Keynote Address
Water Management Challenges in an Era of Competing Demands

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Until very recent times "water" as an input to a variety of uses was widely treated as an inexhaustible, plentiful, free and quite often, even as a predictable resource. Further, with agriculture dominating our economic scene, land, water, agriculture and food production, particularly rice were perceived as inseparable. There are still many laymen and even professionals who hold fast to this view. It is only in the event of a monsoonal or crop failure, a power cut or a water cut that this thought process gets breached; but invariably, these are treated as temporary and passing phenomena never to recur within one's short memory.

Perhaps owing to free access to global information on floods, droughts and persisting water scarcities and based on one's own experience within the span of a single generation, there seems to be increasing awareness of an impending shortage of water—good quality or otherwise—in the not-too-distant future.

In fact, the most recent discussion paper from the Water Resources Secretariat begins with the statement that "warning signs point to increasing water resource problems in Sri Lanka. Variable rainfall, climate change, increasing and diversified demand, degradation of watersheds, water pollution and contamination and over-extraction all point to a scarcity situation either now or in the immediate future, which most Sri Lankans are not prepared for as yet."

The Asian Development Bank, which has taken a lead in the assessment of water resources in the Asian Region, has stated that recent economic developments in the region together with high population growth and urbanization have dramatically increased the pressure on Asia's limited water resources and has predicted that two-thirds of the world's population will experience water stress conditions by the year 2025. With Asia having the lowest per capita availability of freshwater resources and Sri Lanka being the fourth lowest in the list at 2,400 m^3 per capita per year, we seem to be clearly in the red!

Although initiatives for policy and institutional reforms have been taken, over many years in the past, some amount of water-related research has been conducted in an uncoordinated manner though today's event, I believe, is the first-ever comprehensive attempt to bring all researchers and professionals on water together to a common forum and make an effort to focus on water research in a holistic manner.

I feel deeply honored and privileged to have been invited by the organizers of this National Conference to deliver a keynote address to this learned audience on a subject that is very close to my life and heart and one with which I grew up. I thank you very sincerely for giving me this signal honor. I am also delighted to perform this in the shadow of one of Sri Lanka's most distinguished and eminent intellectual giants who consented to grace this occasion and

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incidentally celebrate his—I guess the fiftieth—birthday in the company of water professionals. We wish Dr. Corea many happy returns and many more productive years in public life. His mere presence, I am confident, will give the water sector in Sri Lanka, the global exposure and stature it deserves.

I would venture to say that this National Conference on Water Research has been long overdue; hence, I am grateful to the WRS and IWMI for taking the initiative to conceptualize and initiate it.

Having said that, may I take a few moments Mr. Chairman, to share with you my personal and professional interest in the subject of water. Coming from a rural family background, I learnt very early in my life that what we then called a "watershed" was a line of highland separating two river systems, according to the Oxford dictionary. Today, it is given a different meaning, i.e., a catchment. My parents and grandparents hailed from two adjacent river basins namely Nilwala Ganga and Gin Ganga. The Government Resthouse at Deniyaya, which was a very popular place in those elite planter days, was on this watershed. It is said, and I found it to be true, that while rainwater from one half of the roof of the Resthouse drained to the Gin Ganga basin, that from the other half drained to the Nilwala Ganga basin. This phenomenon really fascinated me and developed in me a keen interest in observing the dynamics of the movement of water and its use.

Another memorable event occurred in 1940 even before I had started schooling when, in the middle of the night, I was awakened and my mother said that we had to leave our house and move to a safe place as there was a threat of floods. Of course, I was thrilled both by the floodwater and by the idea of moving out in the rain. Although finally we did not have to leave the house, in the morning we saw the floodwaters in front of our house. As a kid, I was disappointed that it did not come closer. What interested me most however was a conversation I overheard within a few weeks of the flood to the effect that this unprecedented flood was the result of extensive clearing of forests both for tea plantations and, I guess, for the then food production drive. As a result of this simple event, the link between land, forest cover, water and floods sank deeply into my mind and left a lasting impression in me. Many years later, when I entered the Public Service I felt that we public servants had a duty and a responsibility to stop, if not reverse, these trends through policies and action plans. I guess most public officers echo similar thoughts. But experience has shown that this is no simple task.

