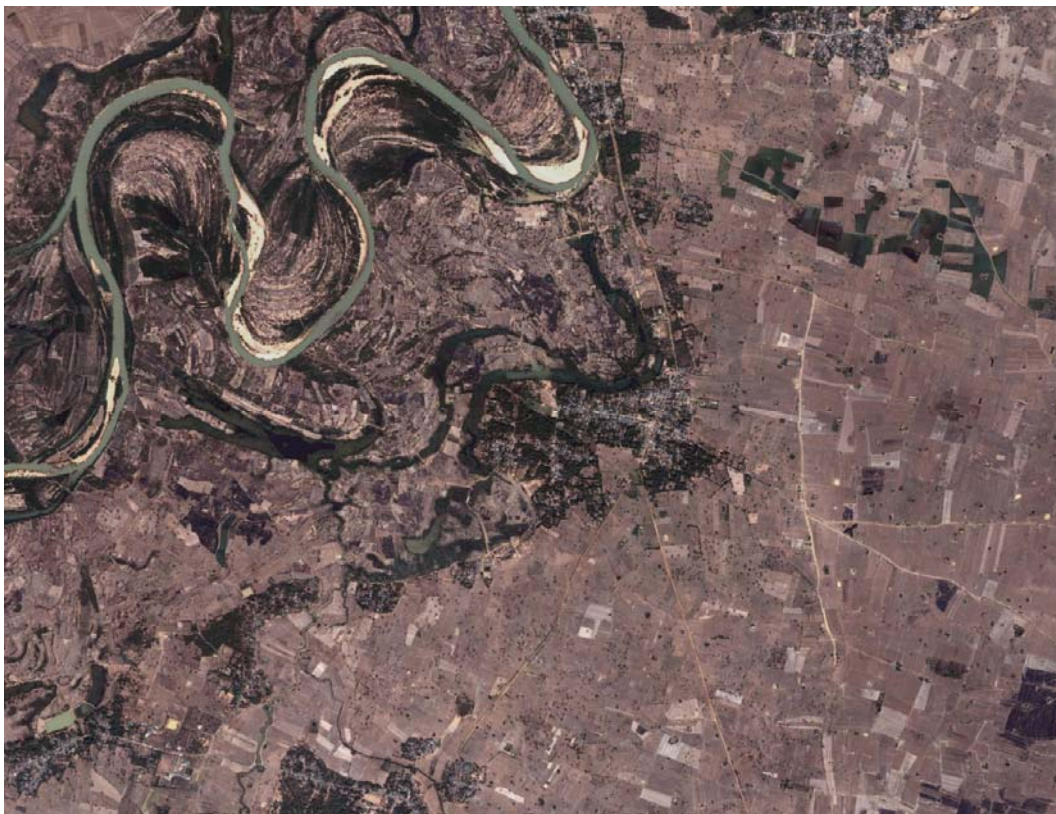


The "Desert Bloom" Syndrome:
Politics, Ideology, and Irrigation Development in the
Northeast of Thailand

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Working Paper

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1 Introduction

Large-scale and comprehensive development of river basins is a child of colonialism. Massive irrigation development in India, Egypt and Sudan by the British, emulated by the French or the Dutch, heralded a new area of the colonial economy. Large swathes of arid lands were brought under cultivation for the production of industrial crops such as cotton, sugarcane or rice. After gaining independence, the national governments took over the colonial model in an attempt to deliver the promises of 'development' and foster economic growth in rural areas (Molle, 2006). The development of water regulation infrastructures and irrigated areas in the 1950-1980 period achieved many benefits, including increased incomes, yields and production, and a global food sufficiency that is reflected in the long term decline of grain prices (Molden et al., 2007). In the absence of opportunity costs for labour such rural development projects had large multiplier effects and their economic justification was quite strong.

With time, because of the opposition to dams, declining benefit/costs ratios and – perhaps – the very successes achieved in terms of food production, such projects have lost their economic appeal and funding by leading development banks dramatically dropped in the late 1990s. In the last five years or so, however, a fresh rhetoric of justification for large-scale water projects was observed. The World Bank, for example, has tried to set up a “new business model” for dealing with high-risk/high-reward infrastructure and has issued several documents that made the case for renewed investments in agriculture (Briscoe, 2003; World Bank, 2005). A number of countries have implemented or floated proposals for massive transbasin diversion projects (e.g., China, India, Jordan, Brazil, etc). Whether they are justified by hydropower generation, flood control, urban supply or irrigation, dams and canals and many megaprojects still feature prominently in the agenda of many governments.

In arid environments, irrigation is still often seen as a redemptive solution and politicians have long seized the promise of water and the pledge to 'green the desert' as an electoral trump card. This paper first recalls a number of historical and current cases of river basin development partly or largely underpinned by the 'desert bloom' syndrome. The following section recounts the chronology of river basin development in the Northeast Thailand, reviewing the different projects that have been planned, designed, dreamt of, and sometimes implemented during the last 60 years.¹ The ensuing section focuses on the rationale and justifications, the ideological underpinning, and the political and strategic dimensions of these successive projects. We are concerned here with the governance of large-scale project planning and with the justifications brought up by the national and foreign proponents (or opponents) of these projects. We hold that ideology and politics are overarching drivers of water resource development and that the way dominant players are able to cast their agenda largely determines outcome. Yet, there is evidence that the political arena where development trajectories are shaped is also conditioned by both supranational evolutions and the irruption of players from the civil society at large.

¹ A more detailed account of the history of water resources development is given elsewhere (Floch et al., 2007).

2 The 'desert bloom' syndrome and megaprojects in irrigation development

Planners and politicians in dry countries have frequently been captivated by the 'desert bloom' syndrome, whether this led them to embracing small-scale community irrigation or large-scale river engineering. In the 19th century, scattered success stories (US, Italy, Spain, India, Egypt, etc.) were widely commented upon across the world; California, in particular, became an icon of the 'desert bloom' (Ertsen, 2006). Given the well known antecedents of civilizations that have thrived in arid lands thanks to their mastery of irrigation, this "rediscovery" can perhaps be explained by the potential offered by irrigation to colonial powers in their conquest of arid lands and to north European migrants in their expansion into the American West. This rediscovery of the promise of irrigation also coincided with scientism and the glorification of man's conquest over Nature, his "effort at the subjugation of the wilderness" (Smythe, 1905).

These sentiments, not unambiguously, were often mixed with biblical symbolism. In the American version, at the turn of the century, irrigation carried with it a sense of moral imperative. People like E.A. Smythe (1905) viewed irrigation as "nothing less than the progenitor of civilization in an otherwise inhospitable land—the key to making the desert bloom" (National Research Council, 1996). They underlined the similarities between the holy land and Utah or California, both in terms of climate and of the divine mission allegedly vested in its people: the glories of the Garden of Eden itself, according to the bible, were products of irrigation and making "the desert bloom as a rose" was seen as a biblical mission², a theme that would later also become central in the formation of the state of Israel (Lipchin, 2003).

Colonial and technological hubris and the lure of extraordinary profits would later clothe this mission with new and more mundane attires. Sir William Willcocks, for example, inspired by his early experience in India and his research on ancient Mesopotamia, championed "the new-found powers of professional engineering to transform the world, and of the importance of state support in giving engineering's power to control nature full play" (Gilmartin, 2003). Referring to the works undertaken in the Nile river basin, Winston Churchill emphatically announced that "These giant enterprises may in their turn prove but the preliminaries of even mightier schemes, until at last nearly every drop of water which drains into the whole valley of the Nile... shall be equally and amicably divided among the river people" (McCully, 2001). Likewise, the French thought "the El Dorado would be at reach once irrigation is developed" in the inner delta of the Niger basin (Schreyger, 1984), and that "Rome's granary" would flourish again in Morocco. Just like the French liked to see themselves as the successors to the Roman Empire, and would compare the Sebou or Oum er Rbia plains to the Nile, expecting to convert Morocco into 'a little Egypt'³ (Swearingen, 1984; Ertsen, 2006), Spain's ruler Franco would later pose as a modern Pharaoh when unleashing a wave of dam construction. In South Africa too, like in most dry places in the world, irrigation was to "turn deserts into gardens" (Turton et al., 2004).

² "This is the miracle of irrigation in the Syrian desert. It is no more miraculous in that far-eastern country than in our own West. Nor is Damascus more beautiful than Denver, Salt Lake City, or than any one of a score of modern towns in California" (Smythe, 1905)

³ While Utah and its Salt Lake was compared to the Jordan valley and its Dead Sea, photos of irrigated fields at the foot of the Atlas were likened to their Californian counterparts at the foot of the Sierra Nevada.

Even where biblical sentiment cannot be mustered, irrigation has long been the linchpin promise of politicians to farmers subjected to the vagaries of rainfall; and the favored option of governments seeking to ensure national food security, alleviate poverty, control potential social unrest, and procure political gains (Sampath, 1992; Abu Zeid, 2001). The Northeast of Thailand, or *Isaan*, although not arid by any standard, is the driest and poorest region of Thailand. If rice cultivation, supplied by derivation of small streams, has been practiced in valley bottoms for centuries, the expansion of cultivation on higher lands has made irrigation a crucial instrument of control of climatic uncertainty.

3 "Greening Isaan": A recurring syndrome

Isaan or the northeast of Thailand makes up 85% of the Thai territory that drains to the Mekong River (Koontanakulvong, 2006). The main rivers systems in the Northeast are the Mun, the Chi (the main tributary of the Mun) and the Songkhram rivers. The largest sub-basin is by far the Chi-Mun basin that covers roughly 120,000 km² and empties into the Mekong River at Khong Chiam. Rainfall in the Northeast is seasonally distributed, with around 85% of the total annual precipitation concentrated in the months from May to October, making irrigation a necessity if year-round cultivation is contemplated. Soils are generally considered of poor quality for agricultural production and yields are much lower than the national averages.

While in northeast Thailand agricultural land totals about 58 million rai (9.3 million ha), land under public irrigation is comparatively small at 5.6 million rai (0.9 million ha). Moreover, although northeast Thailand accounts for 45 percent of Thailand's agricultural land, it received only 18 percent of the state expenditures in irrigation (World Bank and NESDB, 2005). This is commonly attributed to the lack of attractive sites for dams and to environmental constraints, which are reflected in an average per hectare cost higher than in other regions (World Bank and NESDB, 2005).

Northeast Thailand is often identified with underdevelopment and stands out as the poorest region of the country. As a result, the development of water resources in general, and of irrigation in particular, has always been a top priority of planners and politicians since World War II (see e.g. Sneddon, 1999; 2002). With state agro-industrial policies encouraging the rapid expansion of commercial agriculture, and as population pressure and market demand grew, (Vityakon *et al.*, 2004), forest cover gradually shrank from 60% in the post-war period to 11% nowadays. Although the percentage of the population living below the poverty line has fallen dramatically (from 57% in 1962 to 38.5% in 1976 and 12.7% in 1996), poverty remains higher in rural areas in general (16%) and the Northeast in particular (26%) (Fan *et al.*, 2004). The region distinguishes itself by a higher degree of specialization in rice farming, a higher rate of subsistence farmers, a lower use of agrochemicals, indebtedness of two farmers out of five, and a low implantation of industrial units that produce only 4% of the national manufacturing added value (World Bank and NESDB, 2005).

3.1 *Early development and piecemeal projects*

Securing, expanding, intensifying, and irrigating agriculture in Isaan has been taken as a mission by most decision-makers during the last 60 years. This section briefly recounts the chronology of water resources planning and development in Isaan.

