Extending the Hydraulic Paradigm: Reunification, State Consolidation, and Water Control in the Vietnamese Mekong Delta after 1975

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As vividly depicted by James Scott (1998), environmental transformation and the utilization of natural resources for development have, in modern human history, often been driven by the high-modernist world views of (authoritarian) governments. In this context, environmental historians ascribe a powerful role to (hydraulic) engineers as agents of ecological and social transformation. With their epistemic power arising from their association with rational-modern science and technology development, engineers emerged as protagonists of large-scale landscape engineering and water control ventures coordinated by the nation state in the light of modernization. Against this historical background, this paper traces the post-reunification hydraulic mission in the Mekong Delta (1975–90) and highlights the strategic role that state-led water control efforts guided by hydraulic engineers have played in economic recovery, nation building, and state consolidation under socialism. It is argued that water resources development in the Mekong Delta is deeply embedded in the country's historical trajectory, which is framed by national division, the struggle for independence, and the subsequent reunification under the Vietnam Communist Party's leadership. The socialist hydraulic bureaucracy, which arose in the 1950s in North Vietnam, capitalized on the opportune moment of reunification of North and South and systematically expanded its control over the southern waterscape. In this context, the paper presents a historical perspective on how water development strategies and institutional arrangements evolved when North Vietnamese engineers took over water resources management in the Mekong Delta. These past developments still have far-reaching implications for present-day water management dynamics in Vietnam's largest river estuary.

Keywords: Mekong Delta, Vietnam, water resources development, modernization, hydraulic mission, state engineers, water bureaucracy

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I Introduction

Surrounded by the sea to the east and south, and topographically shaped by the interplay of mighty rivers, mountains, deltas, and coastal plains, water is omnipresent in Vietnam. From ancient times, the economic basis of Vietnam's civilization was grounded in intensive irrigated rice production, an activity that requires sophisticated knowledge, skills, and technology in water control. The Vietnamese people can look back at a long history and grand tradition of managing water flows. The origin and cradle of Vietnamese civilization is in the Red River basin where floods, typhoons, and droughts occur frequently and in disastrous magnitude. Ensuring survival in this harsh and unpredictable environment has always required collective efforts in developing flood protection infrastructure and managing irrigation. Unsurprisingly, hydraulic management emerged as important function of the royal state administration in pre-colonial Vietnam. Protecting the nation and people from natural disasters was politically critical, since peasant rebellions and social unrests often arose in the aftermath of famines brought on by severe flooding and droughts (Smith 2002, 77; Tessier 2010, 264). Etymologically, the Vietnamese word *thủy lợi*,[1] a term of Chinese origin and best understood as *hydraulics* in the sense of water control and the utilization of nature by human, comprises connotations of water management that traditionally derive from the above mentioned utilitarian and technical orientation of human-nature relation.

Compared to the Red River Delta, where human settlement and hydraulic interventions into the deltaic landscape go back as far as the beginning of the Christian era[2] (Tessier 2010, 264; Tuan Pham Anh and Shannon n.d., 2), the making of the modern Mekong Delta, Vietnam's largest river estuary located in the Southwest of the country, commenced far later, but has been similarly bound up in the idea of humans striving for dominion over the natural world. Structural interventions imposed on the deltaic ecology, and the resulting environmental change, have been among the major contributors to the profound transformation of the Mekong Delta in modern history. In essence, the Delta's history can be divided into two epochs characterized by divergent human-society relations: first, people's adaptation to the Delta's complex hydro-ecology; second, people's efforts to tame and control the Delta's natural forces with the use of rational science and modern technology. The latter feature has prevailed over the past 200 years, as comprehensively traced by Biggs (2010). Particularly in the past 30 years, the need for

1) While thủy means water, lợi means beneficial or useful.
2) Due to early population pressure in the Red River Delta, the royal court was forced to continuously develop new technological innovations in hydraulic engineering for land reclamation, flood protection, and increased agricultural productivity.

regulating water flows in the light of flooding, salinity, and droughts, has modified profoundly the Delta's physical shape. Hydraulic engineers and planners played a critical role in this socio-ecological transformation of the modern Delta, where water management nowadays, is performed at a large scale through a dense system of water control infrastructure consisting of dikes, embankments, sluices, and partly pumping stations (Evers and Benedikter 2009a). With reference to Wittfogel's (1957) concept of *hydraulic society*, the delta's march toward total hydro-management has transformed the delta society from a traditional *river-water civilization*,[3] which used to live in tune with nature, into a *modern hydraulic society*[4] which strives to exert control over the natural environment in which it is embedded (Evers and Benedikter 2009b).

Along the path to total hydro-management, various intersections of water control, politics, and nation building were at the heart of the Delta's modern transformation. Similar to Swyngedouw's (1999; 2007) portray of Spain's departure from feudalism to modernity, a process driven by technological progress in water control, the Mekong Delta's changing socio-nature and transformation into a predominately human-made landscape can best be understood as part of *hydro-social modernization*.[5] In this, technological progress in water control is given a critical role in the process of transforming a once sparsely populated and human-hostile waterscape into a highly regulated, standardized, manageable, and productive economic and social space (Käkönen 2008; Biggs *et al.* 2009). Irrespective of the political regimes that ruled over the Delta in different epochs, water control was the key paradigm referenced in exploiting the Delta's abundant land and water resources, and mitigating negative impacts caused by nature. Related to what Scott (1998) conceptualized as *high-modernism*, it was the boundless faith in modern science, technology and the firm belief in state management capacity that triggered consecutive hydraulic engineering ventures to tame the Delta's complex hydro-ecology. Covering the period from the end of Vietnam War (1975) to the promulgation of what became known as Renovation policy (1986), or Đổi mới in Vietnamese, this paper follows on the hydraulic history of Mekong Delta by Biggs (2010), which ends in 1975, and traces the *hydraulic mission*[6] subsequently launched by the socialist regime.

Based on exhaustive literature review, archival work, and empirical research con-

3) Văn minh sông nước
4) Xã hội thủy lợi hiện đại
5) According to Swyngedouw, hydro-social modernization defines social, political, and economic transformation on the basis of state-directed water control. It highlights the importance of water engineering and waterscape modification as the key factor for modernization and changing socio-nature.
6) The term hydraulic mission refers to top-down, state-directed, and state-monopolized development of water resources and water infrastructure for the promotion of growth, modernization, and prosperity (Molle *et al.* 2009; Treffner *et al.* 2010, 253).

ducted in Vietnam from 2008 to 2011 in context of an international research project,[7] this paper explores water resources development over the past 40 years. Landscape engineering, water control, and environmental change are viewed as part of a historical process embedded in Vietnam's national reunification and state building efforts guided by the socialist government. Against this background, the paper traces the conquest of the Mekong Delta by Vietnam's national hydraulic bureaucracy and how this process has shaped institutional arrangements, power structures, and ideologies associated with water resources management in past and present. Particular attention is devoted to the corps of state engineers, their role in hydro-social modernization, and how they benefited from this process.

II The Hydraulic Paradigm and the Global Rise of Engineers

Before turning our attention to Vietnam, a brief journey through modern water history and its protagonists, namely the guild of hydraulic engineers and bureaucrats, provides the conceptual gateway into this paper. Water control and landscape engineering have been crucial ingredients of modernization and development over the past centuries of human history. Modern water sciences, hydrology, and engineering technologies have facilitated large-scale structural interventions that have made possible the regulation of water flows and the modification of waterscapes over large parcels of geographical land. As emphasized by Molle (2006, 4), harnessing water through complex hydraulic installations became a crucial precondition for the Industrial Revolution, modern irrigated agriculture, or energy production through hydropower.

The implementation of large-scale water control efforts required heavy investment, and the scale and technological complexity of many hydraulic installations, such as hydropower, irrigation, or flood control schemes, needed centralized coordination and management. This cohesion has created firm state monopolies in water resources development and management, and in the related activities of planning, design, construction, and rehabilitation of water infrastructure. The monopolization of water control under the state favored the rise of powerful *hydraulic bureaucracies (hydrocracies)* around the world (Molle *et al.* 2009; Treffner *et al.* 2010, 254). This somehow mirrors pre-modern types of state coordination of water management referred to in Wittfogel's (1957) conceptualization of *hydraulic society*, namely: ancient polities that rose from state-coordinated col-

7) "Water-related Information System for the Sustainable Development of the Mekong Delta, Vietnam" (2007–13) funded by the Federal German Ministry of Education and Research (BMBF) and the Vietnamese Ministry of Science and Technology (MoST).

lective efforts in water control and hydraulic agriculture. However, in fact, it was only in the nineteenth century with the rise of modern sciences that large-scale water control technology advanced fundamentally. Molle (2006) points to the importance of advanced knowledge in physics, topography, geology, and hydrology that provided the basis for an improved description of the water cycle, the marshalling of the hydraulic power of rivers for industrial development and modern irrigated agriculture.

In a broader sense captured in political ecology, the paradigm of human mastery over nature became a driver of modernity and nation building, manifesting in regional water control plans and ambitious landscape engineering ventures. Hydraulic works, such as huge dams, reservoirs, and irrigation grids emerged as icons of modernity created by ultimate state power (Molle *et al.* 2009, 334). These projects did not only transform natural features such as river valleys, marshlands, or coastlines, but also rearranged human habitats such as settlement structures, the organization of land use, and access to natural resources in specific parcels of geographical space (Blackbourn 2006, 5). Rational-scientific planning and technological progress entails the involvement of specialized knowledge. The triumphal march of engineer-biased water science laid the foundation for a new and powerful professional group to emerge as protagonist of the great work of nation building and social transformation: the guild of engineers. Their modern science-based epistemic monopoly on hydrology, geology, geography, cartography, and other related disciplines legitimized their avant-garde role in society (Scott 1998, 96; Blackbourn 2006, 7).

