

TWO DECADES OF NHRC RESEARCH

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ABSTRACT

The report describes how hydraulic research in the Philippines was institutionalized and made viable for the past 20 years. It considers the unique organization of the National Hydraulic Research Center, the research areas, the training aspects, the viability of NHRC, and a vision for hydraulic research.

(A Professorial Chair Lecture delivered during the NHRC Colloquium held on 31 May 1993 at Room 233-A, NHRC Seminar Room, College of Engineering, U. P. Diliman, Quezon City.)

INTRODUCTION

Prior to the establishment of the National Hydraulic Research Center (NHRC) in 1973, hydraulic research in the University of the Philippines was undertaken on an ad-hoc basis. The general procedure was to organize a research team for each hydraulic research project whenever funding was available. The project leader of the team was usually a senior faculty member of the university.

After the completion of each project, the customary practice was to disband the research team in as much as the university did not have the funds for continued research operations. The experience and expertise gained in hydraulic research has remained in the university only through the faculty members involved. The rest of the team members usually moved on to other institutions.

Under such an academic setting, it was not expected that hydraulic research could be pursued vigorously. The record shows that many faculty members who have misgivings about research and teaching as a career have left the university to pursue more financially rewarding careers in the private sector. Some of those who are inclined for research have left for better opportunities abroad as research in the country was limited.

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RESEARCH ORGANIZATION

The pressing need for a continuing program of hydraulic research was brought about by the increased pace of water resources development activities in the country in the early 1970s. An inter-agency committee composed of the heads of the Department of Public Works, the National Economic and Development Authority, the Metropolitan Waterworks and Sewerage System, the National Irrigation Administration, and the National Power Corporation, considered it more prudent to pool their resources for the establishment of a centralized laboratory instead of building separate ones for specific purposes. This paved the way for the establishment of the NHRC by the University of the Philippines (UP) and the U.P. Engineering Research and Development Foundation, Inc. (UPERDFI) through a Memorandum of Agreement which was approved by the UP Board of Regents at its 834th meeting on 28 June 1973..

Under the agreement, the UP shall appoint the NHRC Director and the UPERDFI shall manage the operations of NHRC. The UPERDFI shall also employ all the necessary personnel to undertake the research activities. Funds for the operations of NHRC are provided by donors and sponsors of research projects as well as by the earnings of the NHRC trust fund being managed by UPERDFI. It may be noted that the UPERDFI contributes to the development programs of UP an amount equivalent to 5% of the gross receipts arising from hydraulic research contracts undertaken by NHRC. The initial contract was for ten (10) years and was renewed in 1984 for another ten (10) years.

This unique arrangement of a private foundation managing a unit of a public university has enabled NHRC to be self-supporting in its operations without relying on government subsidy as is the common practice for research agencies. By being managed as a private enterprise on the one hand, the NHRC has sufficient flexibility to meet expeditiously the fluctuating demands of the various agencies for research studies. As a part of the university on the other hand, the NHRC is in an academic atmosphere that is conducive to research and to the professional advancement of its research staff.

RESEARCH AREAS

The nature of the research activities undertaken by NHRC is a reflection on the state of water resources development and management in the country. With the massive development programs in water supply, irrigation, hydro power, ports, harbors, and flood control, many of the research projects are on water resources management, hydrology, hydraulic structures, coastal structures, river control, sediment transport, and computer applications development. These research studies have usually resulted providing advisory and consultancy services in planning, design, analysis and evaluation, and system operations, of water resources projects.

Water resources management studies were intended to provide guidelines in resolving the competing and sometimes conflicting demands on the limited water and related land resources of the country. Some of these studies have resulted in the promulgation of executive orders and

legislations, noteworthy of which are the *National Water Resources Policies* adopted by the National Economic and Development Authority in 1975 and the *Water Code of the Philippines of 1976*. The recent project on management modelling for conjunctive water use provides a planning tool for the development of surface water and groundwater resources for *Metro Manila and the Laguna Lake Basin*.

