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Author

Zusman, Eric

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12. The River Runs Dry: Examining Water Shortages in the Yellow River Basin

Eric Zusman
Department of Political Science
University of California, Los Angeles
Los Angeles, CA 90095
Phone: (310) 447-2914
Email: ezusman@ucla.edu

Introduction

The Yellow River (*Huang He*) has been deservedly cast as a source of great prosperity and great despair in the annals of Chinese history. Prior to 1949, the river overflowed its banks twice every three years, earning the title “China’s Sorrow.” In contrast, the river has also been called the “Mother of China” for its central role in early Chinese social and economic development. The symbol that these divergent metaphors fail to evoke is one of water scarcity. Droughts have been a part of the struggles of the Yellow River basin’s population and, in an arguably less dramatic fashion, exacted an even more crippling toll than floods.

In recent years, a lack of water has once again reawakened the anxiety caused by droughts, attracting the attention of Chinese policymakers and the Chinese media. In 1988, for instance, the politically controversial Chinese television series the *River Elegy* used the image of a dry Yellow River to suggest that China must “emerge from the constrained, inward focus of ‘Yellow River civilization...’”¹ While the series left a marked impression on contemporary Chinese political consciousness, the state of the river itself, which the series used to make this symbolic impression, will arguably have longer term practical implications for socio-political development than the series’ message. Over the past three decades, a condition known in Chinese as *duanliu*, meaning “to cutoff the flow,” has become sadly illustrative of the severity of water shortages in the river’s basin. In 18 out of the past 26 summers the Yellow River has run dry further and further upstream for longer and longer periods of time. During the summer of 1998, the river failed to reach its mouth at Bohai Bay for over 250 days.²

¹ Description taken from Perry Link, *Evening Chats in Beijing: Probing China’s Predicament*, (New York: W.W. Norton and Company, 1992) 156.

A World Bank report predicted with a median level of runoff water shortages in the basin would amount to between 1.65 billion cubic meters to 12 billion cubic meters per year by next year.³ Conservative estimates from Chinese sources project potential shortages in basinwide industrial use and agricultural use in the middle reaches of the basin within the next decade.⁴ These figures demonstrate that the future of the region's nearly 100 million inhabitants is jeopardized if questions concerning the underlying causes of water shortages in the region and proposed solutions to the shortages are not raised.

Water managers in China cite a combination of unique characteristics or *tedian* as factors that contribute to the basin's water shortages.⁵ The most obvious of these *tedian* is the yellow soil or *huang tu* from which the Yellow River gets its name. The Yellow River is the most heavily sediment-laden river in the world, holding nine-times as much sediment as the Ganges River, the closest standard for comparison.⁶ About 22 billion cubic meters of water, a little over one-third of the total 58 billion cubic meters of the average annual flow, is required to flush sediment into the sea so that it does not accumulate on the river bed downstream and increase the chances of flooding. Less often mentioned as a factor contributing to water shortages in China is growth in agricultural, municipal and industrial rates of water usage that followed the liberalizing of the Chinese economy in the late 1970s and early 1980s. Agricultural water usage increased by 63 percent from the 1960s to the 1980s due in part to profit realizing incentives that came with China's post-Mao economic reforms.⁷

The least frequently mentioned reason for water shortages, however, is the system that manages the Yellow River. David Lampton has written that the "[Chinese] political system is

² For a discussion of the impact of *duanliu* on Dongying, Shandong see Cheng Yiji, "Dongying Huanghe Duanliu Qingkuang yu Yin Huang Duice (The Zero-flow Situation in Dongying and Countermeasures in Irrigation)," *Renmin Huanghe (The Yellow River)*, May 20, 1995, pp. 33-34. For a discussion of the basinwide impact of *duanliu* see Qi Lianan, "Huanghe Duanliu Chengyin jiqi Duice (The Cause of Flow-off in the Yellow River and Corresponding Treatments)," *Renmin Huanghe (The Yellow River)*, July 20, 1996, p.1. See Appendix for *duanliu* graph.

³ World Bank, *China Yellow River Basin Investment Planning Study* (June 30, 1993), p. viii.

⁴ Bai Shaoxi, Hou Chuanhe, et al., "Huanghe Shuili Liyong Xianzhuang, Yuce ji Duice (Water Resource Utilization, Calculation and Countermeasure in the Yellow River)," *Renmin Huanghe (The Yellow River)*, May 20, 1996. p. 5.

⁵ Ti Jiazhi (Chief Editor), *Huanghe Shui Ziyuan (Yellow River Water Resources)* (Zhengzhou: Yellow River Water Resource Publication Office, 1996) pp. 4-8.

⁶ World Bank, *China Yellow River*, p. i-x.