Traditionally irrigation in the northeast was confined to the alluvial soils of the valley bottoms of the secondary rivers, where earthen weirs, locally referred to as *thamnop*, were used to divert streams to the paddy fields (Neawchampa, 1999). Fukui and Hoshikawa (2003) report that in 1920 as many as

503 earthen bunds could be found in the province of Nakhon Ratchasima Province alone. They also argue that irrigation of paddy fields around the Chi-Mun Basin was the norm rather than the exception, with cultivated fields located in the alluvial plains and valley bottoms. Additional storage was limited to natural or small village ponds which catered for a variety of domestic water uses and provided water security for the dry season.

State-sponsored irrigation started in northeast Thailand in 1939, when the Royal Irrigation Department experimented with pilot tank irrigation projects and river diversion weirs. C. Khambu, the charismatic head of the RID in the 1950s, was an early advocate of small-scale solutions and vigorously argued for small and medium-scale reservoirs as the best option for Isaan (Kambhu, 1956). Further to these early efforts, small-scale development intensified in 1951 with the "tank programme", initiated with US assistance (USBR, 1965). In 1956, 127 dams had been constructed to irrigate an area of 25,000 ha (Khambu, 1956; ECAFE, 1957) and in 1963 a total storage capacity of 250,000 m³ had been attained, with 40,000 ha of potentially irrigable land. At the same time, the total command area of irrigation systems in northeast Thailand increased to more than 900,000 rai (144,000 ha), with more than 600,000 rai (102,000 ha) potentially served by river diversion schemes.

3.2 *The Hydraulic Mission: Large- and medium-scale developments*

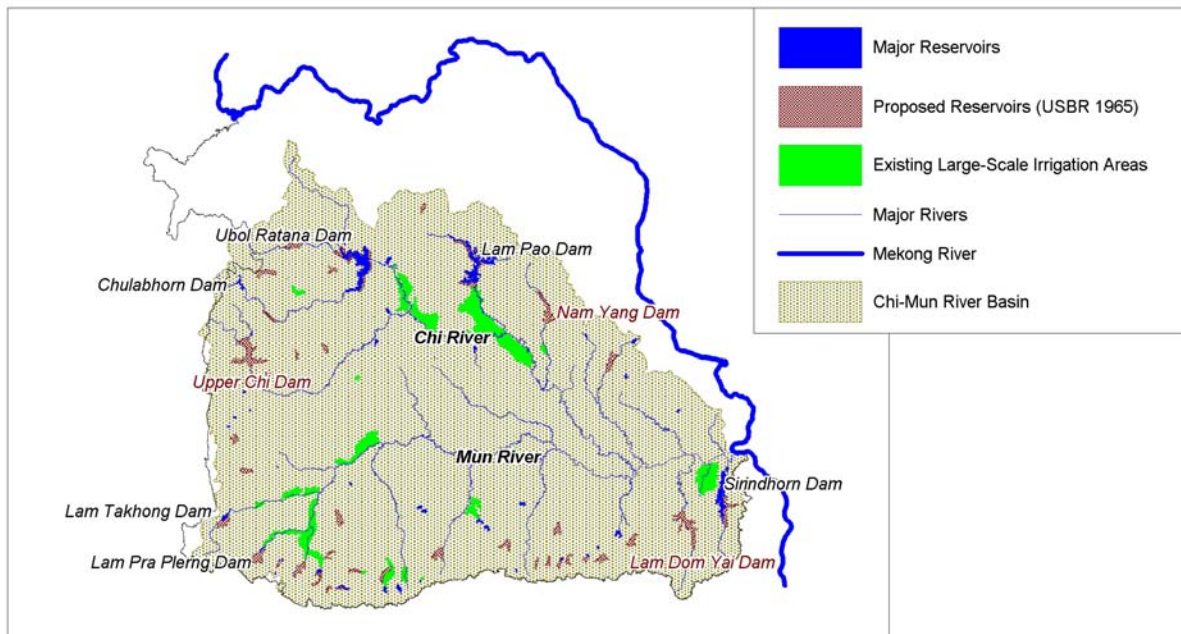
With increasing pessimism about the possibility of diverting unregulated flows from the main rivers of northeast Thailand, and with the implementation of the Tank Program being a comparatively slow and tedious process, in the late 1950s and early 1960s the Royal Irrigation Department increasingly looked into possibilities of large-scale storage projects (Floch et al., 2007). Following the World Bank's advice, Sarit's government set up the National Economic Development Board (NEDB) in 1960 to centralize and coordinate development planning in Thailand.

In 1960, the Japanese Government proposed to the Mekong Committee to undertake the "Reconnaissance of [Mekong] Major Tributaries". The study team identified 16 sites in the Lower Mekong Basin and found that in northeast Thailand a total of four projects – the Nam Pong, the Nam Gam, the Lam Dom Noi and the Chaiya Phum" projects – would be the most favourable for large-scale water resources development (EPDC, 1960). In its first regional planning document for northeast Thailand (NEDB, 1961), the new Board proposed to submit two irrigation and five multi-purpose projects to lending agencies "after thorough feasibility studies", and listed a total of 16 large-scale projects, which together would potentially store 9.2 Bm³ and serve an irrigable area of 278,720 ha. In 1965, the United States Bureau of Reclamation (USBR) conducted the first river basin development planning study for the Chi-Mun Basin with the principle objective of recommending a "program for the orderly economic development of the Chi-Mun Basin, and to establish an order of priority for undertaking feasibility grade surveys on the potential projects in the basin" (USBR, 1965). Though slightly differing, all of these planning documents pointed to the importance of large-scale irrigation and multi-purpose development, and identified the few topographically suitable sites that later would guide planners and decision-makers time and again in the following 50 years.

The first implemented large-scale storage project in northeast Thailand was the Nam Pung hydropower project, which was finalized in 1965, followed by the Ubol Ratana dam in 1966, the Lam Pao Reservoir in 1968, the Lam Takhong Reservoir in 1969, the Lam Pra Plerng in 1970, the Sirindhorn Reservoir in 1971 and the Chulabhorn dam in 1972 (Figure 1). The most favourable sites for large-scale construction were developed within a timeframe of only 10 years, leaving only the Upper Chi, the Nam Yang and the Lam Dom Yai rivers unharnessed by large-scale infrastructure. At

the same time, medium-scale water resources development was also increasingly pursued and totalled close to 400 Mm³ of storage by 1978.

Figure 1: Major infrastructure in the Chi-Mun Basin and the 1965 USBR vision of full development



3.3 *Small is beautiful?*

In 1975 the government of Prime Minister Kukrit Pramoj made funding available (through sub-district or *tambon* funds) for small scale water infrastructure, notably several thousand village ponds and weirs in Isaan (Bruns, 1991); a programme that was extended in 1976 by Prime Minister Seni Pramoj. In 1978, in the wake of a few years marked by political turmoil and farmers' protests, the government re-phrased its official water policy through the introduction of the two-pronged water policy (AIT, 1978). The focus shifted to (i) the development of distribution systems from reservoirs and rivers and (ii) the development of small-scale resource projects in every village as a means of meeting basic domestic water needs and allowing for minimal supplementary irrigation and for minimal dry season irrigation of backyard gardens.⁴ The same year, the Thai government established an "Accelerated Water Resource Development Committee" and the Northeast was designated as a "priority area for accelerated regional development efforts" (AIT, 1978). The sub-district funds were transformed by military governments into the Rural Economy Rehabilitation Programme and, in 1980, the Job Creation Programme, both of which primarily included water resources development projects. Implementation was, more often than not, problematic, with reportedly up to 80 to 90% of the weirs constructed under this programme said to have faced technical problems and to have failed (Bruns, 1991).

⁴ The report estimated that only 20% of the population could benefit from large scale together with river-pumping schemes and that small projects could go a long way in serving the water needs of the remaining 80%.

The 1978 study by the Bangkok-based Asian Institute of Technology (AIT) assessed potential irrigation targets (large scale, small scale, and pumping stations along main rivers, including the Mekong) and proposed to establish a semi-autonomous Mun-Chi River Basin Authority reminiscent of the Tennessee Valley Authority model. Based on this assessment, AIT found that a maximum of 7.2 million rai (115,200 ha) were potentially irrigable in northeast Thailand, i.e. roughly 12% of the arable land suitable for agricultural production. The survey predicted problems of shortages during the dry season and the experience with small scale projects was deemed "discouraging". The Royal Irrigation Department's own efforts to continue the development of the remaining sites that had been identified earlier as suitable for large-scale water resources development, were now considered inappropriate by the National Economic and Social Development Board (NESDB), which made it considerably harder to implement them. The Lam Dom Yai and Upper Chi projects had been repeatedly studied but both were eventually dropped by decision-makers because resettlement difficulties were considered insurmountable. And it was only the relatively smaller Lam Nang Rong Project (1991), the Upper Mun Reservoir (1996) and the Lam Chae Dam (1998) that RID could implement during this period of time, none of which matched the earlier projects in scale.

At the same time, and because of the difficulties experienced, RID was increasingly developing small- and medium-scale irrigation projects. RID implemented projects on basically all tributaries and watersheds in Isaan, with over 4000 small scale irrigation projects, storing over 800 Mm³ (Boonlue, 2005), built between 1978 and present days. On top of that, the Water Resources Department of the Office of Accelerated Rural Development implemented 600 projects small scale projects and several additional programs made funds available for the construction or adaptation of small-scale water projects, including the Thai-New Zealand Project (Hafner, 1987), in the early 1980s, and the German-funded Small Irrigation Projects (SIP) (which repaired part of the "Kukrit weirs", that had been put in place under the Job Creation Programme).

However, in parallel with the Royal Irrigation Department's construction efforts in northeast Thailand, a new and increasingly powerful actor – the National Energy Authority (NEA) – was emerging. In the late 1970s, the NEA started to implement electric pumping stations along the main rivers of the country, each station typically serving an area of 500 ha located within one kilometre of the stream. NEA had constructed the first hydropower project in northeast Thailand, the Nam Pung, and was now looking for means of promoting the utilization of the energy generated.⁵ It is estimated that some 1,000 pumping stations have been implemented in northeast Thailand between the late 1970s and the present day (Boonlue, 2005).

Considered together, all these investments make northeast Thailand a region with a diversified and dense irrigation infrastructure that considerably reshaped the land- and waterscape of the region.

⁵ See e.g. analysis of the Nam Pung Project in NEDECO, 1988.

3.4 Water imports and regional water resources developments

It had been recognized early into the reconnaissance surveys of northeast Thailand that internal water resources were ill-suited for the development scenarios envisioned by planners and decision-makers.⁶ A low runoff to rainfall ratio and a mostly flat and undulating topography (which puts considerable limits on surface water storage and gravity diversions) made planners look into ways to import water from the Mekong River from the onset. In the Mekong dam cascade – a series of dams planned to be built on the mainstream Mekong River considered in early plans – import into, and distribution throughout, the region hinged on the Pa Mong dam, which would bring the twin benefits of storing water and raising its water level. However, implementation of the Pa Mong began to appear increasingly distant and Thai authorities and planning partners explored other options to augment water supply in northeast Thailand, in the continued effort to “green Isaan”.