To return to the business of the day, the thoughts I propose to share with you today would broadly cover the following:

- a brief review of water resources development in Sri Lanka in recent years and their impact
- emerging trends in water use and demand
- how best we can manage this demand
- how research can contribute to this effort

I note with delight that the presentations over the next 3 days cover a whole range of topics from rainwater harvesting to urban water supplies and from pure technical issues to

institutional issues. What I am not sure is whether industrial sector issues and environmental issues are adequately covered. It is heartening that the organizers of this conference have under the rubric "Research" defined it very broadly to include "studies, investigations or action programs to test new ideas on any aspect of water," which would make the research network wider and hopefully bring academics, practitioners and policy makers together.

Now I come to a brief Review of the Development of Water Resources in Sri Lanka. To begin with, in my professional life I have been closely associated with the irrigated agriculture sector and with natural resources management both in the public service and in my associations with IWMI. The major player in this sector during my tenure and, in fact, since the dawn of independence, has been the public sector; the investments at the beginning were almost exclusively on irrigation and hydropower development.

In the 1960s, irrigation and land development received about 12 percent of the total capital budget while the agriculture sector received some 36 percent. I do not have readily with me the investment figures for hydropower and water supply. The investments in water development for irrigation and power continued with minor fluctuations into the 1980s and power development and irrigation expansion were government priorities for the general economic development and for employment. I am sure these investments were fully justified at that time. It would not be reasonable to try to evaluate them with the knowledge available now and in the current context.

In the latter half of the 1960s, with the initial feasibility studies for the Mahaweli Program, the UNDP/FAO and other donors expressed concern over the low productivity and returns on investments made in land and water and the need to focus on minor irrigation system rehabilitation and water management. Within the agriculture sector, adjustments were made to shift investments to increase productivity and reduce capital investment. It would not be fair to fault the planners of that era for not looking at the water sector holistically because the objectives then were quite different. I am sure the then Secretary of Planning present with us today will bear me out.

Although the heavy investments in river basin development and restoration of large irrigation works continued, a shift towards less capital-intensive investments in irrigation rehabilitation and water management started in earnest in the latter part of the 1970s. The Galoya Water Management Project, which combined physical rehabilitation and institutional building through farmer participation, is now considered a turning point in investments in the irrigation subsector. Although overshadowed by the Accelerated Mahaweli Program, which of course combined both irrigation and power development, the less glamorous rehabilitation and water management program was the accepted policy and trend in areas outside the Mahaweli. Terms like VIRP, MIRP, ISMP and NIRP, I think, are familiar acronyms in the public sector. The location of the International Irrigation Management Institute in Sri Lanka and the formation of the Sri Lanka-IIMI Consultative Committee around that time helped in no small measure to shift emphasis from new construction to rehabilitation, water management and institutional development and policy reforms based on field research.

One has to accept, however, that all these investments and trends occurred within different subsectors of the water sector. An attempt to enact a Water Resources Act, and establish a Water Resources Council, as proposed currently, though accepted by the government in principle, could not proceed beyond the Legal Draftsman due to sectarian interests overriding the national interest.

Although "environment protection" was not in vogue at that time as it is today the link between land, water and forestry was quite clearly perceived, and a number of policy measures to protect natural resources were taken and formalized at the Land and Water Resources Development Conference of 1979 with the participation of key line Ministries, and the then District Administration. Participation of NGOs or the civil society again was not quite fashionable at that time. The policies adopted at this Conference were carried through via the Land Use Planning Program, the Forestry Master Plan preparation, the Land Commission Report and the Irrigation Management Program all of which occurred in the 1980s.

The Water Resources Development Program however did not see the light of day, partly because international agencies could not find the necessary skills or the resources. I say this with authority because my personal efforts to get assistance for this program through the UN System was unsuccessful.

Efforts of professionals in the irrigated agriculture sector, with the assistance of IIMI, helped to conduct field research and also make far-reaching proposals to the government on participatory irrigation management and for policy reforms in irrigated agriculture through the Irrigation Management Policy Support Activity (IMPSA) to adopt a long-term vision for the sector, centerd on water. It may be of interest to this audience that IMPSA looked at the water sector as well and, in fact, made several far-reaching proposals including the establishment of a Water Resources Council.

The principles set out in the IMPSA effort are being pursued even today by the Central Co-ordinating Committee on Irrigation Management (CCCIM). From the 1980s onwards, heavy investments took place in the water supply and sanitation subsectors as well; these took the form of piped water supply schemes in urban areas, community water supply schemes in rural areas and groundwater exploration for drinking water.