⁷ Ibid.

not just important as a ‘source’ of [water] problems, it is important because it must fashion and implement solutions [to them].”⁸ The Chinese state began to embrace market reforms in the late 1970s, but the central government did not liberalize all sectors of the Chinese economy equally. Over the past two decades, economic reforms have been sporadic and uneven, creating gaps between subsidized input prices for items such as water and marketized output prices for items that water helps to produce. Even more intractable than the problems created by economic reforms are coordination dilemmas between the myriad bureaucracies responsible for water management in the basin. As Lampton intimated, one way to explore systemic causes of the water scarcity is to discuss proposed solutions to the shortages and illuminate impediments that challenge their implementation.

Upper levels of the Chinese government and the group of bureaucratic agencies that manage water have considered several solutions to water shortages in north China. Most of these solutions borrow from a supply-side approach to water management, while a few adopt a demand-side philosophy. The optimal long-term strategy for remedying the basin’s current water shortages is neither a demand-side nor a supply-side measure; instead, the most effective approach to resolving water problems is reforming the river’s management system.

Solving Water Shortages: Supply-side Measures, Demand-side Measures, and Management Reforms

In regions where available water is scarce, resources may be diverted from distant watersheds or tapped from underground aquifers. The decisions to construct reservoirs, build diversion tunnels or sink wells are known as supply-side measures. Chinese water managers and decision-makers have considered a broad range of supply-side options in response to north China’s water dilemmas. Globally, these methods provide a popular alternative to demand-side solutions because they do not modify behaviors or place limits on water intake, but in China they are viewed even more favorably because they employ large forces of laborers, stimulate investment and accord with the Maoist system of centralized planning. In recent years, dwindling water supplies have raised the price of exploiting surplus water. Many areas facing what is termed a

⁸ David M. Lampton, “Water: Challenge to a Fragmented Political System,” in *Policy Implementation in Post-Mao China*, ed. David Lampton (Los Angeles: University of California Press, 1987) p. 157.

“maturing water economy” have shifted their focus to remedies that concentrate on water demand.⁹

Demand-side measures involve using the existing quantity of water more efficiently. The premise underlying these measures is implementing policies and regulations that treat water as if it was a commodity. Demand-side proponents advocate reforms varying from improved pricing policies to transferable water rights. The commodification of water has encountered opposition for several reasons: water is a public good that is surrounded by a “vector of externalities” in which a host of users have the opportunity to use or overuse resources at the expense of other users¹⁰; (surface) water rights often rest with agencies that receive subsidies to finance water delivery; water is frequently dispatched for a flat-fee regardless of quantity; water’s opportunity cost varies in different regions within the same waterway.¹¹

A third approach to solve water shortages, improving the water management system, has some elements common to demand-side measures in that it advocates using lower quantities of water. However, where demand-side measures attempt to reduce water demand by limiting water use, the systemic water management approach concentrates on improving bureaucratic coordination through better organization.

Historical Review and Formal Management Structure

In traditional China, the maintenance of water management projects mirrored the welfare of the Chinese state.¹² During periods of growth, well-maintained dikes and levees prevented flooding and expanded canal systems accommodated greater communication and transportation needs. During periods of dislocation, aging levees led to floods or poorly constructed irrigation canals made droughts more severe. This interdependent relationship held true into the modern era. Chiang Kai-shek’s 1937 decision to remove the dikes along the lower reaches of the Yellow

⁹ Alan Randall, “Property Entitlements and Pricing Policies for a Maturing Water Economy,” *The Australian Journal of Agricultural Economics* (December 1981), pp. 195-220.

¹⁰ James Nickum, “The Maturing Metropolitan Water Economies,” in *Metropolitan Water Use Conflicts in Asia and the Pacific*, ed. K. William Easter and James Nickum (Boulder: Westview Press, 1994) p. 1.

¹¹ Mateen Thobani, “Formal Water Markets: Why, When, and How to Introduce Tradable Water Rights,” *World Bank Research Observer* (August 1997), pp. 161-179, LEXIS-NEXIS.

¹² Charles Greer, *Water Management in the Yellow River Basin*, (Austin: The University of Texas at Austin Press, 1979) 33. Greer cites Joseph Needham, *Civil Engineering and Nautics*, Vol. 4, No. 3 in *Science and Civilization*, pp. 234-235.

River to stall oncoming Japanese troops during the Sino-Japanese war is the most obvious modern example of an ill-advised water management decision that reflected the chaos of the era.

