Damning The Dams? An Assessment From Vietnam

A summary of EEPSEA Research Report 2002-RR6, Environmental Protection and Compensation Costs for the Yali Hydropower Plant in Vietnam by Nguyen Van Hanh, Nguyen Van Song, Do Van Duc and Tran Van Duc (contact: Nguyen Van Hanh: duckoala@yahoo.com or nguyenminhduc@fastmail.ca)

Throughout the world, the benefits of large dams are being called into question. Most notably, the World Commission on Dams has highlighted the social, environmental and economic problems that such schemes can bring. New research from Vietnam has added more fuel to this debate and shown how the environmental costs of hydro-electric schemes can significantly affect their economic viability. The report argues that incorporating these costs into electricity charges can both generate funds for environmental rehabilitation and community compensation, and reduce demand for environmentally-damaging power generation.

Damming The Sesan

The research was carried out by Nguyen Van Hanh, from the Institute of Energy in Vietnam, and his colleagues Nguyen Van Song, Do Van Duc and Tran Van Duc. Hanh and his team looked at the Yali Hydropower Plant (YHPP) on the Sesan river in the West Highlands of Vietnam's Central region.

Construction of the YHPP - which cost over USD 614 million and is scheduled to produce electricity for forty years - began in 1993 and finished in 2000. The plant has an installed capacity of 720 MW and an energy output of 3,600 GWh per annum. This represents about 10 % of Vietnam's total electricity production forecast for the year 2010.

The construction of the YHPP led to the relocation of 1,149 households living in 26 villages and flooded about 2,000 ha of agricultural land. However, the feasibility studies for the YHPP ignored a wide range of costs relating to the plant's environmental impacts. The researchers set out to identify the these costs and see if energy pricing could be re-structured to support environmental improvement and social development - in other words, to ensure that the polluter pays. To do this, they estimated the cost of the main environmental protection and compensation measures required to mitigate the impacts of the YHPP.

Finding Full Costs

Information was first collected from published sources about the physical impacts of the YHPP. In particular, the researchers drew on the impact

assessments in the original Environmental and Financing Study by the Mekong Secretariat and the Vietnamese Ministry of Energy. This information was supplemented by on-site surveys in a few cases. The researchers assessed twelve kinds of impacts: on meteorology, hydrology, water supply, erosion and sedimentation, land use, forestry, watershed management, fauna, water quality and aquatic life, induced seismicity, public health, and compensation and resettlement.

They found significant environmental impacts in four of these areas: water supply, public health, forestry, and compensation and resettlement. Together these four impacts accounted for over 97% of the YHPP's environmental costs.

Water, Forests & Fever

Although there has been no significant impact on water supplies, growth of demand for irrigation water in the YHPP's catchment will reduce runoff in the future. Hanh and his team calculated that this would reduce the YHPP's energy generation by about 2% per annum. This translates into a revenue loss of about USD 2.8 million a year.

In terms of public health, the researchers found that the stagnant reservoir water (along with the resettlement caused by the reservoir construction) had significantly increased the possibility of people falling ill to diseases such as malaria, diarrhea, dysentery and intestinal parasitic infestations. Preventive medicine and health education programs would cost USD 2.6 million per year while building and renovating needed health centres would cost USD 1 million.

During the construction phase of the plant, a forested area of about 4,000 ha was lost to the rising waters of the reservoir. This consisted of 114 ha of high-value forests, 161 ha of medium-value bamboo forests and 3,670 ha of degraded mixed forests. A further 150 ha of high-value forest was destroyed by the project's power house, access road, and other infrastructure.

The researchers investigated the economic costs associated with the loss of forest land, along with the loss of local household income from non-timber forest products. They also calculated the cost of creating protection forests along the reservoir's shores. Using timber extraction rates and other forestry data plus household income surveys, they calculated that the annual loss of timber extraction was worth some USD 1 million. The loss of local households' income from exploiting non-timber forest products came to about USD 100,000 a year, while the costs of the forestry development program ranged from USD 177,000 a year to USD 340,000 a year, depending on the size of the project.

Compensation Costs

The last item costed was resettlement costs and compensation. The researchers based their calculations on the compensation payments recommended for the affected communities and the costs of building new infrastructure in re-settlement areas. These came to USD 28 million.

After discounting costs using standardized discount rates of 8%, 10% and 12% for the whole plant life, the researchers found that the largest single environmental cost was compensation and resettlement, which accounted for about one-third of the total. The effects on forestry, water supply and public health each accounted for about one-fifth of the costs.

Once they had calculated the main environmental costs linked to the YHPP, the researchers then investigated the impact these would have on the plant's net present value (NPV) and electricity price.

How Much is it Worth?

The NPV and the electricity price are the two most important financial criteria for estimating the financial viability of electric power plants. In the YHPP's original financial appraisal, the environmental costs of the plant were not considered or incorporated into its costs. This means that the plant's original net present value NPV (USD 220 million) and the electricity price (5.2 USc/KWh) were based only on direct costs.

The researchers first investigated what would happen if environmental costs were incorporated into project costs, but the electricity price, and thus, the revenue of the plant, were unchanged. In this case, the net present value was considerably decreased to USD 160 million. They also calculated what would happen if environmental costs were incorporated into the YHPP project costs but the net present value, and thus the financial viability of the plant, were kept unchanged. They found that, in order to maintain the same NPV, the electricity price would have to be increased to 5.68 USc/KWh.

Changing Charges

In light of these findings, the researchers have recommend that the YHPP's electricity pricing should be revised, not only to eliminate government subsidies, but to incorporate the environmental costs of electricity production. They recommend that full-cost electricity pricing be applied to all forms of energy generation in Vietnam.

This would accomplish two things: First, it would encourage electricity consumers to implement energy-saving measures (such as reducing transmission losses, adopting energy-saving technologies and shifting to less-energy intensive industries). Second, it could provide revenue for a fund to cover the environmental protection and compensation costs.

In the case of the YHPP, the price increase would only be 10% - not an exorbitant amount. Furthermore, the environmental costs of the YHPP project are already being paid through losses of forest benefits, damages to public health and disruption to people's lives. Full-cost electricity pricing simply reallocates these costs according to the polluter pays principle. In doing so, it makes the costs visible and creates incentives to reduce them - helping to put Vietnam's power sector on a path that is economically and environmental sustainable.