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Design Issues in Farmer-Managed Irrigation Systems

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Obstacles Facing Farmer-Managed Irrigation Systems in the State of Cambodia

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THE COUNTRY AND IRRIGATION

THE DEVELOPMENT OF farmer-managed irrigation systems in the State of Cambodia (the name was changed from the Peoples Republic of Kampuchea in 1989) presently exists only at a minimal level. The disruptive events of the last 20 years have caused the loss and/or breakdown of many of the country's irrigation systems of the pre-1970s, whether farmer-managed or state-managed. Furthermore, many activities which occurred during the Khmer Rouge regime resulting in changes in the society and physical changes in the topography and hydrological balance of the land now pose severe obstacles for the proper development of the country's water resources.

Rice growing and fishing are the mainstay of the economy of this small Southeast Asian country, with 80 percent of the working population employed in the agricultural sector. Although statistics vary, it is generally accepted that the extent of land presently cultivated and the area under irrigation are less than those 20 years ago.

Most of Cambodia consists of lowlands and slightly elevated flatlands located within the basin of the Mekong River which flows from Laos for 500 kilometers before entering Vietnam to the south. All other rivers are tributaries of the Mekong.

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The author does not profess this paper to be an authoritative and complete representation of the farmer-managed irrigation systems in the State of Cambodia, since his involvement consisted of only short-term visits to a few provinces of the country. However, along with his personal observations, he consulted with some Khmer government officials and with expatriate workers of other development agencies.

Recent History and Effects on Irrigation

Between 1969 and 1973, as the Vietnam war spilled into Cambodian territory and the Khmer Rouge waged a revolutionary war, more than half a million tons of bombs were dropped on Cambodian territory killing or wounding more than one million people. The destruction of lives and property brought agricultural production to a standstill.

In April 1975, the Khmer Rouge, led by their leader Pol Pot, took power and imposed a reactionary regime based on the philosophy of creating a rural society purged of all Western influence. Educated people were regarded as a threat to the regime, and thousands were killed.

Of the many disruptions caused to the country by the Khmer Rouge regime, one of the most significant and lasting was to the hydrological balance of the land. The Khmer Rouge leaders focused on the creation of elaborate irrigation systems as a key to achieving great agricultural gains. However, there was little experience or knowledge to guide the process. The regime sponsored the creation of a grid of irrigation canals to cover the whole country. Instead of using the contour of the land to determine the location of the canals, the Khmer Rouge decided to simplify and standardize everything by matching the alignment of these with topographical map grid-lines. In other words, the canals ran north-south and east-west. Main canals and ditches were spaced at specified intervals to surround units of four hectares. Control structures were almost nonexistent and rapid drainage of upper lands occurred, followed by extended flooding of lowlands.

Another Khmer Rouge idea was to build large earth dikes along some of the canals to create reservoirs for impounding excess runoff water which could later be released into the canal system downstream. However, many were built in flat areas with no real storage capacity causing large areas of land to be wasted. In cases where there was some potential for useful storage, improper design resulted in the failure of the dikes or the structures within a few years.

OBSTACLES FACING CAMBODIAN FARMERS

After liberation of the country by Vietnamese forces in early 1979, the country finally began to return to somewhat normal conditions and started rebuilding. But the Cambodian people are faced with the immense task of rebuilding almost everything under very difficult conditions, with very little assistance from foreign countries.

Some of the traditional small irrigation infrastructures have begun to reappear as an attempt is being made to rehabilitate the systems, effacing the effects of the "Pol Pot" systems, as the people call them. Canals are blocked off to prevent unwanted drainage, or in other areas they have been made part of rice fields. In some cases, farmers have tried to reestablish the original courses of the streams. The main problem is that many farmers have settled into new lands as a result of the dislocations that occurred under the Khmer Rouge regime. They are still unfamiliar with the rainfall and flood conditions of the new areas to which they have moved. Even farmers returning to their original lands are faced with changes in the hydrology of their area. Even if rural areas

are still poor, conditions are much better than they were during the early years after liberation. Overall, resources owned by farmers have increased and as a result they are becoming more independent and water management is now performed more and more by individuals.

Until recently, all land was the property of the government and farmers were reluctant to make great efforts to improve it. In April 1989, the government decreed that the people may own their land. Nevertheless, because most "Pol Pot" irrigation schemes affected large areas it will be difficult for farmers or single villages to overcome the various problems those schemes caused. Therefore, some work will need to be coordinated among villages and some government assistance will be needed.

GOVERNMENT STRUCTURE AND POLICIES

Under the present government, matters pertaining to irrigation are the responsibility of the Department of Hydrology under the Ministry of Agriculture. This consists of departments at both the central and provincial levels. Among the major problems faced by the new government are the lack of material resources and qualified personnel. Most engineers, technicians, and administrative personnel, like all educated people of the earlier regimes, have either died during the Khmer Rouge regime or have fled the country.

Initially, the Department of Hydrology expected to implement large irrigation projects to satisfy the irrigation needs of the country and to provide a training ground for its personnel. However, in the last few years it has begun to encourage organizations to promote small community-based projects after observing the success of an American Friends Service Committee (AFSC) small-scale project in Kompong Chhnang province. It now appears that small community-based projects will become the responsibility of the provinces, while the responsibility for medium- and large-scale ones will be left to the central department.

Present Attempts at Government-Assisted Farmer-Managed Irrigation

The current small-scale irrigation program conducted by the Department of Hydrology of Kompong Chhnang province (located about 100 km northwest of Phnom Penh) with the assistance of the AFSC is now five years old. Through this program, the province has been able to build, repair, or replace small water-control structures, either in natural streams or in various "Pol Pot" systems as part of rehabilitation. Most projects consisted of reinforced concrete weirs or small drop structures in canals which replace the earth and wooden ones previously built by farmers.

For these projects, the AFSC provides construction materials which must be imported; cement, reinforcing steel, and some tools; plus the services of an expatriate engineer to oversee certain aspects. The provincial Department of Hydrology is responsible for providing local materials

such as sand, gravel, and formwood, and for covering transportation costs. Labor for the construction is provided by the villagers while supervision and coordination of the work are the responsibility of the province and the district. Once the project is completed, it belongs to the beneficiary village(s). They become responsible for the management of the structure and the system. When a system serves several villages, the subdistrict officials coordinate the management.

In the beginning, the American Friends Service Committee (AFSC) engineer supervised the site survey and prepared the plans for the structures to be built. The Khon Kaen University-New Zealand standard spillway was chosen as an appropriate design model. A few years ago another standard design for larger structures, the Khon Kaen University-New Zealand II (Chaiyaphum model) was introduced. At present, Kompong Chhnang hydrology personnel are able to survey and design these projects with minor outside assistance. This concept of teaching by showing, and learning by doing, has been the AFSC's working philosophy from the beginning of the project, and is one that will allow the project to eventually sustain itself.