

The Poverty Impact of Public Irrigation Expenditures in Vietnam

Concept note

A. Introduction

1. The Government of Vietnam (GOV) is committed to achieving rapid reductions in poverty, which is also the priority objective for multilateral and bilateral donors. Eighty-percent of Vietnam's population lives in rural areas, and 70% of the labor force depend on agriculture. About one third of the population lives below the poverty line, and 85% of the poor live in rural areas. The primary expenditure instrument used by the Government to improve rural incomes has been subsidized irrigation investments.¹ Irrigation accounts for about half of all public expenditures in the agricultural sector, and three-quarters of all capital investments (about 2.5 TD, or \$250 million per year).² Much of the funding is obtained through international financing agencies. The Asian Development Bank (ADB), the World Bank and JBIC currently have irrigation projects with total commitments of over \$500 million.³ The primary question posed by this study is: ***How effective are public irrigation expenditures in increasing rural incomes, particularly for the poor?***

2. Rice is the major irrigated crop in Vietnam and rice production in Vietnam has soared from 20 million tons in 1990 to over 30 million tons by the end of the decade. Agricultural liberalization has clearly been a driving force in this expansion, but the impact of irrigation investments, which have more than doubled during the 1990s, is less clear.⁴ A study by IFPRI in 2000 concluded that there is a weak relationship, on a per-capita basis, between agricultural output and public expenditures in the provinces.⁵ Paradoxically, amidst the growth in rice production, Vietnamese rice farmers face a stagnant farm income, primarily due to low farm-gate prices, and inappropriate government policies on a number of fronts.⁶

3. The findings from the study will help improve the strategy for rural transformation, which is one of the key themes of Vietnam's CPRGS. Growth in agriculture was the driving force behind rural poverty reduction in the last decade, but in the coming decade agricultural diversification and growth in off-farm enterprises are likely to be key to poverty-reduction. The role of irrigation in this process needs to be redefined.

4. The study will help GOV and donors to better understand the links between government expenditure and poverty reduction. This will fit in well with current efforts in aligning government and donor resource allocations to GOV's Comprehensive Poverty Reduction and Growth Strategy (CPRGS).

The 2000 Vietnam public expenditure review recommended a reallocation of spending within sectors, including agriculture. It also recommend, however, that "to decide on the extent of this reallocation will require further work on the tracking, incidence and the impact of sectoral expenditures."⁷ The study will help provide an empirical foundation for an analysis of agricultural public expenditures, and also serve to assist in project identification, and improve sector and overall economic management. The data collected will be directly useful for the preparation, monitoring and evaluation of new WB, ADB and JBIC water resources projects. The information and analysis will also support implementation completion reports of on-going water resource projects.

B. Study Hypotheses: Improving irrigation and drainage service is a powerful instrument for reducing poverty.

5. According to the 1998 Vietnam Living Standards Survey (VLSS) data, although agricultural diversification is increasingly important in raising farm family incomes, rice production still accounts for approximately 43% of the average family's agricultural revenue.⁸ Moreover, rice grown on the family farm is the major subsistence crop. The profitability of rice has decreased dramatically over the last few years as the international (and domestic) price of rice has declined by almost 50% since 1998.⁹ The decline in the farm-gate price of rice has had a dramatic negative impact on rural incomes. The key to escaping from this poverty trap is to both diversify and improve rice profit margins, and improved irrigation service is central for both objectives.

6. Diversification into perennial crops, industrial crops, and fruit trees, has potentially greater returns but also greater risks than traditional rice production. Larger initial investments are often required and one of the major risks is inadequate irrigation, i.e., insufficient water at the required time, and inadequate drainage. Given particular market conditions, improvement of irrigation service would reduce risk and encourage diversification. Rice will still remain, however, the most important crop for the majority of farmers over the next decade. Given the declining profitability of rice, renewed efforts on reducing production costs and increasing yields are critical to boosting profit margins. Many farmers, in particular poor farmers at the tail-end, receive unreliable gravity irrigation service which may reduce yields, and also result in higher production costs as they must pump (or manually transfer) water from low-level irrigation canals, drainage canals, or shallow wells.¹⁰ These additional costs erode already razor-thin profit margins. This study will help MARD policy-makers at various levels to decide whether investments in irrigation are important for overcoming poverty and growth, and if yes, what the best approach is for further improving the performance of irrigation systems in Vietnam.