The vital role that hydraulic engineers played for such ambitious ventures is documented by environmental historians such as Worster (1985), who highlighted the role played by engineers in the colonization of California and the grand mission of damming and diverting rivers to irrigate the arid land of the American West. Another example is Blackbourn's (2006) work about the making of modern Germany as being a conquest over nature, whereby state engineers drained marshes, modified coastlines, and straightened rivers such as in the Upper Rhine Valley. The hydraulic paradigm of water control did not only stand for modernization and prosperity. In a wider sense, national hydraulic efforts became means to achieve political ends such as nation and state building. Development through large-scale water control projects unified countries and legitimated political regimes, as vividly described by Wester *et al.* (2009) on Mexico's *revolutionary irrigation* movement, or by Swyngedouw (2007) for the case of Franco's *hydro-social dream* of harvesting every drop of surface water flowing across Spain's waterscape.

In the early twentieth century, in many parts of the world, development of centralized water infrastructure at basin, regional, and national scale called for the creation of professional and central state agencies to plan, construct, and manage water infrastruc-

ture on behalf of the nation state. The need for centralized coordination of water control efforts resulted in the emergence of powerful water bureaucracies embedded in the modern state machinery (Molle *et al.* 2009). The establishment of the Confederaciones Sindicales Hidrográficas in Spain in 1879 (Swyngedouw 1999, 459), the Department of Canals in Thailand (Siam) in 1902 (Riggs 1966, 125), and the Comisión Nacional de Irrigación in Mexico in 1926 (Wester *et al.* 2009, 397) are a few manifestations of the global rise of powerful hydrocracies consisting of technical and economics-oriented engineers. In this, one observes how the guild of hydraulic engineers endowed itself with bureaucratic and even political power, thereby becoming part of political elite. From the post-enlightenment period in Europe, the hydraulic paradigm spread around the world as a scientific-technocratic engineering mission, including in the colonies, where "subduing nature and marshalling water became part of the mission of Western countries" of bringing civilization to the world (Molle 2006, 4). The Vietnamese Mekong Delta is a classical illustration of such, whereby large-scale interventions initiated by the colonial regime were perpetuated by post-colonial regimes.

III The Vietnamese Mekong Delta: A Hydraulic Engineering Laboratory

The Deltaic Landscape: Hydro-Ecological Complexities

After a 4,800 km-long journey from the Tibetan Plateau in China through Myanmar, Laos, Thailand, and Cambodia, the Mekong River reaches its estuary located at the southern tip of Vietnam, where the river empties into the South China Sea. The deltaic topography is characterized by the extreme flatness of a vast plain (with an average elevation of 0.5 to 1.2 meters), where paddy fields, fruit orchards, and villages are arranged along countless courses of rivers, canals, and creeks branching out into open space. Blessed with fruitful alluvial soils and abundant water resources, the Mekong Delta is one of the most agriculturally productive areas in the world. Not less than 40 percent of the national food output of Vietnam originates from there, most notably export items such as rice, aquaculture, and fruits (Käkönen 2008). The dense network of over 30,000 km of waterways crosscutting the waterscape is the fundamental characteristic of the delta region, acting as the lifeline and infrastructural backbone of the Delta's agro-economy.

Unsurprisingly, the region is characterized by an extremely complex hydro-ecology. Physically, the Mekong Delta has been formed by the interplay of powerful natural forces. Over thousands of years, gigantic amounts of suspended sediments,[8] traveling in the

8) The sediment load of the Mekong Delta is estimated at 160 million tons per year (Hashimoto 2001, 20).

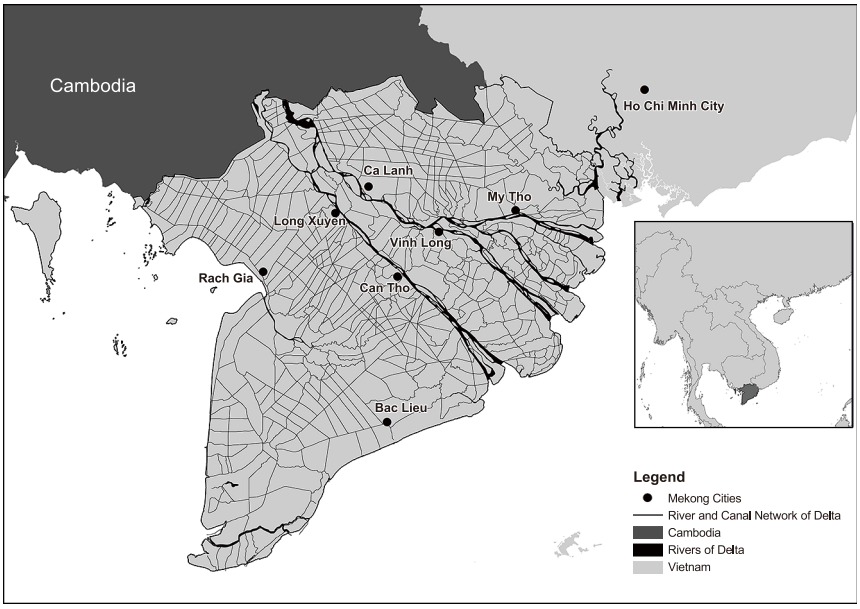

Fig. 1 Map of the Mekong Delta River and Canal Network
Source: Amir Hosseinpour (ZEF).

Mekong River, have been deposited in the estuary and then redistributed by waves, tides, and currents according to the rhythm of seasonal flooding and the daily ebb and flow. Located in the humid tropics of Southeast Asia, the Delta's hydrological cycle is shaped by the monsoon. Saline intrusion is most intensive during the dry season in April, when the river discharge is low and the tidal fluctuation is strong. Consequently, seasonal droughts and water scarcity constrain agricultural production in the coastal belt. The flood season coincides with the wet season, reaching its peak in November. During this period, the overflow from the major distributaries and the influx of floodwater from Cambodia merge. Unlike the other river basins in Vietnam, like the Red River Delta, where floods can appear suddenly and with destructive power, the Mekong Delta's flood regime is calm and prolonged. Inundation levels rise and withdraw very slowly over several weeks. The highest flood levels and duration occur in flood plains in the upstream delta to about three meters, and in extreme flood seasons up to five meters (Hashimoto 2001, 6–20; Vo Khac Tri 2012, 51–62).

Pre-socialist Hydraulic Efforts and the Making of the Modern Mekong Delta

Since ancient times, the complex hydro-ecology was considered a potential resource for agriculture, but also a major obstacle to development and economic growth. This view-

point emerged as the driving force in human efforts to modify the deltaic landscape in order to optimize the use of water and land resources, and curb negative impacts caused by nature. When modern hydraulic technology reached the Delta at the end of the nineteenth century, it became a laboratory for ambitious hydraulic engineering projects and technical interventions coordinated within the frame of modern state structures.

Landscape engineering and water management, to a limited extent, had already commenced in the early Funan period of the mid-third century, when the precursors of what would later become the powerful Khmer empire excavated an artificial water grid around the ancient capital of Oc Eo (Bourdonneau 2013). Much later, throughout Vietnamese colonization beginning in the seventeenth century, a number of new canal projects were carried out under the Nguyễn administration. Canal projects, such as the Vĩnh Tế Canal, which nowadays demarcates a boundary between Vietnam and Cambodia, were strategically critical infrastructure for improving logistics and communication across the new frontier land of the Vietnamese empire in the deep Southwest, and for protecting it from Siamese and Khmer invasion (Biggs 2010, 65). Thereafter, the French conquest and annexation of Cochinchina,[9] which commenced in 1860, led to a rapid intensification of technical interventions and modifications of the deltaic landscape. French colonial planners and engineers brought along modern knowledge, technology, and heavy equipment from Europe which permitted them to carry out large-scale infrastructural interventions. Beginning in the late 1880s, the colonial administration systematically opened up the Delta by crafting a canal grid on its surface which served as the main communication and transportation network, and along which the colonial state reclaimed land for colonization and the establishments of large-scale rice estates. Much of the rice land was owned by big landlords who demised small plots of their land to tenant farmers for cultivation. As in other parts of the colonial world, water control drove the Delta's transformation into an export-oriented plantation economy based on capitalist principles for rural production (Brocheux 1995, 17–40; Biggs 2010, 34–51). This artificial water grid was the precondition for the Delta's colonization and became the hallmark of its settlement structure, determining people's access to land and water. The early man-made canal and river network constituted the first layer of high-modernist space upon which ensuing regimes built.

As vividly shown by Biggs (2010), although infrastructural interventions have helped to convert wild swamps into manageable and productive land, in a wider context of environmental change, these man-made manipulations have resulted in unanticipated hydro-

9) Refers to the southern part of Vietnam, which encompasses the Mekong Delta and Southeast Vietnam.

ecological problems. As in an infinite loop, the unpredictable and often destructive side effects of technical progress have required ever expanding engineering and structural solutions. The sheer size of the Delta, its complexity, ecological dynamics, and growing human interference have made it almost impossible to predict how nature will respond to any modification of the landscape. Trial and error, therefore, emerged as the modus operandi of colonial engineers on the waterscape. Canal dredging works planned by French engineers did not only transform the waterscape, but represented feats of social engineering. With each newly dredged canal, new settlers, plantation owners, and the colonial administration moved deeper into formerly isolated areas. Landscape engineering was pushed forward by the shared interests of a powerful coalition comprising colonial administrators, landlords, public-works engineers, and dredging enterprises (*ibid.*, 47). Embedded in the colonial Department of Public Works, French hydraulic engineers emerged as protagonists in the making of the modern delta.

After the communist victory over the French at Điện Biên Phủ in 1954, Vietnam was divided into two different political regimes. The subsequent French withdrawal from Indochina was followed by the American military engagement, which lasted until the mid-1970s. Apart from sending soldiers and military advisers, the Americans launched aid programs, which were meant to drive back the communist insurgency in the Mekong Delta. In the 1960s, modeled after the Tennessee Valley Scheme, the Americans initiated delta-wide water resources development plans as part of a political mission to pacify the Delta by boosting rural development and starting a Green Revolution to improve socio-economic conditions (Miller 2003, 184–188). A coalition of US-American advisers, engineers, and hydraulic construction companies seamlessly replaced the French Department of Public Works. Beyond the strategic goals of geopolitics, money making interest sustained and fueled the cycle of hydraulic planning, investment, and construction from which they collectively gained (Biggs *et al.* 2009, 214–215, 221). The escalating conflict, however, thwarted these ambitious water resources and infrastructure plans. Ultimately, landscaping engineering efforts petered out in the wake of the US-American withdrawal from South Vietnam after the Paris Peace Accords in 1973 and the Vietnamization of the conflict.

