

Why Can't Thailand Afford More Irrigation Dams?

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INTRODUCTION

Construction of irrigation dams and their impact on environment and people are becoming a matter of concern in Thailand, as well as in other countries of the world. Currently, many irrigation dams in Thailand have been put on hold. Irrigation dams that are pending government approval are listed in [Table 1](#). Those concerned about the adverse effects of dams fear that dam construction will lead to a disruption of forest ecology and may result in unfair resettlement compensation. On the other hand, some others, mostly the proponents of dam projects, are concerned that project requirements, such as Cost-Benefit Analysis (CBA), Environmental Impact Assessment (EIA), and the newly proposed Environmental Valuation (EV) are making it nearly impossible for any dam project to get a go-ahead. These requirements, they claim, will jeopardize many dam projects and will hold back the development process in Thailand.

This article intends to illustrate that project requirements such as CBA, EIA and, particularly, the newly proposed EV, are simply tools used in the government decision making process to test the appropriateness of public investment projects. They should not be construed as the reasons why irrigation dams cannot be built in Thailand.

This article will discuss three possible reasons that might explain why Thailand cannot afford more irrigation dams. These are, lack of agricultural and sectoral management; lack of water demand management; and the loss of forest area and forest ecology.

DECISION-MAKING TOOLS

Many public investment projects that involve utilization of public funds and are likely to have environmental impact, generally have to fulfill two requirements. First, there must be a feasibility study that shows the Economic Cost-Benefit Analysis (Economic CBA) of the project. Second, the project must complete an EIA before being approved. Currently, there is a third requirement that is being considered, that is the EV. A concern among the proponents of public projects such as irrigation dams is that if EV is made mandatory it will make the process of project approval more cumbersome. More importantly, EV may also put the lid on many irrigation dam projects. Hence, implementing EV has become a contending issue among public agencies in Thailand.

The following subsections will describe the roles CBA, EIA, and EV play as tools in the decision-making process. These tools simply help the government in deciding whether or not the project should be carried out.

Cost-Benefit Analysis (CBA)

A project feasibility study consists of two types of analysis: Financial Cost-Benefit Analysis (Financial CBA) and Economic CBA. Financial CBA aims to measure the revenue and the accounting cost of the project. It produces calculations in the form of Net Present Value (NPV), Internal Rate of Return (IRR) and Cost-Benefit Ratio (C/B) that will indicate whether the project is financially profitable. Economic CBA, on the other hand, aims to measure the social benefits and the economic cost of the project. Economic CBA produces NPV, IRR and C/B just as Financial CBA does, but measures the net gain for the society and not merely financial profitability.

Both Financial and Economic CBAs are important tools in the decision-making process. The government observes the Economic CBA because the latter measures social benefits of the project against the forgone social benefits that would have accrued were the money spent on alternative uses. This is to ensure that the project will help improve welfare of the society in general. When an irrigation dam fails to pass Economic CBA, it implies that although the dam may benefit the society, the same amount of money that is required for its construction will generate a higher return if invested in some other projects. However, Economic CBAs have their shortcomings in that they do not include environmental costs (or environmental benefits of the project) in their calculations.

Environmental Impact Assessment (EIA)

EIA aims to examine the possible environmental impact of the project. The objectives of conducting EIA are numerous, for example, to examine the environmental impact of the project, to help develop a precautionary procedure to reduce the environmental impact, to help redesign the project to reduce the environmental impact, or to provide a forecast of future environmental impact.

Although the information produced by EIA studies is useful for project implementation it is not very appropriate when used as a decision-making tool. The reason is that the results produced by EIA studies are presented in physical units while the results from Economic CBA are in monetary unit. Therefore these two results cannot be added or subtracted to obtain the net outcome. For example, a proposed irrigation dam has an NPV of 200 million baht, but it will flood 20,000 rai of a national park and disrupt the habitat of two animal species. These three numbers cannot be added or subtracted from one another, simply because they all are measured in different units.