3.4.1 The "Green Isaan" project

The first regional study that looked into ways to make northeast Thailand bloom was aptly called “*Isaan Khiew*” or “*Green Isaan*”. The fifth national economic and social development plan (1981-86) had (for the first time and on the ground of ‘national security’) included greater social and economic equity as an objective: a poverty-alleviation programme identified the 12,652 poorest villages (60 percent of which were located in Isaan) and showered them with water supply, roads, schools, irrigation, electrification, and soil improvement (Baker and Pasuk, 2005). In 1987, Thai Army Commander in Chief General Chavalit Yongchaiyudh was aiming to become prime minister and in an attempt to build political support in Isaan, undertook to present His Majesty the King with a masterplan for the development of the Northeast.⁷ A severe drought had just hit northeast Thailand, and the project was presented as a response to it (Bruns, 1991). The report, prepared by British Biwater Company, was presented to General Chavalit in late 1987 and was geared towards the accelerated development of water resources, ensuring water supply, increasing reforestation, and improving rural incomes (Biwater, 1987). Initial planning was largely done by army staff. The project met with “considerable criticism and skepticism” from politicians and academics (Bruns, 1991).

With irrigation seen as an essential input for regional development, the study continued to detail strategies for water resources development. Numerous projects of all sizes were identified, and it was thought possible to store almost 5 Bm³ of additional water (basically the sum of all technical feasible storage sites at full development, regardless of costs), serving an additional 1.8 million rai (288,000 ha). Additionally, Biwater looked into interbasin transfer options (some of them studied earlier) worth an additional 2.8 million rai (448,000 ha). Even though Chavalit tried to negotiate a loan agreement with the World Bank, the proposed project did not materialize.

⁶ The 1965 USBR report for example, states that “Full irrigation of all potential lands may not be possible due to the physical limitations on the amount of water that can be regulated by storage within the basin. Importation of water from outside the basin appears to be the only means of developing water for the full irrigation potential. Planning to develop water supplies outside the Mun-Chi basin for use within the basin was beyond the time and scope of this investigation, except to note that there are physical means of bringing water to the basin from other sources, notably the Mekong River”.

⁷ According to Pasuk and Baker (1997), Chavalit was able to divert 80 million baht from the government budget to the preparation of the Green Isaan scheme.

3.4.2 The Khong-Chi-Mun project

After the failure to implement the “*Green Isaan*” plans, a new grand project was elaborated by the National Energy Administration under the banner of the Khong-Chi-Mun Project (KCM). The project largely drew from earlier planning documents which had accumulated over the years and integrated them into one large planning framework. The to-be-infamous Rasi Salai dam, for example, had already been studied in 1982 by Dutch consultant NEDECO (1982) who had earlier assisted the Mekong Secretariat in studying pump irrigation in Isaan and the use of floodplains for storage⁸, which became a trademark of the KCM project (Gibb et al., 1988).

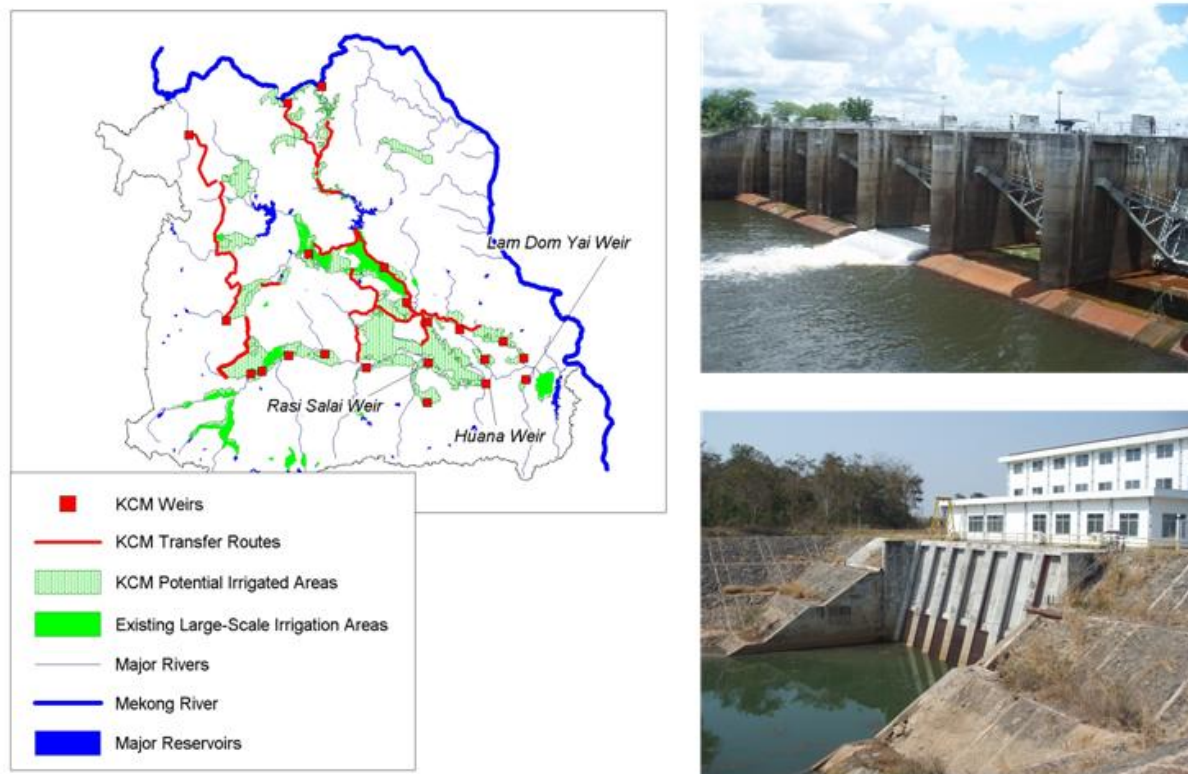
In 1989, the proposed Khong-Chi-Mun project received a boost from the government of then-Prime Minister General Chatichai Choonhavan (1988-91), whose declared intention “to turn the battlefields [of Indochina] into market places” soon became the semi-official policy for development plans in northeastern Thailand (Pednekar, 1997; Kamkongsak and Law, 2001). The Council of Ministers passed a resolution approving the construction of the project and asked the NEA (which later became the Department for Energy Development and Promotion: DEDP), to complete feasibility studies by 1992. Initially proposed with the objective to systematically meet water supply and consumption needs and to make water shortage in northeast Thailand a thing of the past, the 1992 feasibility study detailed that it was technically feasible to irrigate an area of 4.98 million rai (796,800 ha) in 15 provinces, with construction being envisioned in three successive stages over a period of 42 years (ASEAN *et al.* 1992; see also Figure 2 for a general layout of the project at the proposed full development).

Unlike the earlier Green Isaan project, however, the KCM project was (partly) implemented. Some weirs in the Chi and Mun floodplains were constructed and new and larger pumping stations complemented the already impressive number of small-scale electric pumping stations constructed in earlier years by the NEA. Construction of the Rasi Salai weir/dam on the lower Mun river was completed in 1994; the Huana Dam, the largest dam structure within the overall scheme and downstream of Rasi Salai, was constructed shortly after (construction took place from 1992 to 2000). Both projects triggered sustained protest from the local population whose livelihoods depended on the services so far provided by the floodplains, and drew heavy criticism from civil society and academics which pointed to the lack of research, transparency and participation (Sretthachau et al., 2000; Rasi Salai Declaration, 2003; Shannon, 2005).

Despite the outcry, in 1997 then-Prime Minister General Chavalit gave full support to the KCM project as the only way to ensure sufficient water supply to the “long-suffering farmers of the Northeast” and waved the long-held promise of ‘turning the northeast green’ in front of an assembly of village and district chiefs gathered in a five-star hotel in the city of Khon Kaen (Sneddon, 2003). With the advent of the financial crisis in 1997, large-scale capital intensive projects were once again shelved. The KCM remained incomplete, with its cascade of weirs along the Chi and Mun lower reaches challenged on social and environmental grounds, few of the planned pumping stations effectively implemented, and with no additional water imported from the Mekong River.

⁸ In 1989, the Mekong Committee reported that it had introduced a new concept in the design of flood control and storage projects by constructing reservoirs in the areas affected by annual flooding (Mekong Secretariat, 1989). Beset by resettlement problems and constrained by the depletion of attractive dam sites in northeast Thailand, the intergovernmental body recommended that the Government of Thailand should adopt a strategy in a consolidated way so that each step would be taken with the firm knowledge that, in the event that each project is demonstrated to be economically and technically feasible, the Government would wish to pursue further implementation of such a scheme (Mekong Secretariat, 1989).

Figure 2: The Khong-Chi-Mun Project: General layout and typical infrastructure⁹



3.4.3 The Water Grid

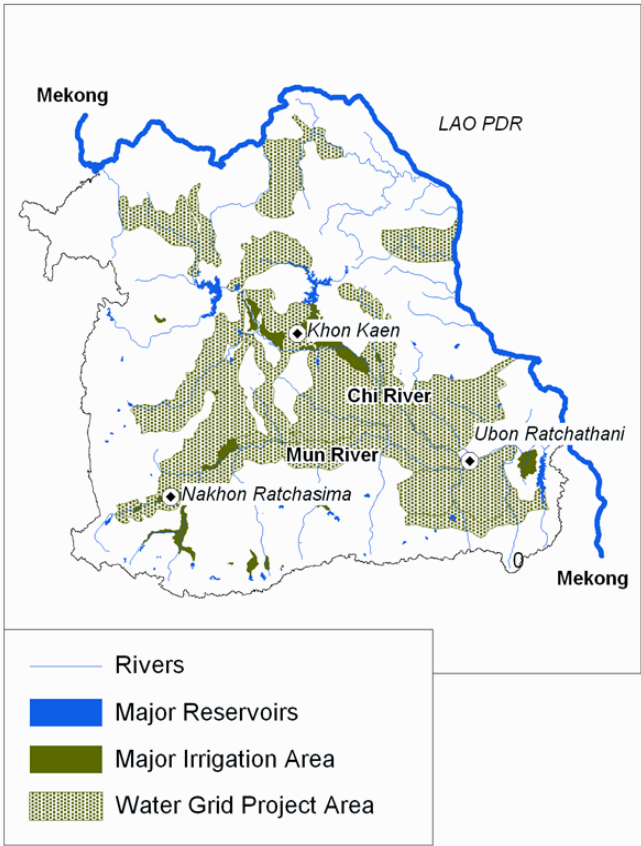
It was not until 2003 that the next avatar of the "greening" syndrome materialized, when the Thaksin government launched the idea of investing US\$5 billion in a project supposed to do away with water problems in the country (see full details in Molle and Floch, 2008). In July 2003, a workshop on "Sustainable Water Resource Management" was organized by the National Water Resource Committee. Despite the alleged priority to water demand management proclaimed in the Ninth National Plan (2002–2006), it was announced that the irrigated land of 29.46 million rai would be incremented by an additional 103 million rai within five years, with the expected benefit of enabling farmers to cultivate and access water all year round. Although project targets announced in the newspapers proved to be fuzzy and contradictory they all pointed to a dramatic increase in irrigated land (Molle and Floch, 2007). The current achievement of 22 million rai was contrasted with a total of 131 million rai of cultivable land nationwide. The public presentation indicated that "11 million rai would be fully irrigated, and that 25 million rai could be planted with crops that require much less water than rice. Another 73 million rai would be irrigated for household consumption and self-sufficiency in agriculture" (Bangkok Post, 3 May 2004), while "a nationwide tap water system will be installed by 2005 so villagers and farmers throughout the country can enjoy running water all year-

⁹ Left: layout of the Khong-Chi-Mun Project with potential irrigated areas at full development. Right-top: typical in-stream Khong-Chi-Mun Weir (here at Rasi Salai). Right-Bottom: Typical large-scale pumping station of the Khong-Chi-Mun Project (the picture shows the main pumping station at the Lam Dom Yai Project).

round.”¹⁰ Borrowing from the power generation sector, the project was dubbed "Water Grid", to describe a set of interconnected reservoirs and basins allowing the movement of water from sources to water-deficient areas.¹¹

The plan presented included several transbasin diversions, the Kok-Ing-Nan (2.08 Bm³), the Salween-Ping (3.8 Bm³), diversions from Cambodia and three Lao rivers, and listed 18 alternative diversion plans all over the country. The northeastern region, however, was to be the major beneficiary of the development project. It provided maps of the major projects envisaged and mentioned two projects almost ready to be implemented (from 2005 onward): the Petchaburi/Prachuab Kirikhan interlinking, with water sourced from the Mae Klong basin, and the Nam Ngum-Chi-Mun project which would transfer over 4 Bm³ of water from the Mae Ngum dam in Laos through a siphon under the Mekong River, with pumping stations allowing transfer to the Chi basin. Figure 3 sketches out this project as well as other companion projects for the Northeast region.