IV The Modern Hydraulic State: Bureaucratic Rule over Land, Water, and People

North-South Antagonism and the Quest for National Unity

When in 1975 the Vietnam War came to an end, and the victorious socialist government

seized power in the South, the leadership of the Vietnamese Communist Party in Hà Nội faced the immense problem of economic recovery in the context of North-South reunification. One of the most urgent challenges was to overcome disquiet and resentment that had grown between the two sides after 30 years of national division. The other was about how to consolidate socialism across the southern territories and integrate the South into the socialist state and the command economy model that had been in place in North Vietnam since 1954. With peasants making up the majority of South Vietnam's population, and an abundance of potential for agricultural development, agrarian modernization was considered critical for stimulating economic growth in the South. In essence, the development and modernization of rural areas, from where the revolutionary struggle for independence and unification received most of its backing, became a key part of efforts in state consolidation and nation building in the South (Miller 2003, 189).

While Hà Nội and the Southern resistance movement were unified in the struggle for national independence, disharmony emerged over the question of precisely how to reunite the country, the pace of reunification and which economic system and policy the country exactly should follow. Moreover, tensions emerged due to Northern domination and Hà Nội's posturing about being in the position to bring up and educate the liberated South (Porter 1993, 28–30; Vasavakul 1995, 272). The North considered itself victor over imperialism and as the cradle of socialist modernity and traditional Vietnamese nationalism. After decades of national division into contrary ideological regimes, the North regarded the South as poisoned by Western capitalist values. Putting the South back on the right course justified Northern claims to leadership within the unified Vietnamese nation:

> During the war, the party had vehemently denied the Republic of Vietnam (RVN) regime's seizure of the mantle of Vietnamese modernity. After unification, the locus for the articulation of Vietnamese identity for Vietnamese south of the 17th parallel shifted dramatically northwards to the new national capital, Hanoi. The former Democratic Republic of Vietnam (DRV) became the template for the reforms prosecuted in the South in the post-war years. (Taylor 2001, 26)

North and South officially reunified in 1976 when the Socialist Republic of Vietnam was proclaimed with Hà Nội as its capital. In the following years, it became crucial for the national leadership to yield quick socioeconomic success to consolidate its political control and legitimacy in the South.

The Mekong Delta's Strategic Role in National Reunification and State Consolidation

In the early years following reunification, economic policies focused on rural areas and agriculture development, as emphasized by the General Party Secretary Lê Duẩn in his

1976 speech at the National Assembly (Turley 1977, 46). The fertile land and abundant water resources of the Mekong Delta became strategically important in this context (To Trung Nghia 2001, 101). Referring to earlier water resource plans compiled by the US-Americans, the new regime identified the Mekong Delta as most promising for agrarian modernization and achieving national food security as precondition for political stability and growth. Developing the Mekong Delta's water resources thus emerged as a strategic goal that served higher political ends and, after years of stagnation, triggered a new hydraulic mission in South Vietnam.

Indeed, in the Mekong Delta, the development of water resources slowed down and even came to a complete stop with the escalation of the military conflict in the late 1960s and 1970s (Biggs 2010, 203). This gave the Northern government an opportunity to point to the failures of the French administration and the coalition of the United States and Saigon Regime in water control and agrarian modernization prior to national reunification under socialism. In a commemorative publication celebrating the 30th anniversary of the Hồ Chí Minh City Association of Water Resources, North Vietnamese state engineers assessed the effectiveness of water control and utilization in the Mekong Delta prior to 1975 as obsolete:

> Thinking back to the first days after liberation of the South, this was a time when the North already undergone 20 years of building up of socialism (including 10 years of national struggle against the aggressive and destructive United States) and was able to keep up pace in the development of water resources at a level equal to other countries in the region. The South, in contrast, had been lagging behind since 1945. . . . Each time the Mekong Delta is discussed, much attention is paid to the great efforts made by the French in excavating new canals. However, in reality, water allocation in those days was sluggish and the bulk of agricultural land remained with only one harvest on average, not exceeding 1.5 tons per hectare per year. (Association of Water Resources of Hồ Chí Minh City 2006, 7)[10)]

The Ministry of Water in Hà Nội diagnosed the South as having a deficit of modern scientific knowledge and expertise (To Trung Nghia 2001, 101). They viewed the adaptive nature of water-society relations and agriculture production in the South as outdated. In response, modernizing water resources utilization was formulated a priority goal for the South:

> Local people in the Delta had no awareness of the role of water resources for development. Thus, the development of water resources in South Vietnam was among the most urgent priorities defined by the party and the state [after reunification]. (Association of Water Resources of Hồ Chí Minh City 2006, 7)[11)]

10) Translation by the author
11) Translation by the author

Reunification and the Political Economy of Water Control and Agrarian Modernization

A brief review of the historical events illustrates the different trajectories of development that took place in North and South prior to national reunification, spelling out why engineers from North Vietnam labeled water management in South as backward. After the Geneva Peace Agreement (1954) and the subsequent national division of Vietnam, the Democratic Republic in the North, with the goal of agrarian modernization, made significant efforts to regulate and harness water flows in the Red River basin. Being cut off from Southern rice surpluses produced in the Mekong Delta, the Northern government declared the development of water resources for a Green Revolution a national affair of the highest priority. In the late 1950s, the Northern government established the Ministry of Water.[12] Embedded in the socialist state machinery, the water management bureaucracy comprised water-related state agencies and state-owned engineering companies at every administrative level to ensure systematic top-down operations. The socialist state mobilized masses of manual labor to dig canals and upgrade dikes as part of public irrigation campaigns. Advisers from the People's Republic of China and the Soviet Union provided funds and technical advice on how to expand and modernize the hydraulic infrastructure. Moreover, water resources management became centralized under the planned economy and was implemented as an integrated part of agrarian collectivization, as explicitly shown by Smith (2002, 195–280). After 1975, to catch up with the North, the political leadership in Hà Nội emphasized the need for a comparable policy in the Mekong Delta:

> . . . without timely cooperativization it is impossible to develop irrigation, impossible to dig the network of canals and ditches such as we now have in the North. Without irrigation double cropping in rice is impossible, development of production is impossible. . . . Irrigation works cannot be performed by individual families on individual plots of land. They must be carried out in each region of the entire delta of the southern region where cooperativization has been completed. (Hoang Tung, a secretary to the Central Committee, in 1978; quoted in Ngo Vinh Long 1988, 163)

Such views reveal the synergies the party state believed to have found in the nexus of water control and the creation of new rural (socialist) institutions, in particular agrarian collectivization. In a speech delivered to young cadres during political training, the party secretary of Hậu Giang Province, one of the Mekong Delta provinces in those days, emphatically pointed out the vital role water resources development was assigned in this process:

> The development of hydraulic infrastructure and progress in rural development must go hand in

12) Bộ Thủy lợi

> hand. On the one hand, water resources must serve cropping, while agriculture at the same time must foster the development of collective groups, collective production units, agricultural cooperatives, and state farms. On the other hand, we have to rely on these organizations to develop our water resources for increased productivity, and this will automatically foster and consolidate all state-run and collective organizations. (*Hậu Giang Newspaper*, February 10, 1982)[13)]

In this sense, it was not only water management that came under state control, but also agricultural land and, consequently, the land use planning. Private property was largely prohibited under the new regime. Farmers in the Mekong Delta were requested to join collectively organized and state-run production units. Due to fierce peasant resistance, however, agrarian collectivization in form of *agricultural cooperatives*[14)] (as implemented in the North after 1954) fell short of expectations in the South. By 1986, only 6 percent of the Delta's farmers were organized in forms of collective production (Vo Tong Xuan 1995, 187).

Nevertheless, despite its failure in the South, agrarian collectivization had profound impacts on the Mekong Delta and its population. Having recognized that rigid *cooperativization*,[15)] as enforced in the North 20 years earlier, was politically unfeasible in the South, the regime opted for a less invasive version that encouraged the Delta's peasantry to get organized in so-called *solidarity production groups*[16)] or *production collectives*.[17)] By integrating farming households in these relatively loosely structured organizations, the new regime hoped to quickly integrate the Delta farmers into the central planning economy (Ngo Vinh Long 1988, 164). Consequently, the situation in the South evolved differently than in the North, such that farmers in the South remained the primary managers of their land, but had to produce according to central directives. Also new in the South were communal efforts in land preparation, irrigation, and threshing, which arose because the individual ownership of the scarce tractors, rototillers, threshers, and irrigation pumps was largely abolished under the new regime.[18)] Such devices, required in modern agriculture, were only available through state-run distribution systems. The same applied to agro-chemicals, specifically pesticides and artificial fertilizers (Vo Tong Xuan 1995, 187–188). In addition, a strict rice collection policy obliged farmers to sell rice surpluses to government agents at fixed prices (Kono 2001, 77). Growing state inter-

13) Translation by the author
14) Hợp tác xã
15) Hợp tác hóa
16) Tổ đoàn kết sản xuất
17) Tập đoàn sản xuất
18) Modern irrigation and agriculture equipment already appeared in the 1950s under the French, and then expanded in the 1960s and 1970s, partly distributed through American aid programs (Biggs 2010, 153–226).

ventionism into rural production shifted key aspects of decision making from on-farm (individual) levels to the commune and district level. This also holds true for water management, which increasingly shifted away from the individual household scale toward more collective modes of regulating water flows (Miller 2003, 189). This was facilitated by increasing physical changes imposed on the waterscape and water control infrastructure (Nguyen Duy Can *et al.* 2007, 77).