C. Case Studies

7. The methodology will apply both qualitative and quantitative assessments. The qualitative assessment will consist of focus group discussions with various groups of farmers (e.g. with and without the irrigation measure) including special discussions with ethnic minorities if present, female-managed households, and various others sub-groups (e.g. tail-enders and top-enders), to deepen our understanding of the issues. The quantitative study will apply agricultural household surveys in different types of irrigation schemes to test the study hypothesis. There are two major routes to improved irrigation service:

- Better Infrastructure
- Better Irrigation Infrastructure Management

8. The quantitative assessment will attempt to control as many variables such as scheme water availability, market conditions, by focusing on differing conditions within the same basic irrigation schemes. The case studies selected by the World Bank and the ADB are listed below. Alternative suggestions are welcome.

9. ***Case 1: Testing the Impact of Irrigation Infrastructure Management: Dau Tieng.*** The Dau Tieng scheme is located in the southeast of Vietnam, to the northeast of Ho Chi Minh City. The scheme consists of a 1.5 billion cubic meter reservoir and approximately 72,000 ha of irrigation command area, of which 58,000 ha are in Tay Ninh and 14,000 ha in the Chu Chi

District of Ho Chi Minh City. The Dau Tieng reservoir and main canals are owned and managed by MARD, while the IMCs manage distribution off the main canals within their provincial boundaries. The provincial government of HCMC has significantly more financial and human resources than Tay Ninh with which to address irrigation management problem. A quick inspection tour by World Bank and ADB staff indicates that the HCMC IMC is among the best run companies in Vietnam, and the farmers are relatively more prosperous than their Tay Ninh counterparts. Since the HCMC IMC is located downstream of Tay Ninh, scheme water availability would not account for this difference. In a similar manner, since the two schemes are located in the same general market, availability to market should not be a major factor affecting farmer incomes. If there is a significant difference in farmer incomes in the two schemes, through lower production costs, diversification, or yields, then the major explanatory variable could be the difference in the management of the infrastructure.

10. **Case 2: Testing the Impact of Infrastructure Rehabilitation: Da Nang or Quang Nam.** The World Bank and the ADB have financed a number of irrigation rehabilitation projects in Vietnam. This case would look at differences in farmer incomes on two different irrigation schemes within the same province. One of the schemes would be a rehabilitated scheme financed by the World Bank, the other scheme would be a non-rehabilitated scheme. (Alternatively, different parts of the same scheme, one section rehabilitated, the other not, could be studied). This case would control for irrigation management since both schemes would be managed by the same IMC. Since the schemes will be in the same climatic zone, scheme water availability will be partially controlled for. Differences in farmer incomes could there be explained primarily by improved infrastructure. Since these schemes were financed under IRP, the data collected can be useful for the ICR.

11. **Case 3: Infrastructure Rehabilitation and Improved Management: Song Chu or North Nghe An:** The GOVN, through the ADB-financed Irrigation and Flood Protection Rehabilitation Project (IFPRP), has rehabilitated part of the Song Chu (Thang Hoa province) and North Nghe An (Nghe An province) schemes in the mid-1990s. However, it became apparent that this was also necessary to improve O&M at the local level. Under ADB TA grant 2869-VIE (completed 1999), a TA program was established to focus on two small pilot areas, around 300 ha each. An interesting comparison could therefore be made between the i) non-rehabilitated areas, and ii) the rehabilitated areas with the intensive pilot TA program.

12. **Case 4: Poor Infrastructure and Typical Management: Cam Son.** The Cam Son irrigation system is located to the northwest of Hanoi, covers approximately 24,000 ha and is supplied by the 228 million cubic meter Cam Son Dam. The infrastructure appears to be degraded and the management is not exceptional. The study would therefore survey farmer incomes at different locations in the scheme to see if there were significant differences between head-enders and tail-enders. The assumption would be that head-enders have significantly higher incomes than tail-enders, and investments in infrastructure and improved management would help reduce poverty. Instead of Cam Son we could include a set of households in Tay Ninh without any irrigation at all. This would enable a comparison of the 'no irrigation' case with the 'with irrigation infrastructure (without improved management)' case, both in Tay Ninh.

