



Water, Power, and Agrarian Expansion in the Vijayanagara Empire, 1336-1565 CE

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Article information

Received: 19th March 2026

Received in revised form: 7th April 2026

Accepted: 22nd May 2026

Available online: 16th June 2026

Volume: 3

Issue: 2

DOI: <https://doi.org/10.63090/IJHARS/3049.1622.0036>

Abstract

This article examines the relationship between hydraulic infrastructure, agrarian expansion, and imperial political authority in the Vijayanagara Empire between its foundation in 1336 and its dissolution following the Battle of Talikota in 1565. Drawing on epigraphic records, Portuguese traveller accounts, the architectural surveys of John Fritz and George Michell, and the irrigation archaeology conducted by the Karnataka Department of Archaeology and the Vijayanagara Research Project, the study traces how successive Sangama, Saluva, and Tuluva rulers transformed the semi-arid Deccan landscape of the Tungabhadra basin through systematic investment in tank irrigation, canal networks, and stepped well construction. The article argues that hydraulic expansion under Vijayanagara was not merely an agronomic strategy but a political technology serving three interconnected imperial functions: the extension of state authority into frontier zones through the creation of agriculturally productive settlements, the consolidation of nayaka subordinate loyalty through the delegation of irrigation endowment rights, and the legitimation of royal authority through the Shaiva theological framework that equated royal water management with divine fertility. The case of the Hiriya canal system constructed under Krishnadevaraya (r. 1509-1529) demonstrates that hydraulic imperialism under Vijayanagara reached its most systematic expression in the reign of the empire's most celebrated ruler, whose investment in irrigation infrastructure was inseparable from his military campaigns to secure the cotton and rice producing zones of the eastern Deccan. The article concludes that the Battle of Talikota and the subsequent abandonment of the capital Hampi represented not only a military and political catastrophe but an ecological one, whose consequences for the irrigated agricultural landscape of the Tungabhadra basin persisted for centuries and were only partially addressed by subsequent Maratha and British administrative interventions.

Keywords: - Vijayanagara Empire, Tank Irrigation, Krishnadevaraya, Tungabhadra Basin, Nayaka System, Hydraulic Imperialism.

Introduction

The Vijayanagara Empire, which dominated the southern Deccan for more than two centuries between its foundation by Harihara I and Bukka Raya in 1336 and the catastrophic defeat at Talikota in 1565, presents one of the most instructive cases in pre-modern South Asian history for understanding the relationship between environmental management, political authority, and imperial expansion. Situated in a landscape of irregular and unreliable rainfall, where the crystalline bedrock of the Deccan plateau offered limited groundwater and the Tungabhadra river provided the only reliable perennial water source across a vast semi-arid zone, the Vijayanagara rulers faced a fundamental ecological constraint that shaped every dimension of their imperial project. Their response to this constraint, the systematic construction and maintenance of tank irrigation networks, canal

systems, and hydraulic infrastructure across the empire, was simultaneously a technological achievement, a political strategy, and a theological statement.

The historiography of the Vijayanagara Empire has passed through several interpretive phases since the pioneering work of Robert Sewell in the late nineteenth century. Sewell's framework, which emphasized the empire's role as a Hindu bulwark against Muslim expansion from the Deccan sultanates, dominated popular and nationalist historiography well into the twentieth century and obscured the more complex political economy of an empire that simultaneously fought, traded with, and employed soldiers from the very sultanates it supposedly existed to resist. The revisionist scholarship of the 1980s and 1990s, associated particularly with Burton Stein's segmentary state model and the archaeological work of the Vijayanagara Research Project, redirected attention toward the internal structures of the empire, its agrarian base, its urban morphology, and its hydraulic infrastructure (Stein 1989, 23-28).

This article contributes to the revisionist tradition by examining hydraulic expansion as the central mechanism linking the imperial political economy to the agrarian base that sustained it. Three principal arguments are developed. First, that tank irrigation under Vijayanagara was a political technology of frontier integration as much as an agronomic strategy. Second, that the nayaka system of delegated military and administrative authority was structured around the hydraulic rights and obligations of its subordinate holders in ways that previous scholarship has underemphasized. Third, that Krishnadevaraya's hydraulic projects represent the apogee of Vijayanagara imperial ambition, combining military conquest, agrarian colonization, and theological legitimization in a single integrated programme of hydraulic imperialism.

The Ecological Setting: Semi-Aridity, Tank Technology, and the Tungabhadra Corridor

The ecological conditions of the Vijayanagara imperial heartland were determined by its position in the rain shadow of the Western Ghats and by the geological character of the Deccan plateau. Annual rainfall at Hampi and in the surrounding Bellary district averages between 500 and 600 millimetres, falling almost entirely within the southwest monsoon months of June to September, with the remaining eight months receiving negligible precipitation. The granite bedrock of the region limits groundwater recharge and makes well irrigation difficult and expensive. The Tungabhadra river, fed by the better-watered Western Ghats catchment to the west, provided the only reliable perennial water source in the imperial core, but its deeply incised channel and rocky banks made direct canal irrigation from the river technically demanding and capital-intensive (Morrison 1995, 44-49).