Water Control Efforts and the Mobilizing State

Although the policy of collectivization largely deviated from its strictest form, collective efforts and mass mobilization in the style of *state corporatism* or *mobilizational authoritarianism*[19] (as denoted by Kerkvliet) was a central feature of state-society relations in those days (2003, 30), and also played a vital role in the development of water infrastructure, particularly in the years immediately after reunification. Indeed, as financial resources and technical equipment were too scarce to fully mechanize interventions in response, accomplishing the state-directed hydraulic mission inevitably had to rely on intensive labor input similar to what was practiced in the early years of French colonial rule from 1860 until the end of the nineteenth century (Biggs 2010, 23–34).

During three decades of military conflict and insurgency in the Mekong Delta (1945–75), hydraulic infrastructure development gradually dwindled and canal maintenance was neglected. As a result, nature took back what humans once created over decades. Many canals were silted to such an extent that water levels were too shallow to perform proper irrigation and drainage functions and could no longer be navigated by boat (*ibid.*, 203; Kono 2001, 78). Canal dredging was therefore urgently needed to restore irrigation and drainage capacity. Furthermore, there was an urgent need to enlarge the canal grid for new land reclamation projects and to expand irrigated land with a concurrent shift towards high yielding rice varieties, which required intensive water regulation and input of agrochemicals (Nguyen Duy Can *et al.* 2007, 77; Käkönen 2008, 206–208). Across the entire Delta, thus, thousands of farmers, soldiers and cadres were mobilized to manually dig and construct hydraulic works under the supervision of local state agencies (Fig. 2).

In theory, every healthy male between the age of 18 and 45 and every woman between 18 and 30 was requested to contribute 30 days of public labor[20] per year for canal digging/dredging (Le Meur *et al.* 2005, 32). One of the first public irrigation campaigns

19) Kerkvliet distinguishes between three different concepts that are commonly used to describe state-society relations in Vietnam. One of these is *state corporatism* or *mobilizational authoritarianism*, which refers to the party-state organization's ability to mobilize the masses to support certain programs and policies (Kerkvliet 2003, 30–31).

20) Lao động công ích

Fig. 2 Irrigation Campaign: Digging a New Canal under the Red Banner and Yellow Star
Source: *Hâu Giang Newspaper*, April 27, 1977.

undertaken by the new regime commenced in 1976 in Long Phú district,[21] where more than 450,000 laborers, including 115,000 women, were mobilized to dig canals and ditches for washing out acidic soil, draining saline waters and provide fresh water for irrigation (*Hậu Giang Newspaper*, April 19, 1978).

Public irrigation campaigns intensified in the wake of the Rice Everywhere Campaign for the Mekong Delta, which required infrastructural support to enlarge the area under multiple cropping (Biggs *et al.* 2009, 210). Expanding the secondary and tertiary canal grid and the dike systems became an infrastructural necessity for promoting agrarian modernization (Käkönen 2008, 206). In Cần Thơ Province, for instance, a great deal of the secondary and tertiary canal network, and a number of primary canals, were excavated after reunification in the 1980s and the early 1990s (Kono 2001, 78; SIWRP 2007, 32). Apart from improved irrigation and drainage infrastructure, the construction of earth dikes along canal banks was meant to either protect fields from flood waters or to prevent saline intrusion.

21) The district currently belongs to Sóc Trăng Province.

V The Irrigation Front: Revolutionary Rhetoric, Water Control, and State Consolidation

While state engineers designed water control infrastructure, local dwellers were mobilized to build it, and, finally, the socialist state used it as icon of modernity and progress to legitimate its claim to rule. The newly established mass organizations took over the role of mobilizing the rural population for collective efforts in public irrigation campaigns. It was in particular the Youth Union[22] that became active in this field, but also the Farmer's Associations[23] and Women's Union.[24] Under a system referred to as *mono-organizational socialism* by Thayer (1995), in which civil society was integrated into the one-party state system, the socialist regime hoped to mobilize all parts of the local population, whether female or male, young or old, peasant or soldier, Buddhist or Catholic, Khmer or Kinh[25] for collective efforts in water control and agrarian modernization.

In the early years after reunification, progress in hydraulic engineering and the development of water resources made weekly appearances in local newspapers. These front-page headlines enthusiastically glorified the achievements made in water control that socialism had enabled. The nexus of technological modernization, economic development, and the guiding role of the new regime were systematically reproduced by the state-controlled mass media. The communist party-state praised itself as the tamer of nature and the modernizer of society, bringing prosperity to the Delta's population:

> Long Phú is a coastal district with lots of potential for agriculture and aquaculture. Prior to liberation [of the South], however, there were no irrigation works, and the bulk of land was exposed to salinity and acidic water. . . . After reunification, agriculture moved forward and the first task to be accomplished was to develop water resources and build hydraulic infrastructure. The Long Phú Party Committee facilitated the compilation of a plan for controlling salinity, increasing the availability of freshwater, and providing irrigation and drainage for the entire region. (*Hậu Giang Newspaper*, March 19, 1980)[26]

The hydraulic mission turned into a mission of state and nation building, supplying political legitimacy and facilitating state consolidation in an authoritarian context of governance. In socialist Vietnam, this phenomenon occurred under the state credo *state of the*

22) Đoàn Thanh niên
23) Hội Nông dân
24) Hội Phụ nữ
25) The three largest ethnic groups in the Delta are the Vietnamese (Kinh), the Chinese (Hoa), and the Khmer. For a rich illustration of their relationships, which are traditionally fraught with tension, see Brocheux (1995).
26) Translation by the author

Fig. 3 Banner Inscription: "The Women of Thoi An Commune Dug an Irrigation Canal to Accompany the Second Party Congress of the Province"
Source: *Hậu Giang Newspaper*, April 6, 1977.

people, by the people, and for the people.[27] The media praised the state-run public irrigation campaign as an effort of *great unity of the entire people*[28] and the Party (*Hậu Giang Newspaper*, March 16, 1977).

The type of language exploited by the state to spread this propaganda and mobilize society was embedded with metaphors that had been used during the war years. It made use of rhetorical devices that invoked martial symbols seamlessly transferred from an era of armed struggle to one of economic recovery, where it lived on in mass mobilization campaigns. The state appealed to the people's revolutionary spirit to serve the nation at the *irrigation front*.[29] During the war, the enemy was embodied in imperialistic forces, whereas after liberation and reunification, the Delta's challenging waterscape and hydroecology emerged as the new frontline along which the party and the people jointly fought against floods, salinity, and socioeconomic backwardness:

> The impression we get from today's irrigation project sites [collective digging] reminds us of those army brigades that marched forward to liberate our fatherland some years ago, but nowadays they

27) According to the Constitution of the Socialist Republic of Vietnam, there is a "state of the people, by the people, for the people. All State power belongs to the people . . ." (Article 2, Constitution of Vietnam, 1992).
28) Đại đoàn kết nhân dân
29) Mặt trận thủy lợi

> liberate the land from salinity and free people from poverty. (*Hậu Giang Newspaper*, March 22, 1977)[30]

Those who engaged in digging and dredging were celebrated as the new *irrigation heroes*[31] and *irrigation veterans*.[32] The state-controlled mass media helped to glorify water control in order to create the myth of the revolutionary *irrigation movement*,[33] which served to bring the revolutionary spirit to the fields to boost rural production (*Hậu Giang Newspaper*, April 19, 1978).

Each digging campaign and each completed irrigation scheme in the various districts was celebrated in the manner of military victories. New canals were named after important revolutionary events such as the Liberation Day of Saigon[34] or the founding date of the Vietnamese Communist Party.[35] Likewise, inaugurations of newly built hydraulic works were scheduled for specific occasions that were meaningful in terms of the revolution and struggle for independence. The opening ceremony of Hậu Giang's first electric pumping station, for example, which coincided with Uncle Ho's birthday (Fig. 4), nicely shows to which extent the socialist state tried to harness progress in water control for political ends such as national building:

> In these days, when the entire nation competes for the most impressive present one can devote to Hồ Chí Minh on occasion of his 88th birthday, this morning (May 19, 1978) the Hậu Giang Department of Water inaugurated the first electric pumping station in the province. . . . Among the distinguished guests were comrade Lê Phước Thọ, member of the Central Party Committee and General Secretary of Hậu Giang Province, comrade Lê Tính, Deputy Minister of Water. . . . (*Hậu Giang Newspaper*, May 24, 1978)[36]

VI Northern Domination: Crafting a Hydraulic Bureaucracy for South Vietnam

Bureaucratizing and Centralizing Water Resources Management

As described above, during the 1950s and 1960s, the socialist regime poured all of its energy into developing water resources and agriculture in the Red River Delta (Smith

30) Translation by the author
31) Anh hùng thủy lợi
32) Kiến tượng thủy lợi
33) Phong trào thủy lợi
34) The Second Vietnam War ended on April 30, 1975 with the liberation of Saigon. Since then this day has been celebrated as a public holiday.
35) The Communist Party of Vietnam was formally established on February 3, 1930, in Hong Kong.
36) Translation by the author

Fig. 4 Inauguration of the First Electric Pumping Station at Hậu Giang Province
Source: *Hậu Giang Newspaper*, May 24, 1978.

