

Sustainable Water Resource Management in Sri Lanka: Status at Present and Strategies for Future

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Sustainable Development vs Intergrated Water Resources Management

Increased exploitation of the natural resources of the earth, primarily by the industrialized nations, has led many people to realize that the limited resources would not be adequate for the future generations. This understanding has brought forward the concept of "sustainable development", which is defined as "the development that meets needs of the present without compromising the ability or future generation to meet their own demand". Bringing this concept to action was taken at the very famous "earth summit" or the UN Conference on Environment and Development (UNCED) held in Rio de Janeiro in 1992. The Agenda 21 approved at the above conference has spelled out the programme to be undertaken for sustainable development in the 21st century. All these programmes on sustainable development are based on three pillars, namely human development (social equity), economic prosperity and environmental sustenance.

Those who work in the discipline of water resources advocate the concept of Integrated Water Resources Management (IWRM) which is accepted and supported globally since this IWRM process has been identified as the way forward to address complex issues associated with water resources development and management. This process is supported by many international financial institutions and government. The Global Water Partnership, created with the blessings of the Water Resources Council in 1996, coordinates the activities around the world to implement IWRM. Reforms, which are considered as pre-requisite for the implementation of the IWRM process has been facilitated by capacity building along with infrastructural development projects funded by the international lending institutions and governments.

It is to be noted that there had been a gradual evolution of basic common principles over the years which led to the concepts of both sustainable development and IWRM. This is given in detail by Allen (2002) in his famous theory of five paradigms of water resources development. The **first** paradigm is associated with pre-modern communities where they used water resources to meet their basic needs. The **second** paradigm of industrial modernity in early 20th century was characterized by the large scale

development of water resources structures led by huge investments with the scientific knowledge that the society had at that time. Frequent occurrences of disasters due to intervention of man in changing the nature has led to the awareness of environment during the **third** paradigm from 1960s to 1980s. One of the evidence to this effect is reflected by the fact that the Environmental Impact Assessment process in all South Asian Countries was institutionalized in 1980s. The **fourth** paradigm was inspired by economists who had drawn attention of water users in the western world to the economic value of water and its importance as a scarce economic input in early, 1990s.

These developments were crystallized and emerged as four principles of sustainable development and management of water resource, at the International Conference on Water and Environment (ICWE) held in Dublin in 1992. These four principles, now known as "**Dublin Principles**" are given below;

- a) Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment
- b) Water development and management should be based on a participatory approach, involving users, planners, and policy makers at all levels.
- c) Women play a central part in the provision, management and safe guarding water.
- d) Water has an economic value and should be recognized as an economic good.

These four principles have also contributed to the development of Agenda 21 at The Earth Summit. This indicates that both sustainable development and IWRM has similar roots. The Integrated Water Resources Management (IWRM) was coined as a concept by incorporating these four principles together which reads as; "IWRM is a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems (GWP 2000). The **fifth** paradigm, as defined by Alien (2002) is associated with the IWRM concept which also is based, similar to sustainable development, on three pillars, such as 'Society, Economics and Environment. Therefore, there is hardly any difference between the concepts of sustainable development and IWRM, except perhaps, the latter specifically refers to water, land and related resources.

The basic attributes underlining three pillars of both sustainable development and IWRM are very similar. For example, equity, gender inclusive development and the participatory approaches in decision making is identified as key areas under society whilst principles of cost recovery, polluters pay and financial sustainability are considered prime under economics. The environment concerns include environmental protection including actions to reduce the generation of waste. One of the important events which put forward a comprehensive action plan including both sustainable development and IWRM was held in UN headquarters in New York in 2000 which came out with the Millennium Development Goals (MDGs). All 191 UN member states have agreed to achieve 8 MDGs by 2015. Water is a cross cutting issue in all goals whilst some of the targets identified in each goal are directly related to water resources development and management. For example one of the targets (Target10) under the Goal 7 is to ensure environmental sustainability by reducing the proportion of people without sustainable access to safe drinking water and basic sanitation to half by 2015.