Over the past two decades, there has been a rapid expansion of the water supply and sanitation subsector serving some 20 percent of the population and another 8 percent being served with tube wells. A further 27 percent in rural areas is said to be served by deep wells. The regularity of service and water quality however may not have reached the optimum level as yet.

The focus right along has been on the development and management of subsectors, be it power, irrigation or domestic water supply and not on comprehensive Water Resources Management.

The main characteristics of these programs and investments were that

- they were all public sector initiated and funded
- other than within the Mahaweli Basin, each subsector went its own way with little regard to the need for integration or sharing of resources
- there was little interest in joint or conjunctive use or any regard to the needs of the "customer"—the community
- not much attention was paid during the period to water quality, either because such problems were not highlighted even if they did exist, or because the expansion of services was considered a higher priority than attention to quality

Overall, the emphasis during this period was on infrastructure development on a subsectoral basis. Hence, intersectoral and water sector issues and policy formulation for IWRM received little attention.

It was only in the 1990s that support was forthcoming for comprehensive water resources management, i.e., from USAID and the ADB, which triggered the setting up of the present Water Resources Secretariat.

Nonetheless, infrastructure development was a crying need in the 1980s and there is no denying that their impacts on economic and social development by way of power generation, irrigated area expansion and rehabilitation, food security and water supply and sanitation were impressive. Institutional strengthening and policy reforms for the water sector, by their very nature, were slow to emerge and needed lengthy deliberations to reach consensus on.

CHANGING TRENDS IN WATER USE AND DEMAND

The decade of the nineties, as you would all agree, has seen dramatic and salutary changes in the perceptions of the international community on the subject of water: an international consensus has emerged on fundamental principles for water resources management. These principles were endorsed in 1992 at the Conferences on Water and on Environment in Dublin and Rio de Janeiro (the Earth Summit), respectively. In summary, the Statement stresses that

- water is a finite and vulnerable resource
- water development and management should be based on a participatory approach
- women play a prominent part in the provision, management and safeguarding of water
- water has an economic value and, therefore, should be recognized as an economic good

To these criteria, the Global Water Partnership has added two more:

- sustainable water management can only be achieved through integrated approaches
- water resources should be managed to ensure benefits to the poor and vulnerable

Sri Lanka, if not already in, is at the threshold of a water-scarce situation. According to the Water Resources Secretariat "visible warning signs regarding the status of water resources are increasing. Seasonal and sometimes serious water shortages are occurring and the combined effect of global climatic change and increasing water demand, rising incomes and general economic development will make these shortages more severe." According to the Water Resources Secretariat, water shortages are, in fact, likely already restricting the achievement of national development.

With urbanization and industrialization a shift in demand is already visible. At present, the irrigation sector in Sri Lanka is said to be taking the lion's share of the total water withdrawn through artificial means accounting for around 90 percent while the global average may be 70 percent; this varies widely from country to country. While there are many who argue for allocating a major share of the water for agriculture on grounds of employment, food security and poverty alleviation and further argue that irrigation water is not, in fact, used for agriculture alone but for multiple uses, agriculture is confronted with two powerful forces, viz. globalization of the world economy and competition from other sectors. The impact of the first is to increase the exposure of farmers, especially those in developing countries, to international competitive markets. This forces farmers to become more efficient and more commercial producers that, in turn, necessitates higher-quality and less-expensive irrigation services. In the process, small landholders and poor farmers growing, what are called, low-value crops will get marginalized. The challenge therefore, is to grow more food or other high-value crops with less water and remain competitive.

Competitions from other sectors, i.e., from urban, industrial and environmental uses are defined as high-value, politically powerful and, in the case of municipal and environmental uses, morally compelling. The dilemma, both globally and in Sri Lanka, is not whether this will happen but how water could be released from agriculture equitably and with minimum adverse impact on production and rural livelihoods—a kind of painless extraction!

It is of course argued that water savings should be achieved at the basin level and not at field level, as water "wasted or lost" in one part of the basin is captured and reused elsewhere in the basin. However, even this technical argument does not detract from the fact that water, if saved in agriculture, can be available for other uses, most likely within the basin itself.

With our long history of irrigated farming and the revival of irrigated settlements over the past 6–7 decades there are strong traditional views regarding water rights for irrigation. There is general social acceptance that irrigation farmers have a right to the water needed for growing crops, stemming obviously from the policy of self-sufficiency in food, especially rice. Irrigation agencies too strongly defend their role in protecting irrigation water rights as being the first priority in water allocation. This no doubt reflects the contemporary political thinking.