Figure 3: Water Grid in Northeast Thailand



In early 2004, the project came under fire from several quarters, including academics doubting its economic profitability (Bangkok Post, 30 Mars 2004), environmentalist predicting salinity problems

¹⁰ A document subsequently posted on the website of the Department of Water Resources (DWR) modified several aspects of the proposal, considering a time frame of 23 years to implement an additional 60 million rai of irrigated land, and also reducing the overall potential from 131 to 111 million rai (DWR, 2004a).

or recalling that earlier pilot projects had failed (Bangkok Post, 14 April 2004; 3 May 2004), as well as water experts such as Senator Pramote Maiklad, who opined that the "project is not cost-effective nor feasible in terms of engineering techniques" (Bangkok Post, 3 May 2004) and its timetable unrealistic (The Straits Times, 2003). In late 2005, the Government also planned to spend up to 1.7 trillion Baht (US\$43 billion) over five years on megaprojects aimed at boosting activity and reducing poverty, including investments in the irrigation sector (MOAC, 2006). All these plans were largely discontinued by the 2006 coup that ended the then-Prime Minister Thaksin's administration.

3.4.4 Transfers from Lao-PDR and other recent alternatives

Although the grand projects of Thaksin era seemed to have faded into oblivion the idea of tapping water from Lao tributaries of the Mekong, siphoning it under the river and using it in Isaan, reappeared in 2007. This idea, also part of the Water Grid, was first tested in 1998 by Sanyu Consultants which envisaged building two dams on the Xe Banghiang River in Laos, close to the confluence with the Mekong, from which 3.3 Bm³ of water could also be abstracted and siphoned under the Mekong into Isaan (RiversWatch, 2002). Another plan studied by Sanyu in 2004 considered siphoning water off the Nam Ngum dam in Lao PDR to the Huay Luang stream. While this option is technically feasible the expected cost of 0.5 baht for a cubic meter of water raises serious doubts about the economic relevance of the project. A study financed by the World Bank and the French Agence Française de Développement (AFD) was carried out to examine the possibility of diverting water from the Nam Ngum and Se Bangfai rivers but did not lend support to further investigation on that matter.

In 2006, a trade journal announced that a newly-formed Thai agency, the Department of Alternative Energy Development and Efficiency,¹² was reviewing plans at Pa Mong and Sambor [on the main stream of the Mekong], and that a private Thai engineering firm (Panya Consultants), would conduct a US\$ 2.4 million study revisiting a total of seven sites first identified by bureau staff in 1952 (Biggs, 2006). In summer 2007 the Chinese were contemplating funding the Sambor dam in Cambodia that was once again the object of a technical study. Likewise in Thailand the Ministry of Energy has recently commissioned two Thai consulting companies to conduct a feasibility study on the construction of the Ban Koum dam on the Mekong River, in the province of Ubon Ratchathani, that would power a 1,800-megawatt generator for an estimated investment of Bt90 billion (approximately US\$3 billion) (The Nation, 2007).¹³ It is not known whether the dam is also planned for irrigation of parts of Isaan.

Last, in February 2008, the newly-appointed elected prime minister, within a week of his investiture, announced that two megaprojects would receive priority, including a plan to divert water from the Mekong River "through underground tunnels to Loei and Udon Thani, where reservoirs will act as distribution centres to send the water on to farms in other provinces during the dry season. The water will be transported through small pipelines" (Charoenpo, 2008). The desert bloom syndrome is alive and well.

¹¹ Of course, because of its bulky nature, moving water is a much more expensive venture than moving electricity. Some examples of such pressurized grids, or "carriers," exist in small arid countries, such as Israel, Cyprus, or Tunisia, but their costs have generally prevented expanding the concept at a very large scale.

¹² This department originated from the earlier DEDP and is now under the Ministry of Energy.

¹³ Several other on-going dam surveys in Laos and Cambodia have also recently been uncovered and have led to heavy criticism of the Mekong River Commission by civil society groups.

4 Aspects and cross-cutting themes

The storyline of the development of water resources in the Chi-Mun river basins presents a number of recurring themes which are analyzed in this section. They include the justifications given and the politics of water resource development, the engineering ethos and lopsided governance patterns.

4.1 *Metadiscourses and the rhetoric of justification*

Stigmatizing Isaan as poor and dry, Thailand's development agencies saw water resources development as the key solution to the problems of the region as early as the 1950s (Sneddon, 2002). Development was the post-war magic wand that would partly come from joint regional development of the Mekong river basin (see Molle and Floch, 2008). Investment in dams, pumps, tubewells, but also roads, electrification, or eucalyptus plantations, would bring prosperity. In the Green Isaan project, for example, the establishment of agro-industry was the focal point of development and would "produce the processed goods for regional export, create employment opportunity in the urban areas and create the demand for agricultural products... Irrigation, required to produce raw materials for the agro-processing industry, will create wealth and job opportunities in the rural areas" (Biwater, 1988a).

The standard description of Isaan is to ascribe its lack of development to natural causes: unpredictable climate, "dryness", poor soils, lack of storage, population pressure, or "traditional", if not backward, farming practices: all putative reasons why "the Northeast has historically lagged behind other regions" (World Bank, 1975). These perceived lacks inevitably lead to calls for increased water storage and irrigation infrastructure, secondarily roads and better links to markets, and sometimes improved social services. Irrigation is generally justified by positive (desert bloom) or negative (cracked soils during water shortages) images and by the mere observation that farmers in irrigated areas are better off than in rain-fed areas. This hardly comes as a surprise, as one would expect that investing, say, \$10,000 per hectare, does yield some benefit; but benefits are routinely emphasized without reference being made to the costs first incurred. Then-Prime Minister Thaksin, for example, reportedly said that "it would not be a problem if the [Water Grid] project required a lot of money because it would be worthwhile eventually"; likewise the Deputy Prime Minister in charge of the project, saw the project as "a worthwhile investment because it will benefit 30 to 40 million people nationwide" (The Nation 23 June 2003).¹⁴ Prime Minister Samak's recent proposal is also "an ambitious water project aimed at helping farmers in the Northeast, the country's poorest region" (Charoenpo, 2008). That "every farmer, especially those from the 19 provinces in the Northeast, should have access to water" (The Nation, 24 September 2004) seemed to be taken as an uncontroversial and desirable future, with no relation whatsoever to costs or alternative options.¹⁵ In late 2007, Suwit Khunkitti, the once Minister for Natural Resources and the Environment and top proponent of the Water Grid, vowed to "continue any policies proven to be good and introduce new

¹⁴ The project would also be justified because farmers in irrigated areas earn three times more than those forced to find their own water supplies, said Mr. Thaksin, and because "if the irrigation system was extended, both farmers and the government would reap higher revenues" (The Straits Times, 26 July 2003).

¹⁵ In contrast with demand management strategies that are emphasized in the 7th Plan, this conception seems to be quite widespread within water agencies: see also the comments by a high-level official: "Water distribution doesn't completely cover those irrigation areas; we've lost a balance between storage and distribution" (Bangkok Post 28 December 2003); or M. Rungrueng: "We urgently need to find water and we must do it whatever way we can. It is as if we are about to drown; we have to grasp anything, even a floating dead dog" (The Nation 24 April 1994).

ones, such as the water tunnel system for the Northeast. A study has shown that poverty persists in only 10 per cent of irrigated areas while 80 per cent of non-irrigated zones remain poor."

Another classical means of furthering projects is to propose them under the umbrella of politically-charged and overriding meta-justifications (Molle, 2008). Such meta-justifications typically include national goals or priorities such as food self-sufficiency, national security, "modernization", or the fight against poverty. Justifications for developing the Water Grid in general and irrigation in particular were based on arguments that merely emphasized expected benefits and were shrouded in a pro-poor rhetoric that magnified the assumed power of the state and attendant benefits. Thaksin "vowed to eradicate all water-related problems plaguing the country, which he said were major hurdles in the government's war on poverty," and the study, to be completed within a year, would design "projects to control levels of water in 25 river basins, to help rehabilitate forest and soil resources," helping him meet his goal of eradicating poverty by 2009 (The Straits Times, 2003). The "war on poverty" was clearly branded as an overriding meta-justification that offered a means to silence opposition since, obviously, nobody is against poverty reduction (Molle, 2006b).

A major meta-justification of water resource development in Isaan, well until the mid 1970s, was the threat of communism, whether represented by local insurgent groups or by neighbouring countries. This motivated massive injection of US aid into the region (see next section). The northeast region insurgency was used by both the US and the Thai military to justify their objectives (Bell, 1969). The scare of communism was used to justify foreign aid, military build-up and suppression of opposition to the regime (Darling, 1965). Such meta-justifications present projects as the result of "pressing needs" that bear no contestation. A Thai general, for example, was reported to say that it is "necessary for us to launch a campaign like the Green Northeast project. It is a matter of national security and the northeast is of much strategic importance" (Labournet, 2004).

The politics of water resource development also often include manipulation of symbolic power. The July 2003 workshop on "Sustainable Water Resource Management" organized for the launching of the Water Grid was opened with a quote from His Majesty the King "The main point is the need of water for consumption, water for agriculture because water is life. People can't live without water. People can live without electricity. If there is electricity but no water, people can't live". Symbolic support from the King is frequently marshalled by recalling his fondness for irrigation and rural development and his support of dams for flood protection.¹⁶ The Green Isaan project was thus aptly billed "Nam Pratan Nai Luang", that is, Water from the King, while opposition to projects like the Pasak dam were efficiently silenced by stressing the King's patronage of the dam.

An interview of Roongrueng Chulasata (Watershed, 1999), a former DG of the Royal Irrigation Department, provides a textbook illustration of the range of discursive devices that are mobilized to justify more infrastructure:

At present, the quantity of water is not sufficient because of an increase in the population which has led to more demand for water... And because many forests have been destroyed, water cannot be retained. So it became necessary that we build a big reservoir to retain water for the dry season... The increased population has led to more agriculture and more demand for water. It would be good if people were not born. But since the population has increased, everything has been affected.

¹⁶ See <http://www.rid.go.th/eng/Irrigation%20Project.html> for water-related projects initiated by His Majesty the King.

However, water is a necessity. When there is a water shortage, it is the RID who is responsible for it. We have tried to propose every solution to solve the problems... Nowadays, in the IMF time, the population in Bangkok has decreased because some people have gone back to agriculture. But they would not have water if the RID did not provide them with water sources. How could we survive? Luckily, the RID has prepared for this.