From Rio to Rio+20

It would be impossible to describe all programmes and activities undertaken to promote both sustainable development and IWRM since they were adopted in 1992. However, a brief description is given below to indicate the importance of these two in the global agenda during the last 20 years. The Dublin principles, adopted at ICWE in Dublin in 1992 on which the IWRM is based contributed to

chapter 18 on freshwater resources in the Agenda 21 at UNCED in 1992. This was followed by the UN conference till Sustainable Development (UNCSD) in New York in 1998 (Rio+5) and World Summit on Sustainable Development (WSSD) in 2002 in Johannesburg (Rio + 10). The Global Water Partnership and World Water Council, established in 1996 to translate IWRM concept in to practice, organized six World Water forums (WWF) Since 1997 (1st W WF in Marrakech in 1997 to develop the water vision 2nd W WF in the Hague in 2000 to prepare frame work for action, 3rd WWF in Kyoto in 2003 to express commitment for action, 4th WWF in Mexico in 2006 to collect examples of local actions, 5th WWF in Istanbul in 2009 to bridge the divides for water and 6th WWF in Marseille in 2012 to bring solutions to water based on openness and exchange). This shows that there have been incremental developments towards achieving the goals of sustainable development along with IWRM.

The 20th annual conference of the UN Commission on Sustainable Development or "Rio+20", scheduled to take place in Rio de Janeiro in June 2012, is expected to elevate more modest MDGs to a higher level of Sustainable Development Goals (SDGs) which is expected to includes commitment from richer Countries under the concept of "Green Economy". It is anticipated that core sustainability issues of food, water and energy security would be addressed with quantifiable targets during the formulation of SDGs within next three years so that the activities undertaken by the MDGs, which is to be expired in 2015, would be updated and continued with more commitment of all nations after 2015 ([http://uk.oncworld.net/guidess/sustainable development?gclid =CJiTweDAvK8CFcl6wodxkphkQ # \ Grecn Economy](http://uk.oncworld.net/guidess/sustainable%20development?gclid=CJiTweDAvK8CFcl6wodxkphkQ#\Grecn%20Economy)).

Green Economy and Sustainable Development Goals

There is no consensual definition of a green economy but the common "win-win" goal is to achieve equitable improvement in living Standards without eroding environmental assets. Karl Burkart defines a green economy as based on six main sectors (<http://green-economy-blog.blogspot.com/2010/12/what-is-green-economy.html>):

- Renewable energy (solar, wind, geothermal marine including wave, biogas, and fuel cell)
- Green buildings (green retrofits for energy and water efficiency, residential and commercial assessment; green products and materials, and LEED construction)
- Clean transportation (alternative fuels, public transit, hybrid and electric vehicles, car sharing and car pooling programs)
- Water management (Water reclamation, greywater and rainwater systems, low-water land scaping, water purification, stormwater management)
- Waste management (recycling, municipal solid waste salvage, brownfield land remediation, Superfund cleanup, sustainable packaging)
- Land management (organic agriculture, habitat conservation and restoration; urban forestry and parks, reforestation and afforestation and soil stabilization)

Above sector are well within the two concepts of Sustainable development and IWRM that have been pursued by the world since the first earth summit in 1992 or Rio+20. Perhaps, more emphasis has been given to address the energy, construction and transport sectors at the Rio+20 compared to Rio +20 where the attention was focused more on natural resources such as land and water.

One of the basic concepts of the green economy is to take note of the environmental damage in the process of development which would provide a much better picture of the total assets of a given country at the end of each year. This could be estimated by subtracting the economic cost of the environmental damage from the GDP. At present, the benefit of constructing a motor way, reservoir,



airport etc are considered as positive though the inclusion of environmental cost in the process of such development might provide a different outcome. This approach would encourage the decision makers to embark on projects which may be truly beneficial for the nation both at present and in future.

CURRENT STATUS ON WATER RESOURCES MANAGEMENT IN SRI LANKA

It is important to review the present status of water resources along with institutional structure in Sri Lanka before suggesting strategies to be followed in view of the sustainability of the resource. The following sections briefly cover the water availability, water demand both at present and future, institutional arrangement in the water sector, issues at present and what needs to be done in line with global perspectives. The analytical part was kept as brief as possible, while more emphasis was given to build the arguments to justify the directions to be taken.