DOMESTIC WATER SUPPLY

Domestic water supply, which in fact is considered the first priority in water allocation as a basic human right, is severely constrained in Sri Lanka. The planners consider availability, security and quality of piped water supply schemes and the rising development and operational costs as important issues that deserve urgent attention. Ninety percent of the National Water Supply & Drainage Board's (NWS&DB) piped water supply schemes outside Colombo are said to suffer from a combination of inadequate supply and treatment capacity. Even community water supply schemes seem to suffer from local raw water shortage and conflicts with other water users. In the dry and intermediate zones, domestic water supply is a widespread problem, which receives little attention from policy makers.

Water supply and sanitation have to be built into all plans for human settlements and relocation of communities including large irrigated settlements. Water use does not depend on population growth alone but it will increase faster with urbanization and industrialization. By the year 2025, over half of Asia's population is projected to live in cities. The major increases in the quantity of water available and maintenance of quality, therefore, are imperatives that society cannot escape from.

INDUSTRIAL WATER SUPPLY

Industry requires water for such things as manufacturing, washing and for supply and sanitation for the work force. Providing adequate water for industry is seen as becoming a serious problem in Sri Lanka, as the water resources planners and the industrial sector have not made comprehensive estimates of projected demand and included them in water resources development plans. Large water-consuming industries in urban areas do not get the supply from the NWSDB as their demands have not been included in urban water supply and planning. Export promotion zones need large quantities of water for industry and employees. It is learnt that expansion of these zones is constrained by inadequate water supplies. There is also the question whether industrialists are willing to meet the additional costs of water supply development. There have also been instances where the Board of Investment has located industrial zones without adequate regard to the availability of water. Water quality for industry and industrial pollution of water and disposal of effluents are major environmental issues that remain unresolved.

Overall, the industrial sector, if one can call it a sector, for water use purposes, has not properly assessed its needs spatially or temporally, to the extent necessary. Water availability will be a determining factor in the location of industries in Sri Lanka where potential for industrial expansion is bright. Hence, an orderly process for reallocating water from irrigation to industry will be required to promote this development process and to achieve the employment and income goals.

In some parts of the country, especially in the more urbanized wet zone, there are instances of water allocated for irrigation remaining unutilized or underutilized for economic reasons

but not being used by industry either in the absence of mechanisms for pricing, trading, recycling and pollution control. Even in rural Sri Lanka, particularly in the irrigated river basins, a conscious policy of reallocating water from agriculture to industry can trigger more employment and increase opportunities for the community and prevent urban migration. These are important issues for consideration by policy makers and planners.

There is, of course, the other dimension of a threat of industry encroaching into the domestic supplies both of surface water and groundwater, in the more populated wet zone parts of the country, which we have to guard against.

HYDROPOWER

Water for hydropower has been an important characteristic of our development and investment programs, so much so that large dams in the Mahaweli system, which were designed to serve the irrigation sector, have had their economic justification on their capacity to generate power. Although hydropower production is nonconsumptive there are some trade-offs to be considered between irrigation and downstream users based on temporal demand.

The Mahaweli Authority has an institutional mechanism for the allocation of its water optimally between these competing demands. However, as electric power demand increases and the Ceylon Electricity Board (CEB) is compelled to use hydropower for peak-load generation, the demand pattern will change; similar changes will occur in the Kelani Basin and other future basins, in the demand for power and domestic water supplies.

ENVIRONMENTAL AND SOCIAL WATER USE

In Sri Lanka, with its long history as a hydraulic civilization, the environmental implications of water adequacy and quality, considerations such as water quality, the assimilative capacity of water bodies, maintenance of habitats and biodiversity, tourism and recreation, and access to water for drinking, bathing, livestock and for religious purposes are emerging issues and causes for potential conflicts. Water allocation for fisheries, for both new and traditional techniques, could be treated as closely related to environmental and social water needs, although there is a strong economic factor incorporated in it. The fishing industry in many lagoons and estuaries along the western and southern coastline has been affected by agricultural or industrial pollution upstream and by variations in flow levels in streams. Inland fishing development too, which is now being encouraged, will demand water, especially in irrigation reservoirs and downstream systems.