I think we are "lost". Many people have imitated foreigners. They want to preserve resources without them being fully developed. It is necessary to develop everything to its full capacity before preserving it. If we preserved our natural resources, what could we use? Would you want to buy them from elsewhere?... Many people ask why we want to do it [interbasin diversion project]. It is because it is a duty we have been assigned. We have learned to find water for you not for ourselves. You live well right now because of what we have done in the past.

The statement borrows from faulty hydrological knowledge, glosses over the fact that urban needs hardly total 10% of water diversions, does not discuss how farmers' "needs" are themselves related to irrigation overdevelopment, stresses the ills of population and urban growth that leave no choice to dutiful and engineers, contrasts their disinterested mission with the irresponsibility of dissenters and with the foolishness of foreigners. Unsurprisingly, the interview achieved a closure of the debate through a familiar Thatcherian TINA (There is No Other Alternative).

Whether out of good intention or as channels of official statements, the media also often contributes to turning unavoidability into common wisdom. Recently, for example, the Bangkok Post (2007¹⁷) discussed the hypothesis that at some time in the future Thailand would not be able to feed its own people and would depend on food imports, having "to fork over a hard-earned foreign exchange advantage to buy ever more expensive food, ... [with] little money left for development", pointing to the imperative to "never abandon its determination to maintain food security". Alarmist discourses are also commonplace, as illustrated by a high official justifying the Phetchaburi project because the province ran the risk of "becoming a 'desert' because the province received less rainfall than the amount of water evaporating from its soil" (Bangkok Post, 14 April 2004). Clichés of the region as "the water-starved Northeast" (Bangkok Post, 2008) implicitly legitimize supply augmentation projects.

The stigma of drought and flood and the "naturalization" of poverty in Isaan make it possible to insist in developing water resources. At the same time this diverts attention from other structural aspects of regional development and from the predominance in Isaan of ethnic minorities who had largely been ignored during the boom years of the Thai economy (Freisen, 1999: 221). Extension of upland and fibre crops in the 1960s, or of eucalyptus in the 1980s, has benefited large urban-based entrepreneurs. The region's agricultural surpluses have been tapped for export, the benefits of which are appropriated by the metropolis, with only marginal changes in technology or living standards in the producing areas (Bell, 1969). This urban bias has been epitomized and affected by the rice premium, which siphoned 30% of the added value of rice production to the state and urban development. Because of its limited irrigated area the Northeast was, on top of that, discriminated against, if compared with more productive irrigated areas.

4.2 *Geopolitics and politics*

Post-war Mekong geopolitics has been a central determinant of government interventions in Isaan until the mid 1970s. The political situation dictated that Thailand would be the only country to be able

¹⁷ The article is itself a commentary of an editorial of Nongnuch Singhadecha in the Matichon.

to benefit from US/western willingness to help develop water resources in the region; one which would fully embrace the objective of combating the spread of communism by investing in rural infrastructures. Indeed, a major objective of small scale investment programmes, as well as major efforts to open up "pink areas" by expanding road networks, was countering insurgency.

Security considerations have been paramount in the composition of the US aid program in Thailand (which started with the communist takeover in China in 1949, and the spread of internal communist insurrection in Burma, Malaya and the Philippines).¹⁸ As Steinberg pointed out, US interventions "at their most naïve, (...) have been justified by the 'domino theory', [and] at a sophisticated level they have attempted to help the Thai authorities establish productive sovereignty over their periphery". By the early 1960s, US policy with regards to long term assistance to Thailand was characterized by the AID (Agency for International Development) as serving Thailand to increase its capability to defend its independence against communist subversion and insurgency, assist Thai efforts to alleviate the economic and social conditions (especially in security sensitive areas), and to assist the Thai efforts toward long-range social, political, and economic development until an adequate rate of self-sustaining growth is achieved (AID, 1963; quoted in *Steinberg 1986*). By 1973, USAID director in Thailand – would characterize the program in Thailand as consisting of two types: (i) security with development aspects and (ii) development with security aspects (Hill, 1973). As, Steinberg (1986) noted, AID felt that over half of the program was primarily security oriented.¹⁹

One of the major security supported programs supported by AID was the Accelerated Rural Development Program (ARD), largely funded by the United States and the World Bank (World Bank, 1975), which received over US\$ 60 million for the construction of rural feeder roads, potable water systems and small-scale irrigation systems in security sensitive areas in northeast and northern Thailand. It was designed in such a way as to integrate remote and ethnically diverse regions and to allow the central government to exert control over these areas (Steinberg, 1986). While able to implement rural infrastructure, the project found critics both within the Thai academia and from foreign observers. Jacobs (1971) described it as "an ambitious direct action, paternalistic, government-service program, frankly aimed at winning friends for the existing political order", and one that would deliver to the villagers what the central government thought they would need. But also, by bypassing the control of the Ministry of Highways (considered as rigid and ineffective), the formation of the ARD program, raised the question of "whether and under what conditions it may be wise for foreign aid organizations to assist in the establishment of new institutions whose functions specifically are designed to bypass existing ones, thereby, perhaps, further weakening line agencies".

Later on, the then active mission director of USOM would comment that, "it is a known fact, disputed only in degree because of the inadequacy of the information available, that during those twenty-three

¹⁸ US interventions in the region have been prompted by fears such as the invasion from the People's Republic of China, regional security after the French defeat in Dien Bien Fu, deterioration of conditions in Laos, the inception and the active communist insurgency in Thailand, Thailand as a base for action in the Vietnamese War, the international trade in narcotics, and the Vietnamese invasion of Cambodia (Steinberg, 1986).

¹⁹ Since the assistance program was justified to the US Congress as being focussed on security, it is likely that there was a certain amount of "security salesmanship" in project documentation, a phenomenon known to be widespread at any point when policies change and projects must be approved. It might also be that Thai officials interested in development used their own "security salesmanship" to get development projects approved under security auspices (Steinberg, 1986). But also, according to Steinberg "it should be noted that Thailand was by no means unique in such programs, which were widespread throughout the world. Asserting Thai sovereignty over border or insecure areas often seemed to have mixed results, with corruption or oppression by police or other central government officials undercutting the purpose of the programs".

years [of US assistance to Thailand] the poorest segment of the population has benefited least from all those expenditures" (Hill, 1973).

Although concerned by these geopolitical considerations, Thai politicians also saw massive public investments as a means of procuring private political and financial gains. By associating themselves with a large water project and conjuring up images of water abundance in order to dispel precariousness and poverty, politicians expect to establish political support and constituencies. This explains the ever-returning grand development projects reviewed earlier. Non-credible announcements of grand targets reveal the political motivations of these projects. The Green Isaan project, for example, promised to make the northeast "green" within five years by improving water resources and raising the percentage of forest areas (Bruns, 1991), while the 1991 regional development plan for the lower northeast region foresaw industrial development in the region, with Korat destined to become the 'Detroit of Thailand'. Likewise, in 1997 General Chavalit reiterated the promise to "turn the northeast green", while Thaksin's Water Grid was to triple Thailand's irrigated area in five years with "a nationwide tap water system... installed by 2005 so that villagers and farmers throughout the country can enjoy running water all year-round" (Bangkok Post 3 May 2004b). The Prime Minister also "vowed to eradicate all water-related problems plaguing the country, which he said were major hurdles in the government's war on poverty" (The Straits Times, 2003).

Notwithstanding the influence of external factors and the political gains sought by politicians, the Thai administration also pursued its own version of the hydraulic mission enmeshed in local and national politics (Floch *et al.*, 2007). As elsewhere, water resource development stood at the confluence of interest groups motivated by professional, financial or political gains (Molle, 2008). As explained by Bruns (1991):

"Irrigation projects are large and visible rewards that politicians can offer in exchange for support. Members of Parliament are active in lobbying RID for projects, at the request of their constituencies. MPs and representatives in provincial assemblies may be contractor themselves or have links to them and stand to gain from building projects funded by the Job Creation program or the provincial Administration. At the national level there has been strong political pressure for construction of water resources projects."

With Isaan remaining both the poorest region and the largest 'reservoir' of voters (40% of the population), it is no wonder that, as recalled sympathetically by the Bangkok Post (28 July 2003), "The idea of transforming the Northeast into a 'promised land' where poor farmers can grow rice and other crops and raise livestock to make enough money to sustain a traditional livelihood without having to travel to the city to make a living every dry season has never faded from the minds of some caring northeastern politicians". A vision shared and promoted by consulting and construction companies more than willing to contribute to greening Isaan. As summarized by Chaianan Samudavanija (1995), "in the name of 'economic development' the military and bureaucratic complex acquired additional financial sustenance through sponsoring infrastructure construction in rural areas. The corruption associated with these projects helped the various patron-client networks maintain their political authority over the rest of the country's population".

Financing, however, whether from state coffers or through bilateral/international funding, is not always forthcoming. Although Chavalit tried to negotiate a loan with the World Bank for his Green Isaan project (Hewison, 1994) and although the project was bundled into a major arm deal purchase with the British government (Bangkok Post, 1994; LabourNet, 2004), the project did not materialize. Thatcher's government was ready to grant US\$100 million and provide a loan of US\$500 million for

the project if agreement was found on a major package of military equipment purchase. Although the Thai Government allocated money for the programme in the 1989 budget plan, the joint project foundered, partly because the Americans succeeded in reasserting themselves as the main arms supplier (LabourNet, 2002). Likewise, when the Mun River Basin Water Resource Development plan (Binnie and Partners 1995) was completed in 1995, with EU funding under the auspice of RID, the NESDB eventually denied funding to RID, although proposals for further development of water resources and irrigation had been dramatically downsized. Promotion of the KCM project was also allegedly embroiled in corruption linked to the military regime in the early 1990s (Samudavanija, 1995).

Within the administration, the prospect of massive projects and attendant funding also awoke professional and financial interest. The KCM project was developed by the NEA/DEDP, an agency under the Ministry of Science and Technology which succeeded in challenging RID's monopoly on water/irrigation infrastructure.²⁰ The Water Grid also demonstrated the financial and political attractiveness of such projects for both line agencies and politicians. The project remained delayed as a "result of a row between Natural Resources Minister Suvit Khunkitti and Agriculture Minister Somsak Thepsuthin over who should oversee the project," because "both ministers want[ed] to supervise the project because it could be promoted in their election campaigns" (Bangkok Post 13 June 2004).

Corruption in Thailand and its links with politics has been well documented (Ockey, 1994; Pasuk and Sungsidh, 1996; Pasuk and Baker, 1997). Much of the water investments in Isaan during the military regimes involved high ranking officers. The example of Sia Leng, a *jao pho* (godfather) from Khon Kaen, given by Pasuk and Sungsidh (1996) illustrates the links between the military regime and money politics. "Because of his underworld activities (lottery, logging) and the gang conflicts which they involved, Sia Leng needed protection and hence cultivated friendship with military man and high officials. He cultivated his relationship with General Chavalit by assisting with his Green Isaan project, a scheme designed by a group of officers to "demonstrate military leadership of rural development in rivalry to civilian government. Again the scheme provided opportunity for *jao pho* to demonstrate alignment with powerful military figures". Programmes like the ARD were also known to be associated with corrupt practices. Contracts for road design and construction supervision were cancelled in 1979 "due to alleged irregularities on the part of some ARD staff and consultants. Charges of inadequate work performance also led to several court actions against contractors" (World Bank, 1985).

