INSTITUTE OF CURRENT WORLD AFFAIRS

DGD-11
Reconsidering Water Resources

P.O. Box 1615
Kathmandu, Nepal
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Mr. Peter B. Martin
Executive Director
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Dear Peter,

In mid-June I attended a two-day workshop on water resources development sponsored jointly by the Agricultural Development Council and the American Universities Field Staff. The official title of the workshop was "Irrigation: Making it Useful for Disadvantaged Groups." The topic of discussion was whether irrigation or other water delivery systems, such as flood control or hydroelectric projects, could be designed to better provide water for domestic and other purposes, thus enhancing their ability to serve women, landless and other disadvantaged groups. A small but heterogeneous gathering of professional people participated in the workshop. Joining the traditional core of irrigation engineers were anthropologists, sociologists, economists, geographers and political scientists, among others. As a representative of the forestry profession, I may have appeared a bit far afield, but indeed not, if one follows the irrigation canal to its origins.

The workshop commenced with a presentation by Adrienne Germain of the Ford Foundation, urging the group to consider a subject much broader than irrigation, rather the multiple use of water resources. Nevertheless, most of the discussion that followed seemed to center around problems of irrigation projects. Phrases such as "overlays on the irrigation system" suggested a certain bias of viewpoint. Although a few individuals argued for more attention to management problems, discourse tended to focus on ways in which to facilitate access to irrigation water. Calls for the rehabilitation and more efficient utilization of present facilities did not generate much interest. The participant's apparent faith in physical systems and inability to define more distinctly the target group of disadvantaged, potential water users suggested a limited knowledge of life in rural communities in developing countries.

The importance of improving water supplies to meet basic needs of human consumption and cleanliness was generally acknowledged. Indeed, surveys in Nepal and other developing countries consistently show the installation of drinking water systems to be of the highest priority among rural villagers. Two of the major benefits associated with investments in domestic water supply systems are the reduction of water-related diseases -- diarrheas, typhoid and paratyphoid fevers, shigelloses,

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Figure 1.
A typical water tap is used for personal bathing, laundry and dishwashing, as well as drinking water collection.

salmonella, cholera, hepatitis, amoebiasis and giardiasis -- and the facilitation of water collection, a chore of women and children in most developing countries. Installing a convenient tap, however, does not automatically improve long-established practices of personal hygiene. As many studies have shown, improvement of water quality alone is unlikely to change the incidence of disease significantly.[1/] To ensure that the potential benefits of improved water supplies are fully realized, such projects should provide drainage and sanitation facilities, as well as health education.

Very little discussion developed during the two-day workshop regarding water supplies for purposes other than irrigation or household use. Water management for electricity generation, flood control, transportation and fish production was mentioned only briefly. Regular and adequate water supplies, however, also can be important for small-scale and cottage industry in rural areas. One finds significant amounts of water used, for instance, in the processing of jute, wool and hides and in the production of paper and various commercial foodstuffs. In Nepal, the water-powered flour mill is an important fixture in many hill villages. Recent efforts to improve the efficiency of water utilization in village mills has involved experimentation with improved water wheels and attachment of belt-driven rice hullers, oil expellers, wood lathes and other village equipment. Nepal's numerous streams and steep topography have encouraged developers to introduce small-scale hydroelectric generators and water-powered water pumps in some mountain areas. A few foresters have even toyed with the idea of introducing a water-powered sawmill to improve recovery of lumber from timber processing in the hill region. It is

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1/ Feacham, R. 1978. Domestic Water Supplies, Health and Poverty. Water Supply and Management, Vol. 2, no. 4.

Figure 2.
Not uncommonly a water tank (white concrete structure to the right) drains into an open sewer, which although quite popular with the duck (foreground) and the small child (background), contributes to the spread of water-borne disease and provides a breeding ground for mosquitos, another disease vector.

estimated that as much as two-thirds of the volume of a log is lost to chips as the village carpenter with ax and adze fashions often only a single plank from a large tree.

Definitely a closer examination of rural villages is needed to ascertain the many present and potential end uses of water resources. Without identifying current and projected consumers, it is difficult, if not impossible, to define their needs or to include them in project design and implementation. Without their participation, engineers will lack the information regarding water quality, scheduling and rate of flow needed to properly design water supply systems capable of serving a diversity of users.