Degradation of catchments, overextraction of groundwater, reduction of water quality due to agricultural, industrial and domestic pollution are burning issues in the water sector, which drastically reduce the net availability of consumable water and affect human health and quality of life. I trust our learned participants who have studied them in-depth will address many of these issues over the next 3 days. It is common knowledge that the effects of water

supply and quality deterioration on the poorer segments of society are severe and that they need special consideration and strategies for allocation.

Along with demand, the costs of providing services, be it in irrigation or water supply and sanitation, are escalating. Mobilizing resources, maintaining cost-effectiveness, cost-sharing and effective service delivery that do not discriminate against the disadvantaged groups are factors that deserve the attention of planners and policy makers. Researchers, I guess, should address the emerging issues with a view to assisting decision makers with feasible and cost-effective options.

I am sure our learned Chief Guest too, with his in-depth exposure to global issues, will address some of these issues.

MANAGING WATER DEMAND

Since it is now quite clear that Sri Lanka, although having adequate water in the aggregate, is facing water scarcity either seasonally or regionally or more precisely, temporally or spatially. Policies and strategies to manage this demand in an orderly and equitable manner are urgently needed. Although, historically, Sri Lanka does not have institutions to look at the water sector across-the-board, we are in some ways fortunate that we are probably ahead of other countries in South Asia at least in setting up a Water Resources Secretariat to look at water in the round.

Based on broad consultations and the decisions of policy makers, the Director of the Water Resource Secretariat is scheduled to present the National Water Strategy to this audience tomorrow. I am sure it will address policy and institutional issues as well as the question of demand management in a scarce situation.

A major deficiency in planning and management of the water sector in Sri Lanka is the absence of an institution backed by legislation to determine water allocation among competing sectors and users with the result that certain users are able to extract water causing major costs to others and to the environment. A further deficiency has been that water has been regarded as an "input"—often as a "no-cost input"—rather than as a key resource that impacts on many other sectors and users.

Attempts to enact legislation for comprehensive management of water and to reform institutions in the past have failed due largely to sectarian interests overriding national interest. I referred, earlier this morning, to my own experience nearly two decades ago. Today, however, global and national pressures are so compelling and information is so convincing that the objections seem to more or less disappear. Environmental concerns, climate change and experience of international bodies and donors, NGOs and the civil society have made it imperative for national policy makers to treat water as a key resource. To address the immediate concerns, the Water Resources Secretariat has proposed objectives of the Demand Management Policy as follows:

"The primary objective of this policy is to promote the efficient use of water resources and to maximize the value of the resource to society."

The secondary objectives of the policy are to reduce water wastage and low-valued use in order to:

- make additional water available for other priorities
- reduce the cost of providing water services
- recover a portion of basin-level water management costs

The key elements of the Demand Strategies have been identified as

- Establishing a Water Rights and Policy Principles
- Water valuation and pricing, and
- Institutional strengthening

I do not propose to deal with the sub-topics in detail but I wish only to make a few comments to provoke your thinking.

The proposed or perhaps already accepted policy on water resources seems to be that all water resources will be owned by the state and managed by the government on behalf of all citizens. There is also a passing reference to an open and participatory approach. Given the current fragmented nature of management by public sector agencies referred to earlier, there will be some apprehension as to whether the state, i.e., the public sector, by itself has or will have the institutional capacity to address all the challenges that lie ahead. It seems that a greater degree of openness and inclusivity and a decentralized approach may be necessary. In other words, a business-as-usual approach would not be adequate to overcome the serious deficiencies in policies and institutions that have dogged the water sector in the past. A more systematic, yet radical and proactive, approach that takes all stakeholders into confidence and where the government plays a leadership role rather than an ownership role would, in my view, be more appropriate. State leadership would mean putting in place broad-based consultation processes, participatory mechanisms and stakeholder involvement in the identification, development and management of water resources, which would result in a true partnership.

WATER RIGHTS AND ALLOCATIONS

Establishing Water Rights and Allocation Principles may be the most complex and contentious aspect of managing the water resources demand in Sri Lanka, given the conflicting subsectoral interests. Hence, putting in place a rational and orderly water allocation system early on is a fundamental prerequisite for the management of the sector.