Mao Zedong's insistence of the rapid construction of the Sanmenxia dam (completed in 1957) is another modern illustration of this interdependency. Sanmenxia's main reservoir filled with sediment a year after its completion. Forty years and three reconstructions later the main reservoir at Sanmenxia still operates at one-third of its planned capacity. Sanmenxia is one among many ill-fated development decisions executed under Mao's rule. All too frequently Maoist projects required tireless amounts of physical labor but were not matched by equally indefatigable planning.

Unlike the aforementioned errors that could be attributed to an over-centralization of decision-making authority, the current water management problems are caused by the uneven devolution of policymaking authority from the central party apparatus to multiple provincial and functional bureaucratic units. In the post-Mao era, the institutions formally involved in solving the water crisis in the Yellow River basin are the State Council, the Ministry of Water Resources (MWR) and the Yellow River Conservancy Commission (YRCC). Other line ministries such as the Ministry of Agriculture play a secondary role, while the Ministry of Electric Power (MEP) and each of the nine provincial governments in the basin have potentially as much leverage as the MWR in major decisions. The State Planning Commission occupies an important position in the approval of funding decisions and can, therefore, also weigh heavily in policy decisions.

The MWR is responsible for overall basin-level planning which it accomplishes through seven subordinate basin-specific agencies—the YRCC being the most powerful of the seven. The MWR must also coordinate investments with the State Planning Commission and get approval from the State Council before it proceeds with plans. The MWR was joined with the MEP between 1958 and 1979 and then again between 1982 and 1988. Even though the two agencies currently operate independent of one another the present version of the MEP still affects water decisions, especially involving hydropower. The nine provincial governments in the basin are just as influential as the MEP when decisions directly impact their water use. Their compliance or lack thereof with allocation decisions can be both helpful and disruptive.

The YRCC functions a half step below the State Council ministries and provinces. The YRCC is charged with integrating provincial needs within broader directives passed down from the MWR. Because it is ranked below the provinces, its formal position is incongruous with its

assigned responsibilities, leaving it at a natural disadvantage. To quote one YRCC engineer “it is difficult to control institutions that formally hold a superior rank.”¹³ The YRCC’s first priority is flood control, which is another reason it has not been as responsive to water use problems.¹⁴

Addressing Water Shortages in North China

According to the Chinese constitution, all water belongs to the Chinese state. Article 9.1 claims “Mineral resources, waters, forests, mountains, grassland, unreclaimed land, beaches, and other natural resources are owned by the state.”¹⁵ Despite this constitutional clause, many water managers regard groundwater as historically the right and property of the landholder. The most controversial proposals revolve around the distribution of surface water. The majority of proposed solutions favor increasing supplies before reducing water use rates--placing supply-side before demand-side solutions.

Supply-side Measures

In the 1950s, Mao Zedong suggested diverting water from the resource-rich Yangtze River in southern China to the semi-arid/ arid regions in northern China. For over 40 years water specialists have been debating the feasibility of such a diversion. Discussions concerning the *nanshui beidiao*, “south water north diversion”, became more serious in the late 1980s and into the 1990s as water shortages became more acute in Tianjin and Beijing. The MWR has consistently supported supply-side solutions and moving ahead with the construction of one of these lines. This general policy prerogative comes from the director of the MWR Niu Maosheng:

Although China has made significant water conservancy progress in recent years, only 18 percent of its water resources have been developed and used... Therefore, during the next five years, China will increase its water supply capacity by 60-80 billion cubic meters.¹⁶

¹³ Interview with Zhu Tingju, Reconnaissance, Design and Planning Institute (RDPI), Project Division, Yellow River Conservancy Commission (YRCC), Zhengzhou, Henan province, People’s Republic of China (PRC), August 15, 1997.

¹⁴ See Appendix.

¹⁵ *The Constitution of the People’s Republic of China*, (December 4, 1982).

¹⁶ Li Rongxia, “Minister Outlines Construction of Water Conservancy Works (China’s Minister of Water Resources Niu Maosheng),” *Beijing Review* (December 18-24, 1995) p. 17.

Since the majority of China's rivers flow west to east, it is useful to think of these diversions as running perpendicular to China's natural waterways. The primary routes under consideration are the eastern route, the central route and the western route. Economic constraints prohibit more than one route from being constructed at a time, thus the different bureaucratic stakeholders use the advantages and disadvantages associated with each as leverage in the political debate over which route to construct.

The State Council approved construction of the eastern route in 1983. The route would use parts of the pre-existing Grand Canal, making it the most cost-efficient of the three. In the 1980s, construction on the route stalled at about the halfway point because water users extracted excessive quantities of resources. Consequently, in the 1990s objections concerning water pollution and water salinization stemming from the eastern route have become more vocal.¹⁷ The most popular option currently is the central route. According to the MWR, the central route "will have the greatest influence on development" along the southeastern Chinese seaboard.¹⁸ Hebei Province and the State Planning Commission have thrown their financial and symbolic support behind the line further reinforcing its status.¹⁹ The fact that the central would force the resettlement of 220,000 area and would carry water over or below the Yellow River bypassing the basin users on its path to Beijing and Tianjin, are noteworthy yet less audible objections.²⁰ Adverse geographic conditions and attendant difficulties in construction make the western line the least desirable line.