Hydrology studies ranged from overall assessments to detailed studies of surface water and groundwater resources to support the needs of a growing population. The studies on the hydrology of small islands, such as those for *Marinduque and Cuyo*, were of significant importance considering the geography of the country. While the usual practice was to consider historical records, studies were also undertaken to consider current and forecasted streamflow events.

Hydraulic structures studies were undertaken with the use of physical models to evaluate the efficiency and performance of spillways, diversion tunnels, diversion dams, dikes, stilling basins, and other control structures, as designed. Recommendations were sometimes made to suggest improvements in the design. Some of these have resulted in substantial savings in construction and in operations. Among the more prominent development projects studied were those of the *Magat Multi-purpose Project in Isabela, the Lake Lanao and Agus River Hydroelectric Projects in Mindanao, and the Napindan and Mangahan Flood Control Structures in Metro Manila*.

Coastal structures studies were concerned with the control of sediments due to the action of waves and tides in ports and harbors. Analytical studies and physical models were used to suggest changes in the layout and design of the various structures. Typical of these studies were those for the *Calaca Harbor in Batangas and the Pulupandan Port in Negros Occidental*.

River control studies were intended to mitigate the damage due to flood flows by means of structural measures such as dikes, river training and protection works, as well as non-structural measures like flood plain zoning and flood insurance. Some of these studies were those for the *Bued River in Benguet, Marikina River in Metro Manila, and the Libuganon River in Davao del Norte*.

Sediment transport studies were undertaken with the use of physical models to consider possible schemes to control the entry of sediments in some hydraulic structures. Some of the recommendations were at best qualitative since the sediment data from the prototypes were considered to be not sufficient to make detailed proposals. Typical of these studies were the control of sediments in the diversion structures on the *Allah River in South Cotabato, the Mag-asawang Tubig River in Mindoro, and the Sto. Tomas River in Zambales*.

Computer applications development were undertaken for specialized studies like flow visualization, operations control, hydraulic analysis, data acquisition, and, information storage and retrieval.