Sri Lanka is prosperous in water resources with 103 rivers, more than 20 major wetlands, exceptionally designed minor and major irrigation systems and significant groundwater resources (Ministry of Environment and Natural Resources, 2008). Rainfall as the main form of precipitation brings an average rainfall of 1450 mm and 2400 mm to the dry (80% of land area) and wet zones (20% of land area) of Sri Lanka respectively. The annual total volume of surface and ground water availability has been assessed at 44000 MCM and 7800 MCM respectively (Imbulana et al, 2006). The per capita water availability would be about 2500 m with the population to peak about 21 million by 2025. 'Therefore, Sri Lanka can be considered as a country with sufficient amount of available water. }-However, there will be spatial and temporal variability and the strategies for water resources management should, therefore, focus on reducing this variability.

Water Demand

The total cultivated area in Sri Lanka had been estimated as 1.8 million ha. The area cultivated with Paddy is about 848,691 ha of which 644,478 ha is irrigated, whilst the balance is rain-fed. Out of the irrigated lands in Sri Lanka 90% is cultivated with paddy and hence the irrigated areas for Other Field Crops (OFCs) are estimated at 71608 ha. Irrigation systems with a command area of more than 80 ha are classified as major irrigation schemes and are managed by the Irrigation Department (ID) and the Mahaweli Authority of Sri Lanka (MASL). The minor irrigation systems are usually associated with a village and are managed by the local community. Department of Agrarian Development and provincial Councils play a major role in providing the necessary services to the farmers in minor irrigation schemes.

The drinking water is provided by the National Water Supply and Drainage Board and covers 31.5% of the population whilst the small rural water supply schemes using natural streams and wells provide water to about 18% of the population. The overall access to safe water is about 81% in 2010. The NWSDB is also responsible for providing water to industrial and livestock sectors.

The Ceylon Electricity Board is the major institution which generates hydropower in the country and hence has the influence on water resources development and management in Sri Lanka. They produce hydropower from their own reservoirs and the ones owned by the MASL. The total generation capacity is about 1206 MW. The available water resources for hydropower are already developed.

The overall water demand as of 2010 is estimated and given in Table I. Much of the available water (93.3%) is abstracted for irrigated agriculture. It is estimated that increasing paddy productivity by about 10%, keeping the same extent of paddy land, and increasing the extent of OFCs by about another 100,000 ha be adequate to ensure the food security of the country in future. Additional water



requirements for other sectors could be satisfied by allocating water from irrigated agriculture by improving the water use efficiency of the latter which stands at about 33% at present.

The various government organizations are responsible in allocating and providing this water to the end users and how it is performed is described briefly in the following sections.

Institutional Arrangements in the Water Sector

Sri Lanka has been identified as a country with long years of hydraulic civilization. The successes of rulers were measured based on the , contribution they made in terms of developing the reservoirs and other infrastructure for irrigated agriculture. The institutional mechanism that existed in the past has been exemplarily with detail rules and regulations including water rights, taxes, water allocation etc. Local, village institutions were responsible for operation and management of such systems (Manchanayake and Madduma Bandara, 1999).

Table 1. Water Demand (Estimated by Author)

Sector	Water Demand (MCM)	Percentage(%)
1. Paddy (irrigated)	19,334	86.87
2. Other Field Crops (irrigated)	1,432	6.43
3. Industrail Sector	15	0.07
4. Livestock Sector	15	0.07
5. Drinking and Sanitation	1,460	6.56
Total	22,256	100.00

Note: The water duty for paddy and other field crops per season is considered as 1.5 m and 1 m respectively based on present land use. The per capita consumption per drinking water is considered as 200 l/p/d and expected to cover the entire population and hence slightly over estimated.

These institutional arrangements have been severely affected during the colonial period with the creation of new institutions. The ownership of land was vested with the Crown and the government departments were Created to manage them. For example, the Irrigation Department (ID)) was established in 1900 and the paid employees were responsible for managing the irrigation systems. Even after the independence in 1948, the farmers expected the government to provide water to their fields and considered such services as the responsibility of the government.

As an alternative to agency managed systems. the participatory and integrated approaches to irrigation management were experimented in major irrigation schemes in Sri Lanka commencing from late 1970s to ascertain as to how best the participation of 'beneficiaries can be obtained in management of irrigation systems. Under this programme Farmers were organized to form Field Canal Groups (FCG) at the lowest level of hierarchy of the canal system as informal groups and Farmer Organizations (FO) at Distributory Canal (DC) level as formal organizations. In addition, a Project Management Committee (PMC) was established at scheme levels encompassing the farmer representatives elected by FOs and agency officials who are involved in management of irrigation systems at scheme level. The PMC at the scheme level provided a platform for agency officials and farmers to come together to manage the system for mutual benefit. These programmes were implemented without legal recognition until the Agrarian Services Act was amended to recognize FO in 1990 and the Irrigation Ordinance was amended to recognize PMC and appointment of Project Managers in 1994.