2002, 195–280). After reunification, the hydraulic mission was gradually shifted southwards into the Mekong Delta, the new agricultural frontier of Vietnam, as Nguyễn Cảnh Dinh, the former Minister of Water recapped 30 years later:

> . . . The Ministry of Water changed the direction of the entire sector towards a focus on the development of water resources in the South, specifically the Mekong Delta. (Nguyễn Cảnh Dinh[37] 2006, 22)[38]

The hydraulic bureaucracy of the socialist North identified the Mekong Delta as a new physical space for expanding its power over regional water resources planning, infrastructure development, and the corresponding investment decisions. In order to modernize water management in the South, it understood as necessary to transfer to the South all the knowledge and experiences, as well as the technology developed over two decades of developing water resources in the North:

> Making use of the excellent experience that all our organisations in the hydraulic management apparatus had gained in the North over many years was a useful asset for developing water resources in the Mekong Delta quickly, solidly, and in a tightly coordinated manner—without wasting opportunities and resources. (*ibid.*)

Historically, therefore, the socialist hydraulic mission in the Mekong Delta has its origin

37) Apart from his function as Minister of Water, Nguyễn Cảnh Dinh was a member of the Central Committee of the Vietnamese Communist Party in the 1980s and 1990s.
38) Translation by the author

in the North. What had been rapidly achieved in the Red River Delta 15 years earlier in terms of water control and agriculture modernization was intended to be replicated in the South.[39] Hence, immediately after the war had ended the Ministry of Water began moving south:

> With regard to the establishment of organisational structures, the ministry [Ministry of Water] took immediate action and set up a representative office in Hồ Chí Minh City. Comrades Lê Tính, Vũ Khắc Mẫn, Đinh Gia Khánh, Nguyễn Giới, and leading officials of the ministry regularly were present in the South, particularly the Mekong Delta. (*ibid.*)

The office functioned as a satellite of the Ministry of Water in Hà Nội and was assigned to facilitate the creation of state management structures in the Southern territories. The rescaling of water management and infrastructure development along parameters of central planning led to coordination with a hierarchical architecture. Financial and administrative authority over the management of water resources, including the planning and construction of infrastructure, became highly centralized following a Leninist fashion. As hydraulic technicians and their expertise were short in the South, the majority of the human resources simply were transferred from the North:

> The prompt foundation of agencies for planning, surveying, engineering, dredging, and construction under the ministry followed demand in the Mekong Delta. The Ministry [of Water] focused on its guiding role by coordinating with the Northern provinces for the provision of forces to train, educate, and promote local cadres, so as to set up and consolidate the hydraulic-bureaucratic apparatus in all provinces and districts of the Mekong Delta. (*ibid.*)

Thus, it was the hydraulic engineers from the Northern part of Vietnam who planned and implemented the post-reunification hydraulic mission in the South. Many of them were trained at the Water Resources University in Hà Nội at a time Vietnam was divided into two regimes and due to this gained their technical knowledge and practical experiences from the river basins of North and North Central Vietnam, in particular the Red River Delta. Immediately after the war ended, hundreds of hydraulic experts, planners, and bureaucrats made their way to the South, and together with them came the knowledge and technology from the North (Nguyễn Ân Niên and Lê Sâm 2006, 32). Apart from transferring knowledge and technology, sending state engineers from the North allowed

39) The big leap forward in water control in the North was achieved from 1961–65, the period in which the socialist state channeled massive investment into hydraulic infrastructure to modernize agriculture (To Trung Nghia 2001, 100). In the 1960s, more than 80 percent of state direct investments were dedicated to water control, in particular the construction of dike polders and large-scale pumping stations to regulate water outflow and intake (Tuan Pham Anh and Shannon n.d., 8).

the central government to fill strategically important leadership positions in the Southern water administration with loyal Northerners, rather than having to rely on untested candidates from the South. Relocated into a new and strange environment, Northern engineers were meant to act as nodes for sustaining relationships with Hà Nội, consolidating both political control, and ensuring strict enforcement of the national policies formulated in the capital.

In this connection, the Ministry of Water began establishing a range of special regional agencies. These agencies were also meant to represent the will of the ministry in the Southern localities and to become reliable enclaves of Northern engineers. Even nowadays, more than 30 years after their establishment, engineers from the North with educational backgrounds from the Water Resources University are predominant in all central water management agencies in the South of Vietnam (Benedikter 2014). With the founding of the Hydraulic Construction Project Management Board No. 10[40] in Cần Thơ in 1976, the first of these regional bodies took shape as a central-level project management board directly subordinated to the ministry, and charged with the coordination of infrastructure construction. One year later, in 1977, the ministry established the Sub-Institute of Water Resources Planning[41] in Hồ Chí Minh City, which was mandated to plan and develop water resources at the regional (basin level) scale, including hydraulic infrastructure for the entire South. An interview with a senior staff member is suggestive of the hegemony of Northern Vietnamese engineers in this and other central water organizations:

> After the war, one-third of our staff was sent to the South to remain there indefinitely for the development of water resources activities, and only returned to the North after 1985. Others stayed with the Southern Sub-Institute of Water Resources Planning in Hồ Chí Minh City. I myself spent several years in Cần Thơ. (interview, Hà Nội, April 14, 2009)

To strengthen research capacity, generate new knowledge on the Delta's peculiar water-ecology and to develop tailor-made hydro-management solutions, in 1978, the Southern Sub-Institute of Water Resources Research was set up in Hồ Chí Minh City as a branch of the National Institute of Water Resources Research[42] headquartered in Hà Nội. This was followed by the Southeast Vietnam Survey Association and the Southern Hydraulic

40) Ban Quản lý Dự án Đầu tư và Xây dựng Thủy lợi số 10

41) Phân Viện Khảo sát Thủy lợi Miền Nam: Today the institute is called the Southern Institute of Water Resources Planning (SIWRP) and still represents the principal planning institute under the central government for the Southern region, including the Mekong Delta.

42) Today it is known as the Vietnamese Academy of Water Resources (Viện Khoa học Thủy lợi Việt Nam).

Design Association. Both of these had been operational in the South since 1975, staffed with a few hundred engineers who were sent by the ministry. In 1983 they were merged into a single institute: the Southern Sub-Institute for Water Resources Survey and Design,[43] with its head office in Hồ Chí Minh City. All of these central organizations have played, and are still currently playing, a prominent role in the development of water resources in the Mekong Delta and the South in general.

To ensure effectiveness in implementing the hydraulic mission in the South, there was a need to build up a system of local satellites in the Southern provinces apart from the central agencies mentioned above. Integrated in the centralized state administration, specialized local state agencies were established in each locality to connect the central part of the apparatus with the grassroots level. Structurally, the local hydraulic-bureaucratic apparatus followed the overall administrative system as it had been organized in the North since 1954. Accordingly, Departments of Water[44] were established in each province of the Mekong Delta. These departments were subordinated to their respective local People's Committees but were also governed directly by the Ministry of Water in Hà Nội. Subordinated to these provincial departments were district Offices of Water,[45] which instructed irrigation cadres in each commune. While district and commune personnel were locally recruited, leadership positions in the newly established provincial Departments of Water were largely staffed with engineers sent from the North. During an interview (June 12, 2009),[46] hydraulic bureaucrats from Cà Mau Province spoke representatively for most other provinces of the Mekong Delta when they said that previously the composition of the Department of Water was almost entirely engineers from the North.

Re-mechanization and the Rise of State-Owned Engineering Companies

Due to the empty state coffers, the mobilization of manual labor to dig and dredge was crucial in the early years of the hydraulic mission from 1975. At the same time, the new regime also made initial attempts to re-mechanize water control. Soon after liberation, specialized state-owned and military-owned hydraulic engineering and construction companies equipped with dredges, barges, and other heavy equipment cropped up in different localities of the Delta and Hồ Chí Minh City. Following the rationale of a socialist planned

43) In 1993, the institute was converted into a state-owned engineering and consultancy company called Hydraulic Engineering Consultants Corporation II (HEC II).

44) In the beginning, these departments were called Ty Thủy lợi. Later on, they were renamed Sở Thủy lợi and retained this name until 1996, when they were merged into the Department of Agriculture and Rural Development (DARD).

45) Phòng Thủy lợi

46) For futher empirical evidence also see Benedikter (2014).

economy, these engineering companies were integrated into the hydraulic state apparatus. They existed either as centrally-controlled business units under the Ministry of Water or as local state companies under the Department of Water in each province.

One of the first centrally-managed hydraulic engineering and construction companies established by the ministry in the South was Construction Company No. 10 (ICCO 40).[47] It was established in 1975 with the head office in Hậu Giang Province, right in the heart of the Delta and in proximity to the Investment and Hydraulic Construction Project Management Board No. 10. One year later, the ministry established the Hydraulic Engineering, Investment and Construction Company[48] (DRECO II) in Hồ Chí Minh City. In 1979, the Ministry of Agriculture founded the Agriculture Engineering and Construction Company, which in 1984 was renamed Company 622[49] and has since remained under the control of the Ministry of Defence. Situated in Cần Thơ City, Company 622 was involved in almost all large-scale dredging ventures carried out in Military Zone No. 9,[50] which administratively encompasses all of the Mekong Delta provinces (People's Army of Vietnam 2004, 545–549). Furthermore, the Ministry of Transport set up two other large state firms in Cần Thơ that became involved in canal construction and dredging. Apart from construction works, the hydraulic mission urgently required heavy machinery and equipment, such as engines and technical devices to build up pumping stations and sluices. In 1976, the Ministry of Water therefore set up the Hydraulic Mechanical Engineering Company 276[51] in Hồ Chí Minh City, which was assigned to develop and manufacture heavy water control equipment and technical systems, including pumps, weirs, and sluices (interviews with companies, 2009; Trần Tuấn Bửu 2006, 40).

In parallel, the provincial governments established local water engineering and dredging companies that came under the auspices of the newly established provincial Departments of Water in Minh Hải[52] (1977), Đồng Tháp (1978), Hậu Giang[53] (1979), and Tiền Giang[54] provinces (1981) (interviews with companies, 2009). Similar to the central and provincial state agencies, hydraulic construction companies were dominated by North Vietnamese engineers who moved to the South after reunification:

47) Công ty Xây dựng số 10 was later renamed Construction Company No. 40 (Công ty Xây dựng số 40).
48) Công ty Thi công Cơ giới Công Thủy—Đầu tư và Xây dựng later on was renamed Công ty ty Cổ phần Tàu Cuốc số 2 (Dredging Company No. 2).
49) Công ty 622
50) Khu Quân sự số 9
51) Công ty Cơ khí Công trình Thủy 276
52) Present-day Bạc Liêu and Cà Mau
53) Present-day Cần Thơ City, Hậu Giang and Sóc Trăng
54) This refers to the Tiền Giang Hydraulic Construction Company (TICCO), which today is one of the most powerful hydraulic engineering companies in the Mekong Delta.