Demand-side Measures

Demand-side measures have not received as much attention in China, because they do not fit well with China's centralized system of planning nor do they appeal to the majority of China's

¹⁷ Interview with Dong Baohua, Director of Department of Science, Technology, and Foreign Affairs, YRCC, Zhengzhou, Henan Province, PRC, June 10, 1997. Li Rongxia, "Extensive Water Diversion Project," *Beijing Review* (October 17-23, 1994), pp. 8-9. Zhao Qinghua, "The Making of the Next World Crisis," *World Paper* (November, 1986) p. 4. NEXIS-LEXIS.

¹⁸ Li, *Beijing Review* (October 17-23, 1994), pp. 8-9.

¹⁹ *Ibid.* Interview with Anonymous YRCC engineer, Austin, Texas, November 21, 1997.

²⁰ Patrick Tyler, "Huge Water Project Would Supply Beijing By 860-Mile Aqueduct," *The New York Times*, p. 8.

emerging market interests.²¹ In the 1950s the PRC adopted a Soviet style planning system that is based on five-year economic plans and favors large-scale projects over regulations and other behavior modifying policy tools. Lester Ross concludes “[Chinese] planners were ideologically inhibited from including water in their calculations because it was not regarded as a product of human labor in the Marxist sense but rather as a gift of nature or a free good.”²² Despite the planner’s ideological predisposition, there have been two recent attempts to impose limits on the intake of water and to slow water overuse that suggest demand-side decisions might become more palatable as environmental protection becomes more pressing.

In 1987 the State Council convened a meeting of provincial representatives to set “reasonable” water quotas on each province in the basin.²³ The results of the meeting produced an annual “foundation” on which the YRCC bases its yearly distribution decisions. The plan’s usefulness has been brought into question because it fails to divide water quantities over time horizons less than a year. Moreover, it neglects to appreciate variations in seasonal needs or annual and monthly precipitation rates so water is taken when it is needed most and when it is available least.²⁴ Other reports claimed that upstream provinces fail to abide by their limits and downstream provinces never reach their limits.²⁵

The redrafting of the Yellow River Basin Comprehensive Management Plan (*Huang He Liuyu Zonghe Guihua*) is the other initiative that might be classified as a demand-side proposal.²⁶ The State Council initially approved the first basin-wide Comprehensive Management Plan in 1955.

²¹ Interview with Long Yuqian, Retired Sediment Specialist, YRCC, Zhengzhou, Henan Province, PRC, July 30, 1997.

²² Lester Ross, *Environmental Policy in China*, (Bloomington: Indiana University Press, 1988), p. 95.

²³ According to one interview the meeting was the first attempt by the Chinese State to rectify the impending water crisis. The meeting’s objectives were reduced after parties began to express their displeasure with water quantity cutbacks.

²⁴ These criticisms came from an interview with Zhang Qishun.

²⁵ Cheng Yiji, “*Dongying Huang He Duan Liu Qingkuang yu Yin Huang Duice* (The Zero-flow Situation in Dongying and Counter Measures in Irrigation),” *Renmin Huang He* (The Yellow River), May 1995, 34.

²⁶ Based on the impressions of some river managers and farmers, the new plan is an important step to realizing consolidated management of the basin. Interview with Guo Wanrong, Sanmenxia Branch of the Yellow River Conservancy Commission, Sanmenxia, Henan, People’s Republic of China, July 3, 1997. Interview with Wang Yongchuan, Deputy Chief Operational Officer and Ding Yuhe, Water Policy Management Division, Kaifeng Regional Office of the Yellow River Conservancy Commission, Kaifeng, Henan, People’s Republic of China, July 9, 1997.

According to a retired sediment specialist at the YRCC, measures have been inserted into the plan over the subsequent years between 1955 and 1997.²⁷ The most recent version of the plan will include an entire section devoted to water resources, which will codify many of these “inserted” measures and introduce other projections.²⁸ Another former YRCC engineer offered that the plan will attack the underlying causes of water shortages in the basin. For instance, the plan recommends gradually raising water tariffs; low water prices are seen as one of the chief reasons for water overuse.