The National Water Supply and Drainage Board (NWSDB), established in 1984 have been responsible for providing water supply and sanitation services for domestics and as well as for industrial users as a main line agency. In addition, municipalities, as local authorities, Provide this service within city limits. Village communities are not been covered under either of these institutions and,thus became the responsibility of individual households to look after their domestic water requirement. In order to cater to these village communities, not covered by the NWSDB and, the municipalities, the Community Water Supply and Sanitation Project (CWSSP) was launched in 1993. This CWSSP was expected to offer relief' to the rural population who faced many hardships due to lack of safe water and sanitation. The project adopted an approach where beneficiaries participated fully in the implementation process. After the completion of the water scheme, the beneficiaries took the responsibilities of operation and maintenance. The project supported decentralized implementation of rural water supply and sanitation activities at provincial and local levels and promoted a Community based participatory approach where beneficiary communities were expected to participate actively in decision making at

all stage of sub-project implementation. The community has been represented by Community Based Organization (CBO) which is fully responsible for construction, operation and maintenance of water supply and sanitation facilities. CBO is a registered organization with its own constitution.

The Central Environmental Authority (CEA), established under the provision of the National Environmental Act No: 47 of 1980 under the preview of the Ministry of Environment and Natural Resources have the overall responsibility in the affairs of the environmental considerations in the development process of the country. The CEA was given wider regulatory Powers under the National Environment (Amendment) Acts No: 56 of 1988 and No: 53 of 2000. The vision of the CEA is to establish a clean and green environment and undertake environmental pollution control, environmental management and assessment, Environment education, provision of national environment information legal activities and planning and monitoring activities.

In addition to the above organizations, which are responsible for irrigation, water supply and water quality regulation, few other organizations are also involved with the water sector and described in detail by Brich and Muthukude (2000). However, what is given above is considered adequate for the purpose of this paper.

Institutional arrangements for inter sectoral coordination

The preceding sections described the role of the FOs and CBOs respectively play in the irrigated and water supply sanitation sectors along with the line agencies. However, there is a necessity to coordinate all these sectors at the national level, especially with regard to the water allocation. This coordination is also required in the development of new projects where many organizations may have to compete for the same water resource.

There have been three coordinating bodies operating at the national level in the past, namely, a) water management panel (irrigation and hydropower sectors), b) Central Coordination Committee in Irrigation Management (CCCIM) and, c) the National Water supply and Sanitation Steering Committee (NWSSSC). Unfortunately, since 2002, CCCIM and NWSSSC have been relegated to a state of neglect mostly due to frequent changes of ministries involved in the water sector.

The Water Management Panel (WMP) was established in 1985 at the head office of MASL to allocate, manage and monitor water primarily for irrigation and hydropower sectors . The WMP is headed by the Director General of MASL, and consists of all Heads of Government Agencies concerned with the management and operation of the Mahaweli Ganga Development Project (MGDP such as, a) Director General of Irrigation Department, b) Director General of Department of Agriculture c) Chairman of Ceylon Electricity Board and, d) Government Agents/District Secretaries of respective districts within Mahaweli and 6 allied basins. The WMP is assisted in its works by a technically specialized Water Management Secretariat (WMS) constituted within the MASL. The WMS provides information and recommendations to the WMP to assist it in reaching its operational policy decisions. Once the decisions are made, the monitoring of the total programme is directed by the WMS. The Director of WMS functions as the secretary to the WMP.

Based on the information provided by the line agencies with regard to their water requirements, the Seasonal Operation Plan (SOP) which gives operation policy, allocation /distribution priorities and programme for the season for Mahaweli and other allied basins is prepared by the WMS (Abegunwardena and Imbulana, 2005). This SOP taking into consideration of water demand and supply is discussed at the Pre-Seasonal WMP meeting that is held with the participation of all concerned agencies, ministry officials and farmer representatives prior to beginning of each season. Once water is allocated, the

organizational structure at the local level has the responsibility to implement it. In addition to the MASL, which is the major user of water, there are number of other institutions involved in managing water at national and local level. These organizations are independent and operate under different ministries. all these organizations in one way or another has to be involved in decision making process in water allocation since they all operate within the Mahaweli area identified under the Mahaweli Authority Act No 23 of 1979. This existing coordination mechanism is shown in Figure 1.

