places like Petra - now in Jordan - which had an extensive and highly ingenious water system that collected water from rain as well as from outlying springs.⁵ Being a Christian, he would have most certainly been eager to flee the Islamic invaders who were closing in on the Christian kingdoms of Jerusalem and Tyre during the early 13th century. That the name

PAPER *One*™

Your One and Only Office Paper

All Purpose
Premium Paper



A3

A4



80 g/m²

PAPER *One*™

Creating the Right Image

Presentation
Premium Paper



A4



100 g/m²

Distributed by

ANA General Import & Export

Sales Office 911 209090

www.anaimportexport.com



View of Bete Giyorgis with water basin.



View of Sacred Spring next to Bete Giyorgis

Libanos refers to Lebanon might be something to take into consideration in this respect, but it seems that the name was not unique even at that time. At any rate, there are no fixed answers to the question of his identity, but clearly Libanos was a recognized figure in the hierarchy.⁶ The church in which he is honored was also dedicated to Lalibela's wife, Maskal Kebra. Since there is almost a thousand years between the great Hellenistic cities of the Mediterranean and their well worked out water systems and the time of Lalibela, one might be tempted to think in terms of a decline. But our knowledge of medieval hydro-engineering is not fully developed, and to underestimate its sophistication would be a grave mistake. As Michael P. Kucher in his study of the water supply system of medieval Siena – also a hill-top town - has shown it was well-planned and regulated.⁷ The Lalibela water system is simpler than Siena's for there are no aqueducts bring in water from outside the city; Lalibela was a spring water and rain water system.⁸ But it was most certainly no less planned. Libanos, this diviner of water, was thus critical to the success of this city. He did his work not through magic – though that is how it may have appeared - but through century-old techniques which have long since faded from knowledge.

At the centre of the Libanos' design was a River Jordan, an artificially-created canyon placed between the two clusters of churches and flowing into a naturally-occurring seam between two hills. It was most certainly linked to a network of channels that distributed the water along the hillside farms. It is also clear that the architects in making the water tanks had to dig down to a particular level to guarantee water in the tanks during dry season, this being the determining factor of the design. This level also established the depth of the excavation around the church, and thus the scale and proportion of the building. Care had to be taken, therefore, to find a balance between the depth of the floor of the churches and the height of the water in the wells. If the floor level was too low, it would fill up with water and become unusable.

This remarkable aspect of the design had to be repeated numerous times, since almost all of the principal churches have a well or pool associated with them [fig. 8]. In the wet season, these overflow and most of the water runs through specially-constructed channels into the River Jordan. In most of the square pools, papyrus grows on the surface. These pools serve a special religious rituals still in effect today. Infertile women - during a special ceremony - are lowered into the pool as a way to restore their fecundity. The papyrus symbolizing rebirth, the birth of Moses, and indeed the Nile River, adds to the symbolic charge of the pools. Bete Giyorgis, the famous cross-shaped church, has not only a pool of its own, but also a special east-oriented corridor that leads to a spring, the overflow from the spring going into a channel that leads to the River Jordan.

The contrast with Petra comes to mind. Modern-day researchers have determined the complex nature of the engineering there. But Petra has long since become an archaeological and touristic site. Lalibela is the opposite. Water is still flowing according to Libanos' designs, and it is also still a living religious site, but we have, unlike in Petra, no hydro-geological studies of how the water system

actually works. What is certain is that the water of Lalibela had two economies. It was central to the agriculture of the region. But it was also part of a brilliantly defined, political-religious economy that was watched over and maintained as something divine. Neither of these would have succeeded without Libanos' hydro-engineering feat.