Although the plan has yet to be released for public review, an employee involved in a YRCC project to monitor flows in the lower reaches of the basin argued that the plan was not the panacea other water managers made it out to be. Much of its content, he explained in less approving tones than his colleagues, is either already instituted operating procedures or a broad-based listing of goals.²⁹ To exemplify the latter, the plan sets objectives for the amount of irrigable land in the basin’s upper, middle and lower reaches. Other water experts grouped the plan and other policy tools together, noting these are still blunt instruments that lack specificity. The YRCC deputy to the National People’s Congress reinforced these remarks by showing visible frustration with her inability to introduce enforceable, meaningful measures that would remedy the basin’s water problems.³⁰

Water Management Questionnaire

Many of these interviews conducted for this project failed to resolve questions about the organization of the water management sector below the highest levels. To elicit more detailed responses about the way water is actually managed and to understand how water distribution decisions are actually made, a questionnaire was distributed to seven water experts working in

²⁷ Interview with Long Yuqian, July 3, 1997.

²⁸ He explained that the width of the first plan’s spine could be measured in inches. The new plan is a series of volumes with numerous appendices. He was not sure whether one person could physically carry the new plan by himself or herself. Interview with anonymous YRCC engineer, Austin, Texas, November 19, 1997.

²⁹ At least, the plan was not available prior to the authorship of this report. The information about the plan was provided by an anonymous planning engineer in the YRCC, Zhengzhou, Henan, People’s Republic of China, August 15, 1997.

³⁰ Interview with Yellow River Conservancy Commission National People’s Congress Representative Wang Liurong, the YRCC, Zhengzhou, Henan, People’s Republic of China, August 1, 1997.

the middle and lower reaches of the basin. The next section offers excerpts from Chinese of the questionnaire's section on management in the upper reaches of the basin, incorporating comments from other interviews for further elucidation when necessary.³¹

The Upper Reaches of the Basin

There are eight large-scale reservoirs on the main stem of the Yellow River. The largest reservoirs in the upper reaches, Longyangxia and Liujiaxia, are under the supervision of the YRCC during flood season—from November to March. Outside of this five-month period, an intra-ministry agency called the Yellow River Upper and Middle Reach Water Quantity Management Commission makes joint decisions on the amount and timing of water released from these two reservoirs. The YRCC occupies the chief position in this intraministry agency, but regional power districts and representatives of upper reach provincial governments flank it officially. Unofficially, these “subordinate” members and others affect decisions. During meetings on water distribution, it is not uncommon for provincial governors or other influential guests to appear and show their support or dissatisfaction with an allocation decision.

Regionally based organizations manage smaller reservoirs in the upper reaches of the basin. For instance, the Inner Mongolia Water Conservancy Bureau, a branch of the Inner Mongolia provincial government, manages the smaller Sanchenggong reservoir. These management appointments lack consistency; the agency building the reservoir takes over management responsibilities. Recently introduced regulations, which raise spending limits on funds a local entity can use to finance a reservoir, will probably make the current situation more complex.³²

There are many glaring oversimplifications in the results of this questionnaire. For instance, there is no real mention of what *danweis* or agencies can request a permit to build a reservoir. Part of this oversimplification is due to the general nature of the questions posed to the water experts.³³ Part of the vagueness relates to the fact that “the notion of unified, basin-wide management system exists in name only.”³⁴ Instead there are many disparate agencies that

³¹ See Appendix.

³² Interview with Jiang Liping.

³³ For enclosed questionnaire see Appendix.

determine the timing and location of water release. For example, a branch of the Inner Mongolia provincial government manages the Sanchenggong reservoir.

To paint the problem in broad strokes, a YRCC engineer explained that the only time downstream provinces adhere to the management decisions of the YRCC is during flood season. Given the downstream provinces' refusal to adhere to guidelines, the likelihood of upstream provinces (where wasted water is most excessive) following the advice of the YRCC is even more implausible. The construction of an intra-ministry board in the upper reaches evidences the formal lack of a consensus in these reaches. In practice, one can only wonder if the compromise allocations decided by this board have any bearing on how much water is actually drawn.

The setting of reservoir levels is one area where the organizational unevenness is most apparent. Reservoir levels can be set by a host of agencies depending on their location and size. Clearly not all of these agencies are intent on achieving the same goals or objectives. Certain reservoirs are operated to generate power, while others are operated to guard against flooding. This is an important distinction because water levels are set in line with functional priorities. The Longyangxia reservoir, according to one discussion, was managed to generate power first, so water levels were kept high during periods when power needs were more intense.³⁵ This created a conflict if downstream users required water release that did not coincide with power generation demands, an all too frequently reoccurring scenario in the dry summer months.