The District Coordinating Committee (DCC) is the main administrative mechanism that coordinates activities at the provincial/district level, which consist of all local members of parliament, provincial councils, *Pradeshia Sabhas*, municipal councils and urban councils in the district and all administrative officers, heads of departments of provincial councils and regional/district officers representing line agencies (officials from ID, MASL, NWSDB included). It is chaired by the senior Member of Parliament or the Cabinet Minister or Deputy Minister representing the district, and is co-chaired by the Chief Minister of the Provincial Council. The District Secretary (Government Administrative Officer) serves as the Secretary to the DCC Though District Secretaries participate for the national level WMP meetings and Pre-seasonal WMP meetings, conflicts can occur when water is diverted between reservoirs and water issues are being made at the reservoirs to the system. These issues are resolved at the DCC and DvCC meetings.

ISSUES IN RELATION TO THE WATER SECTOR IN SRI LANKA

It has been shown that more than 50 legislations and 20 institutions exist in relation to water resources conservation, development and management in Sri Lanka (Chandrasekera, 2010). Therefore, a need for coordination mechanism at the national level has been emphasized by many in the past to coordinate activities of this Fragmented set up (Birch and Muthukude, 2000; Nanayakara 2009).

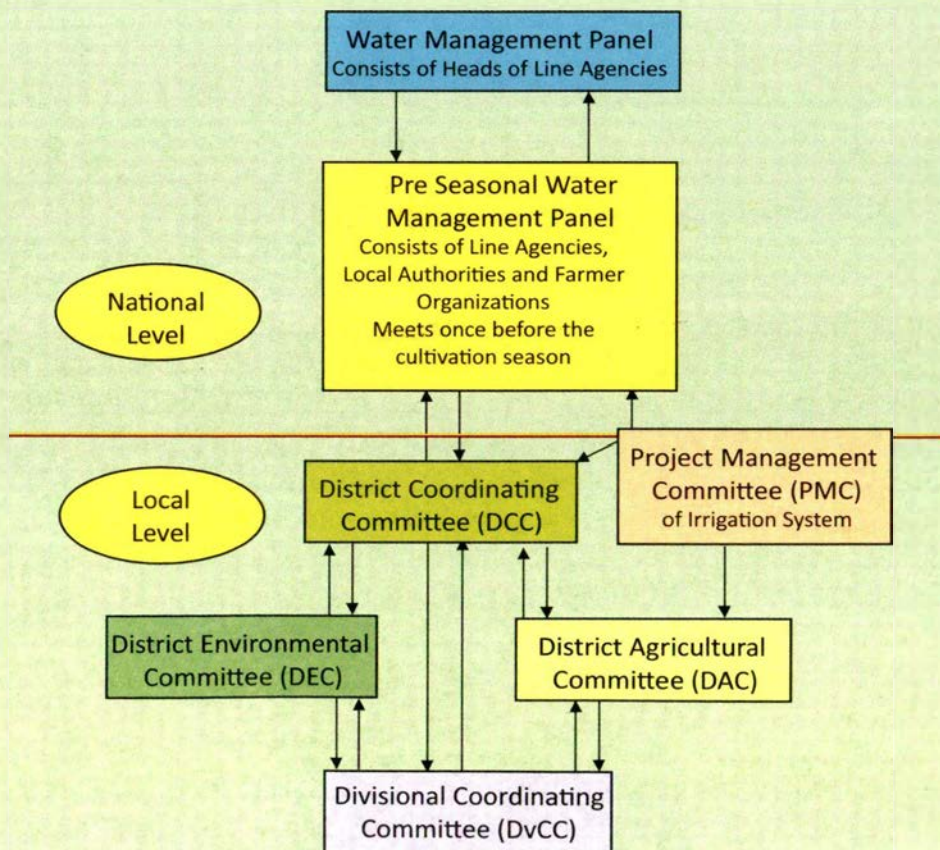


Figure 1. Existing Coordination mechanisms in irrigated sector at the local and national level