13. A summary of the case studies and their tests are:

Test	With	Without
1. Improved Management	a. HCMC	b. Tay Ninh g. Cam Son
2. Improved	c. Quang Nam-Rehabilitated	d. Quang Nam-Not

Infrastructure		Rehabilitated g. Cam Son
3. Improved Infrastructure and Management	e. Song Chu (TA Pilot and Rehabilitated)	f. Song Shu (Not Rehabilitated and No TA)

D. Survey Methodology

14. The methodology presented below is suggested by the World Bank and the ADB. Well justified alternatives will be welcome. There will be at least seven data sets:

- a. HCMC
- b. Tay Ninh
- c. Quang Nam-Rehabilitated
- d. Quang Nam-Not Rehabilitated
- e. Cam Son
- f. Song Chu-Rehabilitated with TA
- g. Song Chu-Not Rehabilitated and without TA

15. For each data set, one head-end and one tail-end primary canal will be selected. For each primary canal system, three “irrigation units” will be selected for household surveys: head-end, middle, and tail-end units. An irrigation unit is defined as an on-farm irrigation and drainage system that is managed by the farmers, and not the IMC. Typically, an irrigation unit would cover around 250 ha and be serviced by a tertiary system. Not all farms within the irrigation unit belong to “water user groups” and pay irrigation service fees because they do not receive reliable service. Since the average farm size is around 1 ha, this typically means 250 families per irrigation unit, of which 10% (say 25 families) should be interviewed. The selection of households should be based on geographical location only, without consideration of economic status or crop type in order to maintain a non-biased sample. The sample selection of households should be geographically dispersed within the irrigation unit. For each data set, the sampling would consist of six irrigation units (150 families), consisting of the following: i) Head-end Primary Canal-three irrigation units; ii) Tail-End Primary Canal-three irrigation units. The total number of households survey would be approximately 1,000 (150*7).

16. One other option that maybe worth considering is to, before the field work, identify households in the study areas that have been interviewed earlier for the VLSS 1998. This may help understand distribution of poverty levels within a scheme which could be used to guide further sample design. Also, these households could then be re-interviewed to assess changes in poverty levels and to determine how much of these changes are related to irrigation measures. However, the VLSS 98 sample design maybe too small for this and these possibilities need to be reviewed first by the international consultant and the statistician for their feasibility.

17. The information to be collected in the household surveys will be partly determined by the outcome of the qualitative studies. But the types of information would include for the last calendar year:

- Farm Size and Cropping patterns for the last three seasons: dry season; pre-monsoon; and monsoon.
- Actual farm budgets, covering all i) production costs: fertilizer, seed, hired labor, equipment, irrigation fees, pumping costs, taxes, etc., and ii) revenues based on crop

yields and farm gate prices; this should enable calculations of household agricultural and non-agricultural net income

- Household expenditures to calculate total household income
- Household labor inputs
- Socioeconomic household information: number of family members, education levels, family members engaged in agriculture, etc.
- Names of families so that follow-up households surveys can be done.

E. Analysis of Survey Results

18. The qualitative information will be summarized for their main conclusions as they relate to irrigation policy measures. These will also serve to further develop the hypotheses for testing in the quantitative study, and to explain some of the relationships that will be found in the quantitative study. The data sets will be statistically analyzed to test the following *draft* hypotheses that :

- ✓ There will be a statistically significant difference in farmer incomes (mean, median, and standard deviation) between HCMC (a) and Tay Ninh (b) that can be attributed primarily to better provincial management.
- ✓ There will be a statistically significant difference between the rehabilitated (c) and non-rehabilitated (d) in Quang Nam.
- ✓ There will be a statistically significant difference in Song Chu between the rehabilitated areas with TA (e), and those without (f).
- ✓ There will be differences between head-enders and tail-enders in all data sets, with the most pronounced difference being in Cam Son (g).