When these three numbers in the above example cannot be added or subtracted in a straightforward manner the decision makers (cabinet members) will then have to do the calculation themselves by assigning *their own* weights to the 20,000 rai of national park area and the habitat of the two animal species. If the weights that the cabinet members assign to the environmental factors reflect the preferences of the people then the decision outcome will be socially desirable. However, if these weights are determined to serve the decision-makers' self-interests then the outcome is likely to be socially undesirable.

Environmental Valuation (EV)

The aim of EV is to convert the environmental impact of the project into monetary value so that it can be added to the NPV of the project (see [Figure 1](#)). For example, EV will convert the loss of 20,000 rai of forest and the habitat of two animal species into Baht. The weights that EV uses to convert the environmental impacts into monetary value are obtained from the preference of the people toward the environment instead of having the cabinet members assign these values. After the EV studies are completed the environmental value will then be added to the Economic CBA to obtain what one may call the Extended CBA.

Extended CBA is a useful decision-making tool as it incorporates not only the economic benefit and the economic cost of the project but also its environmental cost. Basing the decisions on information produced by Extended CBA will help eliminate political interference into the decision-making process as it leaves less room for the decision-makers (cabinet members) for value judgement. This will help ensure that the decision outcome will be socially optimal.

Methods used to value the environment include Contingent Valuation Method, Travel Cost Model, Hedonic Price Method, Environment as Factor Input Method, Replacement Cost Approach, Averting Behavior Approach or Benefit Transfer Approach. All these methods rely on data obtained from the general public. For instance, the Contingent Valuation Method employs questionnaire surveys in assessing people's attitude toward the environment. The Travel Cost Model values recreational aspect of the environment by studying the tourists' travel distance (and travel costs) from their residence to the recreational site. The Hedonic Price Method values environmental goods or bads such as air quality or noise pollution by comparing them with the variations in property prices.

Currently, these valuation methods are widely used by agencies such as the World Bank, the United Nations Environment Programme (UNEP), Resource For the Future (RFF), or the United States Environmental Protection Agency (EPA). The results of these valuation methods have been successfully applied to assess project feasibility and in the designing of economic instruments used for environmental management worldwide.

It can be summarized at this point that CBA, EIA and EV are essential tools to help decision-makers decide whether or not a development project should be implemented. CBA examines the overall economic suitability of the development project and will ensure that the project is socially desirable. EIA and EV are specifically designed to examine the environmental aspect of the project.

The process of initiating new development projects in Thailand is currently subjected to two decision-making procedures. First, a feasibility study must be conducted to show that the economic benefit exceeds the economic cost; that is, the NPV of the proposed project ought to be positive. Second, if the proposed project is likely to have an environmental impact it has to complete an EIA study. The outcome of EIA has to satisfy the criteria set by the Office of Environmental Policy and Planning (OEPP). At present, it is being considered whether the third procedure, EV, should be required in addition to CBA and EIA. If the proposed development projects such as irrigation dams have to

conduct an EV study in addition to the required CBA and EIA then it is possible that many of the proposed irrigation dam projects may not yield a positive net social return and may have to be scrapped.

The process of project approval in Thailand is currently in a difficult situation. On the one hand, the environmental authority may be reluctant to approve a project before an EV study is carried out. On the other hand, the requirement of having to undertake EV, in addition to CBA and EIA, is seen by project proponents as an obstacle to project approval as the environmental cost tends to raise sharply the total cost of the project. What this article will demonstrate in the following section is that the reason a development project such as irrigation dam is halted is not because of the stringent conditions imposed by the authority. Rather, it is because the Thai economic management as a whole and the state of the Thai economy at present do not make investment in irrigation dam socially desirable. The outcomes of CBA, EIA and EV studies that show negative net returns to irrigation dams *are not* in themselves obstacles to irrigation dams but they merely *reflect* the economic management and economic situation of Thailand that cannot afford another dam construction.

FACTORS AFFECTING ECONOMIC FEASIBILITY OF DAMS

This section outlines the economic situation and economic management in Thailand that may explain the negative net returns from the upcoming irrigation dams. These factors include agricultural and sectoral management in Thailand, lack of water demand management, and a pervasive decline in forest ecology in Thailand.