In the absence of anything more professional, the allocation system introduced for the Mahaweli systems and operated for over 15 years appears to be the best example of an allocation system currently available. Although it does not, at present, deal effectively with long-term

and intersectoral allocations and is biased towards irrigation, it allows flexibility for managers to respond to changing conditions and needs and to optimize water deliveries within the physical constraints. These are considered as important strengths to be built into any national water allocation strategy. Water sharing in the Kelani Basin is said to be based on informal consultations, in the absence of a formal arrangement, between the CEB and the NWS&DB. It is clear that the current water allocation system is inadequate to deal with current and future water resources management needs. A multitude of deficiencies have been identified by planners, most serious of which is that large water users have a tendency to allocate water to themselves without considering the needs of other users and the absence of a neutral agency to umpire.

The challenge for the proposed Water Resources Council is to establish a set of allocation principles that is rational and durable and sufficiently flexible to accommodate emerging short- as well as long-term demands.

VALUATION AND PRICING OF WATER

Absence of information and criteria for giving a value to water is a major deficiency in all countries. The Regional Technical Advisory Committee for South Asia (SASTAC) is in the process of developing such a system for South Asian countries, which of course will need considerable time to reach any kind of finality. Meanwhile, pricing and cost-sharing are the tools currently adopted to rationalize demand from competing users.

A pricing system for irrigation water is virtually nonexistent in Sri Lanka. With paddy farming giving declining returns, a shift to more water-efficient high-value crops seems to be the desired trend. It would be of interest to this audience to note that pilot projects have been launched at Ridibendi Ela and Chandrika Wewa to give water rights to farmers and to allow the farmers to trade their rights both within and outside the irrigation sector. The importance of the agriculture sector managing water more efficiently both to increase productivity and to transfer to other sectors cannot be overemphasized. One has to accept though that this will be a painstaking and prolonged exercise.

The domestic sector has, over time, got accustomed to the idea of meeting at least a part of the water supply services. But substantial improvements are possible and necessary to make the price and the subsidies more equitable.

Going by experience in other countries, we can state that the industrial sector is expected to be the most responsive to price changes, as they are able to control water consumption through technological changes as well as through recycling. A sustained policy on pricing and cost recovery is needed to make it an effective instrument in managing demand.

POLICY AND INSTITUTIONAL REFORMS

Policy and Institutional Reforms will include incentive packages, cost-sharing arrangements, basic-level management, regulatory controls, water-saving technologies and the like. These

have to be accompanied by major institutional changes, which can respond to the challenges of the future. This brings me back to the proposed policy of the government to play a state ownership role vis à vis a leadership role—I would commend it for discussion and research.

The water sector in Sri Lanka is, in some ways, fortunate that there is growing concern globally about the impending catastrophe in the water sector. While there are several established institutions like the ICID, IIMI (which will now become IWMI—where W is silent) and IPTRID, which were more focused on irrigation, new institutions such as the World Water Council and Global Water Partnership are emerging to provide global leadership to the ongoing efforts. Multilateral and bilateral donors are increasingly focusing on comprehensive water management. The World Water Commission set up this August with many eminent intellectuals is currently developing a World Water Vision to be completed in 2000.

Having broadened its mandate, IWMI is focusing its research on the river basin. This is a major welcome departure from its original program.

It may be of interest to note that the Global Water Partnership (GWP) in its effort to reach consensus on Integrated Water Resources Management (IWRM), which, in fact, is the goal we are all striving to achieve, gives a novel interpretation: "GWP asserts that to manage water sustainably for continued human development, the competing uses of water must be reconciled. This can occur only if the parties competing for freshwater share the mutual goal of appropriately adjusting their demands and engage in a dialogue on how to do so. Such reconciliation is known as IWRM."

It goes forth to say that the most basic and important benefit of freshwater is health—the health of people, the health of ecosystems and the health of societies. This may be a good point for all of us to ponder!

Permit me now Mr. Chairman, to come back to the central theme of the day. How research can contribute to IWRM. I am aware that, based on a questionnaire survey, my friend Prof. Madduma Bandara is scheduled to deal with this topic in-depth at the plenary session tomorrow. Not being a researcher or specialist of any sort, I shall try to bring a different perspective to this topic.

Before that however, for completeness, I shall make some general comments on the current status of water research in Sri Lanka.