On the surface these management problems relate to the competition between electricity bureaucracies, water bureaucracies and provincial bureaucracies. They are not remarkably different from the bureaucratic entanglements that frustrate water management in developed countries. Nevertheless, in China the shortage of independent administrative channels to remedy these controversies makes them worse, because the disconnected operations that developed within the water management system become covered over by temporary solutions—often in the form of bureaucratic adjustments. Harry Harding has written that policy decisions in the Mao-era (1949-1976) were aimed at remedying bureaucratic “maladies.”³⁶ Harding's analysis applies to the structural changes in the water bureaucracies as shown by the joining, separation, re-

³⁴ Qi Lianan, “*Huang He Duan Liu Cheng Yin yiqi Duice*” (The Cause of Flow Off in the Yellow River and Corresponding Treatments, *Renmin Huang He* (The Yellow River)),

³⁵ Interview with Wang Yineng, Senior Engineer, YRCC, Reconnaissance, Design and Planning Institute, Project Division, Zhengzhou, Henan, People's Republic of China, August 11, 1997.

joining and re-separation of the MWR and the MEP. Most importantly, his observations illuminate that while the structures of the agencies have changed, beneath the labyrinth of structural twists and turns, the fundamental problems of organizational coordination and operation have not improved. In fact, partially liberalizing economic reforms introduced in the late 1970s and 1980s have likely aggravated these coordination dilemmas.

Changes in the water management system are critical if other solutions to North China's water shortages are to be effective. The construction of any of the north-south diversion routes is predestined to fail if a smooth functioning management strategy is not fashioned around them. The current organizational structure is inimical to such a strategy being devised and implemented as evidenced by the stalled construction on the eastern line. The development of sound demand-side measures regulations also suffer from the lack of a uniform organizational management base. It is not surprising that intake limits are difficult to enforce given the wide spread of units with different interests that must enforce them. In some ways their inefficiency is a reflection of the problems deeply embedded not only in the Yellow River basin or the water management sector, but also in other sectors that are forced to organize effectively between the plan and the market.

What is the likelihood of China adopting systemic reforms to the management of the Yellow River? The possibility of reforms hinges on the dynamics of evolution in the Chinese state apparatus. This possibility is virtually non-existent according to Lucian Pye who has written that China is mired in a particularly oppressive political culture.³⁷ A leader of a YRCC *danwei*, when presented with these culturally based ideas, calmly explained "that practical problems such as water overuse not the shadows of history... are at the core of China's water shortage [problems]."³⁸ While he was correct in identifying the source as practical matters, he merely restated the problems themselves without looking for their underlying causes.

In their examination of the policy process in Chinese power bureaucracies, Kenneth Lieberthal and Michel Oksenberg focus on some of these practical matters and find a "protracted, disjointed

³⁶ Harry Harding, *Organizing China*, (Stanford: Stanford University Press, 1981) 17.

³⁷ Lucian Pye, *The Spirit of Chinese Politics*, (Cambridge: Harvard University Press, 1992).

³⁸ Interview with Li Songheng, Senior Engineer, Foreign Affairs Bureau, Yellow River Conservancy Commission, Zhengzhou, Henan, People's Republic of China, July 8, 1997.

policy process characterized by bargaining and consensus building.”³⁹ The post-Mao period is distinguished by a “fragmented authoritarian” policy environment. In this decentralized environment the PRC’s top leaders, twenty five to thirty five individuals who hold positions from Politburo member to Vice Minister, negotiate between State bureaucracies, provinces and themselves. At the top of this structure, political factions crystallize around policy issues that arise from vertical and lateral bargaining.⁴⁰ Therefore, policy is made slowly through a series of informal tradeoffs and compromises.

While this model is applicable to the bargaining that is suspending further action on the north-south diversion, it less applicable to demand-side water policies that regulate behavior. In some cases environmental policy is still a developing area without a clearly identifiable list of tradeoffs. Thomas Fingar’s reminds readers of this fact in his discussion of energy policy in China,

General principles and broad objectives substitute for detailed policy guidelines; details are supposed to be worked out in the course of implementation. As a result, agencies and individuals responsible for putting policies into effect enjoy a great deal of flexibility; they are also subject to tremendous pressure.⁴¹

Fingar’s remarks, although meant for the energy sector, bear a striking resemblance to the Yellow River basin’s demand-side measures.

Unfortunately, the agencies that would benefit the most from systemic reforms are also likely to be resistant to them. The YRCC has a vested interest in pursuing large-scale, capital intensive projects because its funding levels are adjusted when projects are approved. This is particularly important in a sector focusing on flood control; the YRCC lacks the capability to generate funding on its own except for small enterprises like the YRCC restaurant, which is emblematic of how resourceful Chinese bureaucracies have been to create funding opportunities with recent reductions in state funding levels. Although the YRCC restaurant serves some of Zhengzhou’s finer cuisine, it cannot generate enough capital to finance the reconstruction of irrigation canals.