This situation is in no way peculiar to Thailand. In post-war Japan, a system of collusion between politicians, businessmen, and bureaucrats evolved. They formed a so-called "iron triangle" of shared benefit and influence which made public works projects the center of a system of vested interests that encouraged bribery and bid rigging. Massive government spending on public works projects often benefited business rather than the general public (Feldhoff; 2002; Woodall; 1993). In the US, too, much of the construction drive of the Bureau of Reclamation and the Army Corps of Engineers has been fuelled by and linked to a triangle of shared interests (Reisner, 1986; McCool, 1987). Collusion between business, politics and bureaucrats in the water sector is a commonality shared by virtually all countries (Repetto; 1996).

²⁰ Several informants reported severe antagonism between the two agencies.

4.3 *The development industry: A fixed discourse in a changing world?*

Beyond general justifications of development and the pervasiveness of political interests, analysis of the last 50 years shows a remarkable regularity in the promotion of large scale water resources development in Northeast Thailand. Although this vision has gradually been challenged and has somehow evolved with regard to which projects are pushed forward, it has by and large adhered to the ethos of the *hydraulic mission*, whereby the opportuneness of water infrastructural development is seen as obvious and other considerations - whether economic, social, or environmental – are at best treated as externalities to be mitigated.

Although a common feature of the four post-war decades that saw 'modernization' and technology as central to economic development, this ethos has also been linked to, and nurtured by, the wider debate around water resources development in the Mekong basin (Friesen, 1999; Nguyen, 1999; Jacobs, 1995; Molle et Floch, 2008). Grand plans, modelled after the TVA, to achieve a "comprehensive development" of the basin, including several major dams on the mainstream, ensured the prominence of the engineering mindset. The engineers of the US Bureau of Reclamation, in particular, transplanted their "culture of irrigation" to Asia, most particularly to Thailand where American influence was greater: a dozen Thais visited the Bureau in the US as early as 1946 (Biggs, 2006) and intense exchanges lasted at least two decades. The concept of river basin full development promoted by the TVA was apparent in the reconnaissance on the Chi-Mun basin carried out by the Bureau in 1965 at the request of USAID. It produced a report where almost every single tributary to the Chi and the Mun rivers was dammed in its upper course (see Floch et al., 2007).

The Royal Irrigation Department created a culture where floods and drought automatically translated into proposals for more dams and more irrigation schemes. This was predicated, as shown above, on the self-defined engineering mission of RID but also on a disregard for indirect costs and on the argument that "water flows to the Mekong unused" (Roonruang, in Watershed 1999): a typical argument insensitive to wider ecosystemic functions of the water regime as well as to pre-existing people's livelihoods, echoed in 1995 by the Foreign Minister of Thailand: "It has been a pity to let the Mekong River, with its abundance of water resources, just flow to the sea" (cited in Friesen, 1999).

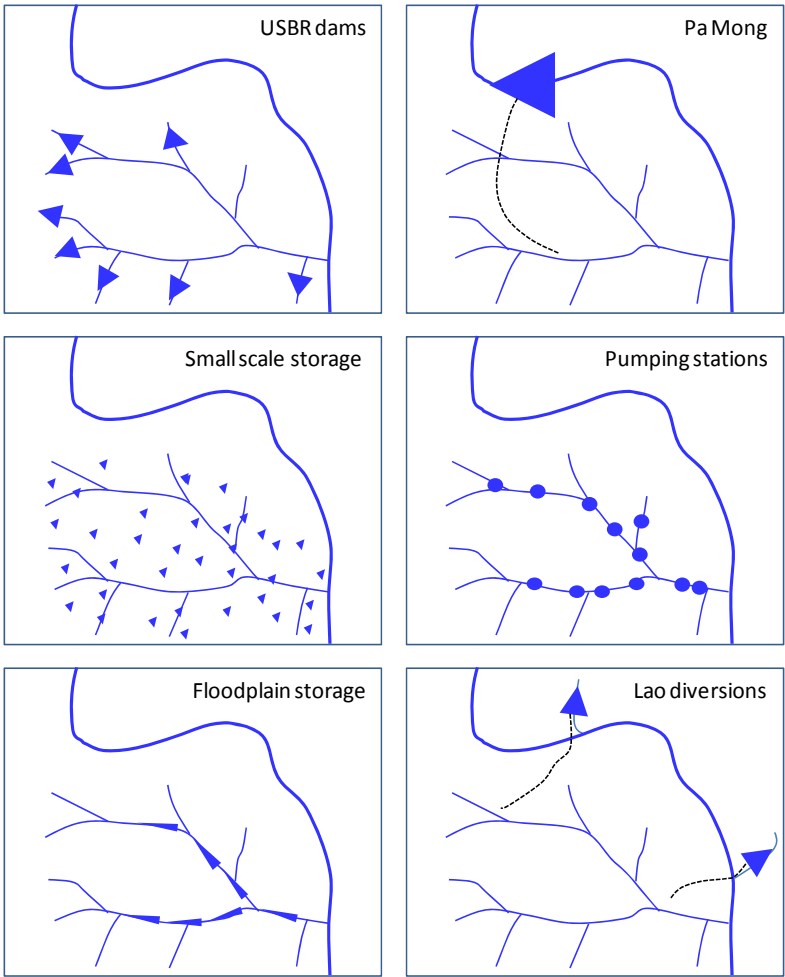
Also, while the rhetoric of participation and local and small-scale developments featured prominently in basically all water planning documents after the 1978 AIT report, the underlying understanding of the uses of water and the discourses surrounding the utilization of basin resources have merely been readjusted to comply with the overall policy, with no substantial rethinking of the benefits and costs associated with water resources developments at large. A case in point is Rinfret (1988) who analyzed ways to "Filling small watersheds with weirs" (the title of his report) – a computer-aided decision-support tool calculating how many weirs were technically feasible for implementation on any given tributary. This highlights that the paradigm of comprehensive and full development (leaving no drop of water run waste to the Mekong), has been carried over successfully from the 1960s planning practices into the time of participatory water resources development.

In retrospect, the above review of water resources development plans in Isaan reveals an impressive insistence and ingenuity in finding ways to mobilize water for the region. We can at least identify six main options that have been explored and/or implemented at different points in times (Figure 4): 1) small scale storage or diversion structures (ponds, tanks, weirs,...) have been an early solution that resurfaced in the late 70s; 2) damming the various tributaries of the Chi and Mun rivers has been the hallmark of the 1965 USBR survey and several of these dams have been constructed; 3) The Pa Mong

dam long was the cornerstone of irrigation through diversion of the Mekong waters (and gave way to several variants in the KCM project, where water would be pumped from the rivers); 4) pumping stations along the main rivers were disseminated by the NEA/DEDP, starting in the 70s up to the mid 90s; 5) storing water in the flood plain itself, through a succession of weirs was first introduced in the 1980s (NEDECO, 1982) and later incorporated in the KCM project; 6) last, frustrated efforts to import water directly from the Mekong led to creative plans to siphon water from dams located in Lao-PDR under the Mekong into Isaan.

This engineering drive and the fixed discourse stressing the "urgent need to bring water from the Mekong to alleviate the region's water needs" (Interim Committee, 1988) have been gradually challenged on economic, environmental, and social grounds.

Figure 4: Main options for the mobilization of water resources in Isaan



Economic considerations have never featured prominently in Isaan project planning, The 1988 Revised Indicative Plan of the Mekong Committee reveals that the "economic returns [of the five Isaan projects] are not very attractive. This is due to forecasted low rice prices... Nevertheless, the economics of the projects may improve considerably if a greater proportion of upland crops is introduced... A major consideration with respect to irrigation projects in Northeastern Thailand is that economic merits of a project do not capture other critical strategic and political aspects such as employment generation and risk reduction...under the 'Green E-sarn Scheme' and for socio-political reasons, irrigation in Northeastern Thailand is likely to be acceptable at somewhat lower economic

returns than elsewhere in the country" (Interim Committee, 1988). The cost-effectiveness of small-scale projects has also been at best dubious, with "a consensus among government engineers building small reservoirs and other small projects that such projects cannot be justified in economic terms, but are necessary for political reasons or for their social benefits" (AIT, 1979). Some academics have also disputed the economic relevance of the later KCM and Water Grid projects but these arguments have had relatively little effect.

Environmental issues have been somehow more prominent. The salinization problems, the conflicts on flood plain management around the Rasi Salai and Huana dams, on the Mun River, have generated debates about Environmental Impact Assessment and critiques about the ways shoddy assessments are used to "greenwash" projects. For example, the first EIA done for the Songkhram Irrigation Project in 1992 by consultants AEC et al. were rejected by the National Environment Board (NEB), after finding that these were exact copies of EIAs that had been done earlier for another large-scale water diversion project, the Khong-Chi- Mun (Breukers, 1999). In 1991, Dr. Mark Rentschler of the US Treasury Department advised the US Government that "The environmental impact assessment prepared for the Pak Mun project did not "appear adequate to allow the [World Bank's] Board of Directors to evaluate the environmental soundness of the project" (Watershed 1(3)). Nevertheless, the World Bank and EGAT never commissioned a new EIA and continued to state that the Pak Mun dam would only have minimal impact on the surrounding natural and human environments (Friesen, 1999). Likewise, in 2002, in the mid of conflicts related to the Rasi Salai and Pak Mun dams, the DEDP submitted a proposal and an EIA for the second phase of the KCM project but the expert panel which analyzed the EIA rejected the proposal on the ground that the comprehensive groundwater study carried out by KKU had not yet been completed (Wiszniewski, 2003).

The Minister of Natural Resources and Environment, Praphat Panyachartrak, attempted to upgrade Environmental Impact Assessment (EIA) procedures in order "to catch up with the rapid economic growth" and to promote participation from the public, who –according to him- should "be allowed a much bigger say in state development projects, which will also face tougher scrutiny from a new agency" (Bangkok Post, February 2004). His efforts were not rewarded and perhaps not unrelated to his removal and replacement by Suvit Khunkitti, the main proponent of the Water Grid. In sum, EIAs are seen as a "bureaucratic "hoop" to be jumped through in order to start construction, not as an authentic mechanism to decide whether or not the dam should be built" (Friesen, 1999). This has led local groups to engage in grassroots research in order to mobilize local knowledge and to produce "people's EIA" (Manorom, 2007).

The conflicts around the Pak Mun and Rasi Salai dams, let alone earlier occurrences of displacement because of dam construction, have shown abundantly that social impacts have been equally neglected, belittled in the name of national development. Unfortunately the debate between the state and NGOs is now polarized. The government distinguishes between "good" and "bad" NGOs and generally either attempts to keep planning secretive²¹ or envisions debates in terms of confrontation, as suggested by Prime Minister Samak's recent declaration that "he did not care about opposition from non-governmental organisations" (Charoenpo, 2008). The narrowness of this vision and the continuing disregard for site-specific conditions was demonstrated by his declaration that "the project was realistic, given what Israel had done by turning its arid areas into fertile farmland," and his vow "to

²¹ An article in the Bangkok Post (2004) referred to military units conducting 'psychological operations' in order to convince local people to accept the construction of the Kaeng Sua Teng dam.

make it possible even though he could possibly face criticism from environmentalists" (Charoenpo, 2008).