An initiative in this regard was taken by the ADB funded Institutional Assessment for , Comprehensive Water Resources Management (CWRM) Project in 1992 to develop an overarching policy and law to govern water resources and institute a single “apex body” with responsibility for coordinating water related activities. Accordingly, the Water Resources Secretariat (WRS) and Water Resources Council (WRC) were established in 1996 by the Government of Sri Lanka. The WRS was responsible for developing the new water resources policy. The new national water resources policy and institutional arrangement developed by the WRS was passed by the Cabinet of Ministers in 2000. Though, it was approved, no follow up action was taken since there was a serious opposition to the new water policy from various quarters (Ariyabandu, 2008) Since then WRS had attempted, From time to time, to draft and present a Water policy, though no progress was made in the face of opposition to all the subsequent revisions.

In the meantime, a government change in 2004 has resulted in creating a new ministry called Agriculture, Lands, Livestock and Irrigation by amalgamating number of previous ministries. A Committee appointed by this new minister submitted a proposal on August 16 2004 for the formulation of a water policy titled “ Deshiya jala sampath pariharanaya, sanrakshanaya ha sanvardanaye moolika prathipaththi” (Basic policies for utilization, conservation and development of water resources). Those who opposed the ADB initiated water policy has promoted this indigenously developed water policy which was developed without any external influence or intervention (Silva, 2010).

The indigenous water policy differs substantially with the ADB assisted water policy as the later totally reject the private sector participation. Water rights, including third party rights and transferable water entitlements are to be introduced in the ADB assisted water policy enabling private sector participation, which facilitate water to be traded in the market as a commodity (Withanage, Undated: Withanage and Tharanganee, 2002). This is also vehemently opposed by the indigenous water policy which considers water as a fundamental right. The institutional mechanisms suggested in the indigenous water policy ,also differ from what is proposed by the ADB assisted water policy. However, the water policy debate continues with no National Water Resources Policy for Sri Lanka, the only country without a national water policy in the South Asian region.

Apart from the main issue with regard to (the overall institutional arrangement, there have been number of other issues which threaten the availability of water resources in the country. Water resources are being polluted from urban, industrial and agricultural wastes (GISSL, 2006; Amararasiri, 2008). *Nuwara Eliya, Kalpitiya and Jaffna* are the best examples for the presence of polluted groundwater due to agricultural wastes as a result of overuse of agro chemicals. This has led to situation where people in Kalpitiya have to buy water from tankers For drinking purposes. Faecal contamination of the water supply system was evident in Paradeka and other water intakes located in Pussalla Oya which led to the Hepatitis outbreak in Gampola area (Ministry of Healthcare and Nutrition, 2007). This finding was further confirmed by Rajapakshe (2009) who found that domestic and estate water supplies were contaminated with faecal materials due to improper sanitation practices. Slum houses within Greater Colombo do not have adequate sanitary facilities and due to this reason slums use natural streams for sanitation and disposal of solid wastes. The kidney diseases reported in the dry zone was also attributed to the contamination of water though none were able to come up With a conclusive causative agent.

Impact of soil erosion on water resources as a result of poor land management has been a problem since the last century. However, its intensity has been increased due to encroachments of stream and reservoir reservations and illegal gem mining. Nutrients enriched sediments derived from soil erosion transported with the runoff leads to eutrophication of water bodies. Siltation of reservoirs affecting its hydro power generation and storage capacities are some of the long term impacts of the soil erosion (Amarasiri, 2008).

River sand mining is another severe environmental problem which has a serious impact on river erosion and groundwater availability (Rathnayake, 2008). Although the sand is required for construction activities and enhances the development of the country, illegal sand mining cause destruction of river beds and increases the depth of the river. Rathnayake (2008) pointed out that lowered water table due to sand mining in Kelani river led to salt Water intrusion affecting the drinking water intake. Over extraction of groundwater in Jaffna Peninsula for the domestic and agricultural uses also caused sea water intrusion to ground water aquifers.

There is some kind of coordination among water sector organizations (which deals with water quantity) such as ID, MASL, NSWDB,CEB Local Authorities etc. through the Water Management Panel for water allocation as described above. However, there is hardly any linkage between those organizations with institutions which are responsible for water quality and environment, such as CEA, Forest Department. Geological Survey and Mines Bureau etc. There is a need for grater coordination of institutions which are mandated to ensure both water quantity and quality.