³⁹Kenneth Lieberthal and Michel Oksenberg, *Policy Making in China: Leaders, Structures and Processes*, (Princeton: Princeton University Press, 1988), p. 410.

⁴⁰ Ibid.

⁴¹ Thomas Fingar, “Implementing Energy Policy,” in *Policy Implementation in Post Mao China*, Edited by David Lampton (Los Angeles: University of California Press, 1987) 195.

Another factor working against the establishment of management reforms is institutional inertia. While this seems to be a problem endemic to bureaucracies everywhere, the practices in China and in the Chinese water sector appear to be particularly entrenched.

The one glimmer of hope for systemic management reform starts with the central state. If the Chinese center can adequately diagnose the fundamental organizational and operational problems with the current water system, it may begin to re-delegate authority to institutions with an incentive to optimize water distribution and form enforceable guidelines, regulations and procedures that codify these operations. Barry Naughton has noted in the post-Mao period “[although] the central government has been weakened by a decline in resources under its direct control, [it has also been] strengthened by an increase in information and skills and by a broader range of instruments at its disposal.”⁴² Whether the center will be motivated to use these “skills and instruments” and effectuate such reforms is beyond the scope of this work; however, a recent incident in Dongying, Shandong might be telling in this regard.

During the summer of 1996, the Shengli oil fields, the second largest source of oil in China, was desperately in need of water. The first water arriving in the lower reaches of the Yellow River in over 100 days that summer was sluiced off from nearby farmers and diverted to the oil fields. Shengli received the water it needed; the farmers protested and stole water under the cover of night.⁴³ The more the problem of water shortages become interconnected with other issues, the more motivated the Chinese center and other institutional actors might be willing to make changes. Unfortunately, the interconnectedness with other issues raises the complexity level of the chosen path of reform and does not guarantee a solution to water shortages in the Yellow River basin.

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⁴² Barry Naughton, “Hierarchy and the Bargaining Economy: Government and Enterprise in the Reform Process,” in *Bureaucracy, Politics and Decision Making in Post-Mao China*, Edited by Kenneth Lieberthal and David Lampton, (Los Angeles: University of California Press, 1992) 247.

⁴³ Patrick Tyler, “China’s Fickle Rivers: Dry Farms, Needy Industry Bring a Water Crisis,” *New York Times*, May 23, 1996. LEXIS NEXIS.

Cheng Yiji. "Dongying Huang He Duan Liu Qingkuang yu Yin Huang Duice (The Zero-flow Situation in Dongying and Counter Measures in Irrigation)". *Renmin Huang He (The Yellow River)* May 1995: 33-35.

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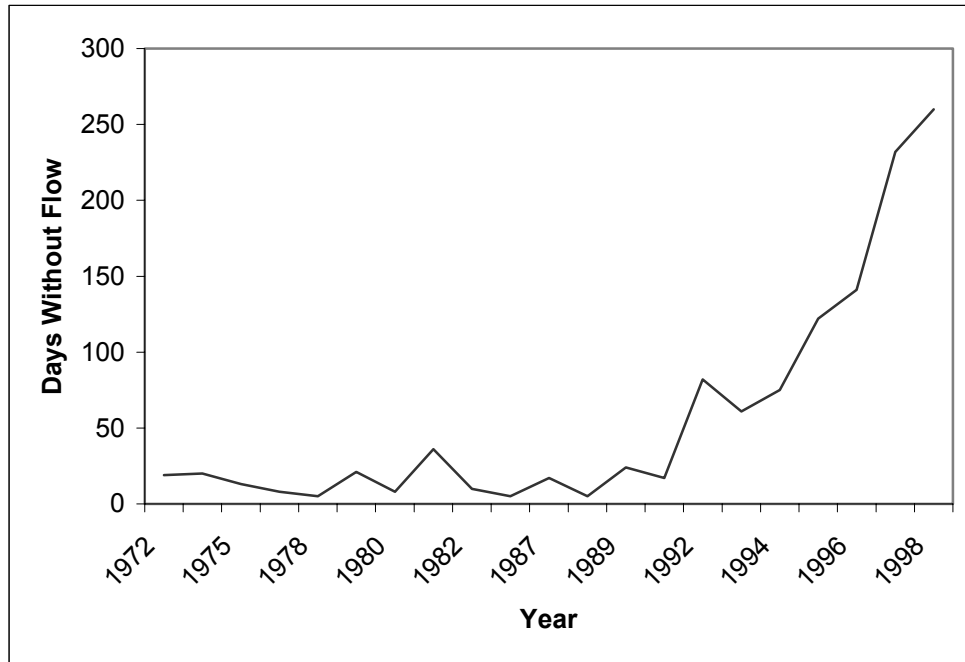
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Appendix

Chart I.