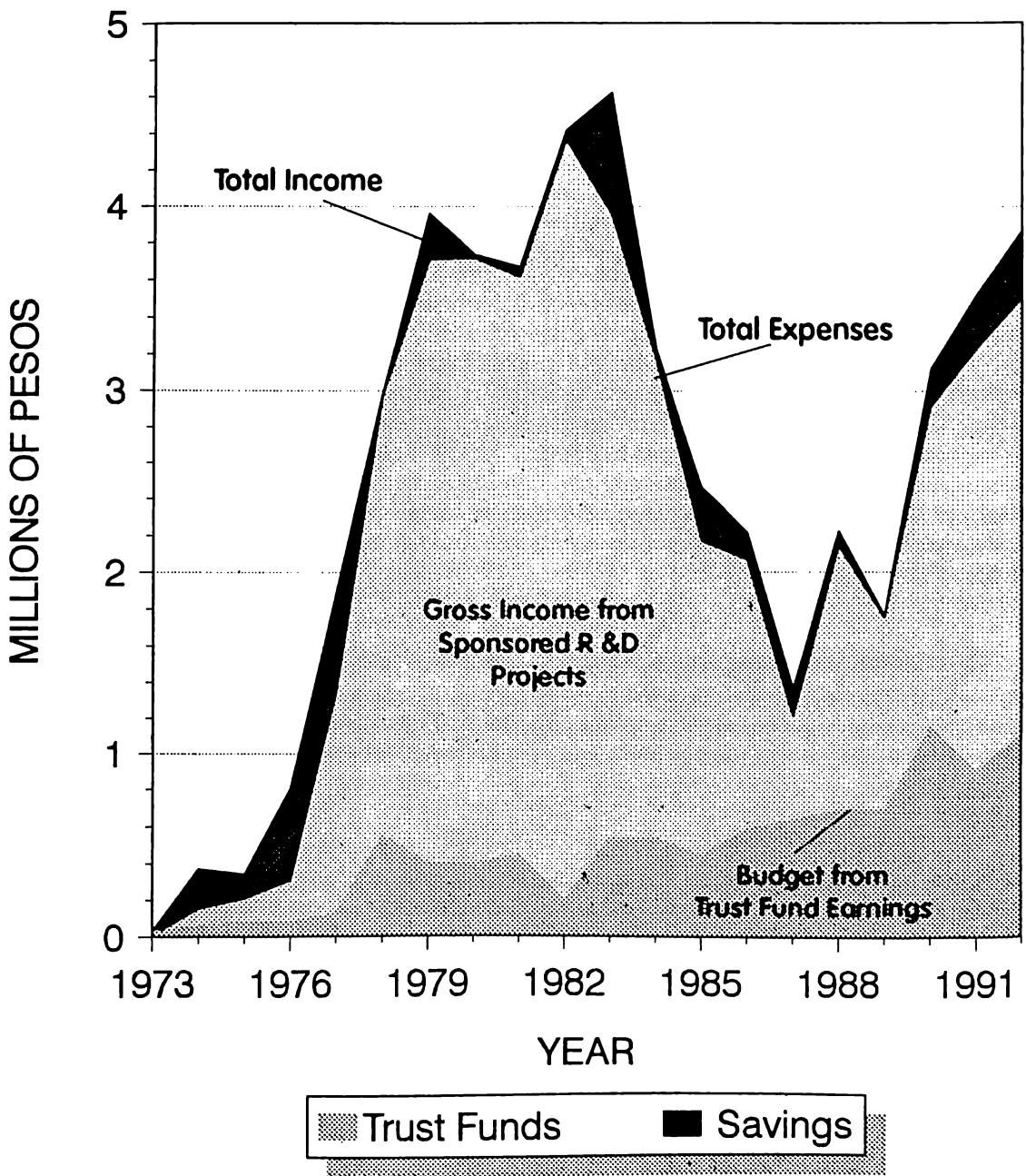


Fig. 1 - NHRC Income and Expenses

TRAINING ASPECTS

While the major mission of NHRC is to undertake research studies on water problems, it is also committed to provide training in water resources as a service to the clientele of NHRC in particular and to the country in general. The experience and expertise of the its professional staff as well as its extensive laboratory facilities enables NHRC to effectively contribute to the academic program in water resources of the university. The current personnel complement of NHRC consists of 10 members of the research staff and 14 members of the operations staff. All members of the research staff have advanced degrees in various fields of specialization in water resources development and management. Many of the staff members have been with NHRC for a long time.

The Water Resources Training Program is being offered at the U.P. College of Engineering. This graduate program is managed by NHRC and is financially supported in part by the earnings of the NHRC trust fund. Courses in the graduate program in water resources as well as the undergraduate program in fluid mechanics and hydraulic engineering are jointly offered by the Department of Civil Engineering and the Department of Engineering Sciences with the NHRC professional staff as lecturers. Financial support by NHRC for the training program consists of the salary of the lecturers, graduate fellowships, and the operation and maintenance of the laboratory facilities.

The graduate program aims to provide advanced training for practitioners in the field of water resources development and management, and to meet the continuous demand for water resources expertise in the country. It consists of a certificate, a diploma, and a master's degree in water resources engineering. A limited number of graduate fellowships are available for qualified staff members nominated by government agencies and institutions engaged in water resources development, management, research, and training. Since its institution in 1977, some 93 employees from about 18 agencies of the government and the private sector have participated in the training program.

VIABILITY OF NHRC

The operations of NHRC are supported by the income from sponsored R&D projects as well as a budgetary allocation from the earnings of the NHRC trust fund. In preparing the contract proposals for sponsored projects, all the usual charges are included to make these projects self-supporting and viable. Although the NHRC has been established as a non-profit agency, it is the policy to include in the contract cost an additional amount as contribution for the growth of the NHRC trust fund.