GLOBAL PERSPECTIVES ON WATER RESOURCES MANAGEMENT AND ITS APPLICABILITY FOR SRI LANKA

As indicated above, IWRM is being accepted and promoted globally with the blessing of international lending institutions and governments. One of the four Dublin principles, upon which IWRM is based, identifies the importance the stakeholders' play in water resources development and management. The second Dublin principle reads as; "water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels". The importance of stakeholder participation is also emphasized in the Agenda 21 of the Earth Summit. As such, stakeholder participation has taken legitimacy in all activities associated with water issues. The multi-stakeholders processes (MSPs) became familiar word in recent time in water resources management as a vehicle to promote stakeholder participation in water resources development and management.

According to the Wageningen International the idea of participation has been widely adopted at the local level to make development more effective and sustainable and to empower people to manage their own development. MSP take participation to a higher level by bringing governments, businesses and civil society together in a process of interaction, dialogue andl social learning (<http://portals.wi.wur.nl /msp/ ?page =5171>). This is shifting the role of government and opening new infortant avenues for civil society (particularly water user associations, NGOs and local communities) and the private sector to participate in decision-making processes. Building this capacity and well Functioning governance structures can involve focus on process orientation, formal and informal institutions, inter-organizational relations and coordination, bottom-up management, expansion of voluntary exchange and self-governance and market based mechanisms (SIWI, 2010).

The current global level initiatives in the water sector reforms Facilitate the MSP where the private sector and market mechanisms play a major role. Independent Regulatory Authority (IRA) is considered as the major pre-requisite to ensure that all stakeholders, including the state, NGOs and private players could participate in providing water resources and sanitation services. The main agenda of sectoral reforms includes usual universal elements of water sector reforms such as full-cost recovery, supply on volumetric basis, privatization, and independent regulation. in addition, water rights and transferable water rights are introduced and administered so that water could be considered and used as a marketable product.

However, the evidence from developing countries, especially from South Asia, does not indicate that the principles of water sectors reform prescribed by the global institutions does not bring anticipated benefits (Gunawardena, 2012). It has been shown that the reform process in the water Sector to bring efficiency and cost recovery were found to be incompatible and inadequate on different counts with the demands put on them by the sector, stakeholders and the norms prescribe by international organizations such as the World Bank. It is also found that in cases like privatization of irrigation projects, the reform instruments were not compatible with each other. The reform process could only work if the stakeholders, especially the farmers are equally empowered as the others such as the private sector. If not the weak stakeholders appear to be removed and alienated from the regulatory processes and fail to make any effort or interventions to secure their legitimate rights and benefits.

The alienation of weak stakeholder is rooted in their ignorance or lack of awareness about the different decision-making processes such as privatization of projects or determination of entitlement or tariff as well as about the regulatory mechanisms that are expected to protect their rights during these processes. This alienation of the weak stakeholders has allowed the dominant groups to try to usurp maximum benefits by bypassing the new reform measures and by encroaching upon the rights of the weak water-users. Moreover, the alienation of the weak stakeholders and their absence in the regulatory processes was traced to the failure of the government agencies and regulatory authorities to reach out to these consumers and inform them about the possibilities and opportunities provided by the new reform instruments such as the regulatory law and the independent regulatory authorities. This new reform process has Created challenges on basic principles of water governance such as accessibility, affordability, ownership, equity, equitable distribution, delivery and participation. This demand,, public participation for democratic decision- making within the water sector and processes by which the public can effectively and meaningfully contribute to public decision making. This requirement needs to be institutionalized and legalized through proper processes/ procedures. 'Public control over governance' a useful concept that requires people-centered transparency, accountability, participation and autonomy also need to be introduced, with the public having legal rights to intervene at any point of the process when it is felt that the government or implementing/governing agencies are deviating with results that go against the public interest. The ability and the appropriateness of IRA as in institution to accommodate such basic principles that govern decision making in the water sector needs to be studied in detail before subscribing to such institutional arrangement.