RESEARCH ON WATER RESOURCES MANAGEMENT

The current research work on water resources is limited to subsectoral uses such as agriculture, irrigation, water supply and groundwater resources, etc. The research agendas generally do not cater to the problems in the subsectoral water use and have been considered as partly responding to academic interests. These research results are hardly used for development decisions. There is hardly any water quality research that has been initiated on common water bodies except on a few main areas that have been subjected to frequent pollution. On the basis of limited research studies, it can be stated that few watershed areas have been subjected to

continuous monitoring for watershed degradation, although watershed protection programs against soil erosion are being practiced on a regular basis, particularly in the upper Mahaweli areas. There has been no research work carried out on water source degradation and no agency has been responsible for protection of sensitive water-source areas. Accordingly, the scientific research work on water resources is currently stagnant while a few socioeconomic and policy-related research studies on irrigated agriculture have been carried out by the International Water Management Institute (IWMI). The Central Environmental Authority (CEA), National Aquatic Research Agency (NARA), National Building Research Organization (NBRO), Ceylon Institute for Science and Industrial Research (CISIR), etc., are carrying out water pollution studies.

The research work on water resources has to be based on quantitative and qualitative aspects and should be user-oriented while the results should be used for decision making on policy and planning functions. A research culture should be inculcated among the water agencies to facilitate rational decision-making processes. Policies and plans on integrated water resources management should be directed mostly on research results conducted at source level, user level and on the basis of demand-supply gaps identified on medium and long-term projections, catering to sustainable development needs of the country. There is also a need to assess the current efforts of research carried out, in relation to water resources, in various member countries of the GWP by both the public and the private sector.

Having said that I shall briefly revert to the findings of Dr. Madduma Bandara's survey, part of which I was privy to and I would like to take the liberty to build on it. The response to the questionnaire had shown that the highest interest and demand for research were in the area of Institutions and Policies.

Dr. Madduma Bandara had commented that this might be due to the large number of responses coming from government agencies. If it is so, it is a reflection of the policy makers' and practitioners' interest in research that would assist in the decision-making process. If it is so, I would consider it as a welcome sign—a breakthrough I might add. In the research implementation nexus, we know very well that, on the one hand, most research results do not feed into implementation or are not implementable while, on the other, most implementors are either not interested in research or are incapable of utilizing research. If, on the basis of the responses to the questionnaire, we can move towards research-based policies and programs then we are in, what is nowadays fashionably called, a win-win situation.

Here I may, with the permission of the Chairman in his capacity as Secretary, Ministry of Forestry and Environment, share with you the experience we went through in a recent program of research-based policy studies on economic-environmental linkages.

We made an open invitation to Sri Lankan professionals to come up with proposals for studies on the above theme covering any subject area to undertake policy studies that would assist the government to decide on long-term policy options for environment and development. We had a good response and we commissioned 19 studies, all of which have now been completed with tremendous success.

The point I want to highlight here is that we requested the proponents to, as far as possible, form a team comprising a combination of trained researchers (coming as they would from the academe) and seasoned policy makers or practitioners coming from among implementors. The idea was to ensure that, while the academics would ensure that the hypotheses, research methodology and proper survey techniques are adhered to, the practitioners would look at the real-world situation and policy options for consideration by the client.

I must say that where this combination was possible we had excellent results, and now, we have a set of policy options, which the Secretary will take up with a high-level committee chaired by the Secretary, Finance and Planning; any matters that cannot be resolved at that level will go to the Cabinet.

I hope the Water Resources sector can and would get thinking on these lines if this is considered a feasible and sound approach. I might make special mention here that the framework study led by Prof. Mohan Munasinghe under this program quantified the loss caused by waste and pollution of water at Rs 2.7 billion per annum.

We were disappointed though that there were hardly any proposals touching the water sector per se although watershed management was very well represented.

Let me now conclude by saying the following:

- Value of water has to be understood in a very wide context. Since some civilizations have perished purely due to mismanagement of water let us eschew that camp.
- To meet the impending water scarcity situation, we need to aggressively go for dynamic and innovative strategies. The SASTAC, that is currently being formed, would be a conduit for sharing regional expertise and experiences. One of the presentations in this conference refers to "riding the back of the kangaroo." In this case, may be we can "ride the back of the buffalo" as it were.
- Water has to be shared—not competed for—for mutual benefit; conflicts must be reconciled and according to GWP that would result in good health for all.
- The public sector's role in water-sector development is in providing leadership and building partnerships. The proposed National Water Partnership for Sri Lanka should be the forum for networking and consensus-building.
- Research conferences of this nature should be followed through and repeated to help launch an Integrated Water Resources Management program for Sri Lanka.

I thank you once again for giving me this wonderful opportunity to address you and for your patience.