Agricultural Management

The major benefit of irrigation dams in Thailand is the supply of water for a second crop, usually of rice. Water for soybean production or flood prevention are only minor benefits and account for only a small monetary benefit of an irrigation dam. As the rate of return of rice plantation (profitability of the farmers) is low and the trend of the world price of rice is a declining one, these two factors together will suppress the marginal value of water when used in rice production. Therefore, the inability of the Thai agriculture to switch away from low value crop such as rice to higher value crops will suppress the benefit that water will generate for the society. As a result, the economic benefit of irrigation dams will continue to be low and, in many cases, will not offset the economic and the environmental costs of irrigation dams. Irrigation dams will become a worthwhile investment if water is allocated to higher value crops or other high-return economic activities.

Water Demand Management

Water allocation in the Thai agricultural sector is rarely governed using any effective demand management scheme. An example of water demand management is the implementation of the water pricing system. As water pricing tends to be more of a political issue than an economic one, it never finds its way to implementation. Politicians tend to favor free water schemes over water pricing schemes as they believe water pricing can easily jeopardize their political popularity. To cope with water scarcity during the dry season, Thailand chooses to allocate this scarce resource by means of supply management through investment in new irrigation dams.

Thailand's inability to implement water demand management through schemes such as water pricing, provides an incentive for farmers to continue using water as long as it generates a positive benefit to them. As water utilization increases, its marginal contribution to farm output falls and approaches zero. For this reason, the marginal benefit of water will be low in the absence of effective water demand management. To put it differently, the inability of the country to implement water demand management has lowered the economic benefit of irrigation dam projects.

Irrigation dams will become a worthwhile investment if Thailand can effectively implement some form of water demand management. Water pricing can provide incentive for water users to reduce water utilization and hence raise the marginal benefit of water. Part of the revenue collected by pricing water can be allocated for a central fund to help create supplementary work opportunities for the farmers who have to go without water during the dry season.

Decline in Forest Area

Lastly, the decline in forest area in Thailand—from around 50 percent of the total area in the 1960s to less than 20 percent during the 1990s—has changed the value people attach to the forest. A decline in the forest area impacts forest ecology, biodiversity, watersheds and wildlife. With less forest coverage people tend to attach a higher value to whatever forest that has remained. These values include direct use value such as tourism or non-timber products, indirect use value such as biodiversity, and non-use value such as intrinsic value or mere existence value of the forest.

For example, when the forest resource was abundant 50 years ago, a loss of a teak forest would have incurred little environmental cost to the society. Today, on the other hand, if an irrigation dam is to be constructed, the society will express a greater concern over the environmental loss if forest is to be removed. When the environmental loss of the forest is measured with EV methods the values tend to be large and may exceed the economic NPV of the proposed irrigation dam project.

[Figure 2](#) summarizes all the three reasons that explain why new irrigation dams may be too expensive for Thailand and highlights the role of decision-making tools in the project approval process.

CONCLUSION

This article shows that the obstacles to investment in new irrigation dams are not requirements such as CBA, EIA and EV studies that the developers have to carry out before the dam projects can be approved. These requirements are merely scientific tools that indicate, on behalf of the country's people and its economy, the degree of usefulness of new irrigation dams. These tools only help coalesce all the relevant information and process it into a form that is useful for decision making. They will inform society when or which of the proposed irrigation dam projects are desirable and will protect society from engaging in unfruitful investment.

Irrigation dams are becoming too expensive for Thailand because the Thai people are being more concerned about their environmental impact. This heightened concern tends to increase the environmental cost when a forest area has to be converted into a water reservoir. On the benefit side, the returns on the irrigation dam investment have been low due to the lack of effective water demand management that could prevent less productive water utilization. In addition, the inability to promote higher value crops or more productive use of water puts a limit to the benefit stream from irrigation dam investment. The rising environmental costs together with the limited benefits explain why Thailand cannot afford more irrigation dams.

For irrigation dams to play a role in the process of sustainable development, changes must occur toward the following: introduction and promotion of higher value crops or other profitable economic activities in rural areas; implementation of an effective water demand management scheme such as water pricing; and, prevention of further forest encroachment and concerted efforts to increase the forest cover in Thailand.