- 1 Research was made possible by a grant from the MIT School of Humanities, Art and Social Sciences Research Grant.
- 2 Among the most recent scholarship, there are the following works: Jacqueline Pirenne, "La signification symbolique des églises de Lalibéla, à partir des inscriptions découvertes en 1980-1983," in Taddese Beyene, ed., Proceedings of the Eighth International Conference of Ethiopian Studies, University of Addis Ababa, 1984, Addis Ababa, 1989, pp. 137-45; Michael Gervers. "The Rehabilitation of the Zague Kings and the Building of the Dabra Sina – Golgotha – Sellassie Complex in Lalibela," [http://www.utoronto.ca/deeds/pubs/golgotha/golgotha.html#_edn12 (June 12, 2007)]; Marilyn E. Heldman, "Architectural Symbolism, Sacred Geography and the Ethiopian Church," Journal of Religion in Africa, 22/3 (Aug., 1992), pp. 222-241; Gigar Tesfaye, with the collaboration of Jacqueline Pirenne, "Inscriptions sur bois de trois églises de Lalibala", Journal of Ethiopian Studies, 17 (1984), pp. 107-43; D.R. Buxton, "Ethiopian Medieval Architecture – The Present State of Studies", Ethiopian Studies, papers read at the Second International Conference of Ethiopian Studies (Manchester University, July 1963), ed. C.F. Beckingham & Edward Ullendorff, Journal of Semitic Studies, 9 (1964), pp. 239-44; Emeri van Donzel, "Ethiopia's Lalibäla and the fall of Jerusalem 1187", Aethiopica, 1 (1998), pp. 27-49; Taddesse Tamrat, Church and State in Ethiopia, 1270-1527, Oxford, 1972.
- 3 Tamrat Taddesse, Church and State in Ethiopia (Oxford: Clarendon Press, 1972), p. 61 n.3.
- 4 It is also sometimes spelled Yemrehanna Krestos.
- 5 On Petra, see: Charles R. Ortloff, "The Water System and Distribution System of the Nabataean City of Petra (Jordan) 33 BC- AD300" [published on line, June, 2007] http://journals.cambridge.org/download.php?file=%2FCAJ%2FCAJ15_01%2F50959774305000053a.pdf&code=06a4d4fe5df8a15b559d97c60a9e146d
- 6 I would like to thank Cherenet Zegeye for his useful comments on this question.
- 7 Michael P. Kucher. The Water Supply System of Siena, Italy: The Medieval Roots of the Modern Networked City, (New York: Routledge, 2005).
- 8 For other literature dealing with medieval water systems see: Peer Beaumont, Michael Bonine and Keith McLachlan, eds. Qanat, Kariz, and Khattara: Traditional Water Systems in the Middle East and North Africa (London: Middle East & North African Studies Press 1989); Leigh-Ann Bedal. The Petra pool-complex: a Hellenistic paradeisos in the Nabataean Capital: Results from the Petra "lower market" survey and excavations, 1998 (Piscataway, NJ : Gorgias, 2004); Dora P. Crouch. Water Management in Ancient Greek Cities (Oxford: Oxford University Press, 1993); Thomas F. Glick, Irrigation and Society in Medieval Valencia. (Cambridge MA, Belknap Press of Harvard University Press, 1970); Roberta Magnusson and Paolo Squatriti, "The Technologies of Water in Medieval Italy," in Working with Water in Medieval Europe: Technology and Resource Use (Leiden: Brill, 2000); Paolo Squatriti. Water and Society in early Medieval Italy, AD 400-1000. (Cambridge: Cambridge University Press, 1998).

AB-HAM ENTERPRISE PLC

CONSTRUCTIVE SOLUTIONS' provider



FOSROC International Ltd. Leading supplier of various specialized construction chemicals with over 60 years of international and 10 years local experience.

Inspired by construction technology, AB-HAM delivers first class construction technologies to our civil construction with options to designers by adding extra flexibility and confidence.



Products range

- Concrete admixtures
 - Concrete repair and protection
 - Grouts and anchors
 - Epoxy floorings
 - Protective coatings
 - Joint sealants
 - Waterproofings
 - Concrete adhesives
- and many more

AB-HAM Enterprise Plc

Wollo Sefer Road
In front of BERTA TEBABER Building
Tel.: +251 11 515 9754, 550 7634/35
Fax: +251 11 551 9840
P.o.Box: 6712, Addis Ababa, Ethiopia
abhament@ethionet.et

www.ab-ham.com