19. In addition to testing these hypotheses, the impact also needs to be quantified and set against the background of national household expenditures quintiles. These analyses will be assessed on the use of matching techniques. This will match households in 'treatment' groups with households in 'comparison groups' ensuring both households are similar in observed variables that are not related to the irrigation intervention. The impact of the irrigation interventions can then be established by determining the difference between the treatment and the matched comparison households in the different outcome indicators associated with the project. A similar method is being applied in an on-going impact evaluation of rural road rehabilitation¹¹. This information will help assess likely impacts of future irrigation projects (WB, ADB, JBIC), and also into broader sectoral programming issues over the value of infrastructure and management investments, and into priority setting and public expenditure decisions within MARD.

F. Consultant Staffing Needs

20. The Consultant Team would consist of the following staff:

International Team Leader (ITL - ADB financed): The ITL should be an agricultural economist with at least 10 years experience in analyzing the economic impacts of rural investments in developing countries, with specific experience in Asia and experience in irrigation. The ITL should have demonstrated expertise in conducting participatory studies as well as formal rural household surveys, including survey design, methodology, and statistical analysis of results. The ITL should have a record of academic and professional publications/reporting in the general field of rural poverty reduction. Expected inputs are approximately 70. The ITL, in conjunction with the NTL, will be responsible for the overall

design and management of the surveys, analysis, reporting of results, and liaison with the World Bank, other donors, and the Government of Vietnam.

National Team Leader (NTL): The NTL should have a similar profile to the ITL, but should be Vietnamese and affiliated with a recognized Vietnamese research institute.

Survey Team Leader (STL): This person should have significant experience in the design, implementation, and management of rural household surveys. The STL should be able to train, organize, and manage a team of field surveyors, and have a relevant college degree, preferably at the graduate level.

Field Surveyors: The field surveyors should have college degree in a relevant discipline, and previous experience conducting rural household surveys.

Statistician: This person should have a degree in statistics or agricultural economics, and be actively involved in the design of the surveys, take a lead role in the statistical analysis of results, and assist in the ITL and NTL in the reporting.

G. Time frame

21. The assignment is expected to be of six months duration, with the following reporting schedule. All reports shall be in English, submitted to the ADB, World Bank and JBIC and concerned Government agencies. A final presentation workshop will be organized.

- Month 1: Inception Report with detailed study methodology
- Month 2: Qualitative field studies
- Month 3-4: Formal household surveys, with Status Report in Month 3
- Month 5: Analysis of Data and Draft Final Report at end of Month 5
- Month 6: Review and Comment, Final Report

H. Estimated Inputs

22. The following table provides an estimate of the number of days input for guidance purposes only.

Name	Days
International Team Leader	70
National Team Leader	120
Survey Team Leader	120
Local Surveyors	175
Statistician	30

¹ The term irrigation is used in the broad sense to cover all agricultural water control infrastructure, including drainage, flood control, and supply of water for crops.

² IFPRI, "Vietnam Public Expenditure Review: Input on the Agricultural and Rural Sectors," March 21, 2000, pg. 12, Table 6.

³ Figures presented at MARD Water International Donor Support Meeting, March 2001.

⁴ IFPRI, pg. 11.

⁵ IFPRI, pg. 6.

⁶ ADB, "O&M Development in the Irrigation Sector" (TA No. 2869-VIE), pg. 93.

⁷ World Bank, "Proposed Poverty Reduction Support Credit: Report and Recommendation to the President," April 23, 2001, pg. 27.

⁸ Vietnam Development Report 2000: Attacking Poverty, pg. 52

⁹ According to the Bank's Commodity Price Data newsletter, the March 2001 international price of Thai Rice (A1) was \$134/ton, compared with around \$250 in 1998

¹⁰ This is well documented in Black & Veatch, "Phuoc Hua FS Annex E: Water Management Institutions in Dau Tieng," 2001.

¹¹ Van de Walle (2002). Impact evaluation of a rural road rehabilitation project in Vietnam : a research proposal. DECRG, World Bank , Washington DC.