The NHRC trust fund, which is being managed by UPERDFI, consists of donations, contributions from sponsored projects, and savings from operations. Only a part of the earnings of the NHRC trust fund is used to support the water resources training program, to fund in-house research, and to insure the continued operations of NHRC. The rest of the earnings is used for fund build-up.

A review of the income and expenses of NHRC for the past 20 years is shown in Fig. 1. This indicates a large number of sponsored projects in the late 70s and early 80s when the water

resources development program of the government was at its peak. The slow down in the national economy that started in the middle 80s has also affected the number of sponsored projects by government agencies. It is encouraging to note, however, the upward trend in sponsored projects during this period of a declining economy. This is mainly due to the sponsorship of the private sector and the International Development Research Centre of Canada.

In spite of these fluctuations in the income from sponsored projects, the management and operation of NHRC over the past 20 years have remained viable. Expenses for operations have always been within the available income. While there have been personnel changes in response to the fluctuating demand for services, a core group of highly qualified and experienced staff members has been retained. This viability of NHRC operations is mainly due to the budgetary support from the earnings of the NHRC trust fund, the judicious management of the fund by UPERDFI, and the soundness of the strategies in the management of NHRC as a private enterprise.

Lately, decreasing interest rates on investments have been observed as a part of the strategy of the national government to pump-prime the economy. This would severely strain the earnings of the NHRC trust fund as to reduce the support for the water resources training program and in-house research. It is expected, however, that the Medium-Term Development Plan (1993-1998) of the government would translate into more sponsored R&D projects for NHRC in the energy, water, and transport sectors. While the major clientele of NHRC would continue to be the government agencies, other sponsors that are becoming aware of the excellent track record of NHRC include the agencies from the private sector and the international funding agencies.

A VISION FOR HYDRAULIC RESEARCH

Perfect vision is also known as a 20/20 vision. For NHRC this means a review of the past 20 years in order to have a better assessment of possibilities for the next 20 years.

Almost all of the agencies of the government concerned with the development and management of water resources have availed of the research, training, and consultancy services of NHRC. In all of these engagements, the research projects have been usually programmed within the budget of the development plans of the agencies. This arrangement has resulted in the fluctuating demand for research services but which the NHRC has successfully managed to provide.

The water resources research needs of the country are many. As a self-supporting institution, however, the NHRC can only address itself to a small portion of these problems as it is limited by its available manpower and financial resources. It is necessary for NHRC to expand its horizon in order to make a meaningful contribution to national development.

Having matured as an organization with considerable experience in research and training, the NHRC is in a well-positioned advantage to assume the major role of a **national center of excellence** in water resources engineering. This role includes addressing the needs of the country in **education, training, and research**, in water resources engineering, hydrology, hydraulic engineering, coastal engineering, water supply, irrigation, hydropower, flood control,

and other related fields. In assuming this role, the NHRC shall undertake the following functions:

- a. Develop upgraded and highly-trained technical manpower in government, the private sector, and the academe by offering advanced degree programs and other types of training;
- b. Deliver to water resources agencies state-of-the-art engineering and policy research support in the forms of:
 - (1) Periodic and comprehensive assessments of water and related land resources ;
 - (2) Studies on new, appropriate, and feasible strategies and schemes for sustainable management of water resources;
 - (3) Research on engineering options for structural adjustment in response to economic and environmental stresses;
 - (4) Hydraulic and hydrologic research of highly- specialized and technical nature in response to specific questions and problems in water resources; and,
- c. Promote informed decision-making on water resources policies and strategies by implementing programs of water information exchange and dissemination.

As a national center of excellence in water resources engineering, the NHRC would need the support and assistance of the national government, the private sector, as well as all agencies concerned with water resources development and management. Considering its excellent track record over the past 20 years, the NHRC looks forward with confidence to contributing its share in national development through hydraulic research.