

Abstract

This thesis on the dynamics of ancient *tula* wells cultural landscape is an attempt to integrate Environmental and Social History. The thesis advances knowledge on ancient water systems, of which past recorded knowledge is meagre. The thesis has two fundamental sections: A (introductory) and B (individual study papers). The first part introduces important concepts and provides background and theoretical information for reconstructing the environmental and social history of ancient water systems. The thesis approached environmental reconstruction using oral time recall systems based on the indigenous time recall system of the Borana for understanding the impacts of natural disasters, socio-political perturbations and human responses on this ancient water system. This thesis has followed the tradition of previous historians working on environmental history of the lacustrine lakes of East Africa which used oral sources to reconstruct several centuries of environmental and social change. With brief discussions of the roles of the ancient water systems in transforming the water deficient regions of the world, the thesis situates the dynamics of ancient *tula* wells in the contemporary debates of African environmental and social history. The second part (Part B) comprises four articles. The individual papers present an analysis of the impacts of natural disasters, socio-political perturbations, human responses (Papers I & II), human perceptions of land use changes (Paper III), and labour and technological transformations in the utilizations of *tula* wells (Paper IV).

Paper I reconstructs environmental and social history of the ancient *tula* wells. The *tula* well in southern Ethiopia represents a unique water-cultural landscape wherein the well is linked to sustainable pastoral production, clan social identity, religious and ritual practices, and political debates of the community. The Borana pastoralists explain the pivotal role of *tula* wells by linking the wells to family, cattle economy, and peace of Borana (*nagaa Borana*). This water system has been modified by centuries of natural disasters, socio-political perturbations and human actions. The dynamics reflect the historical imprints of natural disasters (epidemics, droughts, excessive rainfalls or floods, famine, etc.) and socio-political perturbations (social disharmony, disunity, and political perturbations) that induced human adaptive responses. The Borana oral sources explain the dynamics of *tula* wells using three interrelated Borana concepts: *gogessa* (patri-class), *maqabas* (cyclical name) and *dhaaccii* (predestined event repetitions). The concepts provide time experts with tools to

memorize and narrate environmental and socio-political perturbations and human responses in understanding the dynamics of *tula* wells. These interconnected and complex concepts define the cycles and replications of events in historical perspectives. In the cycles of *maqabas* and *gogessa*, natural disasters and socio-political perturbations that affected at least one of the three interdependent and important aspects of Borana pastoral system (wells, cattle economy, and family or human demography) served as historical markers and references for time recollection. Corroborating the oral sources with proxy environmental data, the thesis reconstructs the impact of natural disasters, socio-political perturbations, and human responses on the cultural landscape of *tula* wells.

The study shows that Epidemics, droughts, famines, and excessive rainfall or floods are key environmental perturbations in the ancient *tula* wells cultural landscape. Epidemics and droughts collapse cattle economy and human demography, denying the *tula* wells the most important inputs forcing the Borana to abandon many *tula* wells. Floods on the other hand have repeatedly hit *tula* wells, filling the well shafts and collapsing the walls. The Borana pastoralists responded to such environmental vagaries through rehabilitation and re-excavation of the collapsed wells. This has been dependent on the status of the pastoral economy and availability of human labour. The imbalance between the number of collapsed and re-excavated wells caused higher proportion of the wells to remain dysfunctional. The natural disasters are closely linked to socio-political perturbations that influenced the operation and management of *tula* wells. Socio-political perturbations weakened the social institutions and society's capacity to mitigate disasters or cope with and manage recovery processes, revoking human stewardship.

Paper II presents detailed descriptions of the impact of the rinderpest epizootic on cattle economy, the consequent famine, and human responses. The impact is remembered by the Borana oral sources as *ciinna* – termination or discontinuity. *Ciinna* refers to the total collapse of social, economic, political and cultural lives of the pastoral society. The collapse of cattle economy and consequent famine created social disorientation and disharmony that dispersed the society into bush, exposing them to wild beasts. The term *ciinna* explains not only the extent of damage caused to the pastoral economy but also the incapacitation of the social system that limited the human responses to the multiple disasters that occurred simultaneously. The damages are remembered in terms of economic collapse, human

demographic decline, dispersion of families and clans, the practice of pawning children, and the crises in social identity. The social disorientation and disorganization was reversed soon after the disaster by Borana indigenous institutions that reorganized the society, enabling concerted actions. Despite the historical facts that show the resilience of Borana social institutions, the combined effect of repeated natural disasters, socio-political perturbations, external intervention, and internal dynamics have played significant roles in transforming *tula* wells cultural landscape and the institutions that mobilized human labour and cattle economy to re-excavate collapsed wells or rehabilitate the functional ones.

Paper III presents societal perceptions of *tula* wells cultural landscape changes. In recent years, the dynamics of *tula* wells and the cultural landscapes are associated with land use changes (e.g. change in settlement patterns and expansion of crop cultivation). Peri-urban centres have been established in every well cluster in the last four decades, while traditional settlements have shown steady movement into well zones during the same period. Similarly, crop cultivation has shown dramatic increase in the well zones, particularly after 1991. These changes disrupted the traditional resource use pattern that reserves the well zones exclusively for livestock grazing during the dry seasons. These changes are considered as severe threats to the operation of *tula* wells, as they are not governed by *aadaa seeraa* (customary law) and compete for land resources with livestock. The transformation occurred concomitantly with technology used to dig wells and lift water from the deep *tula* wells, as well as institutional transformation.

Paper IV describes how labour and technological transformations in the utilization of ancient *tula* wells influenced changes in the operations of these ancient water systems. The technological transformations include changes in water bucket (*okole*) technology from giraffe hide to plastic jerry cans, tools for well digging changing from rudimentary hand tools to improved metallic tools or heavy earth moving machines. The institutional transformation is revealed in changes in labour organization (from clan-based to hired labour) while the role of the clan in organizing labour shifted to pastoral associations, particularly when external organizations fund the well digging. The Borana also adjusted the economic contribution to fit the timely demand. They now contribute in cash rather than in kind (cattle) for well digging. The transformations brought structural transformation in the wells that increased water yield and eased access to water. However, the long term impacts of the transformations

are not clear. Currently, pastoralists use the most yielding wells, which is more likely to leave many of the less yielding wells in a disused state. In conclusion, the dynamics of *tula* wells cultural landscape are the cumulative effects of natural disasters, socio-political perturbations, and human actions. The human-environment relations are reciprocal and the influences are not linear.