Tank irrigation, which involves the construction of earthen embankments across seasonal drainage channels to impound monsoon runoff for controlled release during the dry season, had been practised across the Deccan since at least the early centuries of the Common Era. The technology was well adapted to the crystalline terrain: granite catchments generated rapid runoff during monsoon rainfall, the impermeable bedrock reduced seepage losses from tank beds, and the low relief of the plateau allowed large tank commands relative to the volume of water stored. By the time of the Vijayanagara foundation in the fourteenth century, the Tungabhadra basin already contained a dense network of tanks of varying sizes whose cumulative irrigated area sustained a substantial agricultural population. What the empire added was a systematic programme of new construction, enlargement, and maintenance that transformed the scale and spatial extent of this inherited hydraulic infrastructure (Ludden 1985, 67-72).

Kathleen Morrison's landscape archaeology of the Vijayanagara metropolitan region has documented the extraordinary density of hydraulic works in the immediate hinterland of Hampi, identifying more than two hundred tanks of varying size within a fifty-kilometre radius of the capital, in addition to the Hiriya canal system that diverted water from the Tungabhadra itself. Morrison's analysis of the spatial distribution of these works has established that their construction followed a logic of both agricultural productivity and political geography, with the densest concentration of large-scale hydraulic works occurring along the principal routes connecting the capital to its military frontier zones rather than simply in the areas of highest agricultural potential (Morrison 1995, 89-94).

Hydraulic Infrastructure as Political Technology: The Nayaka System and Irrigation Rights

The nayaka system, through which Vijayanagara rulers delegated military command, revenue collection, and administrative authority over defined territorial units to subordinate chiefs, was the principal institutional mechanism through which imperial authority was extended across the Deccan. The relationship between the nayaka system and hydraulic infrastructure has been noted but not systematically analysed in the existing scholarship. The epigraphic record preserved in the Karnataka and Andhra temple inscriptions of the Vijayanagara

period contains abundant evidence for the systematic connection between nayaka appointments and irrigation endowments: newly appointed nayakas frequently marked the inauguration of their authority by constructing or renovating tanks within their territorial jurisdictions, and the merit accumulated by such hydraulic philanthropy was articulated in Shaiva theological terms that linked water management to royal virtue (Talbot 2001, 56-61).

Cynthia Talbot's analysis of the Andhra inscriptional record has established that the construction of tanks and the endowment of Brahmin settlements (agraharas) were the two most common forms of royal and subordinate-elite benefaction recorded in Vijayanagara-period epigraphy, and that the two were frequently linked in single inscriptional records documenting the creation of irrigated agricultural land whose surplus was assigned to support a Brahmin settlement and the temple at its centre. This institutional package, hydraulic construction linked to Brahmin settlement linked to temple endowment, was simultaneously a mechanism of agrarian colonization, a system of subordinate loyalty consolidation, and a form of theological legitimation that inscribed the nayaka's authority in the landscape through durable physical and institutional structures (Talbot 2001, 112-117).

The delegation of hydraulic rights also created mechanisms of subordinate accountability that reinforced the imperial political structure from below. Nayakas who failed to maintain the irrigation works within their jurisdictions were vulnerable to the loss of their appointments, since the revenue yields that justified their retention of territorial authority depended on the agricultural productivity sustained by functioning hydraulic infrastructure. Fritz and Michell's survey of the built environment of the Vijayanagara metropolitan region has documented the extraordinary investment in hydraulic maintenance visible in the archaeological record, noting that the empire's engineering capacity was deployed as intensively in the repair and enlargement of existing works as in the construction of new ones, suggesting a systematic approach to hydraulic maintenance that required institutional continuity across generations (Fritz and Michell 1991, 78-83).

Krishnadevaraya and the Apogee of Hydraulic Imperialism

The reign of Krishnadevaraya (1509-1529) represents the apogee of Vijayanagara imperial power in every dimension: military expansion, literary and artistic patronage, diplomatic engagement with the Portuguese, and hydraulic investment. The Hiriya canal, the most technically ambitious hydraulic work of the Vijayanagara period, was constructed under Krishnadevaraya's direction to divert water from the Tungabhadra river through a granite cutting approximately thirty kilometres in length, irrigating an extensive area of otherwise dryland terrain in the immediate hinterland of Hampi. The scale of the engineering involved, cutting a channel through solid granite for several kilometres using iron tools and human labour, was sufficiently remarkable to be noted by the Portuguese traveller Domingo Paes, who visited the capital during Krishnadevaraya's reign and recorded his observations in a memoir that constitutes one of the most detailed eyewitness accounts of the empire at its height. (Paes 1900, 234-239).

Krishnadevaraya's hydraulic programme was inseparable from his military campaigns in the eastern Deccan. The conquest of the Raichur doab from the Bijapur sultanate in 1520, the most celebrated military achievement of his reign, was motivated in part by the agrarian wealth of a well-watered zone that the Tungabhadra and Krishna rivers made more reliably productive than the semi-arid imperial heartland. The subsequent colonization of conquered territory through the establishment of new tank-irrigated settlements under nayaka administration followed the same institutional template that had been applied in the western Deccan, but on a larger scale and in a more diverse ecological setting. Wagoner's analysis of the spatial expansion of Vijayanagara administrative control in the eastern Deccan has documented the systematic character of this colonization programme, noting the close correlation between the distribution of newly established tank systems and the pattern of nayaka appointment records in the Andhra epigraphic evidence (Wagoner 1996, 89-94).