The fixity of the development discourse is also demonstrated by the obsessive focus on water resource and irrigation development (see above) and a disregard for alternatives, although reservations surfaced –at times- in official reports. For example, a World Bank report in 1969 noted that "the North East is merely the more striking example of the widespread predisposition to disregard the potential for rain-fed agriculture – at least at the official level". An 1977 ECAFE report considered that the Chi Mun was inadequate for irrigation because of lack of storage sites and because of their "flashy flow"; groundwater was also contemplated but found salty or sulphurous so that with the exception of small tanks for which the number of sites was also deemed "limited". Even if irrigation development was, arguably, a sound public investment option in the 1970s, the lack of re-evaluation is striking: at a time when neighbouring countries like Malaysia are resolutely moving out of an agrarian economy to higher value economic activities, billion dollars worth of investments plans in irrigation infrastructure still make the headlines in Thailand, despite the fact that agricultural labour is already in short supply, rice markets are saturated, and many remaining soils are salinity-prone (in Isaan) (Molle and Floch, 2007).

5 Conclusion

Colby (1984) attempts to distinguish between successive conceptualisations of the relationship between development and the environment. Frontier economics paradigm has long been dominant, with its exclusive priority given to conventional economic growth and a vision of the environment as a mere physical support. The 'environmental protection paradigm' stresses that some economic growth must be foregone in order to preserve the environment, while the 'resource management paradigm' argues that only by maintaining a healthy environment can we ensure growth. International institutions like the World Bank or the ADB are supposed to have gone through the three phases and to now rest with a resource management paradigm which should be reflected in their practices and, perhaps, might have somehow percolated down to borrowing countries (Colby, 1984).

In the case of Isaan, or Thailand in general, evidence of such a shift is suggested by several facts: the greening of legislation, the advent of the Ministry of Natural Resources and Environment, the requirement of EIA (under certain conditions), the strengthening and maturing of environmental and/or livelihood-oriented NGOs of different stripes, the organization of civil society around struggles on the Huana or the Pak Mun dams, etc. can be taken as clear signs of change.

At the same time it is debatable whether the mindsets of engineers, bureaucratic thinking, politicians' view of water resources, or the core business of consultant companies have really evolved in parallel. The above account suggests that most of the worldviews and interests that underpinned the ideologies of the hydraulic mission or the 'frontier economics' are alive and well. Avoidance, distortion, or manipulation of EIAs, attempts to denigrate social movements, continued use of overriding objectives (food security, national security, poverty alleviation, etc) to close debate, token participation of stakeholders to build legitimacy, and other political devices show that practice has only been superficially modified. According to Chomchai (2001) "national environmental policy seems to have been overshadowed and indeed supplanted by a development strategy that favors the industrial and commercial sectors and vested interests at the expense of natural ecological balance and overall national interest". Whether it is demanded by population growth, extrapolated energy needs, or

promises of bright economic future for the region, large water infrastructures are still presented as something of a panacea.

Although the grand projects of the Cold War era may have reflected both the ideology of full-river basin development and the geopolitical interest of the US, the logic and bundle of political and financial interests underpinning large-scale water projects have not significantly subsided since that time. In developing countries classical 'iron triangles' give way to influential and lasting 'iron rectangles': Politicians derive direct political benefit from building strong constituencies through their mediation of public investments (O'Mara, 1990); state bureaucracies ensure sustained budgets and strengthen their professional legitimacy; private consulting and construction firms ensure a steady flow of business opportunities. In addition, projects typically offer scope for corrupt practices that enhance the private financial benefits of one or several of these actors. The fourth apex of the rectangle is formed by development banks and cooperation agencies, which also have vested interests in maximizing disbursement of funds (Molle, 2008). Relationships between these four apexes are very fluid and vary with time but the confluence and coincidence of their interests is extremely strong. All, by and large, benefit from continued large scale development of infrastructures.

This does not mean that these four groups of organizations are homogeneous. Other segments of the administration (typically the Ministry of finances or the NESDB) may disagree and successfully oppose projects; development banks may also strengthen their social and environmental criteria and not support particular projects. Yet, the declaration of Prime Minister Samak – less than a week after being appointed – about a megaproject to bring water to Isaan provides a fascinating and remarkable continuity to 60 years of water policy centered on the "desert bloom" promise. Whose dreams and visions are being fulfilled by the river development schemes? ask Hudson-Rodd and Shaw (2003), "who benefits from the projects and who determines what projects are carried out in the name of "progress and development"?"

The emerging major (unanswered) question is why, after all, governance shifts are so hard to come about. Why would it be not possible to do "good projects", with adequate safeguards, compensations, detailed assessments of future impacts and strict screening of projects? For Grey and Sadoff (2006), who acknowledge the need for improved project governance, "the world is a different place in the 21st Century, and there is no doubt that the costly mistakes of the past can and must be avoided in the future." Investments in hardware should be paralleled by "investment in institutions", with capacity building, participation and good-will supposed to make a difference. The above account of decision-making in water resource development in Isaan suggests that this view includes a good dose of wishful thinking and that institutions are not easily swayed by injection of money or rhetorical calls for a "responsible growth". Governance shifts are slow and result from the complex interplay of local, national and global dynamics, with democratization more likely to result from hard-fought battles than from the mere desirability of social and environmental sustainability.

6 References

- AID (Agency for International Development) 1963. Long range assistance study for Thailand, Secret, subsequently declassified, quoted in Steinberg.
- Altshuler, A. A.; Luberoff, D. E. 2004. Mega-Projects: The Changing politics of urban public investment. Washington, D.C.: The Brookings Institution and Lincoln Institute of Land Policy.
- ASEAN, PALCON, SWHP, NIPPON KOEI. 1992. Me Kong-Chi-Mun detailed feasibility report, prepared for the Department of Energy Development and Promotion, Bangkok.
- Asian Institute of Technology (AIT). 1978. Water for the Northeast: A strategy for the development of small-scale water resources (Volume 1). Asian Institute of Technology. Bangkok, Thailand.

Baker, C. and P. Pasuk. 2005. A history of Thailand. Cambridge University Press.

Bangkok Post. 2008. Samak says he will personally supervise five megaprojects. February 25, 2008.

Bangkok Post 28 February 2005. Mega projects 'lack good governance'.

Bangkok Post. 07 July 2005. Grid system given thumbs down.

Bangkok Post. 08 December 2005. Why Isan's dip in birth rate matters. Editorial. Thursday 08 December 2005.

Bangkok Post. 12 April 1997. Irrigation scheme wins PM's backing despite opposition by environmentalists.

Bangkok Post. 13 June 2004. Water crisis looms, says grid study.

Bangkok Post. 18 February 2004. B400bn water management scheme to be proposed to cabinet.

Bangkok Post. 20 March 2004. Suvit plans new water network.

Bangkok Post. 24 April 2004. PM pledges B100 billion.

Bangkok Post. 24 March 2004. New projects to ease chronic shortages.

Bangkok Post. 27 April 2004. Ponds to be dug for farmers.

Bangkok Post. 28 December 2003. Call to build water supply networks: reservoirs cannot meet agri demand.

Bangkok Post. 3 May 2004a. Govt. policy fails to address root causes.

Bangkok Post. 3 May 2004b. Irrigation head air doubts on proposed national grid.

Bangkok Post. 7 May 2004. Military units conducting 'psychological operations'.

Bangkok Post. February 2003. The Ministry of Agriculture and the Natural Resources and Environment Ministry are engaged in another turf war. 02 February 2003.

Bangkok Post. February 2004. Public to get more say in state projects. Agency to ensure EIA specifications are met. 13 February 2004.

Bell, P. F. 1969. Thailand's Northeast: Regional Underdevelopment, "Insurgency," and Official Response. *Pacific Affairs*, Vol. 42, No. 1, pp. 47-54.

Biggs, D.A. 2006. Reclamation Nations. The U.S. Bureau of Reclamation's Role in Water Management and Nation Building in the Mekong Valley, 1945–1975. *Comparative Technology Transfer and Society*, 4(3): 225–46.

Binnie and Partners 1995. Mun river basin water resources development master plan. Final technical report. Prepared by Binnie and Partners in association with WS Atkins International Ltd., UK; ITC, Netherlands; ATT Consultants Co. Ltd. and TA&E Consultants. Royal Irrigation Department, Ministry of Agriculture. Bangkok, Thailand.

Biwater, 1987. Investigation and preparation of a water resource development programme for Northeast Thailand (Final Report: Water Resources).

Boonlue C. 2005. The present condition on water resources development in the northeastern region of Thailand. In: Proceedings of the International Symposium on Sustainable Development in the Mekong River Basin. Japan Science and Technology Agency.

Briscoe, J. 2003. Country Water Resources Assistance Strategies. Presentation at the World Bank Water Week. Washington D.C.: The World Bank.

Breukers, S. 1999. Who defines the "problem", who defines "development"? The case of the Songkhram Irrigation Project. *Watershed* Vol. 4 No. 2 November 1998 – February 1999.

Bruns B., 1991. The Stream the Tiger Leaped: A study of intervention and innovation in small scale irrigation development in Northeast Thailand. Ph.D. Thesis. Cornell University.

Chainarong Sretthachau. 1999. People movement against dams in Thailand. Environmental NGOs' International Symposium on Dams "Problems of Dam Construction Policy & Alternatives for the 21st Century", December 1999, Seoul.

Charoenpo, Anucha. 2008. Megaprojects 'a top priority' for new govt. Big plans for diversion of water from Mekong. *Bangkok Post*, 4 Feb 2008.

Chomchai, P. 2001. Environmental governance: A Thai perspective. Workshop on Mekong Regional Environmental Governance, June 2000, Chiang Mai. The Regional Environmental Forum (REF) for Mainland Southeast Asia.

Colby, Michael E. The Evolution of Paradigms of Environmental Management in Development. Policy, Planning, and Research Working Papers. Washington. DC: The World Bank, 1989