STRATEGY TO BE FOLLOWED

Some of the disadvantages of water reform process as indicated above, over the existing system of water governance of Sri Lanka were the main reasons for the failure of adopting the proposed water-policy and water law. Alien administrative structures and procedural requirements prescribed by international agencies might be counterproductive and also could badly impact on the gradual development of community based participatory structures. The administrative allocation mechanism now in place and present legal mechanism appears to work well in Sri Lanka. The equity, transparency and the access to decision making process for the communities have been assured through the existing arrangements at local and national levels. All these features which are considered as attributes of sustainable water resources management should be Preserved in any future reform process. Some argues for the introduction of water rights and encourage water transfer through transfer of entitlements for greater efficiency . There is strong objection to this suggestion and opponents argue that the existing system, which appears to work well, should be strengthened. Therefore, the best option would be to strengthen the existing governance mechanism. Identify the weaknesses in the present system and address those weaknesses gradually to strengthen sustainability rather than impose new structures and regulation which are alien to the local communities.

The integration among water users and uses is the biggest challenge for the operationalisation of the integrated approach in resource management. Strengthening relationship among the users group with local institutions, government agencies and other external institutions is necessary for expanded mandate for integrated activities on land and water management. However, the policy formulation in itself is inadequate unless it is backed by legislative and institutional reforms for its effective implementation.

Water as one of the most important for the overall development of the country can not be considered in isolation in devising a Future strategy. The tendency for the water sector institution in most of the developing countries is to continue along the hydraulic mission by constructing new hydraulic infrastructure as indicated by Allen (2006). Those who advocate this path could argue that the availability of more water storage could reduce the risk of water scarcity (because you have more control over the resource) and also is a step in the right direction in view of the impending climate change. However, it is also important to look at the environmental costs that has to forgo by the nation in constructing those storage structures. Devising strategies to improve the management of existing resources to provide goods and services for the nation at present and in future without damaging the environment is a sensible approach that needs to be taken by the government. This is what needs to be done if we were to advocates the principles of sustainable development, IWRM and green economy. All options should be investigated before embarking on a new infrastructural development in water resources management in contrast to the current practice of sectoral approach to development through respective institutions and their ministries.

RECOMMENDATIONS FOR FORWARD

In view of the above discussion, major recommendations to be followed in order to assure sustainable water resources management for the well being of the citizens of Sri Lanka is given below.

- As described above, Sri Lanka will not become a country of water scarcity since the per capita water availability is adequate for the estimated peak population. In addition, the available water resources are sufficient for food security, water supply and sanitation and other users if the resource is managed judiciously. However, there is an issue with the availability of water in space and time due to climatic variability of the country. Therefore, it is important to make an assessment of the needs of different uses and users and availability of water resources at the river basin/provincial/district levels so that future strategies for water resources conservation, development and management could be formulated and followed base on sustainable development principles.
- The above inference is made assuming that the existing water resources are being protected and managed for future generations. Therefore, all other sectors which have either direct or indirect impact of water resources are expected to perform their mandated responsibilities. For example, protected areas network in Sri Lanka needs to be conserved and managed by the Forest Department and Wild life Conservation Department to ensure that the headwaters of rivers are not disturbed. Streams and tank/reservoir reservations needs to be looked after by the local authorities and the ID/MASL, respectively. CEA needs to enforce and regulate the water quality of water bodies in coordination with respective institutions
- Large number of legislations and institutions with overlapping responsibilities is one of the reasons for most of the issues facing the water resources sector in Sri Lanka. Therefore, it is important to review the existing legislations and institutional arrangement and initiate an institutional reform process. Some of the institutions which were created in the past for specific purposes are no longer

effective and hence considered redundant. Politically, this becomes a very difficult proposition. However, this institutional reform process is needed to effectively manage the water resources in Sri Lanka in the new millennium.

- Watersheds are the foundations of the water sector. A policy to guide strategies to finance watershed management will ensure sustained water services to the society. Kotagama et al (2012) suggest a conceptual frame work to guide formulation of a policy to finance watershed management in Sri Lanka after reviewing economic theory, international experience and current practices in Sri Lanka. These suggestions should be pursued to ensure regular supply of water with good quality through sound watershed management.
- None of the above could be achieved Without adequate resources. There is a dearth of qualified trained professionals in the water sector institutions due to brain drain, retirement of those who stayed back and difficulty of recruiting and keeping them due to poor remuneration. In addition, there are inadequate physical resources for monitoring and operation of water resources in the country. Therefore, it is important to review the availability of man power in the sector along with the institutional review and make appropriate intervention to address the constraints.

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