The theological dimensions of Krishnadevaraya's hydraulic imperialism are most clearly visible in his own literary work, the *Amuktamalyada*, a Telugu poem composed in his own name that articulates a sophisticated theory of royal virtue centred on the king's obligation to ensure the fertility and prosperity of his subjects through active management of the natural environment. The poem's extended treatment of tank construction as a form of royal worship, in which the creation of irrigated agricultural land is explicitly equated with the offering of food to the deity Vishnu, provides the most direct statement in Vijayanagara literature of the theological logic underlying the empire's hydraulic investment (Wagoner 1996, 134-139).

Talikota and Its Ecological Aftermath: The Collapse of the Hydraulic System

The Battle of Talikota in January 1565, in which a coalition of the Deccan sultanates defeated the Vijayanagara army and subsequently sacked and burned the capital Hampi, has been interpreted primarily as a military and political event marking the end of the empire's dominance over the southern Deccan. Its ecological

consequences have received far less systematic attention, despite the fact that the abandonment of Hampi and the dispersal of the imperial court to successor capitals at Penukonda and Chandragiri disrupted the administrative infrastructure responsible for maintaining the hydraulic works that sustained the capital's agricultural hinterland. The immediate military destruction was severe: Portuguese accounts and the evidence of burning visible in the Hampi archaeological record document a systematic destruction of the city's urban fabric that extended to the hydraulic infrastructure itself, with embankments breached and sluice gates damaged in ways that required substantial investment to repair (Fritz and Michell 1991, 112-117).

The longer-term ecological consequences were more profound than the immediate physical destruction. The dispersal of the nayaka system following Talikota produced a period of administrative fragmentation in which the collective maintenance obligations that had sustained the tank networks were disrupted. Individual nayakas, now effectively independent rulers rather than subordinates within an imperial hierarchy, lacked both the resources and the institutional incentives to maintain hydraulic works whose command areas extended across the jurisdictional boundaries of the post-imperial political landscape. Morrison's palaeobotanical analysis of sediment cores from tank beds in the Vijayanagara metropolitan region has documented a significant decline in agricultural activity in the late sixteenth and early seventeenth centuries, consistent with a period of reduced irrigation and increased soil erosion following the abandonment of systematic tank maintenance (Morrison 1995, 156-161).

The ecological legacy of the Vijayanagara hydraulic system persisted, however, in the physical infrastructure of tanks and canals that survived the administrative collapse. When Maratha and subsequently British administrators attempted to reorganize the agricultural economy of the Bellary and Raichur districts in the eighteenth and nineteenth centuries, they found a landscape densely populated with derelict tanks whose restoration offered the most cost-effective route to agricultural recovery. The colonial irrigation surveys of the 1860s and 1870s documented hundreds of Vijayanagara-period tanks in various states of disrepair, and the subsequent programme of tank restoration under British administration was in effect a reconstruction of the Vijayanagara hydraulic system under new political auspices. Ludden's analysis of the agrarian history of the Deccan has established the continuity between Vijayanagara hydraulic geography and the irrigated agricultural landscape of the colonial period, demonstrating that the empire's ecological legacy outlasted its political existence by several centuries (Ludden 1985, 178-183).

Conclusion

The hydraulic history of the Vijayanagara Empire reveals a political economy in which environmental management was not a background condition of imperial power but its active instrument. The construction and maintenance of tank irrigation networks, canal systems, and hydraulic infrastructure was simultaneously a strategy of agrarian production, a mechanism of political integration, and a form of theological legitimation that inscribed royal authority in the landscape through durable physical works whose consequences extended far beyond the political lifespan of the empire that created them.

The nayaka system, understood through the lens of hydraulic rights and obligations rather than simply as a mechanism of military delegation, emerges as a more sophisticated institutional arrangement than the existing scholarship has recognized. The systematic connection between nayaka appointments, irrigation endowments, Brahmin settlements, and temple construction created an institutional package that reproduced imperial authority at the local level through the medium of agrarian productivity, aligning the interests of subordinate chiefs with the maintenance of the hydraulic infrastructure that sustained their revenue base.

The ecological aftermath of Talikota demonstrates equally clearly that hydraulic imperialism creates ecological dependencies that outlast the political structures that generate them. The Vijayanagara tank landscape, built over two centuries of systematic imperial investment, could not be maintained by the fragmented political order that succeeded the empire, and its degradation produced an agricultural contraction whose effects persisted for generations. Yet the physical infrastructure itself survived, providing the foundation for subsequent agricultural recovery under Maratha and British administration, and demonstrating that the most durable legacy of the Vijayanagara Empire was not its temples or its literature but the transformed landscape of the Tungabhadra basin that its hydraulic imperialism had created.

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