- Dolinsky, D.J. 1995. Assessment of contract farming at Lam Nam Oon, Thailand: A Combined effort of USAID and the Royal Thai Government. Working paper No. 193, CDIE, Arlington, VA, US.
- EPDC, 1960. Comprehensive report on the major tributaries of the lower Mekong Basin. The Mekong Reconnaissance Team organized by the Government of Thailand. Bangkok, Thailand.
- Ertsen, M. 2006. Colonial irrigation: Myths of emptiness. *Landscape Research* 31(2): 146-167.
- Feldhoff, T. 2002. Japan's Construction Lobby Activities –Systemic Stability and Sustainable Regional Development. *ASIEN*, 84, S. 34-42.
- Feldhoff, T. 2002. Japan's Construction Lobby Activities –Systemic Stability and Sustainable Regional Development. *ASIEN*, 84, S. 34-42.
- Floch, P.; Molle, F. and Loiskandl, W. 2007. Marshalling Water Resources: A Chronology of Irrigation Development in the Chi-Mun Basin, Northeast Thailand. M-POWER Working Paper, IWMI/IRD/BOKU
- Flyvbjerg, B.; Bruzelius, N.; Rothengatter, W. 2003. Megaprojects and risk: An anatomy of ambition. Cambridge University Press, Cambridge, UK.
- Gibb et al., 1988. Chi Basin Water Use Study. Final Report: Appendices. Sir Alexander GIBB & Partners, TEAM Consulting Engineering Co, Ltd., MINSTER Agriculture Ltd., Institute of Hydrology. Royal Irrigation Department. Bangkok, Thailand
- Hafner, J. 1987. View from the Village: Participatory Rural Development in North East Thailand, *Community Development Journal*, 22:2 (1987:Apr.) p.87.
- Hewison, K. 1994. Greening of Isaan - More than just a pinch of salt. Australian National University Coombsarchives. Thai-Yunnan Project Newsletters Issue 24. <http://www.nectec.or.th/thai-yunnan/24.html#6>
- Hill R.M. 1973. An Overview of USAID participation in the Thailand Programs of Security and Development, 1951 to 1973. United States Overseas Mission (USOM), Bangkok, Thailand (cited in Steinberg 1986)
- Hirsch P and Lohmann L 1989 Contemporary politics of environment in Thailand *Asian Survey* 29 (4) 439-451
- Interim Committee for the Coordination of Investigations of the lower Mekong Basin. 1988. Perspectives for Mekong development. Revised indicative plan for the development of land, water and related resources of the lower Mekong basin.
- Interim Committee, 1990. Mekong Mainstream Development Possibilities: Summary Report.
- Jacobs J.W., 1995. Mekong Committee history and lessons for river basin development. *The Geographical Journal* Vol. 161(2): 135-148
- Jacobs N. 1971. Modernization without Development: Thailand as an Asian Case Study. Praeger Publishers. New York. (quoted in Steinberg 1986).
- Kambhu C. 1956. Memorandum on water condition, water requirement, and water control projects in the northeast region of Thailand. Royal Irrigation Department, Ministry of National Development. Thailand
- Kamkongsak L. and M. Law, 2001- Laying waste to the land: Thailand's Khong-Chi-Mun Irrigation Project. *Watershed* Vol. 6(3): 25-35
- Manorom, K, 2007. People's EIA: A mechanism for grassroot participation in environmental decision-making *Watershed* 12(1): 26-30.
- Koontanakulvong S. 2006. Water Situation in Thailand in the year 2003. Faculty of Engineering, Chulalongkorn University. Presentation presented at the: http://www.watercu.eng.chula.ac.th/publications/Present_191006_1.pdf (last accessed 5 March 2007)
- LabourNet. 2004. <http://www.labournet.net/biwater/biwater.html>. Accessed April 2004.
- Lipchin, C. 2003. Water, agriculture and Zionism: Exploring the interface between policy and ideology. Paper presented at the 3rd conference of the International Water History Association, December 2003, Alexandria.
- McCool, D. 1987. *Command of the Waters: Iron Triangles, Federal Water Development, and Indian Water* by Berkeley: University of California Press.
- Mekong Secretariat, 1970. Indicative Basin Plan. Committee for Coordination and Investigation of the Lower Mekong Basin. Bangkok, Thailand.
- Mekong Secretariat, 1989. The Mekong Program and Irrigation Development of the North-East. A Briefing Paper prepared by the Mekong Secretariat
- Ministry of Agriculture and Co-operative (MOAC). 2006. Project: Integrated Irrigation System Development. Conference of Interested Parties, 26 January 2006, The Government House. www.modernizethailand.com

- Molle, F. 2006. River basin development: a few lessons to be learned from history. Paper prepared for "Mekong Region Waters Dialogue: exploring water futures together". 6-7 July 2006, Vientiane, Lao PDR.
- Molle, F. 2008. Why enough is never enough: The societal determinants of river basin closure. *International Journal of Water Resource Development*. Forthcoming.
- Molle, F., Floch, P. 2008. Megaprojects and social and environmental changes: The case of the Thai "Water Grid". *Ambio* 37(2).
- Muscat R.J., 1990. Thailand and the United States Development, Security and Foreign Aid. Columbia University Press.
- National Research Council. 1996. A New Era For Irrigation. Committee on the Future of Irrigation in the Face of Competing Demands. Water Science and Technology Board. Commission on Geosciences, Environment, and Resources. National Academy Press, Washington, D.C. 1996
- NEDECO, 1982. Development of the Lower Mun Basin. Feasibility Study Volume 1: Main Report. NEDECO Netherlands Engineering Consultants for the Interim Committee for Coordination and Investigations of the Lower Mekong Basin. Arnheim, The Netherlands
- Neawchampa C., 1999. Socio-economic changes in the Mun River Basin, 1900-1970. In Fukui H. (Editor): The Dry Areas in Southeast Asia: Harsh or Benign Environment?. CSEAS, Kyoto University. 215-235. Kyoto, Japan
- Nguyen, T. D. 1999. The Mekong River and the struggle for Indochina: Water, war and peace. Westport, CT: Praeger.
- NWRC (National Water Resources Committee). 2003. Workshop on "Sustainable Water Resources Management". Powerpoint presentation, the 23rd of July 2003, Ministry of Foreign Affairs Club.
- Ockey (1994) Political Parties, Factions and Corruption in Thailand. *Modern Asian Studies* 28(2): 251-277.
- O'Mara, G. T. (1990) *Making bank irrigation investments more sustainable (it is time to rationalize policy guidelines on bank irrigation projects)*. Agriculture and Rural Development Department. Working Paper. Washington D.C.: The World Bank.
- Pasuk & Sungsidh. 1996. Corruption and Democracy in Thailand. Silkworm Books. Chang Mai, Thailand.
- Pasuk Phongpaichit; Baker, Chris. 1998. *Thailand's boom and bust*. Silkworm: Chiang mai..
- Rasi Salai Declaration, 2003. Rivers for Life! The Rasi Salai Declaration. Endorsed at the Second International Meeting of Dam Affected People and their Allies. 28 November – 4 December 2003. Rasi Salai, Thailand
- Ratner, B.D. 2003. The Politics of Regional Governance in the Mekong River Basin Global Change, Peace & Security 15(1):59 – 76.
- Reisner, M. 1986. Cadillac desert: The American West and its disappearing water. (New York, Penguin).
- RID, 1988. Chi Basin Water Use Study. Final Report: Appendices. Sir Alexander GIBB & Partners, TEAM Consulting Engineering Co, Ltd., MINSTER Agriculture Ltd., Institute of Hydrology. Royal Irrigation Department. Bangkok, Thailand
- RID, 1995. Mun River Basin Water Resources Development Master Plan. Final Technical Report. Prepared by Binnie and Partners in association with WS Atkins International Ltd., Uk; ITC, Netherlands; ATT Consultants Co. Ltd. and TA&E Consultants. Royal Irrigation Department, Ministry of Agriculture. Bangkok, Thailand
- Rinfret, J.R. 1988. Filling small watersheds with weirs: a preliminary computer simulation. Khon Kaen University.
- RiversWatch. 2002. Laos-Thai Friendship Water Diversion Project. <http://www.rwesa.org>. Accessed in August 2005.
- Roongrueng Chulasata, 'There Is No Other Alternative', *Watershed: People's Forum on Ecology*, 4,2 (1999), p. 10, emphasis added.
- Samudavanija, Chai-anan. 1995. Economic Development and Democracy, in Thailand's Industrialisation and its Consequences St Martin's Press, Canberra, Australia.
- Schreyger, E. 1984. *L'Office du Niger au Mali 1931 à 1982. La problématique d'une grande entreprise agricole dans la zone du Sahel*. Wiesbaden: Steiner.
- Shannon K.L., 2005. The Social and Environmental Impacts of the Hua Na Dam and Khong-Chi-Mun Project: The Necessity for More Research and Public Participation. Presentation at Water for Mainland Southeast Asia, 30.November – 2 December 2005, Siem Reap, Cambodia.
- Smythe, E. A. 1905. The Conquest of Arid America, 2nd ed. Reprint. Seattle, Wash.: University of Washington Press.

Sneddon C.S., 2000. Altered rivers: socio-ecological transformations, water conflicts and the state in Northeast Thailand. Ph.D. Thesis submitted to the University of Minnesota.

Sneddon C.S., 2002. Water Conflicts and River Basins: The Contradiction of Comanagement and Scale in Northeast Thailand. *Society and Natural Resources* Vol. 15: 725-741

Sneddon, C.S. 2003. Reconfiguring scale and power: The Khong-Chi-Mun project in northeast Thailand. *Environment and Planning A*, 35: 229-2250.

Southeast Asia Rivers Network. 2002. Laos-Thai Friendship Water Diversion Project. An Excerpt from the Conceptual Study Report on Laos-Thai Friendship Water Development for Sustainable Agriculture in Savannakhet Province of Lao P.D.R. and Lower Chi Basin of Thailand, June 1998, Conducted by Sanyu Consultants Inc. Prepared by Southeast Asia Rivers Network-Thailand Chapter, June 20, 2002.

Sretthachai C., K. Nungern and A. Olson, 2000. Social Impacts of the Rasi Salai Dam, Thailand: Loss of Livelihood Security and Social Conflict. Paper prepared as a submission to the Fourth Regional Consultation of the World Commission on Dams. Hanoi

Steinberg, D.I., 1986. The Role of External Assistance in the Economic Development and Planning of Thailand: Torques and Tensions in the American Aid Program. *Aid Evaluation Occasional Paper No. 6*, U.S. Agency for International Development.

Swatuk, L. A. 2004. Whose values matter most? Water and resource governance in the Okavango River Basin

The Bangkok Post. 2007. Food security is paramount. Saturday November 03, 2007.

The Nation, 199X. For Thailand and its neighbours, all's fair in the war for water resources. 17 April 199X

The Nation. 14 September 2003. National water grid: Holes in pipeline projects.

The Nation. 1994. Isarn Aid Project linked to UK Arms Sales Bid. 7 March 1994.

The Nation. 2 July 2003. National grid: Water plan could run into trillions.

The Nation. 2007. Plan for massive dam on Mekong: Project likely to draw protests from neighbours, academic warns. Published on November 4, 2007

The Nation. 2007. Pua Paendin is confident in overcoming Thaksin legacy: Suwit. 25 October 2007.

The Nation. 23 June 2003. Infrastructure project: Tap water grid planned by '05.

The Nation. 24 April 2004. Isaan Trip: PM plays Lord Bountiful.

The Nation. 24 September 2004. Irrigation plan 'will hurt intended beneficiaries.'

The Straits Times. 2003. Thaksin vows to tackle Thailand's water problems. July 26, 2003. Internet: <http://straitstimes.asia1.com.sg/>, accessed June 2004.

The World Bank. 1975. Thailand Appraisal of the Northeast Thailand Rural Development Project, December 31, 1975, Report No. 721-TH. Washington D.C.: The World Bank.

Turton, A. R.; Meissner, R.; Mampane, P. M. and Seremo, O. 2004. *A hydropolitical history of South Africa's international river basins*. Report to the Water Research Commission. Pretoria: African Water Issues Research Unit (AWIRU), University of Pretoria.

USAID. 1980. Irrigation development options and investment strategies for the 1980s.

Vientiane Times. 2007. 30 October 2007. Laos boosts efforts to become 'battery' of Asia.

Vityakon, P.; Subhadhira, S.; Limpinuntana, V.; Srila, S.; Trelo-ges, V.; Sriboonlue, V. 2004. From Forest to farmfields: Changes in land use in undulating terrain of northeast Thailand at different scales during the past century. *Southeast Asian Studies*, 41(4): 444-472.

Watershed 1(3), Pak Mun: The Lessons are Clear, but is Anyone Listening.

Woodall, B. 1993. The logic of collusive action: The political roots of Japan's Dango System. *Comparative Politics*, Vol. 25, No. 3. (Apr., 1993), pp. 297-312.

World Bank and NESDB. 2005. Thailand Northeast economic development report. Joint Report of Thailand's National Economic and Social Development Board and the World Bank. Bangkok.

World Bank. 1985. Thailand: Northeastern rural development project. Performance audit report. (Loan 1198-TH). Report No 5990. December 27, 1985. Washington D.C.: The World Bank.

World Bank. 2005. Reengaging in Agricultural Water Management: Challenges, Opportunities, and Trade-Offs. Water for Food Team Agriculture and Rural Development Department (ARD). Washington D.C.: The World Bank.

Figure 4: Plans, Construction and Major Events