Duanliu: Increase in Days Over the Past 27 Years *

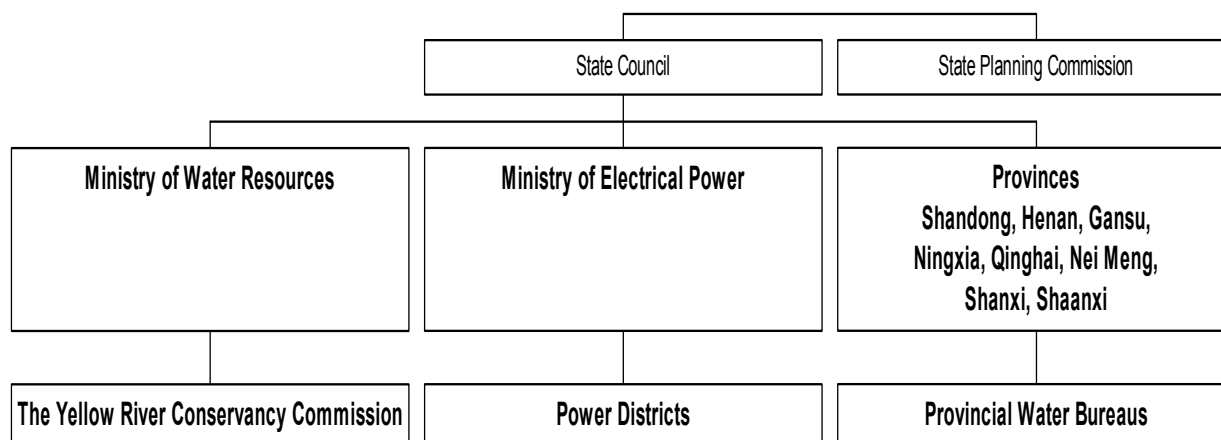
| Year | Days |
|------|------|
| 1972 | 19 |
| 1974 | 20 |
| 1975 | 13 |
| 1976 | 8 |
| 1978 | 5 |
| 1979 | 21 |
| 1980 | 8 |
| 1981 | 36 |
| 1982 | 10 |
| 1983 | 5 |
| 1987 | 17 |
| 1988 | 5 |
| 1989 | 24 |
| 1991 | 17 |
| 1992 | 82 |
| 1993 | 61 |
| 1994 | 75 |
| 1995 | 122 |
| 1996 | 141 |
| 1997 | 232 |
| 1998 | 260 |



* Figures for the years 1972 to 1995 are taken from *Huang He Shui Ziyuan (Yellow River Water Resources)*, Ti Jiazhi ed., (Zhengzhou: Yellow River Water Resource Publication Office, 1996) p. 69. Figures for 1996 and 1997 were transmitted via email correspondence with Li Songheng, former Director of the YRCC Foreign Affairs Bureau. The figure for 1998 is gathered from Henry Chu, "Giving China New Sorrow: Overuse, Dry Weather Deplete Waterway Once Known for Flooding," *The Los Angeles Times*, February 18, 1999, p. 1.

Chart II.**Projected Water Use in the Yellow River Basin 2000, 2010 (x 10⁸m³)***

| Region | Industrial | | Urban Residential | | Rural Residential | | Agricultural | | Totals | |
|----------------|------------|-------|-------------------|------|-------------------|------|--------------|-------|--------|-------|
| | 2000 | 2010 | 2000 | 2010 | 2000 | 2010 | 2000 | 2010 | 2000 | 2010 |
| Upper Reaches | 23.2 | 36.2 | 4.5 | 6.3 | 4.9 | 5.9 | 187.9 | 190 | 220.5 | 238.4 |
| Middle Reaches | 77.5 | 111.3 | 9.4 | 14.5 | 11.5 | 14 | 117.6 | 127.2 | 216 | 267 |
| Lower Reaches | 27.4 | 41 | 4.6 | 6.5 | 2.8 | 3.4 | 167.1 | 167.1 | 203.2 | 218 |
| Totals | 128.1 | 188.5 | 18.5 | 27.3 | 19.2 | 23.3 | 473.9 | 484.3 | 639.7 | 723.4 |

Chart III.**Organizational Chart of the Water Management Sector**

* Figures taken from Bai Shaoxi, Hou Chaunhe, *et al.*, "Huanghe Shuili Ziyuan Liyong Xianzhuang, Yuze ji Duice (Water Resource Utilization, Calculation and Countermeasure in the Yellow River)," *Renmin Huanghe (The Yellow River)*, May 20, 1996, p. 5.