> Many other engineer colleagues and I were sent to the South immediately after reunification in 1976 to take up positions in the newly established local administration of water management in the Mekong Delta. Many of those who came with me had studied at the Hà Nội Water Resources University. (interviews with company director, Cần Thơ City, 2008)

This type of career path, as well as others captured in interviews, point to a tight interlocking between state management agencies, planning units, and state-owned businesses. Together they represented Vietnam's hydraulic bureaucracy in the South. State enterprises and state agencies were not only bound together in the sense that they were unified under the Ministry of Water but also in terms of personalized connections. Especially those in leadership positions shared features of an elite group with a strong collective identity based on a common background in terms of education, career, and regional provenance. Many had studied together at the Water Resources University in Hà Nội, the most elite educational facility in water management, before starting a career with the Ministry of Water in either a state agency or state-owned engineering company. Since each university class was small in those days and access to the university limited to the political elite, students could easily form groups, networks, and a strong *esprit de corps*. Because bureaucracy and business were unified within the socialist state system and central planning, cadres in state agencies and state companies frequently exchanged their positions by moving seamlessly between state management and state business. Hundreds of state engineers moved from the North to the South, thereby contributing to the expansion of tight networks of North Vietnamese engineers in the South. As state engineers and cadres they greatly benefited from predictable and stable careers, modest but regular incomes, coupled with privileged access to health services, housing, and education for their families (Porter 1993, 62). Young graduates from the Water Resources University in Hà Nội particularly gained from the organizational expansion into the South, where water engineers were in great demand to fill vacancies. In line with this, student enrolment at the Water Resources University increased by 70 percent in the years following reunification (1975–1978).[55)]

55) According to data of the student secretary, Water Resources University; personally received in 2009, Hà Nội.

VII Modernization with Side-Effects: Northern Blueprints and Technology Transfer

Ignoring the Local Conditions: Technology Transfer under Central Planning

The hegemony of Northern engineers had far-reaching consequences with regard to the development of hydraulic infrastructure in the Mekong Delta. After a century of foreign domination by French colonial engineers and American advisers, the Mekong Delta again came under the tutelage of a non-local power when the Northern engineers took over responsibility for planning and developing water resources in the South. As with their predecessors in colonial times and during the war, water engineers from the North brought along hydrological knowledge and technical blueprints from their native regions. At the same time, due to the long period of national division, engineers from the North lacked local knowledge and experiences about the South's distinctive hydro-ecological conditions.

In each region of Vietnam, topographies and climatic conditions have very distinctive characteristics. Accordingly, water regimes in the sub-tropical North and the tropical South differ fundamentally from each other. This has profoundly shaped people's relation to, and notions of how, to manage water in North and South. In contrast to the Mekong Delta's hydrology, which is characterized by the flatness of the land and a rather calm and predictable water flow regime, the Red River basin's hydrology is largely determined by the interplay of mountains and plains. Hence, in the valleys and plains of North and North-central Vietnam, sudden floods pose the greatest threat to the people's life and assets. During typhoons and prolonged downpours, water levels in the Northern river basins can rise suddenly from one to four meters within only a few hours. Masses of water then often cascade from higher terrain through river valleys into the plains in the form of flash floods, destroying settlements and damaging harvests (Tuan Pham Anh and Shannon n.d., 2; Pruszak *et al.* 2005, 373).

Regionally different water regimes have shaped different perceptions towards water, particularly with regard to flooding. Whereas people in the North traditionally associate flooding with disaster, local dwellers in the Mekong Delta consider the flood waters of the Mekong River an essential development resource. Every year the flood seasons brings along fertile alluvial soils to spread over the fields as well as aquatic products that are critical for local livelihoods. These divergent perceptions manifest in different terms used to denote flooding. *Lũ* stands for *flood* in the North and refers to the destructive force of water. *Mùa nước nổi*, which means *water-moving season*, is the term prevalent in the Mekong Delta, referring to the naturally calm nature of the local flood regime. As perceptions of water management differ significantly in North and South, infrastructural

interventions and technology would also involve different objectives. Water control infrastructure in the North predominantly aims at protecting settlements and fields from sudden and extreme flooding. Dike polders equipped with irrigation and drainage canals and massive pumping systems, some of which are being combined with multi-purpose reservoirs to bridge dry periods, constitute a great deal of what characterizes water control infrastructure in North Vietnam. In the Mekong Delta, in contrast, water management used to be performed more flexibly in adaption to the rhythm of the seasons. Flood waters, for instance, are only temporarily kept away from fields until harvest. Then earth dikes are consciously opened to inundate rice fields to benefit from fertile alluvial sediments and collect aquatic products carried in by the flood during the flood season (Ehlert 2012, 35–73).

Moreover, as mentioned earlier, the military conflict in the South thwarted the implementation of large-scale infrastructure development in the Mekong Delta for a long time and people thus lived adapted to the natural ecology. Therefore, when North Vietnamese engineers arrived in the South in 1975 they found themselves in a deltaic environment that was largely unregulated (Miller 2003, 189–216), because infrastructure such as dikes, sluices, or pumping stations existed only in isolated pilot sites. To them, these conditions were backward and underdeveloped and suggested immediate action to improve hydro-management, similar as in the highly regulated Red River Delta.

Large-scale pumping stations were installed in the Red River Delta[56] during the 1950s and 1960s when hydraulic engineering efforts reached an apogee in the socialist North (Smith 2002, 195–280). There, pumping stations well served their purpose of irrigation and drainage management in a physical setting characterized by massive dike polders for flood protection (Fontenelle 2001, 11–17). In contrast, irrigation and drainage based on large polder equipped with large-scale pumping stations as commonly found in the Red River Delta did not exist in the Mekong Delta in those days, which was appraised technologically ineffective by engineers sent from the North. What functioned in the northern delta could not be bad for the southern delta, they reasoned. Consequently, as mentioned earlier, it was in the late 1970s and early 1980s that the Ministry of Water initiated an investment program to build a network of electric pumping stations across the Mekong Delta based on blueprints transferred from the Red River Delta. Ultimately, however, the pumping station program turned out to be a misguided undertaking and failed. This is captured in an interview with local irrigation cadres from a district in Cần

56) In 2011, the Mekong Delta had 1,151 pumping stations, while the total number of irrigation and drainage pumping stations in the Red River Delta was more than 3,700 (Vo Khac Tri 2012, 78; Nguyen Van Diep *et al.* 2007, 2).

Thơ, who, in recollecting on the centrally-mandated hydraulic mission, suggest that water engineering programs derived from Northern schemes and state engineers more or less blindly followed trial and error approaches as colonial engineers[57] had earlier done:

> In 1979, there were official guidelines [by the central government] for building large-scale pumping stations commanding dyke-protected land with the objective to foster agricultural production and control flood waters. The Department of Water invested in the construction and delegated the management responsibility to the districts until 1985. The pumping scheme had the capacity to irrigate 2,500 ha and drain 600 ha of agricultural land. However, the pumping station failed for several reasons. One problem was that the command area was too large for proper management and operation. Related to this, the uneven ground did not allow for even water level management. When water was pumped into the scheme, lower areas were inundated, while in upper areas the water level remained shallow. (interview, October 27, 2008)

The failure and the subsequent closure of the pumping station in Vĩnh Thạnh (Fig. 4) was not an exception, but representative more broadly the failure of centralized water management approaches that ignored the local conditions, as national hydrocrats admitted retrospectively more than 20 years later:

> In the beginning [after 1975], the use of hydraulic engineering technologies that were successfully applied in the North . . . made evident deficiencies and required further research to develop more adequate technical solutions suitable for the southern rivers. Hence, the 100 medium and large-scale irrigation pumping stations did not succeed. The pumping stations turned out to be ineffective and thus were shut down again. . . . (Nguyễn Ân Niên and Lê Sâm 2006, 32)[58]

Apparently, the deltaic environment of the South was alien to Northern state engineers, who had problems reading the local conditions. After 25 years of national division, they found themselves for the first time operating in the South—a place they were not familiar with. In response to the failure, new hydraulic plans for the Delta temporarily relinquished the use of large-scale pumping station,[59] but increasingly relied on sluices instead.

Large-Scale Operations

Over the years of growing hydraulic efforts, water resources planning[60] became more

57) Biggs (2010, 37–38, 84)

58) Translation by the author

59) It was only in 2008 that the government approved a new investment program for pumping station development in the Mekong Delta, but this time under different considerations and with a more decentralized and adaptive approach, in which responsibility has been delegated to the provincial authorities (Prime Minister 2009).

60) Quy hoạch thủy lợi

systematic under the Ministry of Water. Based on new knowledge of local hydrological cycles, soil quality, and local flood and salinity regimes generated by the ministerial research institutes, it was in the late 1970s that the Sub-Institute of Water Resources Planning in Hồ Chí Minh City began to outline the hydraulic planning regions for the Mekong Delta. In principle, as shown in Fig. 5, four major planning regions were identified, namely: the Long Xuyên Quadrangle,[61] the Plain of Reeds,[62] the area between Bassac (Hậu River) and the Trans-Bassac (Tiền River),[63] and the Cà Mau Peninsular.[64] Simultaneously, for more systematic and standardized planning of space, land and water resources, each of the four water resources regions was subdivided into smaller *water resources areas*,[65] which were then further subdivided into even smaller units called water *resources zones*[66] (Vũ Văn Vĩnh 2006, 54). Based on these units, national-level engineers and planners decomposed the southern waterscape into singular fragments in order to reconstruct it on the drawing board as a fully human-regulated and manageable landscape. The generation of new knowledge on the Delta was facilitated also because the socialist party state rapidly expanded its physical presence and control throughout the Delta. Rigid top-down command and bottom-up reporting mechanisms provided the organizational infrastructure to systematically conduct surveys and collect all kinds of data required to plan large-scale water resources development in the context of centralized state planning. As a result, this inevitably induced an administrative rescaling of water management, lifting water resources planning from the local to the regional level and even the national level, where the spatial control over water flows became increasingly centralized in the hands of hydraulic bureaucrats and engineers.