More efficient utilization of water resources must come about not only through improved planning of future water delivery schemes, but also through better care and management of existing facilities. A.K. Biswas, noted water resources consultant, claims that "the agricultural sector which accounts for nearly 80% of global water consumption is probably the most inefficient sector....Existing efficiencies of irrigation systems are often so low that they do not by any means reflect the real water requirements for crop production....[Recent studies show that] it is quite common to find that 80 to 85% of water delivered to the head gate of the main canal never reaches the crop."2/ In addition, water-logging and soil salinity have become significant problems in many agricultural areas of China, India and Pakistan due to mismanagement of irrigation water and inadequate drainage. In Nepal,

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2/ Biswas, A.K. 1979. Water Development in Developing Countries: Problems and Prospects. Geojournal, Vol. 3, no. 5, pp.453-454.

farmers are well aware that a shortage of water retards plant growth and reduces crop yields, but many have yet to learn that an excess of water can also be detrimental to production. Developers of the vast Makaveli resettlement project in northern Sri Lanka worry that despite government agricultural education efforts, pioneer farmers in the project area will waste valuable irrigation water in attempts to cultivate the traditional, but unsuited, paddy on the newly cleared land. Labor intensive irrigation systems are more difficult to manage than the fully mechanized and automated systems familiar in developed countries. Yet very little, if any, assistance is given to Third World farmers to ensure the successful operation and maintenance of new irrigation schemes.

Considerable scope for water conservation exists in the industrial and domestic sectors as well. Most developing countries experience an extremely high degree of water loss through their distribution systems, especially through leakages of water mains and faucets. According to Biswas, such losses in urban areas of Third World countries may account for almost "one-half of total water pumped."3/ Improper or inadequate maintenance of water supply facilities exacerbates such problems. It is estimated that some seventy percent of a handpumps installed in many parts of the world are out of order.4/ In some sections of Kathmandu free flowing taps are a common sight, while across the city the pipes are dry and people must queue up behind government trucks distributing precious drinking water.

In seeking better management of water resources we must not limit our attentions to the demand and consumption. Sufficient provisions of water must be insured by intervention on the supply side as well.

Figure 3.
A portion of this stream has been diverted into the irrigation canal at the left; another through the mill at the right(the water wheel, set horizontally beneath the mill, is not visible). Here also the village women have just finished the laundry which hangs drying on the surrounding bushes.

3/ Ibid., p. 455

4/ Ibid.

Improved watershed management can increase both productivity and overall production of our water resources. Natural population growth coupled with the ever-rising water demands of developing societies will render water an increasingly scarce commodity in many Third World countries in the near future. Withdrawals of water from its natural course in rivers and underground aquifers, construction of in-stream structures to facilitate local usage, such as hydroelectric dams, and changes in land-use patterns altering the soil-vegetation complex influence water availabilty both spatially and temporally.

Deforestation of the Himalayas has adversely affected the timing and intensity of flood waters in river drainages of much of South Asia. If water resources development programs neglect to broaden their horizons to include watershed management, engineers will find themselves more and more preoccupied with remedial measures, that is, building flood control embankments, dredging reservoirs, and reconstructing bridges and towns in the alluvial plains and deltas. Destruction of forests with the elimination of ground cover not only increases soil erosion and water run-off, but reduces infiltration and groundwater recharge. Excessive exploitation of underground water supplies can result in declining yields from wells, dissapearance of springs--the natural overflow of groundwater storage--and in coastal areas the intrusion of sea water into fresh water reservoirs. Examples of depletion of groundwater resources through overuse are common. According to Revelle and Lakshimarayana, "even at present the dry-season flow of the Ganges is barely sufficient for the needs of India and Bangladesh. If irrigation with either groundwater or surface water continues to be developed along the lines of present programs, the dry season flow will be continuously reduced."5/

It is estimated that roughly 40 percent of the world's population live in transnational river basins.6/ For these people their socio-economic development is intimately linked to a water resource that must be shared with one or more, not necessarily friendly, neighboring countries. In the case of the Ganges River which, fed by rivers originating in Tibet and Nepal, flows through India and Bangladesh before emptying into the Bay of Bengal, it appears that very little joint effort has been expended by the several neighboring governments to harness the great river. Year after year thousands of lives are lost and property and productive farmland destroyed as the swollen river escapes its debris-filled channel during the annual summer monsoon. Multinational cooperation is desperately needed if vast river systems, such as the Ganges, are ever to achieve their potential to serve beneficially the communities they traverse.

5/ Revelle, Roger and V. Lakshimarayana. 1975. The Ganges Water Machine. Science, Vol. 188 (May 9, 1975).

6/ Falkenmark, M. 1979. Main Problems of Water Use and Transfer of Technology. GeoJournal, Vol. 3, no. 5. p. 442.

The goal of the workshop was to produce a document which might influence individuals involved in the design and implementation of water projects. Acknowledging the intricacies of ecology and culture affecting the development of water supply programs, the sponsors decided to "narrow the focus to something manageable" and thus chose irrigation systems as the central theme of the workshop. Ensuing discussions reminded me of debates surrounding the development of management programs for the United States national forests several years ago. Despite a mandate to consider recreation, watershed and other forest benefits besides wood production, not until foresters changed the title of their working document from "timber management plan" to "forest management plan" did they succeed in pulling together a balanced and comprehensive program addressing the various needs of society in the development of the several aspects of our nation's forest resources. Similarly, I suspect that if we continues to focus on irrigation systems, the complexities of multiple purpose water resources development will remain elusive --- and the life of the average Third World villager, much the same.

Sincerely yours,

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