Based on these plans, state-owned engineering and construction companies carried out the first large-scale engineering operations using heavy equipment such as dredges, sluices, and partly large-scale pumping equipment. Despite of numerous setbacks as described for the pumping-station program, the number of large-scale infrastructure projects has steadily increased. The influx of capital investment gained further momentum after Đổi mới (1986), when government revenues began to recover and increase as a result of economic liberalization and international integration. Renovation policy stimulated growth and convinced the Western donor community to resume its financial assistance to Vietnam after years of absence. Finally, renovation policy opened up new finan-

61) Tứ Giác Long Xuyên
62) Đồng Tháp Mười
63) Vùng giữa Sông Tiền và Sông Hậu
64) Bán đảo Cà Mau
65) Vùng thủy lợi
66) Khu thủy lợi

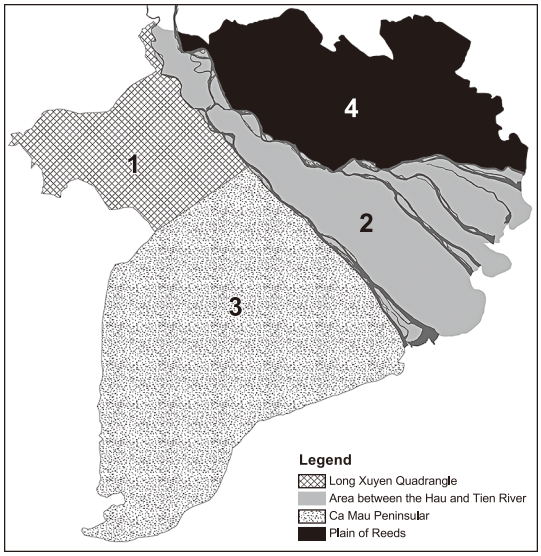

Fig. 5 Water Resources Planning Regions of the Mekong Delta
Source: Amir Hosseinpour (ZEF).

cial resources for large-scale infrastructure development (Ministry of Water 1994, 68–71; Biggs *et al.* 2009, 210).

The initial post-1975 infrastructural interventions were primarily concentrated in the Long Xuyên Quadrangle and the Plain of Reeds, where water resources and agricultural development were less intensive during the French rule and, subsequently, during the Southern Republic period (1954–75). The complex natural conditions in this area, a combination of acidic sulphate soils and extreme flooding, coupled to some extent with saline intrusion, made water resources development a difficult and costly venture. Challenging in terms of its particular natural conditions and sparsely populated, yet characterized by a strong revolutionary past, the socialist regime identified the potential of this region as the new agricultural frontier for land reclamation, resettlement, and rural development (Nguyen Van Sanh *et al.* 1998, 34; Miller 2003, 399). The absence of major canals was regarded as a major obstacle to water conservancy development, particularly in places situated far from the big rivers and natural creeks. Expanding the canal grid for improved irrigation, draining floodwaters more effectively, and washing out acidic soils were considered the major targets in the development of the Plain of Reeds and other flood-prone areas in the upper Delta. At the same time, *sweetening*[67] programs were

67) Ngọt hóa

Table 1 Hydraulic Work Projects in the Mekong Delta from the National Budget (1976–90)

Year	Name of Project	Location	Duration (Years)	Objective	Constructor
1977	Hồng Ngự Canal	Đồng Tháp	10	Water conservancy	DRECO II, ICCO 40
1979	Hòa Bình Canal	Minh Hải	10	Water conservancy	ICCO 40
1982	Vĩnh Tế Canal	Kiên Giang	8	Dredging	DRECO II
1983	Sa Rài Canal	Đồng Tháp	3	Water conservancy	DRECO II
1984	Cái Xe Sluice	Hậu Giang	2	Water conservancy	Hau Giang Hydraulic Construction Company
	Cái Oanh Sluice	Hậu Giang	2	Water conservancy	Hau Giang Hydraulic Construction Company
	Tám Phương Scheme	Cửu Long	3	Irrigation	ICCO 40, DRECO II
1985	Tri Yên Sluice	Long An	2	Drainage	ICCO 40
	Canal KH5	Kiên Giang	5	Water conservancy	ICCO 40
1986	Canal No. 28	Long An	4	Water conservancy	DRECO II
	Cái Bát Canal	Long An	3	Water conservancy	DRECO II
	Gò Công Sluice	Tiền Giang	3	Salinity control	TICCO
1987	Đa Lộc Sluice	Cửu Long	2	Salinity control	ICCO 40
	Thanh An Pumping Station	Hậu Giang	1	Irrigation	Hau Giang Hydraulic Construction Company
1988	Long Uông Sluice	Tiền Giang	2	Salinity control	TICCO
	Hiệp Hòa Sluice	Cửu Long	2	Salinity control	ICCO 40
	Tân Thành-Lò Gạch Canal	Đồng Tháp	2	Water conservancy	DRECO II
1989	Bắc Phèn Sluice	Cửu Long	2	Salinity control	ICCO 40

Sources: Table by the author, data from the Ministry of Water (1994, 68–71) and interviews conducted with engineering companies in 2009.

initiated in downstream coastal areas to improve salinity control and channel freshwater into dike-protected areas (SIWRP 2011, 7).

Public labor campaigns and manual digging lost intensity in the late 1980s, and then almost vanished in the mid-1990s, as infrastructure development became increasingly mechanized in the transition to large-scale engineering projects. Table 1 provides an overview of the large-scale projects financed by the central government that stood out most prominently in the first 20 years after reunification. Most of these projects ran for several years and provided a stable income for engineering companies and their staff. Centrally-managed companies under the direct subordination of the ministry, such as ICCO 40, DRECO II, or the military-owned Company 622, were involved in almost all larger hydraulic infrastructure projects implemented across the delta region. These included canal excavation and dredging works in the upper delta, most notably the Hồng Ngự Canal Project in the Plain of Reeds (1977–87), which still is considered a milestone

by Vietnam's national hydrocrats (Cao Đức Phát[68] 2006, 15). The post-reunification hydraulic mission in the South did not only spur mechanization but also nurtured a domestic water engineering industry embedded in the command economy, alongside of which the corps of state engineers could further expanded its influence (interviews with state agencies and engineering companies, 2009; *Hậu Giang Newspaper*, May 29, 1985).

The question of how to operate and financially maintain a steadily growing array of infrastructure became pressing in the late 1980s. In response, a second wave of water control mechanization followed, which centralized the power over water management in the hands of state engineers. Based on the nascent ideas about water pricing and service fees arising in tandem with economic liberalization, the first irrigation and drainage management companies (IDMC)[69] were set up by the mid-1980s at the local level. They were assigned to operate and maintain main canals and headworks such as irrigation and drainage sluices, as well as larger dikes (Barker *et al.* 2004, 27). Established as financially self-sufficient public utility providers, the IDMCs were entitled to collect irrigation service fees[70] from farmers. The revenue generated from this levy was used to cover the overheads of IDMCs (e.g. salaries and equipment), with the rest being reinvested in infrastructure maintenance to ensure the performance of hydraulic works (interviews, 2008/09). As in the state-owned engineering companies, IDMCs provided employment and career opportunities for engineers. And in general, this second wave of mechanization expanded the socialist hydrocracy's power in terms of the scope of its mandate, and through the accumulation of financial resources and personnel.

As a result of the hydraulic mission, agricultural land in the Mekong Delta expanded by 20 percent from 1975 to the 1990s, in particular irrigated paddy land (Le Anh Tuan *et al.* 2007, 22). Nevertheless, as illustrated in Fig. 6, due to the lack of economic incentives under state-imposed agrarian collectivization and the failures of central planning rice output fell far short of expectations in the beginning (Nguyen Van Sanh *et al.* 1998, 47). From 1976 to 1979, paddy output even declined. It was only in the mid-1980s, when de-collectivization fully re-established household-based production and economic liberalization under Đổi mới unleashed market forces, that the water regulation infrastructure laid earlier yielded rapidly growing output (Vo Tong Xuan 1995, 188). Whereas water control technology and technical know-how traveled from the North to the South after 1975, the shift from central planning to a market-based economy originated in the South, most notably in the Mekong Delta. Early attempts at deviating from the planned economy

68) Incumbent Minister of Agriculture and Rural Development
69) In Vietnam, these companies are called công ty quản lý và khai thác công trình thủy lợi.
70) Thủy lợi phí

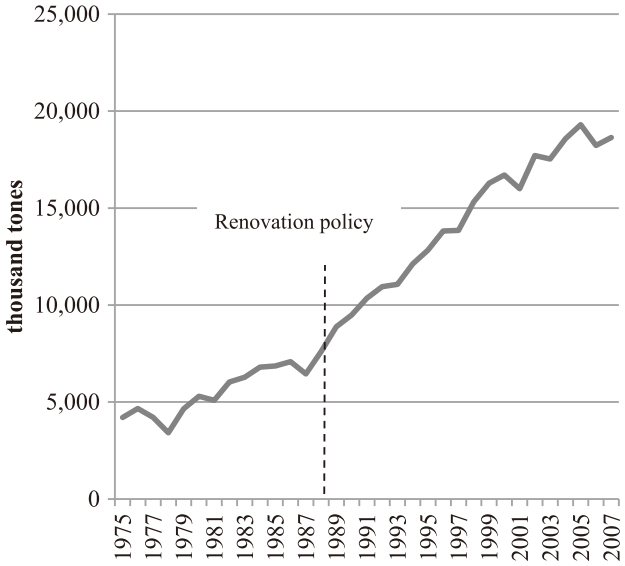

Fig. 6 Annual Rice Output in the Mekong Delta (1975–2007)
Source: Figure by the author, data from the General Statistic Office of Vietnam (GSO).

commenced already by the end of the 1970s, famously becoming known as fence-breaking (Porter 1993, 118–127).[71] In the context of Đổi mới, the hydraulic paradigm from the North combined with economic liberalization in the late 1980s in the South to produce an agro-economic upswing in the Mekong Delta.

VIII Recent Developments towards Total Hydro-Management

The actual boom gained pace in the 1990s, when the central government and the international donor community revisited older plans for Delta-wide water resources development aimed at rural development and poverty reduction. Funded by the United Nations Development Programme (UNDP) and the World Bank, Vietnamese and foreign engineers and planners under the overall coordination of NEDECO,[72] a Dutch water engi-

71) This refers to the national food supply crises in the 1970s and the first rice trade experiments in the Mekong Delta. These informal experiments became possible with the backing of prominent party cadres, such as Võ Văn Kiệt, the party secretary of Hồ Chí Minh City (1975–88) and later Prime Minister of Vietnam (1991–97), as well as provincial leaders from Long An and An Giang province (Rama 2008, 9–27).

72) Netherlands Engineering Consultants

Table 2 Large-Scale Water Control Systems Developed in the Mekong Delta from 1995 to 2010

Name of Water Control Scheme	Location	Service Area (ha)
Quản Lộ-Phụng Hiệp*	Bạc Liêu, Sóc Trăng	178,000
Nam Măng Thit*	Trà Vinh, Vĩnh Long	225,000
Ô Môn-Xà No*	Cần Thơ, Hậu Giang, Kiên Giang	45,000
Tiếp Nhật*	Sóc Trăng	53,000
Cần Thơ-Long Mỹ	Cần Thơ, Hậu Giang	50,000
Cái Sắn-Thốt Nốt	Cần Thơ, Kiên Giang	58,000
Ba Lai	Bến Tre	50,000
Bắc Vàm Nao**	An Giang	31,000
Ba Rinh-Tà Liêm*	Sóc Trăng	30,000

Source: Vo Khac Tri (2012, 76) (modified by the author).
Notes: * World Bank funded water control schemes.
** AusAid (Australian Agency for International Development) funded water control schemes.

neering consultancy group, developed the NEDECO Mekong Delta Master Plan in 1993. As summarized in Table 2, by proposing large-scale, multi-purpose water control schemes, including flood management measures, salinity control, irrigation, and drainage functions, the Master Plan heralded a new era of hydraulic engineering and water control in the Mekong Delta. Based on results of more than 50 different scientific consultancy reports, this particular plan is considered the first multi-purpose and multi-sector planning document for the delta, though the focus clearly remained on water and agriculture (Waibel *et al.* 2012, 169). Subsequently, huge investment was channeled into large-scale water control and irrigation scheme development from the mid-1990s to promote agrarian modernization, rural development, and poverty reduction.

There is little doubt that these technically complex interventions have indeed boosted growth, modernized agriculture, and improved livelihoods in the Mekong Delta, but they have also spawned unintended side-effects for nature and society. As it has occurred so often as part of large-scale interventions into nature, the recent expansion of water control barriers and other regulatory infrastructure significantly changed the natural water regime. As a result, water quality depreciation within closed and fully flood-protected irrigation and drainage schemes increased, biodiversity and aquatic resources diminished, flood waters shifted to formerly flood-free areas, river bank erosion intensified, and canal silting accelerated, just to mention some of the impacts (Le Thi Viet Hoa *et al.*, 2007; 2008; Hashimoto 2001). Even so, water resources management continues to adhere to utilitarian notions inherent in *thủy lợi*, which is entrenched in rigid top-down and centralized management regimes. Critical (local) voices pointing to the social and environmental impacts resulting from large-scale engineering projects implemented by the central government and often based on inappropriate technologies and

designs have largely fallen on deaf ears. Seeing themselves being largely excluded from decision-making and planning processes of large-scale water control structures, and pointing to the failure of national level planners, local officials and experts cynically refer to them as Red River Delta design projects. This view manifests mounting tension between central-state hydraulic engineers and local communities, which increasingly have contested central state interventions (Benedikter 2014).

Thirty years after reunification and 25 years after the promulgation of Renovation (Đổi mới), engineers from North Vietnam still dominate Vietnam's national hydraulic bureaucracy. They are most powerful because they still enjoy unlimited control over central-level state agencies, planning institutes, and the above mentioned engineering companies, most of which have been (semi-)privatized in the wake of state-owned enterprise reforms. Their elite networks, which are typically based on cronyism, kinship, and patronage—many of which still stem from the Hà Nội Water Resources University—have persisted to the present day. These networks began strategically capturing the hydraulic engineering industry that has become increasingly deregulated in light of Đổi mới over the past 20 years (Evers and Benedikter 2009a). The self-serving interests inherent in these resources networks, coupled with a strong adherence to state-planning and notions of a developmental state, still prevail as critical factors shaping water resources development in the Mekong Delta. Despite ongoing administrative and fiscal decentralization, large-scale water control efforts initiated after 1995, the majority of which involve significant amounts of donor money and funds from the state coffers, remain centrally managed by the ministry in Hà Nội, its satellites in Hồ Chí Minh City, and formerly state-owned engineering companies (Benedikter 2014).

Embedded in these power structures and their underlying vested interests, the water resources and infrastructure development initiatives have consistently failed to provide space for local communities in the Mekong Delta to participate in spatial planning and water management at large scale. North Vietnamese engineers and their networks within the Ministry of Agriculture and Rural Development (MARD), which replaced the former Ministry of Water in 1996 in the light of administration reforms, dominate planning procedures. Off the record, local state agencies in the Delta blame the ministry in Hà Nội for neglecting the local conditions and perceptions, while carrying out central-state operations from afar (interviews, 2009). Meanwhile, the role of local state agencies and communities is restricted to providing funding for operation and maintenance. The Water Resources Development Project for the Mekong Delta (1999–2009),[73] based on the NEDECO Master Plan funded by the World Bank and implemented by MARD, exempli-

73) See Table 2: World Bank-funded projects are highlighted by an asterisk.

fies how the interests of national hydrocrats and their networks dominate and co-opt water management approaches, thereby preventing participatory, decentralized, integrative, and polycentric water management reforms from unfolding their effects in real life (Benedikter 2014). Just like in former times, also nowadays in the era of renovation, technocratic and centralized birds-eye planning coupled with a trial-and-error orientation remain the guiding principles of waterscape engineering as part of the Mekong Delta's path towards total hydro-management.

IX Conclusion

To sum up, this paper illuminated the vital role water control and hydraulic engineers have played for the modernization and development of the Mekong Delta subsequent to reunification of North and South. Subduing the Delta's hydro-ecology and exploiting its maximum potential of land and water resources was not only critical in terms of economic growth and modernization. Dominion over the waterscape was also symbolically important for the socialist regime to serve political ends such as nation building, state consolidation, and bolstering of its political legitimacy in the South. Environmental and social transformation after 1975 was akin to what Scott defines as high-modernism, which manifests in "self-confidence about scientific and technical progress, the expansion of production, the growing satisfaction of human needs, the mastery of nature . . ." (1998, 4).

The state-directed mission of development planned in Hà Nội sought to bring socialist modernity to the Southern population, freeing the delta from its backward mode of water management and rural production, which would ensure the nation's food security. Authoritarian one-party rule, economic nationalization, and the incapacitation of civil society under mono-organizational socialism leveled the social terrain for an exclusively state-directed and top-down technocratic hydro-social modernization process. Spatially the socialist hydraulic mission followed the closing off plans conceived by American advisers and engineering companies in the 1960s (Käkönen 2008, 206; Miller 2003, 182–225), while technologically it drew on the water control models that had been implemented in the Red River Delta and other places in the North a decade earlier by the socialist state and its hydraulic bureaucracy.

The Democratic Republic of Vietnam, in general, functioned as development template for the South. In this context, the desire to modernize water utilization and agricultural production in the South, paved the way for a replication of the hydraulic efforts made one decades earlier in the North. The new regime's diagnosis that knowledge, technology, and expertise was lacking in the South opened up opportunities for hydrau-

lic engineers and planners form the North to dominate water resources planning and development in the Southern region. Water resources development was rescaled as a central state mission directed from Hà Nội and implemented in a rigid top-down manner through a hierarchical apparatus. Under Soviet-style central planning and the corresponding political economy, state management and engineering businesses functioned as an inseparable unit integrated in the Ministry of Water. Hydraulic engineers and bureaucrats from the North took the place of US-American advisers and engineers. They appeared to be the new designers and implementers of the hydraulic mission and, thus, acted as the vehicle along which the hydraulic paradigm traveled from the North to the South. National reunification under Northern guidance in tandem with the hydraulic mission provided spatial and institutional space for the socialist hydraulic bureaucracy to expand southwards, its power and sphere of influence based on enlarged organizational structures, numbers of followers, control over physical space and the flows of water, and access to financial resources devoted to capital-intensive structural interventions. Subsequently, in the wake of gradual mechanization and the growing complexity of water control infrastructure, state engineers and hydraulic bureaucrats were able to further strengthen their power base in the Mekong Delta.

The specific trajectory shaped by the historical events, from which the hydraulic mission evolved after 1975 in the South, has far-reaching implications for present water resources management dynamics in the Mekong Delta. With the hydraulic mission in the Mekong Delta receiving its direction from distant Hà Nội, the development of water resources and infrastructure again was, and still is, dominated by external ideas rather than local notions. The peculiar power structures that emerged after 1975 in the South continue to have an effect on contemporary water management dynamics in the Mekong Delta. What has changed in comparison to the post-unification years, however, is that against the background of administrative decentralization and other reforms, central state projects more often than in the past are subject to contestation arising from the local community's discontent regarding the social and ecological costs of such projects, but so far only with moderate success. The strategic coalition of water bureaucracy and hydraulic business, in which North Vietnamese engineers are most powerful, remains the dominant discourse elite, pushing forward its own agenda and interests.

In essence, as indicative in recent large-scale hydraulic landscaping projects, more than 30 years after national reunification, and 20 years after the promulgation of Renovation Policy (Đổi mới), a high-modernist worldview prevails. This comes along with three major issues: the problems for hydrocrats in Hà Nội to read the local conditions; second, the defectiveness of centralized water resources planning because of its inflexibly to adjust policies and technologies to the peculiar local conditions; and third, that policy

formulation in hydraulic management and infrastructure development has often been derived from the North's hydro-ecological and infrastructural conditions, whereas the local conditions in the Mekong Delta have been largely ignored. As the national corps of engineers remains overly powerful and local stakeholder involvement is insufficiently considered in decision and planning procedures, trial and error prevails as the principle modus operandi along which Vietnam's hydrocracy is developing water resources in the Mekong Delta in a technocratic manner.

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